



**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

**ANALYSIS OF CAREER DEVELOPMENT
FOR ENGINEERING DUTY OFFICER
COMMANDING OFFICERS**

by

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June 2023

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE June 2023	3. REPORT TYPE AND DATES COVERED Master's thesis	
4. TITLE AND SUBTITLE ANALYSIS OF CAREER DEVELOPMENT FOR ENGINEERING DUTY OFFICER COMMANDING OFFICERS		5. FUNDING NUMBERS	
6. AUTHOR(S) Mark A. Brown			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.		12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) Engineering Duty Officers (EDOs) perform critical duties to support the entire sequence of ship building and maintenance for the U.S. Navy. The desire for cost savings, timely execution, and increased efficiency in ship maintenance has warranted the need to evaluate the current fundamental leadership and professional development for EDOs. Several alternatives are available; however, each generates a direct net financial burden. To support decision-makers on shaping the education, training, and development of EDOs, this thesis examines net direct costs on two hypothetical adjustments of the current typical EDO development path to ensure successful command: expanded business acumen and improved talent management. Specifically, using a cost-effectiveness analysis framework and a set of financial management tools, this thesis estimates direct net costs associated with adding business acumen training at Naval Postgraduate School, EDO Basic School, and EDO Senior Course/Advanced Management Program. In addition, this thesis estimates direct net costs associated with adding an additional detailer and adding a retention bonus like the Surface Warfare Officer bonus into the EDO development path.			
14. SUBJECT TERMS EDO, Engineering Duty Officers, command, career progression		15. NUMBER OF PAGES 67	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18

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**ANALYSIS OF CAREER DEVELOPMENT FOR ENGINEERING DUTY
OFFICER COMMANDING OFFICERS**

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

Engineering Duty Officers (EDOs) perform critical duties to support the entire sequence of ship building and maintenance for the U.S. Navy. The desire for cost savings, timely execution, and increased efficiency in ship maintenance has warranted the need to evaluate the current fundamental leadership and professional development for EDOs. Several alternatives are available; however, each generates a direct net financial burden. To support decision-makers on shaping the education, training, and development of EDOs, this thesis examines net direct costs on two hypothetical adjustments of the current typical EDO development path to ensure successful command: expanded business acumen and improved talent management. Specifically, using a cost-effectiveness analysis framework and a set of financial management tools, this thesis estimates direct net costs associated with adding business acumen training at Naval Postgraduate School, EDO Basic School, and EDO Senior Course/Advanced Management Program. In addition, this thesis estimates direct net costs associated with adding an additional detailer and adding a retention bonus like the Surface Warfare Officer bonus into the EDO development path.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMP	Advanced Management Program
BAH	Basic Allowance for Housing
BAS	Basic Allowance for Subsistence
CAPT	Captain
CDR	Commander
CO	Commanding Officer
COA	Course of Action
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DH	Department Head
DTM	Defense Travel Management Office
ED	Engineering Duty
EDO	Engineering Duty Officer
EDQP	Engineering Duty Qualification Program
GAO	Government Accountability Office
GS	General Schedule Pay Scale employee
GS-15 Step 5	General Schedule Pay Scale 15 Step 5 employee
I-Stop	Immediate Stop between Permanent Change of Station
LCDR	Lieutenant Commander
LDF	Leader Development Framework
LRB	Lieutenant Commander Retention Bonus
LT	Lieutenant
MILPAY	Military Pay
MIT	Massachusetts Institute of Technology
NAVSEA	Naval Sea Systems Command
NPS	Naval Postgraduate School
O-3	Officer – 3 Rank. LT

O-4	Officer – 4 Rank. LCDR
O-5	Officer – 5 Rank. CDR
O-6	Officer – 6 Rank. CAPT
OJT	On-the-Job training
PCS	Permanent Change of Station
RMC	Regional Maintenance Center
SORB	Senior Officer Retention Bonus
SUPSHIP	Supervisors of Shipbuilding
SWO	Surface Warfare Officer
TDY	Temporary Duty travel

EXECUTIVE SUMMARY

There are 825 Engineering Duty Officers (EDOs) that account for 1.4% of all United States Navy Officers. (J. Keegan et al., PowerPoint slides, 2021). EDOs perform critical duties to support the entire sequence of ship building and maintenance for the U.S. Navy. There is a need to analyze the education, training, and leadership experiences required to prepare EDOs to successfully take command and lead the Navy's large, complex civilian organizations such as shipyards or regional maintenance centers.

Tick et al. identified ten major potential issues throughout the career path of a Commanding Officer of a Shipyard and/or a Regional Maintenance Center (Tick et al., 2022). In this thesis, the ten major issues were collapsed into four major themes: 1) business acumen, 2) talent management/retention, 3) leadership opportunity, and 4) upward mobility. To support decision-makers on shaping the education, training, and development of EDOs, this thesis examines net direct costs on adjustments of expanded business acumen and improved talent management on the current typical EDO development path. Using a Cost Effectiveness Analysis framework and a set of financial management tools, this thesis estimates direct net costs associated with adding business training, a retention bonus, and an additional detailer.

This thesis found that it would cost one EDO per month \$16,055, \$20,723, and \$24,891 to add business acumen training to Naval Postgraduate School, EDO Basic Course in Port Hueneme, and EDO Senior Course/Advanced Management Program (AMP), respectively. With potential additional savings in cutting what might be deemed non-essential training in EDO Senior Course and AMP, it is recommended to combine and overhaul EDO Senior Course and AMP, adding business acumen training. In addition, this thesis recommends adding a scalable retention bonus and adding a detailer to increase retention. The total estimated cost for one EDO per month is \$751.

References

Tick, S., Nissen, M., Rendon, R., & Mortlock, R. (2022). *Preparing Engineering Duty Officers for Major Command Assignments* (Report No. NPS-22-N277-A). Naval Postgraduate School.

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ACKNOWLEDGMENTS

Thank you to Dr. Simona Tick for her patience, understanding, and extra push during my writing of the thesis. Additionally, I would like to thank Dr. Amilcar Menichini for reviewing my thesis, recommendations, and increasing my knowledge on cash flows and present value analysis. Thank you, Dr. Mark Nissen, for reviewing my thesis and providing an innovative analysis to evaluate the Engineering Duty Officer Commanding Officers.

Last, I would like to thank my wife, Andrea Brown, and two boys, Mathias and Elijah, for dealing with me through the thesis process.

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I. INTRODUCTION

A. GENERAL

Engineering Duty Officers (EDOs) perform critical duties to support the entire sequence of ship building and maintenance for the U.S. Navy. Over the years, the demands of these professional areas have increased in range and complexity, warranting the need to evaluate the current fundamental leadership and professional development for EDOs in comparison with those of other Navy communities and Department of Defense (DOD) agencies and with private best practices.

Therefore, there is a need to analyze the education, training, and leadership experiences required to prepare EDOs to successfully take command and lead the Navy's large, complex civilian organizations such as shipyards or regional maintenance centers. The desire for cost savings, timely execution, and increased efficiency in ship maintenance has warranted the need to evaluate the current fundamental leadership and professional development for EDOs.

To support decision-makers on shaping the education, training, and development of EDOs, this Master of Business Administration (MBA) thesis examines net direct costs on two hypothetical adjustments of the current typical EDO development path to ensure successful command: expanded business acumen and improved talent management. Specifically using a cost effectiveness analysis framework (CEA) and a set of financial management tools, this thesis estimates direct net costs associated with adding business acumen training and improved talent management.

