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**Acquisition Career Progression Model for Navy Explosive Ordnance Disposal Officers**

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ACQUISITION CAREER PROGRESSION MODEL FOR
NAVY EXPLOSIVE ORDNANCE DISPOSAL OFFICERS

by

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B.S. May 2013, Old Dominion University
A.A. November 2009, American Military University

A Thesis Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
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ABSTRACT

ACQUISITION CAREER PROGRESSION MODEL FOR NAVY EXPLOSIVE ORDNANCE DISPOSAL OFFICERS

Andrew John Heckel
Old Dominion University, 2022
Director: Dr. Charles B. Daniels

The United States Navy Explosive Ordnance Disposal (EOD) officer community does not have a dedicated career progression model that is focused on progressively building an acquisition knowledge base which makes it more difficult to be a successful program manager and to promote as an operational leader. This thesis outlines a career progression model that is designed as an acquisition knowledge management strategy for Navy EOD officers. The model utilizes the existing billets manned by Navy EOD officers to gain the knowledge and experience required to attain Acquisition Professional Membership within the Department of Defense. Most importantly, the model is used to present four example career paths that blend operational and acquisition experience to give the opportunity of creating a well-rounded officer that has a greater knowledge base for serving in senior leadership roles.
ACKNOWLEDGMENTS

My greatest thoughts of appreciation go to those that helped during my research and throughout the development of this thesis. Special thanks are given to the acquisition leaders that helped to educate me along the way. To Jack, Sal, Alex, and Luc, thank you for your insight, document review, and guidance. I would not have gotten this far without you.

Finally, I’d like to thank my four children for being understanding while I was “shackled” to the computer. And most importantly, to my wife, you’re always there helping me to be the best that I can be and keeping the family moving along in the right direction while I’m on some work thing or academic adventure. You are the glue that keeps this invention together and words can’t express how much I appreciate you!

Thank you,

Andrew
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CHAPTER I
INTRODUCTION
THEORETICAL AND TECHNICAL FORMULATIONS

Since the origin of Navy Explosive Ordnance Disposal (EOD) in 1941, there has not been a formalized acquisition career path for the community. This may largely be a result of the community being birthed as an afterthought to the need for formally trained bomb and mine disposal personnel (Bush, 2012). As Plato famously wrote, “Our need will be the real creator” Svoboda (2021). It was not until 1947 that the Navy started the first research, development, test and evaluation unit for Navy EOD equipment (Explosive, 2020). During this time, the Navy EOD community did not have its own Type Commander and fell under Naval Surface Forces, which by large, has fleet officers that are not familiar with the ground and expeditionary warfare in which the EOD community primarily operates. The type command is responsible for all of the administrative functions that include manning, training, and equipping (MT&E) the force. Prior to 2006, the Navy had six type commands that included the Naval Air, Surface, and Submarine forces for the Atlantic and Pacific Fleet. Falling under Naval Surface Forces also limited the potential growth of Navy EOD officers.

The Iraq War created the need to consolidate the Navy’s ground forces, and subsequently in 2006, the type command called Navy Expeditionary Combat Command (NECC) was established. This meant that the MT&E functions were being controlled by leaders that had a greater understanding of the needs of the force. The Improvised Explosive Devices (IEDs) that were heavily used in the Iraq War and Afghanistan War brought floods of money to counter that threat (Carter, 2009). In haste, the quick decision to try everything and anything, and once again playing the catchup game, led to some poorly thought-out programs that failed at first use in the
field. As the wars tapered down around 2010, the Navy EOD community was able to reflect on the years of combat, and dive more into the lessons learned. One of these areas was the acquisition process that EOD was using, but the community lacked enough leaders familiar with the process to develop solutions. Key acquisition billets were filled with quality personnel, but they often found themselves drastically behind the curve with acquisition terminology and the defense acquisition process of requirement generation, funding, designing, and developing systems. Another limiting factor was that those billets were typically only filled for approximately 18 months. Much of that time was spent learning the new-to-them world of defense acquisitions, with little to no time available for improving the process, and that is where this research adds value to the body of knowledge.

In 2020, Rear Admiral Diguardo created key strategic initiatives (KSI) for the Navy EOD 2020-2030 Vision. A couple KSIs that are relevant here include, “empowering the force through technology (KSI 1.4)” and “ensuring competitive advantage against our adversaries through industry, research and development labs, and academia (KSI 5.3)”. Both goals are in part a facet of defense acquisitions. In fact, many parts of the strategic plan fall in the realm of acquisitions, be it unmanned underwater vehicles, robotics, neutralization tools, digital publications, interoperability, and/or burden sharing with allies, foreign military sales, etc. The aim of this research is to support that vision and contribute by developing recommended solutions.

In this thesis, an exploratory analysis of the career paths that lead to becoming an acquisition professional as a military officer is completed. This contains extensive review of the Navy EOD Officer acquisition billet structure and outlines the positions that are available for creating the required knowledge base and experience. A high-level overview of the requirements that leads towards promotion in the community is captured. The knowledge gained from this
research will lead to a model that is specifically designed for the Navy EOD Officer Community that attains both the experience required for becoming an Acquisition Professional Member (APM) and maintaining due course for command level positions.

PURPOSE

The purpose of this research is to create an acquisition career progression model for the Navy EOD Officer Community. This model outlines career milestones, billets, and educational opportunities with the focus of progressively building upon the knowledge of the individual as an acquisition professional. The model will serve to guide the EOD Officer Community Manager, Detailer, and individual through the options that are available to gain knowledge and experience to better serve them in future acquisition-coded billets.

PROBLEM STATEMENT

The lack of a specialized professional acquisitions career path in the Navy Explosive EOD Officer Community has led to a proliferation of inexperienced EOD officers filling acquisition program manager billets, and therefore increases the difficulty of being a successful program manager.