B. PRIMARY RESEARCH QUESTIONS

1. What were the major issues identified by Tick et al. (2022) report? Can those ten major topics be grouped into larger categories?
2. Where in the EDO career pipeline can business acumen and retention/ talent management be adjusted or corrected to enhance the success of an EDO Commanding Officer?

3. Utilizing a Cost Effectiveness analysis and a net direct cost financial analysis, what are the potential recommendations for business acumen and talent retention?

C. SCOPE

The cost-effective analysis focuses on the senior EDO leadership career path, with recommendations and alternative solutions to enhance the career pipeline. EDO commanding officers or Regional Maintenance Centers (RMCs) and Supervisors of Shipyards (SUPSHIPS) were interviewed.

D. JUSTIFICATION

This topic is important because it identifies career development processes that need improving in the EDO community. GAO study Navy Shipbuilding, *Increasing Supervisors of Shipbuilding Responsibility could help Improve Program Outcomes*, has illustrated a need for increasing the performance of supervisors of shipbuilding facilities. Therefore, strengthening the senior EDO's pipeline is instrumental to ensure a successful command tour. Overall helping the Navy's design, acquisition, and maintenance processes of ships.

II. BACKGROUND

The United States Government Accountability Office (GAO) found in 2022 that over the last decade, the United States Navy has encountered challenges in accomplishing shipbuilding and maintenance goals (Government Accountability Office (GAO), 2022). Altogether, shipbuilding was faced with failure to meet deadlines due to delays, excess cost growth, and below expected performance. The Engineering Duty Officers (EDO) are called to lead maintenance centers and shipyards in a way that helps the U.S. Navy diminish these recent challenges (GAO, 2022).

The EDO community selects, trains, and develops Naval engineers who provide technical and program management capabilities in the surface fleet, submarine warfare, and aviation warfare. The Naval Sea Systems Command (NAVSEA) EDO Handbook illustrates that this is achieved by providing experts in fleet maintenance, acquisition program management, systems engineering, and national missions (Naval Sea Systems Command (NAVSEA), 2017). The mission areas that an EDO can aid are System Engineering, Warfare Systems, Combat Systems, Hull, Mechanical, & Electrical Systems, Ordnance Engineering, Fleet Maintenance, Program Management, Naval Architecture, Operational Engineering, Diving & Salvage operations, and Command, Control, Communications, Computers, Intelligence, Surveillance, & Reconnaissance (C4ISR) (NAVSEA, 2017).

Overall, EDOs are comprised of a diverse group of individuals. Representing only 1.4% of all Navy Officers, EDOs are a select group (J. Keegan et al., PowerPoint slides, 2021). The EDO handbook states that there are two ways to become an EDO: lateral transfer from another Navy community or by submarine or surface accession (NAVSEA, 2017). Three different career paths of EDOs are Acquisition, Regional Maintenance Centers (RMCs) supervisors, and Supervisors of Shipbuilding (SUPSHIP). While SUPSHIP are the primary liaison to the construction of new ships RMC COs are the liaison to restructuring and ashore ship maintenance (maintenance, modernization, and technical support) (NAVSEA, 2017).

A. CAREER PATH

The EDO's Handbook states that most EDOs first complete one or two non-EDO sea tours prior to becoming an EDO (NAVSEA, 2017). Their first EDO tour they are assigned to a Fleet Maintenance Activity (FMA). These commands give opportunities to maintain ships or submarines and to complete their Engineering Duty Qualification Program (EDQP). Upon completion of the initial tour and the EDQP, an EDO is familiar with shipboard maintenance, financial systems, acquisition programs, their career path, and the roles of an Engineering Duty Officer (NAVSEA, 2017).

1. Acquisition EDO Command

For EDOs on the acquisition career path, NAVSEA's EDO Handbook states following the completion of the EDQP, an EDO can be in the acquisition pipeline (NAVSEA, 2017). There are two major career paths for acquisition EDOs culminating in either being a major program manager (MPM) or a Supervisor of a Shipbuilding (SUPSHIP). MPMs have at least two Program Officer tours and a Field Activity tour. The Field Activity tour takes place in a shipyard, in which Junior Officers work as Production Officers, Project Officer, or Senior Test Officers. During the Program Officer tour, Junior Officers work as Test and Trials Directors, Chief engineers, Command, Control, Communications, Computers, & Intelligence (C4I) Directors, Production Officers, or Combat Systems Officer. On the other hand, SUPSHIP Commanding Officers have at least one tour as a Program Officer and two Field Activity tours. Generally, both the SUPSHIP and MPMs career path requires one senior broadening tour at the Pentagon (NAVSEA, 2017).

NAVSEA's EDO handbook further states that once all the prerequisites are complete the following skills are required to become a major command acquisition EDO: technically and operational savvy (HM&E, C4I, and Combat Systems), exhibit political awareness, good at analyzing the budget, a financial manager, industrialist, businesspeople, and a manager of both military and civilian communities (NAVSEA, 2017). Elite Acquisition EDOs are great multitaskers and try to minimize cost, keep ahead or on schedule, and the performance of their programs are in accordance with the parameters (NAVSEA, 2017)

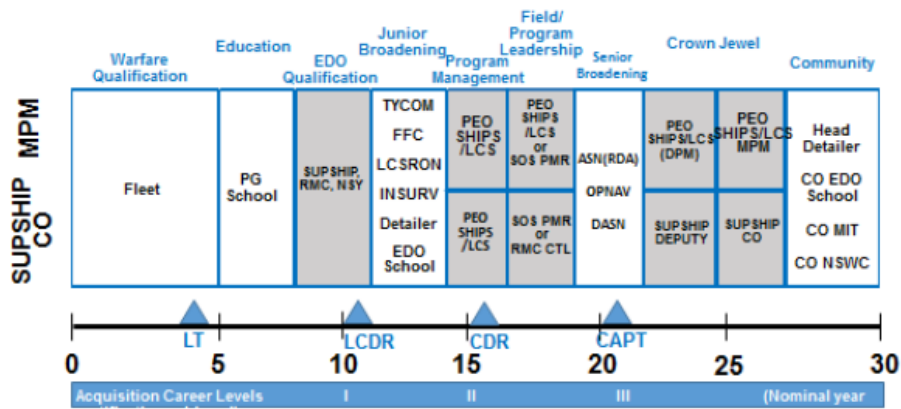


Figure 1. Career Path to Becoming a SUPSHIP or MPM. Source: Naval Sea Systems Command (2017)

2. Regional Maintenance Center Command

For EDOs on the RMC career path, NAVSEA’s EDO handbook states that following the completion of EDQP, an EDO can be on the path to being a Commanding Officer (CO) of an RMC (NAVSEA, 2017). The next job assigned would be as a Zone manager or an Assistant Project Superintendent, their focus generally would be on Naval Nuclear Propulsion Program, primarily on refueling, overhauling, and repairing. A Shipyard Commander path usually requires an additional shipyard tour so EDOs are assigned as an DH. During this timeframe they should spend at least 12 months as an Operations officer. The other two years they will serve in Production Resource, Engineering & Planning, or Business & Strategic planning departments (NAVSEA, 2017).

NAVSEA’s handbook further illustrates that the operations department manages work safety, work quality, schedule, and cost requirements (NAVSEA, 2017). The Production Resource department trains the production workforce. Engineering and Planning department assists in technical assistance. The Business and Strategic Planning department manages shipyard long range schedules and obtains work authorization and funding with customers. Once all the prerequisites are met these skills are required to become a major command RMC CO: be able expertly manage technical, financial, quality, production, contractual, and civilian personnel involved in RMC operations (NAVSEA, 2017).