Research questions:

- What are the career paths for Navy EOD officers?

- How are the career paths viewed and understood within Navy EOD?

- Is there a career path that outlines the successful development of an acquisitions professional?

- In which ways can the career path be improved?
RESEARCH DELIMITATIONS

The research only focuses on improving upon the knowledge and experience necessary for Navy EOD officers to fill acquisition-coded billets that are owned by the Navy EOD Officer Community while using the current billet structure and available manning. This research does not investigate additional acquisition billet opportunities that are not currently owned or filled by the Navy EOD Officer Community. Nor does it examine the Navy EOD enlisted career model and billets that are focused on acquisitions. The research does not investigate the restructuring of any command organizational model, although this and the other research delimitations will be recommended as potential areas of research in the future.

ORGANIZATION OF STUDY

This thesis has five chapters, beginning with “Chapter I – Introduction” providing the background and the current environment that led to the purpose of defining the problem and focusing the research area. “Chapter II - Literature Review” consists of a summary of pertinent previous research to provide insight into past works. “Chapter III – Methodology” outlines the process and sources from which the data was collected. “Chapter IV - Results and Discussion” presents the collected data and is both a descriptive analysis and an overview of the findings that leads to a solution for the problem statement, while clearly stating the implications and limitations of the research. “Chapter V – Conclusion” provides the primary contributions of this study, answers the research questions, and suggests topics for future research and the value that such research may have.
CHAPTER II

LITERATURE REVIEW

This chapter is the groundwork of the research and starts with identifying recent and ongoing changes within the Department of Defense as that information relates to creating acquisition professionals. Previous work that has been conducted on the Navy EOD Acquisition Career Progression Model is presented next, before exploring other professional acquisition communities to determine processes that may be adopted to fit the goal of this research. The review of literature culminates with explaining how previous works fall short of providing all the necessary information required to create an Acquisition Career Progression Model for Navy EOD Officers.

BACK TO BASICS

The Under Secretary of Defense for Acquisition and Sustainment announced in a memo that Defense Acquisition Talent Management (DATM) was to implement a streamlined approach for the Defense Acquisition Workforce (DAW) called Back to Basics (BtB) (Lord, 2020). BtB is a major overhaul of the DAW, with the last update being most recently in 1990 when the Defense Acquisition Workforce Improvement Act (DAWIA) was passed into law. The factors influencing the change are caused by a reduced budget and the need for optimization that is being driven by competition with great powers (Shaffer et al., 2020). The goal of BtB was to simplify the process of training and certifying defense acquisition personnel by reducing the multiple certification options to seven functional areas and incorporated levels as seen in Table 1. Each of these functional areas have two levels, Foundational and Practitioner or Practitioner and Advanced. Contracting is the exception because it only has one level called Professional.
In order for Navy and Marine Corps Officers to join the DAW, they must apply for Acquisition Professional Membership (APM). In a memo, the Director of Defense Acquisition Talent Management (DATM), Marianne Lyons, listed the eligibility standards for applying for APM. There are four standards for becoming an APM (Lyons, 2022).

1) officer in the paygrade of O-4 and above

2) DAWIA certified in any of the functional areas

3) a baccalaureate or graduate degree from an accredited institution, with at least 12 credits in business related topics: accounting, business, finance, law, contracts, purchasing, economics, industrial management, marketing, quantitative methods, leadership, and organizational management

4) 48 months of documented acquisition experience

The experience is typically achieved by filling acquisition-coded billets. However, twelve months may be credited for the completion of graduate-level studies at DoD-affiliated schools or other accredited academic institutions. Separately, higher education that results in the award of
Naval Construction Engineering sub-specialty code 5100 may be credited up to 24 months of experience. For Unrestricted Line Officers (URLs), they may count time spent in an O-5 or O-6 command tour billet as the commanding officer, if the job responsibilities demonstrate program management competencies such as planning, execution, business acumen, resource management, and interface with the material establishments (Lyons, 2022; Defense Acquisition University, n.d.).

**NAVY EOD**

Navy EOD is an operational community that is often in direct conflict with adversaries. The focus of the community is primarily given to filling operational billets that provides an officer with the opportunity to progressively lead more individuals in combat situations or in preparation for combat. The most senior billet for the community is the Operational Commander of Navy Expeditionary Combat Command, which is an O-7 Navy Rear Admiral paygrade (NECC, 2020). The logical step in a career progression model must point an individual towards being on track to fill that senior billet position at the culmination of their career, or as the Navy references as being “due course” (Pinkerton, et al., 2019).

The Navy EOD community fills billets in Program Management (PM) and Test and Evaluation (T&E). PM is the primary functional area that is explored in this research because that is the area that not only has the highest paygrade billet, but also requires the most amount of acquisition experience to achieve the highest level, 8 years vs. 4 years. That billet is the Program Manager of Expeditionary Missions Program Management Support Office (PMS 408), which is an O-6 paygrade of a Navy Captain. PMS 408 reports to the Program Executive Office of Unmanned and Small Combatants (PEO USC) (NAVSEA, 2022). PMS 408 has six primary program lines of effort that include: Underwater EOD, Joint EOD, Anti-Terrorism Afloat,
Counter Radio-Controlled IED Electronic Warfare, Expeditionary Medical, and Foreign Military Sales of equipment and software (Malatesta, 2021). Given the operational focus of the equipment that PMS 408 manages, the necessity of having an individual experienced in defense acquisitions and operational employment of forces is valued. The commonality of operational experience is thus important for being due course for becoming RDML of NECC and for filling the leadership role of PMS 408.

In searching for existing acquisition career progression models for the Navy EOD Community, it was determined that there was a proposed model from PMS 408 in the form of a draft brief (Campbell, 2022). This model will be referenced in this thesis as “Campbell’s draft model”. Campbell’s draft model outlined the creation of future billets, the elimination of other billets, and the recoding of additional qualification designations (AQDs) for some. This was an important discovery because it presented some of the acquisition-coded billets and other billets that are not coded but viewed as important to the EOD leaders that are familiar with acquisitions. Campbell’s research introduced recent changes within the Defense Acquisition Workforce (DAW) and briefly highlighted the way the community builds acquisition talent. Through interviews, it was determined that other EOD leaders had worked on similar products and initiatives, with little success and no published findings. Records of such research are lost to retired individuals and the “black hole” of the military’s data storage system. Publishing this thesis is an effort to prevent the loss of such work.

**PROGRAM MANAGEMENT**

In 2021, Updike identified in the thesis, Program Manager Preparation and Acquisition Outcomes, a correlation between the performance of an acquisition project and the program manager’s capability. He determined that the greatest contributor to success was the experience
of the program manager, and recommended that the military services seek to have officers gain that experience early in their career, which has already been successfully implemented within the Air Force. The Under Secretary of Defense for Acquisition, Technology and Logistics (USD AT&L) identified in 2010 that the training, education, and experience of an individual is more than a check in the box, and weighs heavily on how that knowledge was applied and demonstrated in a career (Sheikh, 2010). Achieving experience early in an officer’s career would require acquisition billets to be opened to junior officers. For the Navy EOD community, it would also require a shift in the perceived value of those positions because many of the acquisition coded billets do not fit into the current mindset of operational growth of an officer.

FINANCIAL MANAGEMENT

Some military communities have conducted and published consecutive research initiatives like the Financial Management community. The Financial Management community has published multiple documents as outlined by Cutter (2004) in his thesis on “Building Line Officers into Financial Managers.” Cutter recognizes five theses and the consistent themes in each one relating to the difficulties facing the community and the development overtime (Cutter, 2004). Financial management in the Air Force was also a point of interest as written by Greg Leingang (2018), then Director of Resources for Air Force Life Cycle Management Center, as he outlined community development through recruitment, training, and career guidance in the form of mentorship.

LIMITATIONS OF EXISTING STUDIES

Campbell’s draft model is a way to restructure the billets to gain efficiencies with billet manning. However, the bureaucracy of changing such billets can take many years and some require the billet owner to change the coding of the billet, which requires an administrative
burden on their part and may be difficult to achieve for a multitude of reasons. Part of the restructuring in Campbell’s draft model includes creating new billets at commands that conduct project management. This would add to the opportunity to gain necessary experience; however, new billets require additional funding and are unlikely to occur quickly because they need to be planned for within a fiscal budget that is approved by Congress. For billets that are to be deleted, the billet owner must agree that they don’t need that billet and then be willing to cut it from their command structure. The Navy EOD officer community could also decide to not fill the billets that don’t fit into the acquisition experience growth of an officer, but this only works if other billets have a higher priority. Ultimately, billet restructuring is a long-term solution provided that everyone agrees on the restructuring and are willing to take on the administrative burden and adjust the funding as appropriate.

The Financial Management community has done a good job with continuing to progress and document changes. The continuous research shows a vested interest that the community has towards improving and recording that change. Much can be learned from other sub-disciplines as there are common principles within the larger discipline of management (Davies, Manning & Soderlund, 2018). The studies are plentiful but lack the granular focus necessary for the Navy EOD officer community and the type of program management and test and evaluation billets that are filled.
CHAPTER III

METHODOLOGY

This chapter covers the process and resources used to develop the foundational knowledge for constructing the Acquisition Career Progression Model for Navy EOD Officers. This information is gathered for the purpose of building upon previous research and filling in the knowledge gaps that prevent a viable model from being created.

RESEARCH DESIGN

An extensive search through library databases, military sites, consultation with the Navy EOD Detailer, Navy EOD community leaders that are well versed in the acquisition process, conversations with a representative from the Defense Acquisition University (DAU) and the Navy’s Defense Acquisition Talent Management (DATM) office, the Expeditionary Program Management Office, and personal experience contributed to the research for this thesis. A full understanding of the recent changes to defense acquisitions with the “Back to Basics” (BtB) initiative was necessary to formulate a plausible career progression model. Sticking with the limitation of working with billets that already exist and that are typically filled with Navy EOD Officers, the next step was to understand the coding process used for billets. A list of all the billets filled by Navy EOD officers was retrieved by the Navy EOD Detailer and then analyzed to determine which ones were coded for acquisitions. Additionally, an understanding of the officer promotion process was necessary to identify key leadership milestones that must be achieved to promote to the next paygrade. Each of those milestones also has an AQD associated with them that is applied to the officer’s profile once they are achieved. The final step was to blend acquisition billets and professional milestone billets along a possible career path that could
yield an individual with the opportunity to be promotable in the traditional sense, or due-course, and yet also highly knowledgeable with acquisitions.

DATA COLLECTION

Traditionally, the Navy EOD officer community has not actively mentored and developed officers for acquisitions. Navy EOD officers often go through the early years of their career with no exposure to the billets, the process, or requirements necessary to become a knowledgeable acquisition professional. Navy EOD is not the only community to have this issue, and in fact, it seems to be a broader issue with all the services, except the Air Force (Updike, 2021; Kupec, 2013). As previously mentioned, this is likely because the Air Force identifies which officers will be working primarily with acquisitions in the beginning of their career.