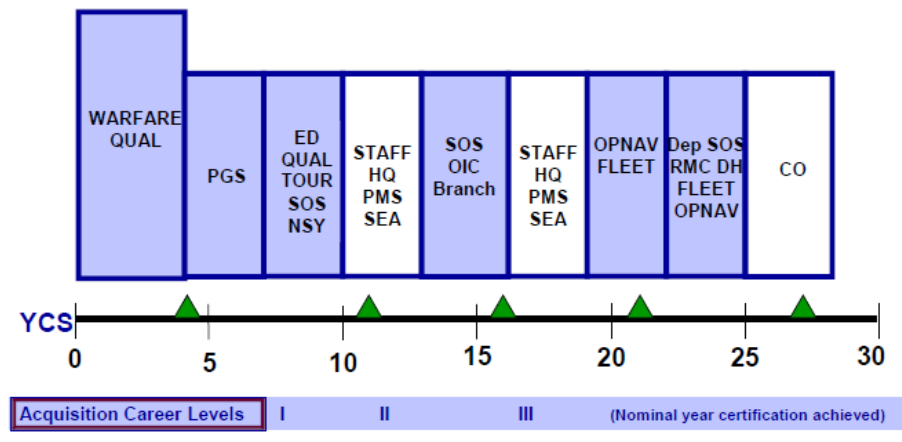


Figure 2. Career Path to Becoming a CO of an RMC.
Source: NAVSEA (2017)

Figure 2 indicates major milestones for an EDO in the RMC Command track. Like the career path to become a SUPSHIP, the major milestones can be broken down into a general description. PGS is a Postgraduate School. Following PGS an EDO completes their EDO Qualification tour. The first STAFF HQ PMS SEA is a Junior Broadening tour, and the second STAFF HQ PMS SEA is a Senior Broadening tour. During the SOS OIC Branch tour an RMC career path EDO completes either an Engineering or a Waterfront Operations assignment. The OPNAV Fleet and the DEP SOS RMC/ DH FLEET OPNAV tours are CDR and CAPT level tour where leadership opportunities in being a Waterfront Operations Department Head, Business Office DH, Engineering DH, Combat Systems DH, or a Production Hull, Mechanical & Electrical Officer. The following tour is the crown jewel tour as a CO (NAVSEA, 2017).

The green triangles above indicate possible rank increases. Around 4 years is LT, 11 years in is LCDR, 16 years in is CDR, and 22 years is CAPT. Additionally, what can be seen in the career path template is acquisition career levels. During the qualification tour an Acquisition Career level I is achieved. During the Junior broadening tour, a level II acquisition career level is achieved, and a Level III nominal certification is achieved shortly after picking up CDR during the Senior broadening tour. Table 1 contains the requirements for achieving Acquisition certification levels.

Table 1. Certification Levels and Factors. Source: Defense Acquisition University (n.d.)

Certification Level	Consideration Factors
<p>Level III (Advanced)</p>	<p>Active Duty Officers:</p> <ul style="list-style-type: none"> - This level is required for all KLPs, CAPs, O-5 and above military acquisition billets. <p>Civilian Positions:</p> <ul style="list-style-type: none"> - This level is required for all KLPs and CAPs. - For other positions, this level is typically assigned to appropriate positions located in organizations with a major acquisition mission, e.g. the SYSCOMs. - Level III is commensurate with AWF experts whose duties require a high level of knowledge or particular proficiency associated with acquisition program components, systems, or capabilities. For example, a GS-12/13 working in an ACAT I or II program office may require a Level III designation whereas a GS-14 (or equivalent) working in an Echelon III or IV activity may require Level I or II. - This level is not applicable to the Purchasing Career Field. - This level is not applicable for SELRES positions.
<p>Level II (Intermediate)</p>	<p>Active Duty Officers:</p> <ul style="list-style-type: none"> - This level is required for some O-3 and all O-4 positions in acquisition billets. - This level may also be assigned to positions in the NACO, the Naval Life Cycle Logistics (LCL), Financial Management Career Program (FMCP), and other DACM-approved developmental programs. <p>Active Duty Enlisted:</p> <ul style="list-style-type: none"> - Level II is normally assigned to E-7 positions and above in acquisition billets. - Enlisted Contracting Specialists may be assigned Level II at E-6 and above in acquisition billets. <p>Civilian Positions:</p> <ul style="list-style-type: none"> - Level is appropriate for those in entry level development programs and journeymen or senior positions (non-KLP/CAP) who need an intermediate level of acquisition knowledge and skills. - For example, Level II would be appropriate for a GS-14/15 manager working in a warfare center or field activity who has subordinate acquisition technical experts.
<p>Level I (Basic)</p>	<p>Active Duty Officers:</p> <ul style="list-style-type: none"> - This level is required up to O-3 acquisition billets. - See exceptions for developmental programs identified in Level II above. <p>Active Duty Enlisted:</p> <ul style="list-style-type: none"> - Level I is required for all E-6 and above and Contingency Contracting Force (CCF) at the E-4 and E-5 grade levels, except as noted in Level II above. <p>Civilian Positions</p> <ul style="list-style-type: none"> - Basic certification standards are designated to establish fundamental qualifications and expertise in the individual’s Career Field. It is appropriate for entry level and other positions that require a basic knowledge of the acquisition systems.

Each level translates to a significant amount of experience in its civilian counterpart.

B. EDUCATION

There are many school requirements on the path to becoming a senior leader in the EDO community. NAVSEA’s EDO handbook details the education requirements for an EDO, starting with after selection into the EDO program, prospective EDOs are sent to either Massachusetts Institute of Technology (MIT) or Naval Postgraduate School (NPS)

to obtain a technical master's degree (NAVSEA, 2017). Some technical degrees that NPS offers for EDO's are Naval/ Mechanical Engineering, Electrical and Electronic Systems Engineering, Combat Systems Sciences and Technology, Space Systems Engineering, Systems Engineering, and Computer Science (NAVSEA, 2017).

Following master's school, EDOs go to Engineering Duty (ED) basic course. This course is a five weeklong course for newly selected active duty EDOs. The goal is to give the future EDOs basic level knowledge of the community (NAVSEA, 2017).

After EDO basic, EDOs are expected to get certified as an EDO. During this qualification tour the EDQP card is given to an EDO. The qual tour consists of On-the-Job Training to understand various skills essential to becoming an EDO to include legal counsel, environmental safety and health, quality assurance, engineering, waterfront operations, planning, contracts, logistics, production, corporate operations, lean, production, and civilian personnel service office. Additionally, some mission related training requirements achieved during this tour are funds administrator course, Contractor Administration Quality Assurance Program (CAQAP), Human Resources Management for supervisors, green belt training, CNRMC project manager, port engineer, contracts specialists' course, and a DAWIA course contract planning, contract execution, and contract management (CON 121/124/127) (NAVSEA, 2017).

The next school that is offered for EDOs is ED Senior course. ED Senior course is for newly selected O-5s and is a two-week course. The major goal of this course is to prepare the EDO for their respective role as senior leadership. With this course another course is required called Advanced Management Program (AMP). This is also a two-week course and is located at the Supply Corps School. Taught by business school professors, EDOs can develop more business tools for their senior leadership tour. The final school that occurs is Engineering Duty Officer Captains Training seminar (EDOCTS). This seminar is two days and mostly discusses current leadership issues (NAVSEA, 2017).