The promotion of a Naval officer above the paygrade of O-3 is done through a selection board process that is governed by Title 10 of the United States Code Chapter 36 Subsection 611 (Selection Boards, 1980). Officers from different communities are on the selection board and rank all the records based on what the selectee’s community values at each paygrade. Each community has a different career path and set of expected milestones for each paygrade. Figure 1 depicts the Navy EOD officer community’s career progression and Figure 2 displays what was valued during the fiscal year 2022 (FY22) O-4, O-5, and O-6 selection board (Navy, 2022).
The Navy EOD officer career progression path above outlines the typical billets filled at each paygrade and years of service. The milestones for a Navy EOD officer include obtaining the following AQDs: KG5 EOD Officer and KG0 EOD Department Head. The officer must also be successfully screened for Executive Officer (XO SB), Commanding Officer (CO SB), and Major Command (MAJ Cmd SB) in an administrative board. Failing to screen in an administrative board generally prevents an officer from promoting to the next paygrade. This process is referred to as the “up-or-out” promotion system within the military. Recently though,
the National Defense Authorization Act of 2019 changed this system by permitting the retention of officers with particular skills that are valued by the military (Department of the Navy [DoN], 2019; National Defense Authorization Act, 2018). However, Navy EOD officers are explicitly restricted from this relatively new “up-and-stay” policy (DoN, 2019). The continued emphasis of the up-or-out policy can be seen in Figure 2 with what the Navy EOD officer community presented to the FY22 selection board on what is valued for the promotion of a Navy EOD officer. It is worth pointing out that the community valued acquisition experience during that year.
There are approximately 470 to 500 Navy EOD officers in the community at any given time, which reflects the health of the community. The continued viability of a military community as it refers to personnel management, is the view of how well the community is maintaining its overall strength or number of personnel through recruiting, training, promoting, and retaining. This number varies as the quantity of new accessions is paired with the retention-loss that is commonly occurring from separations and retirement. Factors that affect retention may include: morale, pay and bonuses, amount of time deployed vs. time home, family status, overall job satisfaction, rank, rank needs of the Navy, etc. (Gutierrez, 2016). The structure of the community by rank is a pyramid design, in that there are more people filling junior ranks and the
proportion of personnel decreases as the ranks progress higher (See Figure 3). Each year, there is a balanced number of about 60 personnel that are either transitioning into or out of the community. The flow of personnel in and out of the community can be represented in an agent-based model (ABM) using NetLogo as depicted in Figure 4.

Figure 3.
**EOD Officer FY 2021 Rank Structure**
(Reprinted from EOD Det Millington Bulletin October 2021)
NetLogo is free software used as “a multi-agent programmable modeling environment” (Wilensky, 1999). The code created for this simulation is in Appendix A and was crafted in such a way that it simulates the goal of maintaining the desired number of personnel in the Navy EOD officer community. Figure 4 is a screenshot of the NetLogo ABM. Each agent in this model represents officer personnel in the Navy EOD community and is depicted as a bug. The different colors of the bugs are not significant and hold no meaning. The number by each agent is the number of years that the agent has served. Thirty-one agents are initially brought into the environment and then step through the model while attempting to attain 30 years of service. The separation factor determines the likelihood and rate of separation in the environment. As the agents step through the model, they are randomly selected to separate at key progression intervals in a Navy EOD officer’s career. In the model, these separation points occur after 5, 10,
15, 20, 25, and 30 years. These points were chosen to create the same rank structure in Figure 3. Comparing the Navy EOD officer rank structure graph in Figure 3 and the yearly distribution graph in Figure 4, it can be observed that they are similar in appearance. Additionally, the results of NetLogo can be transmitted to RStudio which “is an integrated development environment (IDE) for R” (RStudio, 2021). The R language is a scripting language used for statistical analysis that was created by Ross Ihaka and Robert Gentleman in the 1990s (Cotton, 2013). The combination of the software provides a means to model an environment with agents and then conduct comprehensive statistical analysis of the data obtained from the simulations.

RStudio was then utilized after having a working model in NetLogo. The additional advantage of RStudio is that a particular model can be run multiple times while varying the separation input value and then recording the results of each run. For this project, the model was run for a period of 50 cycles, which equates to 50 years in the model. The simulation was repeated 50 times (see Figure 5) with the separation rate randomly chosen from a value of 1.0 to 10.0 (see Figure 6). The RStudio code for this project is in Appendix B.
Figure 5.
*RStudio plot of quantity of agents at each step for all runs*

Figure 6.
*RStudio Plot of separation value for each run*
At year one of the simulation, there are only 31 agents in the model. It is not until year 30 that the simulation is fully running with every year group filled. When all the year groups are filled, steady state quantity of agents can be determined. In Figure 5, it can be observed that the average number of agents tends to be approximately 440, with a separation range of 1.0 to 10.0. Looking back at Figure 4, a separation value of 6.0 returned a quantity of agents that varied around 430. It can be seen in Figure 7 what the estimated count of agents will be at the various separation values. The average count of agents at each separation point is slightly negatively skewed because the simulation does not stabilize until the 30-year cycle point. This could be accounted for by cutting out the data observed prior to 30 years.

Figure 7.  
*RStudio plot of agent counts by separation value*

It is important to note that the separation value in this ABM is arbitrary and does not reflect any of the factors affecting retention (Gutierrez, 2016). Even though this ABM is similar to the overall Navy EOD officer community rank structure, it lacks the true nature of an ABM in
that the agents do not interact with the environment (de Marchi & Page, 2014). To create a true
ABM of the Navy EOD officer community it would entail programming the billets into the
model and factoring in all the things that affect the retention of an individual. That effort is
beyond the scope of this thesis and is presented here to lay the groundwork for future research.

Moving on through the research with the Navy EOD Officer Detailer, it was determined
that there are 454 billets that are filled by Navy EOD officers designated as 1140. This does not
include the 60 billets of new O-1 Ensigns that are currently in their two years of basic EOD
training at the Naval School Explosive Ordnance Disposal (NAVSCOLEOD). There are three
designations of officers that relate to Navy EOD, 119X, 114X, and 648X. Navy officers in
training at NAVSCOLEOD are designated as 119X, EOD Warfare qualified Navy officers that
are unrestricted line are 114X, and limited duty officers are 648X (Department of the Navy
[DoN], 2010). The last digit of the designation refers to whether an officer is of the Regular
Navy, or Naval Reserves. In this case, the ‘0’ represents an officer of the Regular Navy with a
permanent paygrade of Ensign or above (DoN, 2010). For the purpose of this research, the focus
will be on 1140 officers.

Of the 454 billets, only 35 have an acquisition related additional qualification designation
(AQD) code as indicated in Table 2. The AQD is a three-character code. The first character
identifies the billet specialty type, (ex. ‘A’ for Acquisition, ‘J’ for Joint, or ‘K’ for Surface
Warfare). The second character in the ‘A’ billet specialty type relates to the DAWIA career field
type, (ex. ‘A” for Program Management and ‘T’ for Test and Evaluation). The third character of
the AQD identifies the billet as either a non-critical (N), critical (C), or key (K) leadership
position. Twenty-seven of the 35 billets are acquisition program management related (AAN,
AAC, or AAK) and eight are acquisition T&E (ATN) (Department of the Navy, 2022). A
depiction of Table 2 is presented in Figure 8 and portrays when each billet lines up with the years of service of an individual. This data is critical for creating the Acquisition Career Progression Model for Navy EOD Officers because it lays out the acquisition billets that are available during an officer’s career path.
Table 2.
Acquisition Billets Filled by Navy EOD Officers

<table>
<thead>
<tr>
<th>Line #</th>
<th>Unit Identification Code</th>
<th>Billet Title</th>
<th>Billet Rank</th>
<th>Primary Additional Qualification Designation</th>
<th>Secondary Additional Qualification Designation</th>
<th>Officer Designator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N00029</td>
<td>OSD JRAC</td>
<td>CAPT</td>
<td>JD1</td>
<td>AAC</td>
<td>1140</td>
</tr>
<tr>
<td>2</td>
<td>N00174</td>
<td>NSWC IH</td>
<td>CAPT</td>
<td>AAC</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>3</td>
<td>N52210</td>
<td>PEO LCS / PMS 408</td>
<td>CAPT</td>
<td>AAK</td>
<td>KG7</td>
<td>1140</td>
</tr>
<tr>
<td>4</td>
<td>N52210</td>
<td>PEO LCS / PMS 408</td>
<td>CAPT</td>
<td>AAC</td>
<td></td>
<td>1110</td>
</tr>
<tr>
<td>5</td>
<td>N52210</td>
<td>PEO LCS / PMS 408</td>
<td>CAPT</td>
<td>AAC</td>
<td></td>
<td>1110</td>
</tr>
<tr>
<td>6</td>
<td>N45184</td>
<td>OIC SHR ACT</td>
<td>CDR</td>
<td>AAN</td>
<td></td>
<td>6480</td>
</tr>
<tr>
<td>7</td>
<td>N66632</td>
<td>SOF AT&amp;L</td>
<td>CDR</td>
<td>JD1</td>
<td>AAN</td>
<td>1140</td>
</tr>
<tr>
<td>8</td>
<td>N00011</td>
<td>OPNAV N972</td>
<td>CDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>9</td>
<td>N4118F</td>
<td>NAVX WF LAB</td>
<td>CDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>10</td>
<td>N42192</td>
<td>NAVSEA 00C</td>
<td>CDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>11</td>
<td>N4617A</td>
<td>EXU (CO)</td>
<td>CDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>12</td>
<td>N57023</td>
<td>COTF</td>
<td>CDR</td>
<td>ATN</td>
<td>KG5</td>
<td>1140</td>
</tr>
<tr>
<td>13</td>
<td>N66632</td>
<td>SOF AT&amp;L</td>
<td>LCDR</td>
<td>JD1</td>
<td>AAN</td>
<td>1140</td>
</tr>
<tr>
<td>14</td>
<td>Z1FDD8</td>
<td>JSOC J8</td>
<td>LCDR</td>
<td>JD1</td>
<td>AAN</td>
<td>1140</td>
</tr>
<tr>
<td>15</td>
<td>N0463A</td>
<td>NEDU (XO)</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>16</td>
<td>N32372</td>
<td>DTRA Shore</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>17</td>
<td>N40010</td>
<td>PEO PAXRV / PMA 263</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>18</td>
<td>N4617A</td>
<td>EXU (XO)</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>19</td>
<td>N52210</td>
<td>PEO LCS / PMS 408</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>20</td>
<td>N57023</td>
<td>COTF</td>
<td>LCDR</td>
<td>ATN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>21</td>
<td>N65460</td>
<td>DTRA Kirtland</td>
<td>LCDR</td>
<td>ATN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>22</td>
<td>Z12985</td>
<td>SQDRN (XO)</td>
<td>LCDR</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>23</td>
<td>N30697</td>
<td>DET CHINA LAKE (OIC)</td>
<td>LT</td>
<td>KG5</td>
<td>ATN</td>
<td>1140</td>
</tr>
<tr>
<td>24</td>
<td>N30702</td>
<td>DET CRANE (OIC)</td>
<td>LT</td>
<td>KG5</td>
<td>ATN</td>
<td>1140</td>
</tr>
<tr>
<td>25</td>
<td>N30703</td>
<td>DET DAHLGREN (OIC)</td>
<td>LT</td>
<td>KG5</td>
<td>ATN</td>
<td>1140</td>
</tr>
<tr>
<td>26</td>
<td>N30712</td>
<td>DET PC (OIC)</td>
<td>LT</td>
<td>KG5</td>
<td>ATN</td>
<td>1140</td>
</tr>
<tr>
<td>27</td>
<td>N42192</td>
<td>NAVSEA 00C</td>
<td>LT</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>28</td>
<td>N4617A</td>
<td>EXU</td>
<td>LT</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>29</td>
<td>N4617A</td>
<td>EXU</td>
<td>LT</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>30</td>
<td>N4617A</td>
<td>EXU</td>
<td>LT</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>31</td>
<td>N57023</td>
<td>COTF</td>
<td>LT</td>
<td>ATN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>32</td>
<td>N00174</td>
<td>NSWC IH</td>
<td>LTJG</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>33</td>
<td>N4617A</td>
<td>EXU</td>
<td>LTJG</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>34</td>
<td>N4617A</td>
<td>EXU</td>
<td>LTJG</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
<tr>
<td>35</td>
<td>Z12985</td>
<td>SQDN</td>
<td>LTJG</td>
<td>AAN</td>
<td></td>
<td>1140</td>
</tr>
</tbody>
</table>