III. LITERATURE REVIEW

A. 2022 EDO STUDY

Tick et al. conducted a study on preparing Engineering Duty Officers for Major Command Assignments. During the research study interviews were conducted on EDO's who were ranked O-6 and higher who commanded or are commanding either Regional Maintenance Centers (RMC) or Supervisors of Shipbuilding (SUPSHIP) (Tick et al., 2022). The questions are listed in Appendix B.

Each interview was recorded and evaluated for trends weighing different ideas and thoughts mentioned (Tick, 2022). In addition, alternative courses of actions to potentially improve the issue were generated from the research data. From there the major recurring themes or major issues were found. The major issues that were found are listed in Table 2.

Table 2. Major Issues and Alternatives. Adapted from Tick et al. (2022)

Issue	Alternative
Working with industry is challenging	- RMC specific addition to EDO Sr Course - Ensure officers have prior RMC experience before command
Acquisition: Fixed price contracting	- Reassess acquisition strategy - Consider policy waivers
Acquisition: Training shortfalls	- Continue DAWIA certification - Continue Navy acquisition training - RMC specific addition to EDO Sr Course
CO prep is inadequate for some	- Executive coaching (beyond mentoring) - Soccer practice: full contact (RMC) CO course - FDRMC, Detachment or OIC as prerequisite to RMC CO
Lacking business understanding	- Enhance & extend Advanced Management Program (AMP) - EMBA Programs (NPS, others) - Technical undergrads pursue business degrees (MBA)
O6 is too late for first command	- FDRMC, Detachment or OIC as prerequisite to RMC CO - RMC XO-CO Fleet Up (shorter tours?)
Unclear path to Flag	- How much PM & SY experience is necessary? - How to gain RMC experience without becoming too narrow? - How to prevent wrong people from taking RMC CO jobs?
EDO retention & mobility	- Signal expectations for taking overseas jobs - Signing bonus for key EDO milestones

Issue	Alternative
	- Merit reordering
Promotion based on technical talent	<ul style="list-style-type: none"> - Education, training, experience & mentoring + personality - Best engineers not necessarily best leaders - Flag level conversations
Not everyone is suited for command	<ul style="list-style-type: none"> - Seek out motivated, self-driven people - Understand people’s strengths, weaknesses & potentials

This study is the base of this thesis and is important to analyze to discover the major themes that require improvement in the EDO career pipeline.

B. ACTIVITY-BASED COSTING IN THE NAVAL POSTGRADUATE SCHOOL

In a Master of Business Administration Professional Report conducted by Joel Gomez, an equation to estimate the cost per student per year of a NPS student was derived. The average cost per student year is derived by dividing the total cost for education by the student load. This resulted in an estimate of \$31,312 per student in FY 2013 (Gomez, 2015). Utilizing this same equation and numbers from the NPS *2021 Calendar Year and Mission Measures*, an estimate of costs for adding an additional month of training is calculated in this thesis. This information is important to estimate a course of action of adding in school training to an EDO’s career path.

C. ANALYSIS OF THE FLEET SCHOLARS’ EDUCATION PROGRAM

In a Master of Business Administration thesis, Platt measured the implicit opportunity costs to send officers to a Fleet Scholar Education Program. These costs include officer compensations for Basic Allowance of Housing (BAH), estimates in Basic Pay, and Basic Allowance of Subsistence (BAS) (Platt, 2020). A similar way to measure net direct costs is used in this thesis to measure the estimated cost of an EDO.

IV. METHODOLOGY

A. COST-EFFECTIVENESS ANALYSIS (CEA) FRAMEWORK

The methodology begins by evaluating the ten major issues deduced from Tick et al. (2022) report. These ten major issues are broken into four major themes: business acumen, improved talent management/ retention, leadership opportunity, and selective upward mobility.

When discussing business acumen, the problem can be divided into three categories 1) Training/education 2) Experience and 3) Industries understanding of military structure. In order to improve these categories schooling or on-the-job training is required. If training or on the job training is conducted the following major issues identified in Tick et al. will improve 1) working with industry 2) Acquisition: Fixed price contracting, 3) Acquisition: Training Shortfalls, and 5) Lacking business understanding (Tick et al., 2022).

The second major theme, talent management, pertains to retaining talent to increase the efficiency and expertise of the EDO community. Two ways to retain the talent of the EDO community are 1) to provide bonuses for achieving milestones and 2) incentive-based detailing. Talented EDOs can be found by the number of attributes an individual can master from Figure 3. In the beginning career stages an EDO strives to improve himself. As an EDO matures, they grow to lead projects, programs, people, and during the Crown Jewel tour, an EDO leads an organization.



Figure 3. EDO Leader Development Continuum. Source: Naval Sea Systems Command (2021)

Leadership opportunity is related to the availability of positions to be leaders. There are currently seven RMCs each having opportunities for leadership prior to the CO tour. Comparable to the Surface Warfare Officer (SWO) community, there are opportunities for leadership prior to the crown jewel tour.

Overall, John Keegan’s PowerPoint illustrates that the mobility of EDOs from inception to O-6 is comparable to other communities (J. Keegan et al., PowerPoint slides, 2021). However, there are comments about an unclear path to Flag officer in the Tick et al. research (Tick et al., 2022). These comments were emphasized more in RMC COs than other EDO COs. The RMC COs believe the flow path to making Flag officer is clear on the programmatic side but not as clear on the maintenance side (Tick et al., 2022).

To support decision-makers on shaping the education, training, and development of EDOs, this Master of Business Administration (MBA) thesis examines net direct costs on two hypothetical adjustments of the current typical EDO development path to ensure successful command: expanded business acumen and improved talent management. The

methodology utilizes a CEA framework and a set of financial management tools to estimate direct net costs associated with adding business acumen and improved talent management.

1. Business Acumen

Table 3 includes a summary of the CEA framework that will be conducted for business acumen. The major categories are status quo, cost of adding additional business acumen, and the benefits from the addition of business acumen training.

Table 3. Business Acumen Cost Effectiveness Analysis (CEA) Summary

Business Acumen: Cost Effectiveness Analysis
Status Quo
No addition of business acumen
Cost: Addition of Business acumen
Cost of Training <ul style="list-style-type: none"> A. Additional Schooling <ul style="list-style-type: none"> 1. Cost of Overhead <ul style="list-style-type: none"> a. School house b. Postgraduate school 2. Cost of Instructor <ul style="list-style-type: none"> a. Civilian b. Military B. On-the-Job training <ul style="list-style-type: none"> 1. Instructor <ul style="list-style-type: none"> a. Civilian b. Military
Cost of EDO not performing Operational Duty <ul style="list-style-type: none"> A. BAH B. BAS C. COLA D. Basic Pay E. Per diem
Benefits: Addition of Business Acumen
Increased Knowledge Cost Savings Timely execution Increased efficiency

a. Status QUO during Schools

(1) ED Basic Course

During EDO Basic Course, EDOs get the equivalency of Fundamentals of Systems Acquisition Management (DAWIA Acquisition Course 1010), Intermediate Systems Acquisition, Part A (DAWIA Acquisition Course 2020), Intermediate Systems Acquisition, Part B (DAWIA Acquisition Course 2030), and Program Management Tools Course (PMT 2570) (Defense Acquisition University (DAU), n.d.). The EDO schoolhouse PowerPoint slides state that these courses account for four of the six practitioners Defense Acquisition University training requirements (Engineering Duty Officer School Basic (EDO Basic), PowerPoint slides, December 6, 2022). These four courses are designed for a mid-level acquisition professional providing an overview of systems acquisition principles, policies, and processes (DAU, n.d.).

(2) Postgraduate School

During Postgraduate School aspiring EDOs go to either MIT or NPS to get a technical degree (NAVSEA, 2017). Acquiring additional business acumen is optional; however, getting a technical degree is mandatory. This is one of the only times in an EDO's career path where technical education is obtained.

(3) ED Senior Course

NAVSEA's EDO handbook states that ED Senior course is a two-week course for EDOs who are selected for commanders (NAVSEA, 2017). The goal is to prepare EDOs for increased responsibility in acquisition and the life-cycle engineering management of naval ships and systems (NAVSEA, 2017). Major topics found in the EDO schoolhouse slides are Flag presentations, CAPT presentations, EDO Community Plans and Policy, Leadership development and self-awareness, and media and legal training (EDO Basic, PowerPoint slides, December 6, 2022).

(4) Advanced Management Program (AMP)

NAVSEA's EDO handbook states that AMP is a two-week course at the Navy Supply Corps School (NAVSEA, 2017). The course is taught by civilian business school

professors. The goal is to advance strategic leadership (NAVSEA, 2017). This course yields a minor improvement in business acumen.

(5) Engineering Duty Officer Captains Training Seminar (EDOCTS)

NAVSEA's EDO handbook illustrates that EDOCTS occurs at around 22 years of military service (NAVSEA, 2017). EDOCTS is for Senior leaders and their main purpose is to discuss current leadership issues. Occurs during the OPNAV Fleet or Dep SOS/RMC/DH Fleet OPNAV tour timeframe seen in Figure 1 and Figure 2 (NAVSEA, 2017).

b. Status Quo during Operation Tours

(1) Warfare qualification

The warfare qualification tour is designed for an EDO to receive operational experience in the conventional Navy prior to becoming an EDO. At the end of the tour Sailors receive an insignia (i.e., SWO pin, Submarine Pin). Some EDOs can directly enter the EDO program without the warfare qualification tour; however, the majority of EDOs have a warfare qualification tour (NAVSEA, 2017).

(2) ED Qualification tour

Assessing the Southeast Regional Maintenance Center (SERMC) Engineering Duty Officer Training and Qualification Program, 3 out of 13 prerequisites have Business acumen: 1) Funds Administrator Course 2) Project Manager, Port Engineer, Contracts, Specialist course, and 3) DAWIA Course) (Southeast Regional Maintenance Center (SERMC), 2023). The DAWIA course is the only item in the prerequisites that has acquisition. 65 out of 179 (36.3%) of the checkouts for core competencies in the PQS potentially have factors that improve business acumen (SERMC, 2023).

(3) Subsequent tours following Qualification Tour

On-the-job training occurs during the tours outside EDO schooling. These tours include the Junior broadening tour, Senior broadening tour, Waterfront operations, Engineering operations, Production, and the Department head tour (NAVSEA, 2017). During these tours, an EDO applies the tools they learned from school and experience to

accomplish the EDO mission of providing business and technical solutions as experienced Naval Engineers. Each operational tour has its own primary and secondary mission. These missions often vary from command to command.

c. Overall Cost

The overall cost to add business acumen to an EDO's career path is the sum of the cost of the training plus the opportunity cost of each EDO not being available to do their operational duty. These costs will be evaluated below.

d. Cost – Cost of Training

The direct cost of training depends on the type and location of the training. The training can occur as schooling or On-the-Job training (OJT). Some factors that are included in additional schooling are the cost of the overhead and the cost of the instructor. The cost can change depending on the training being conducted at the EDO Schoolhouse in Port Hueneme or during Postgraduate school at MIT or NPS.

In order to estimate the costs for schooling, this thesis assumes the costs will be equivalent to the cost of a NPS student; since, the majority of EDO's attend NPS to obtain their technical degree (NAVSEA, 2017). Utilizing Gomez's equation and evaluating it per month, the cost of a month of additional schooling can be estimated by dividing the total annual cost for education by 12 times the student load (Gomez, 2015). The FY2021 NPS annual report, the most recently published report, can be used to obtain the total costs of education and student load. The total cost of education is the sum of Graduate Education Instruction (\$54M), Instructional Support (\$50M), and Reimbursable Education (\$38M), summing to \$142M (Naval Postgraduate School (NPS), 2021). An estimate of the student load is the sum of the resident degree students (1446), distance learning degree (808), and Certificate and Non-Degree (513) students equaling a total of 2,767 (NPS, 2021).

$$\begin{aligned} \text{Cost per Student for a Month of Schooling at NPS} &= \frac{\$142M}{12 \times 2767} \\ &= \$4,276.59 \text{ FY2021} \end{aligned}$$

Utilizing the U.S. Bureau of Labor Statistics CPI inflation calculator, the FY2021 cost (\$4,276.59) is then adjusted to an estimated cost of 2023 schooling at NPS: amounting to a value of \$4,690.57 (U.S. Bureau of Labor Statistics, 2023).

On-the-Job training will have a different cost than the schooling cost. One way to estimate on-the-job training cost is to assess the instructor time. Assuming the trainer is a senior highly specialized government employee, this thesis evaluates the cost for one month of a 15th pay grade step 5 of a General Schedule (GS) pay scale employee and an O-5 with 16-18 years of service. The monthly pay for a GS-15 Step 5 at different major RMC locations are calculated in Table 4.

Table 4. GS-15 Pay Scale Per Month. Adapted from FederalPay (2023)

Costs
General Pay with Locality (per month)
<u>On the Job Training Duty Stations</u>
San Diego, CA (Southwest Regional Maintenance Center) GS-15 Step 5: \$13,524.46
Mayport, FL (Southeast Regional Maintenance Center) GS-15 Step 5: \$11,935.46
Norfolk, VA (Mid Atlantic Regional Maintenance Center) GS-15 Step 5: \$12,083
Bremerton, WA (Puget Sound Naval Shipyard) GS-15 Step 5: \$13,274.54
Hawaii (Regional Maintenance Center) GS-15 Step 5: \$12,413.92

The average monthly cost for a civilian, GS-15 Step 5, is \$12,646.28. If quality OJT is conducted by a senior military member, O-5 the costs will differ. If the training is collateral there will be risks of quality, therefore this analysis will not analyze collateral duty training. Military OJT will consist of a billeted O-5 with dependents who receive Per-Diem for traveling for their training. These values are taken out of Table 5. An O-5 with

dependents having a permanent station (PCS) as San Diego and the ability to travel will cost \$5,196 (BAH) + 30 x \$157 (30-days of Max Per-Diem) + \$9,982.80 (Basic Pay) + \$311.88 (BAS) = \$ 20,200.68.

e. Opportunity Cost – EDO not performing Operational Duty.

The cost of an EDO being taken away to train varies with rank, location, and timeline position of an officer. Overall, an EDO’s cost can be evaluated by Basic allowance for Housing, Basic allowance for Subsistence, Base Pay, COLA, and/or Per-Diem rate. If the EDO is staying 20 or more weeks at a duty station, they are PCSing. If an EDO is staying less than 20 weeks, the EDO is either taking an Immediate Stop or utilizing Temporary Duty travel (TDY). Table 5 has a list of possible expenses incurred from each.