**Note.** Adapted from Navy EOD Officer Detailer, n.d.
Figure 8. Navy EOD Officer Acquisition Coded Billets

EOD Acquisition Coded Billets

Current 1140 Billets: 32
AAN (PM): 24
ATN (T&E): 8

1110 or 6480 Billets: 3
AAN (PM): 3
ATN (T&E): 0
CHAPTER IV
RESULTS AND DISCUSSION

In this chapter, the Acquisition Career Progression Model for Navy EOD Officers is depicted, as well as an overview of the findings, and the implication and limitations of the research are covered.

DESCRIPTIVE ANALYSIS

The Acquisition Career Progression Model for Navy EOD Officers is created by taking the EOD Officer Career Progression Path (Figure 1) and the Navy EOD Officer Acquisition Coded Billets (Figure 8), while blending the requirement to be due course (Figure 2) and the standards to become a member of the acquisition community (Chapter 2 BtB). This overlay of requirements is the proposed model and is depicted in Figure 9 with a series of four possible string of billets that lead towards having both operational and acquisition experience. Along the top line is the progressing type of billets that are indicative of being due course. The timeline is the years of service that the individual has throughout the career progression. On the timeline are the PM level goals of Practitioner and Advanced. These goals are placed at the expected time that an individual needs to have achieved the appropriate PM level to be fully qualified to fill the O-6 level PM billets. Below the timeline is the example string of billets that leads towards accomplishing that goal. Each billet bubble is color-coded as defined in Table 3.
Figure 9.
EOD Officer Acquisition Career Progression Model

Table 3. Billet Bubble Color Code

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>1140 Billet: No acquisition experience credit can be claimed</td>
</tr>
<tr>
<td>XXXX</td>
<td>1140 Billet: Acquisition experience credit can be claimed</td>
</tr>
<tr>
<td>XXXX</td>
<td>1140 Billet: Partial acquisition experience credit can be claimed for graduate education</td>
</tr>
<tr>
<td>XXXX</td>
<td>1140 Billet: Acquisition experience credit can be claimed along with joint credit</td>
</tr>
<tr>
<td>XX (CO)</td>
<td>1140 Billet: Acquisition experience credit can be claimed because it is a CO billet</td>
</tr>
<tr>
<td>XXXX</td>
<td>1110 or 6480 Billet: Acquisition experience credit can be claimed</td>
</tr>
</tbody>
</table>
As per Table 3 above, the white fill indicates that there is no acquisition credit that can be claimed by filling that billet. However, it is in the model as a part of being due course. The blue fill indicates that the billet is acquisition coded and yields acquisition experience. The blue filled CO billets are the exception in that they are not coded as an acquisition billet, but acquisition experience is attained as outlined by DATM because the nature of the duties as the CO. The billets that are partially filled white and blue indicates the educational tours that can lead to a portion of the time counting towards acquisition experience if it meets the criteria outlined by DATM as referenced in Chapter 2 with BtB. The billet bubbles that include purple are joint coded and acquisition coded. All the billets are 1140 billets with exception of the two 1110 billets that are filled with 1140 officers, this is indicated with the tan color. The complete list of billets is listed in Table 2.

Each of the example string of billets show when the required amount of experience has been achieved for either Practitioner or Advance level certification. Note that in three of the four examples, the experience is achieved before it is required for the senior position. This assumes that individuals spend the exact amount of time required of that billet. This is hardly the norm because the rotation of personnel from one billet to the next is reliant on someone being available to relieve them. Many times, a tour needs to be extended, shortened, or gapped for a period of time to get personnel to their next tour when required or to align promotions with positions. The Navy EOD Officer Detailer expressed that the community is in constant flux as personnel come and go, achieve qualifications, and get promoted. Therefore, having a model that achieves the acquisition goals early is ideal in the event that the timing does not go as planned.
OVERVIEW OF FINDINGS

This proposed Acquisition Career Progression Model for Navy EOD Officers leads to the successful development of an acquisition professional, while maintaining the ultimate career path to command at the EOD community’s senior most position. This is a viable model because if followed, it will provide an officer with the necessary amount of experience in years and skills to be accepted for APM while gaining operational experience to being due course for Navy EOD promotions. Additionally, the model improves upon the current method of billeting by bringing awareness to the new structure of the Defenses Acquisition Workforce Back to Basic initiative.

RESEARCH IMPLICATIONS

The research conducted here resulted in a comprehensive list of the current acquisition billets that the Navy EOD officer community fills. This list will guide the community toward the tailored development of experienced acquisition professionals. The Acquisition Career Progression Model for Navy EOD Officers demonstrates how acquisition experience can be attained while maintaining due course for promotion. Being mindful of the requirements captured in this thesis are necessary to avoid the stated problem of having inexperienced and unqualified personnel filling the acquisition-coded billets.