Table 5. Potential Costs Incurred

Costs
BAH (per month) <i>All BAH values are taken from DTM (2023a)</i>
<u>Schooling location</u>
Monterey, CA – NPS
O-3 with Dependents: \$4,272
O-3 without Dependents: \$3,366
O-4 with Dependents: \$4,662
O-4 without Dependents: \$3,837
Cambridge, MA – MIT
O-3 with Dependents: \$4,707
O-3 without Dependents: \$4,230
O-4 with Dependents: \$5,322
O-4 without Dependents: \$4,431
<u>On the Job Training Duty Stations</u>
San Diego, CA (Southwest Regional Maintenance Center)
O-3 with Dependents: \$4,230
O-3 without Dependents: \$3,726
O-4 with Dependents: \$4,794
O-4 without Dependents: \$3,954
O-5 with Dependents: \$5,196
O-5 without Dependents: \$4,056
Mayport, FL (Southeast Regional Maintenance Center)
O-3 with Dependents: \$2,310

Costs

O-3 without Dependents: \$2,253

O-5 with Dependents: \$2,517

O-5 without Dependents: \$2,277

Norfolk, VA (Mid Atlantic Regional Maintenance Center)

O-3 with Dependents: \$2,232

O-3 without Dependents: \$2,121

O-5 with Dependents: \$2,769

O-5 without Dependents: \$2,202

Bremerton, WA (Puget Sound Naval Shipyard)

O-3 with Dependents: \$2,946

O-3 without Dependents: \$2,466

O-5 with Dependents: \$3,315

O-5 without Dependents: \$2,823

Hawaii (Regional Maintenance Center)

O-3 with Dependents: \$3,882

O-3 without Dependents: \$3,432

O-5 with Dependents: \$4,527

O-5 without Dependents: \$3,738

BAS (per month) – \$311.88 *BAS values are taken from MILPAY (2023b)*

Per Diem rate (Overall Max \$157) *Per Diem rate values are taken from DTM (2023b)*

Max lodging: \$98

Local Meals: \$54

Or Proportional Meals: \$36

Incidentals: \$5

Basic Pay *Basic Pay values are taken from MILPAY (2023a)*

O-3 at 6/8 years – \$6,780.30 / \$7,120.50

O-4 at 10/12 years – \$8,254.80 / \$8,665.50

O-5 at 16/18 years – \$9,982.80 / \$10,265.40

COLA (per month) *COLA values are taken from DTM (2023a)*

Japan – SRF-JRMC

O-3 with 0 Dependents at 6/8 years: \$414 / \$428

O-3 with 1 Dependents at 6/8 years: \$465 / \$481

O-3 with 2 Dependents at 6/8 years: \$517 / \$535

O-5 with 0 Dependents at 16/18 years: \$485 / \$485

O-5 with 1 Dependents at 16/18 years: \$545 / \$545

O-5 with 2 Dependents at 16/18 years: \$606 / \$606

Additional Notes: COLA varies from month to month. BAH varies yearly. Overseas housing values (OHA) for Yokosuka, Japan; Naples, Italy; Bahrain; and Rota, Spain, are not included.

Adapted from Defense Travel Management Office (2023a, 2023b, Military Pay (2023 a, 2023b).

(1) ED Basic Course

ED Basic Course, being less than 20 weeks, is considered an Immediate Stop (I-stop) after transferring from a Warfare Qualification tour (Military OneSource, 2023). At ED Basic, an ED is usually an O-3 with six years. The cost lost to add a month's worth of business acumen during ED Basic Course is the sum of the BAH from the Warfare Qualification tour location, Per-Diem, BAS, and Basic pay. For instance, a Sailor with dependents having a Permanent Change of Station (PCS) from San Diego to EDO Basic will cost:

$$\$4,230 \text{ (BAH)} + 30 \times \$157 \text{ (30-days of Max Per-Diem)} + \$6,780.30 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)} = \$16,032.18.$$

(2) Postgraduate School

Postgraduate school is held at either MIT or NPS and because it takes place for more than 20 weeks, it is considered a Permanent Change of Station (Military OneSource, 2023). EDs at this time can be an O-3 or an O-4. The cost lost to add a month's worth of business acumen during Postgraduate school is the sum of the BAH from either Monterey or MIT, BAS, and basic pay. For instance, an O-3 with dependents attending MIT will cost:

$$\$4,707 \text{ (BAH)} + \$6,780.30 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)} = \$11,799.18.$$

While an O-3 with dependents attending NPS will cost:

$$\$4,272 \text{ (BAH)} + \$6,780.30 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)} = \$11,364.18.$$

(3) ED Qualification tour

The ED Qualification tour, being more than 20 weeks, is considered a PCS (Military OneSource, 2023). This occurs after obtaining a technical degree at a Postgraduate school. During the ED Qualification tour an ED is either an O-3 approaching

eight years or an O-4. The cost lost to add a month's worth of business acumen during the ED Qualification tour is the sum of the BAH of their duty station location, Basic pay, BAS, and potentially Per-Diem if the training is not at the location of the Qualification tour. For instance, an O-3 with eight years with dependents having a permanent station (PCS) of San Diego will cost:

$$\$4,230 \text{ (BAH)} + \$7,120.50 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)} = \$11,662.38.$$

(4) ED Senior Course and Advanced Management Program (AMP)

ED Senior Course and AMP, both being less than 20 weeks, can be seen as either an I-stop or a TDY (Military OneSource, 2023). During each course a qualified EDO is an O-5 with approximately 16 years of service. The cost lost to add a month's worth of business acumen are each the sum of the BAH from the current operational tour, Per-Diem, BAS, and Basic pay. For instance, an O-5 with dependents PCSing from San Diego will cost:

$$\$5,196 \text{ (BAH)} + 30 \times \$157 \text{ (30-days of Max Per-Diem)} + \$9,982.80 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)} = \$20,200.68.$$

(5) Operational Tours

EDOs are assigned a billet in their operational tours. Those operational tours include the Junior and Senior Broadening tours, Department Head tours, and OPNAV tours. Therefore, if time is taken from that tour an additional EDO must fill their position. The lowest cost Operational tour, the Junior Broadening tour, will be assessed first.

During the Junior Broadening tour an EDO is an O-4 with approximately 12 years of service. For this calculation an O-4 with dependents from San Diego will be utilized. The sum of the costs would be two BAH, two Basic pays, two BAS.

$$2 \times [\$4,794 \text{ (BAH)} + \$8,665.50 \text{ (Basic Pay)} + \$311.88 \text{ (BAS)}] = \$27,542.76.$$

A Senior Broadening tour will result in a higher cost. An EDO is an O-5 with approximately 16-18 years of service during this tour. The sum of costs would be equal to:

2 x [\$5,196 (BAH) + \$9,982.80 (Basic Pay) + \$311.88 (BAS)] summing to \$30,981.36.

On the higher end of costs of adding business acumen during operational tours, Cost of Living Allowance (COLA), Per-Diem, and the highest-ranking EDO could be utilized for calculations to maximize the costs.

f. Benefit

The ultimate benefit for adding business acumen is a successful CO tour (Tick et al., 2022). However, the earlier the addition of business acumen in the career path the more potential for increased knowledge which results in increased money savings. The Future Values equation (FV) illustrates the results of increasing knowledge earlier.

$$FV = PV * (1 + r)^t$$

FV = Future Value, PV = Present Value, r = rate, t = time. Source: (A. Menichini et al., PowerPoint slides, 2023)

By increasing knowledge earlier, the present value and the time will increase. As the amount of time and present value increases the future value will increase. These values are difficult to quantify benefits of increased knowledge, cost savings, timely execution of maintenance, and increased efficiency of maintenance are difficult to measure.