RESEARCH LIMITATIONS

This thesis does not demonstrate the best series of billets to create acquisition personnel in the EOD Officer Community, as that would entail restructuring billets that are not within the authorities of the community. The EOD Officer Acquisition Career Progression Model is thus clearly limited by the current billets that the community fills. New billets that require a greater use of program management skillsets at the junior officer level would be advantageous to developing the experience early in a career. Additionally, the recoding of community-owned
billet related to requirements would provide more opportunities to gain experience within the
realm of defense acquisitions. This research did not examine the motivation or desire of the
personnel in the community regarding becoming a member of the DAW. It therefore lacks the
analysis into the willingness of the community’s ability to utilize the model presented.
CHAPTER V

CONCLUSIONS

This chapter wraps up the thesis with a summary of the contributions this study strives to attain. Thorough research has repeatedly demonstrated a lack of knowledge available about this topic and its applicable users. A final recommendation is given to potential future researchers, should they decide to investigate defense acquisitions.

PRIMARY CONTRIBUTIONS OF THIS STUDY

The purpose of the research was to address the lack of a specialized career path in the Navy EOD officer community, which has led to a problematic climate with inexperienced Navy EOD officers filling acquisition program manager billets. This increases the difficulty, and lowers the likelihood, of being a successful program manager. First, the model was built using the existing billets available and designed to simultaneously create a path that attains acquisition experience while progressing onto command at the highest level. The model was then used to demonstrate that there are multiple paths to achieve the desired outcome. The result achieved the research goal.

WIDENING THE SCOPE

This research may provide a point of reference for other communities involved with creating acquisition professionals. It may be an outline of the methodology of analyzing the billet structure and aligning the goals of the community within the billets that are available. This is a deliberate approach towards creating the desired experience necessary and is an example for others to follow. The introduction of a rudimentary agent-based model, coupled with the analysis capability of RStudio, is the building block for a more comprehensive predictive model of retention.
SUGGESTIONS FOR FUTURE RESEARCH

Highlighting the initiatives of Campbell’s work with restructuring the acquisition billets is an important long-term endeavor. A detailed outline of targeted billets for creation, modification, and deletion, is key for determining a way forward. Capturing the process to make such changes will reduce the administrative burden of implementing the plan. Additional research in this area is necessary for improving the experience and ultimately the success of future program managers in Navy EOD.

This research was an extensive look at the officer billets as it relates to developing future program managers. The review of the enlisted billet structure and the significant part they play with the development of requirements and their role with acquisitions in Navy EOD is completely non-existent. Accurately creating the initial requirements that leads to the development of a piece of equipment or program is critical for fielding a viable solution for the end user. Research in this area would improve the entire acquisition development process.

A detailed review of the entire acquisition process as it pertains to Navy EOD would be a valued endeavor because there are few people in the Navy EOD community that understand the process. Research in this area would likely include the requirement development process, the program management process, and the options available for the final disposition of a system. Capturing this information through research would preserve knowledge and be a basis for others in the community to become more aware of the process that affects them through the tools and resources that they have available.

As a final suggestion for future research, the overall retention of Navy EOD officers should be explored in greater detail with the goal of inputting that data into an agent-based model that encompasses the factors that affect retention. Such an ABM that receives the input from
annual surveys of the community’s rating of those retention factors, would provide EOD community leaders with a true sense of what the health of the community is trending toward. The initial ABM that is presented in this thesis will hopefully help with creating a more robust model in the future.

Three of the four suggested research topics may be subject to resources from the Acquisition Research Program (ARP) at the Naval Post Graduate School and should be considered early in the research process (Naval Postgraduate School, n.d.). ARP can assist with research in defense acquisition topics by conducting a thesis review during the development process, providing funding, and giving the opportunity to publish in their database. An added benefit is the possibility to present newly discovered research to Department of Defense leaders in the acquisition community. Additional support with developing the overall thesis will add to the quality and value of the research conducted.
REFERENCES


Campbell, A (2022, January 12) Requirements Resourcing Acquisition: Building Talent in our EOD Force. Brief


Naval Postgraduate School (NPS). (n.d.) The Acquisition Research Program at NPS. https://nps.edu/web/acqnresearch
Pinkerton, J., & Findlay, J. (2019, June) Graduate Education As A Strategic Asset: Deriving Educational Core Competencies For Naval Aviation. A thesis submitted to the Faculty of Naval Postgraduate School. NPS Archive: Calhoun. https://calhoun.nps.edu/handle/10945/62763


APPENDICES

APPENDIX A.

NETLOGO CODE

;;;;;;;;;; Any updated code work is available from the author
;;;;;;;;;; See the Vita at the end of the thesis for contact information
globals [ capacity-year ; capacity of turtles at a year ]

breed [bugs bug]
turtles-own
[
  year ; initial year of turtle
]

;;;;;;;;;;;setup;;;;;;;;;;;;;;;;;;
to setup
clear-all
; ask patches [ set pcolor white]
set-default-shape bugs "bug"

;;;;;; sprouts bugs along pcor = -15
ask patches with [pxcor = -15]
[
  if random 1 = 0
    [ sprout-bugs 1
    ]
]

ask bugs [
  set heading 90
  set capacity-year capacity-year + 29
]

reset-ticks
display-labels
end

to go
  if not any? bugs [ stop ] ; stop the model if there are no bugs
  ask bugs [
    year-up
    separate
  ]
tick
display-labels
ask patches with [pxcor = -15]
    [sprout_new]
end

; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
to move
    set heading 90
    fd 1
end

; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
to year-up
    set year year + 1
    move
end
to separate
    if year >= 31 [die]
    if year >= 26
        [if random-float 100 < separation [die]]
    if year >= 21
        [if random-float 100 < separation [die]]
    if year >= 16
        [if random-float 100 < separation [die]]
    if year >= 11
        [if random-float 100 < separation [die]]
    if year >= 6
        [if random-float 100 < separation [die]]
end
to display-labels
    ask bugs [ set label "" ]
    if show-year? [ ask bugs [ set label round year ] ]
end
to sprout_new
    if random 1 = 0
        [ sprout-bugs 1 ]
end
APPENDIX B.