2. Talent Management/ Retention

Table 6 includes a summary of the CEA framework that will be conducted for retention of talented EDOs. The major categories are the status quo, cost of adding retention incentives, and the benefits from retaining talented individuals.

Table 6. Retention of Talent Cost Effectiveness Analysis (CEA) Summary

Talent Retention: Cost Effectiveness Analysis
Status Quo
No adjustments made to retain talent
Cost: Addition of cost of Retention
Retention Bonuses: Estimated at SWO bonus
SWO DHRB
SWO LRB

Talent Retention: Cost Effectiveness Analysis	
SWO SORB	
Detailing Costs	
	Added O-5 Detailer
	A. BAS
	B. Basic Pay
	C. BAH
Benefits: Retaining Talented EDOs	
	Increased Knowledge
	Cost Savings
	Timely execution
	Increased efficiency
	Total Cost of a Talented EDO from O-1 to O-6
	A. BAS
	B. Basic Pay
	C. BAH

a. Retention Bonuses: Status Quo

Another issue identified by Tick et al. was talent management and retention. The EDO community can do better in retaining its top talent. Retention bonuses have been utilized in other communities to increase retention. The typical EDO does not have a retention bonus; however, EDO(N) can have a nuclear bonus if they maintain their Additional Qualification Designation (AQD). The nuclear bonus is approximately the same as a Nuclear Surface Warfare Officer and submarine officers. This amount starts at \$35,000 per year and increases to \$40,000 at 12 YCS (M. Curnen et al., PowerPoint slides, 2023).

b. Retention: Detailing Status Quo

The detailing triangle in Figure 4 is a common Military tool used to illustrate the detailing process. When detailing a Sailor, a detailer looks at personal preferences, career needs, and the Needs of the Navy.



Figure 4. Navy Detailing Triad. Source: Heames (2023)

Another way to retain talent is to be more accommodating when it comes to detailing. CAPT Jeff Heames's PowerPoint states that personal preference can be broken down into homeport/billet, geographic stability, and family needs (Heames, J., 2023). Career needs can be broken into qualifications, timing for screening, career progression, and assignment diversity. The Needs of the Navy can be broken into billet availability, Navy priority jobs, overseas duty, and sea/shore duty (Heames, 2023).

Although the detailing triangle is known by most in the Navy, the Needs of the Navy and Career Needs sides for the EDO community were assessed to be large from the Tick et al. report. There have been numerous comments about requesting to maintain the same geographic location for longer period of time in the RMC career path (Tick, 2022). This is drastically different than the programmatic EDO route where an EDO can maintain in the same area for years. It is also drastically different than the SWO community where an individual can spend years in a location. In general, maintaining EDOs in the same area for longer will increase family satisfaction; therefore, increasing retention.

c. **Retention Bonuses: Cost**

The SWO retention bonuses can be used as a template to retain individuals with incentives. The SWO retention bonus works to allow the military to compete with civilian management. Throughout a SWO career there are bonuses to incentivize talented individuals' retention. These bonuses include the SWO Department Head Retention Bonus (SWO DHRB), SWO Lieutenant Commander Retention Bonus (SWO LRB), and the SWO Senior Officer Retention Bonus (SWO SORB). Altogether, these bonuses have the potential to sum up to \$199,000 (Heames, 2023).

(1) SWO DHRB

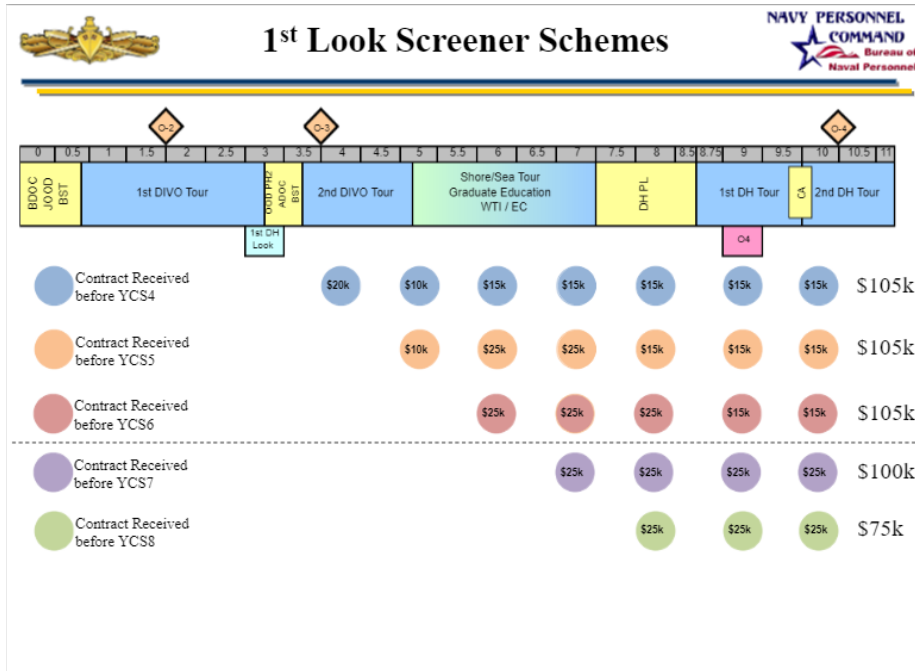


Figure 5. 1st Look Screener Schemes. For SWOs Who Are Selected DH during Their First Opportunity. Source: Heames (2023)

The sum of the SWO DHRB ranges from \$75,000 for 3rd look screeners to \$105,000 for 1st look screeners as seen in Figure 5. SWO DHRB requires two afloat DH tours or one single long tour which normally equates to seven years of additional service (Heames, 2023).

(2) SWO LRB

The Office of the Chief of Naval Operations (OPNAV) indicates the SWO LRB is given to qualified SWOs who were promoted to LCDR (Office of the Chief of Naval Operations (CNO), 2017). This bonus has a three-year obligation of service from their 12th year of commissioned service (YCS) to their 15th YCS. Some of the eligibility requirements are:

1. qualified and serving as an active duty SWO
2. permanently appointed LCDR
3. have at least 11 YCS, but no more than 12 YCS
4. completed two afloat department head tours or a single longer tour (Cheng/ WEPS- CSO fleet-up)(CNO, 2017)

The SWO LRB consists of a \$22,000 bonus on the 2nd anniversary of promotion and two \$12,000 bonuses on the 3rd and 4th anniversary of promotion to LCDR (CNO, 2017).