RSTUDIO CODE

# //////////////////////////////////////////////////////////////////////#
# Navy EOD Personnel Agent-Based Model
# Old Dominion University
# By Andrew Heckel <aheck002@odu.edu>
# Useful resources:
# https://docs.ropensci.org/nlrx/articles/getstarted.html
# https://github.com/ropensci/nlrx
# //////////////////////////////////////////////////////////////////////#
# Need to install Netlogo before installing the packages.
# https://ccl.northwestern.edu/netlogo/index.shtml
# //////////////////////////////////////////////////////////////////////#
# Link for fixing JAVA_HOME error if encountered.
# https://stackoverflow.com/questions/17315425/error-in-setting-java-home
# https://mkyong.com/java/how-to-set-java_home-on-windows-10/
# //////////////////////////////////////////////////////////////////////#

#install.packages("nlrx")
#install.packages("lhs")
#install.packages("Rcpp")
library(nlrx)
library(Rcpp)
library(lhs)
library(ggplot2)
library(gridExtra)
library(igraph)
library(dplyr)
library(reshape2)
library(doParallel)

# This enables R to use multiple cores to decrease
# the amount of time it takes to run models and simulations.
registerDoParallel(cores = 4)

# Windows default NetLogo installation path (adjust to your needs!):
networkpath <- file.path("C:/out")
outpath <- file.path("C:/out")

nl <- nl(nlversion = "6.2.0",
nlpath = networkpath,
modelpath = modelpath,
jvmmem = 1024)
# Build the experiment.
# For a clean uniform set of data, set the runtime equal to the number of evalticks.
nl@experiment <- experiment(expname="EOD_Personnel",
    outpath=outpath,
    repetition=1,
    tickmetrics="true",
    idsetup="setup",
    idgo="go",
    runtime=50,
    evalticks=seq(1,50),
    metrics=c("count bugs"),
    variables = list('separation' = list(min=1, max=10, qfun="qunif")
    ),
    constants = list("show-rank?" = "true"))

# Design the simulation run settings.
# May want to set the sample size to something small like 5 for quicker results
nl@simdesign <- simdesign_lhs(nl=nl, samples=50, nseeds=1, precision=3)

# This checks if all the appropriate data is in the nl dataframe
eval_variables_constants(nl)

# This prints a summary of the data check.
#   The support nlversion may not be checked but will still run.
#   The simoutput results attached and the number of runs calculated will not be
#   checked until after the test is ran and the results are attached to the nl
#   dataframe.
print(nl)

# Run the netlogo experiment and store the results. This may take a while
#   depending on how large of a simulation you are running and your computer
#   system capabilities.
# An error of incorrect JAVA_HOME may appear which can easily be fixed by
#   googling the error and changing the system settings.
# An additional was error was caused when the run_nl tried to cleanup temporary files.
#   This error still occurred even with running R Studio as an administrator.
# Temp file location was: C:\Users\user\AppData\Local\Temp\RtmpqsEakH\
# Finally fixed this error by setting the option to cleanup files to FALSE.
# Also, I observed that the results from the simulation are still created even
#   with the error. The only thing that happens is the temp files are not deleted.
results <- run_nl_all(nl, cleanup.bat = TRUE, cleanup.csv = TRUE, cleanup.xml = TRUE)

# Attach results to nl object:
setsim(nl, "simoutput") <- results

# Write output to outpath of experiment within nl
write_simoutput(nl)
# Do further analysis:
analyze_nl(nl)

### This is for creating a graph of the nl dataframe but I was not able
### to get it to work. Likely because "agent" is defined as bugs or something
### else that wasn't generic.

nl.graph <- nl_to_graph(nl)

# This is necessary if the experiment is not ran and would like to bring
# in the results from a previous test. It also helps to clean some of the
# column labels by completing the write_simoutput(nl) and then reading
# the data back in.
results1 <- read.csv(file.choose())

View(results1)
attach(results1)
head(results1)
tail(results1)
summary(results1)

# Create an initial plot of the count of all separation in the dataframe
ggplot (data = results1, aes(x=siminputrow, y=separation)) +
  geom_point(color = "purple") +
  geom_smooth()

# Manipulating the df
df_1st_row <- results1[results1$siminput == "1", ]

View(df_1st_row)

# Start Exploratory Data Analysis
# Fix column name for col 15. Could have done this earlier to save a step.
# This did not apply to this simulation
#names(results1)[6]<"count.bugs"

# Graph of all count.bugs from all experiments.
ggplot (data = results1, aes(x=X.step., y=count.bugs)) +
  geom_point(color = "purple") +
  geom_smooth()

# Individual graph for bugs of the 1st part of the run.
ggplot (data = df_1st_row, aes(x=X.step., y=count.bugs)) +
  geom_line(color = "purple") +
  geom_point(color = "purple") +
geom_smooth()

# Individual graph for bugs of the 1st part of the run.
ggplot (data = df_1st_row, aes(x=separation, y=count.bugs)) +
  geom_line(color = "purple") +
  geom_point(color = "purple") +
  geom_smooth()

# Individual graph for bugs of the 1st part of the run.
ggplot (data = results1, aes(x=separation, y=count.bugs)) +
  geom_line(color = "purple") +
  geom_point(color = "purple") +
  geom_smooth()

# This did not apply to this simulation
# Combined graph of Sheep, Wolves, and grass
#df_1st_row_long <- melt(df_1st_row, id = "step", measure = c("count.sheep", "count.wolves",
  "count.grass"))
#ggplot(df_1st_row_long, aes(step, value, colou

# Create box plots and assign the plot to a variable
bugs_box <- ggplot(data = results1, mapping = aes(x = 1, y = count.bugs)) +
  geom_boxplot()

# Depict multiple box plots on one image viewer using grid.arrange
grid.arrange(bugs_box,
  ncol = 1, nrow = 1)

# Evaluate the summary statistics for bugs
summary(results1$count.bugs)
VITA

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