(3) SWO SORB

The Office of the Chief of Naval Operations (OPNAV) indicates the SWO SORB is given to qualified SWOs who were promoted to commander (CDR) (Office of the Chief of Naval Operations (CNO), 2022). This bonus has a four-year obligation of service from the 19 YCS to 23 YCS. Some of the eligibility requirements are:

1. Qualified and serving as an active duty SWO
2. Permanently appointed CDR
3. Have at least 18YCS but no more than 19 YCS
4. Screened and served in or completing XO-SM, XO-afloat, CO-SM, CO afloat milestone tour. (CNO, 2022)

The SWO SORB consists of four payments of \$12,000 starting at the 19th YCS and ending at the 22nd YCS (CNO, 2022).

d. Retention: Detailing Cost

The cost of detailing an EDO to the same geographic area consistently is a lack of location diversity. This lack of diversity can result in complacency. In addition, this enhanced look at detailing would require an increased oversight of each EDOs career by the detailer or placement officer. This cost can be equivalent to adding an additional detailer. The cost of adding an additional O-5 detailer can be estimated as the sum of Basic pay, BAH in Millington, TN, and BAS. A per month estimate would be:

$$\begin{aligned} & \$9,982.80 \text{ (Basic Pay O-5 with 16 years)} + \$2,526.00 \text{ (BAH O-5 with dependents)} + \\ & \quad \$311.88 \text{ (BAS)} = \$12,820.68. \end{aligned}$$

e. Benefit

Like the benefits of increased business acumen, retaining talented individuals is instrumental in reducing costs, shortening maintenance periods, increasing knowledge, and lowering mishaps. The value for a talented EDO can be estimated as the training of an EDO from Commissioning to Command.

(1) Basic Pay

The cost to train a talented EDO from O-1 to O-6 will include Basic pay at each rank for an officer who made the appropriate rank at the earliest opportunity. This cost without any adjustments in future day Basic pay sums to \$ 2,207,775.60 after 23 years of service or averages to \$7,999.19 per month as seen in Table 7.

Table 7. Basic Pay, BAH, and BAS from O-1 to O-6. Adapted from MILPAY (2023)

YCS	Pay Grade	Years of Service on Pay Char	Basic Pay (per month)	San Diego BAH w/ dependents (per month)	BAS	Total
0 - 1	O-1	<2	\$ 3,637.20	\$ 3,801.00	311.88	7750.08
1 - 2	O-1	<2	\$ 3,637.20	\$ 3,801.00	311.88	7750.08
2 - 3	O-2	2	\$ 4,772.70	\$ 3,804.00	311.88	8888.58
3 - 4	O-2	3	\$ 5,496.90	\$ 3,804.00	311.88	9612.78
4 - 5	O-3	4	\$ 6,469.80	\$ 4,230.00	311.88	11011.68
5 - 6	O-3	4	\$ 6,469.80	\$ 4,230.00	311.88	11011.68
6 - 7	O-3	6	\$ 6,780.30	\$ 4,230.00	311.88	11322.18
7 - 8	O-3	6	\$ 6,780.30	\$ 4,230.00	311.88	11322.18
8 - 9	O-3	8	\$ 7,120.50	\$ 4,230.00	311.88	11662.38
9 - 10	O-3	8	\$ 7,120.50	\$ 4,230.00	311.88	11662.38
10 - 11	O-4	10	\$ 8,254.80	\$ 4,794.00	311.88	13360.68
11 - 12	O-4	10	\$ 8,254.80	\$ 4,794.00	311.88	13360.68
12 - 13	O-4	12	\$ 8,665.50	\$ 4,794.00	311.88	13771.38
13 - 14	O-4	12	\$ 8,665.50	\$ 4,794.00	311.88	13771.38
14 - 15	O-4	14	\$ 8,951.10	\$ 4,794.00	311.88	14056.98
15 - 16	O-4	14	\$ 8,951.10	\$ 4,794.00	311.88	14056.98
16 - 17	O-5	16	\$ 9,982.80	\$ 5,196.00	311.88	15490.68
17 - 18	O-5	16	\$ 9,982.80	\$ 5,196.00	311.88	15490.68
18 - 19	O-5	18	\$ 10,265.40	\$ 5,196.00	311.88	15773.28
19 - 20	O-5	18	\$ 10,265.40	\$ 5,196.00	311.88	15773.28
20 - 21	O-5	20	\$ 10,544.70	\$ 5,196.00	311.88	16052.58
21 - 22	O-5	20	\$ 10,544.70	\$ 5,196.00	311.88	16052.58
22 - 23	O-6	22	\$ 12,367.50	\$ 5,241.00	311.88	17920.38
Average Monthly Cost			\$ 7,999.19	\$ 4,598.74	\$ 311.88	12909.81

(2) Allowances

Allowances will include BAS and BAH. For calculation ease the BAS and BAH are not adjusting for future day increases. Therefore, the BAS is 311.88 and is the same for all ranks of Officers. The BAH is a variable cost, varying from location and rank; however, an Officer living in San Diego with dependents will be used for calculation ease. The average monthly BAH after 23 years of service is \$4,598.74.

V. COMPARATIVE ANALYSIS

To conduct a comparative analysis, assumptions will be listed prior to their analysis. A discount rate will not be utilized. A discount rate could be determined by the expected rates of return of the financial markets since items are discounted because a present-day dollar may cost more in the future and a stable dollar is worth more than a risky dollar (Brealey et al., 2020). In Principles of Corporate Finance, Richard Brealey mentions that rates of return in the market would be determined by how much to discount for time and risk. However, since the complexity and uncertainty of today’s money and the potential growth of the courses of actions, discount rates will not be utilized.

A. TOTAL MONTHLY COST OF ADDING BUSINESS ACUMEN TRAINING PER EDO.

The cost of adding business acumen training per EDO during EDO basic, PGS, EDO Senior, AMP, and OJT are summarized in Table 8.

Table 8. Comparative Analysis Summary of Adding Business Acumen Training

Timeline	Rank	Cost of Training	Opportunity Cost	Sum
EDO Basic	O-3	\$4,690.57	\$16,032.18	\$ 20,722.75
PGS	O-3	\$4,690.57	\$11,364.18	\$ 16,054.75
EDO Senior / AMP	O-5	\$4,690.57	\$20,200.68	\$ 24,891.25
OJT time-based with GS-15 instructor	O-4	\$1,264.63	\$27,542.76	\$ 28,807.39
	O-5	\$1,264.63	\$30,981.36	\$ 32,245.99
OJT times based with O-5 instructor	O-4	\$2,020.07	\$27,542.76	\$ 29,562.83
	O-5	\$2,020.07	\$30,981.36	\$ 33,001.43
OJT continuous training	O-4 /O-5	\$116.29	\$29,084.20	\$ 29,200.49

The costs of adding business acumen at different times in the career will be analyzed further in the following chapter.

1. EDO Basic

Initial Assumptions: EDOs in Postgraduate School, EDO Senior, AMP, EDOCTS, and most stages of their OJT will not receive additional business acumen training if training is given in EDO Basic. The calculation will utilize an EDO who is PCSing from San Diego with an I-stop at EDO Basic.

The cost would be the Cost of training in a Schooling Environment (\$4,690.57) plus the Opportunity Cost of an O-3 at 6 years in transit (\$16,032.18) totaling \$20,722.75/month per EDO.

2. Postgraduate School (PGS)

Initial Assumptions: EDOs in Postgraduate School, EDO Senior, AMP, EDOCTS, and most stages of their OJT will not receive additional business acumen training if training is given at Postgraduate School. The calculation will utilize an EDO who is stationed at Naval Postgraduate School in Monterey, CA.

The cost would be the Cost of training in a Schooling Environment (\$4,690.57) plus the Opportunity Cost of an O-3 at 6 years (\$11,364.18) totaling \$16,054.75/month per EDO.

3. EDO Senior / AMP

Initial Assumption: EDOs in EDOCTS and beyond will not receive additional business acumen training if training is given at EDO Senior and/or AMP. The calculation will utilize an EDO who is stationed or is PCSing from San Diego with an I-stop or TDY at the Schoolhouse in Port Hueneme, California.

The cost would be the Cost of training in a Schooling Environment (\$4,690.57) plus the Opportunity Cost of an O-5 in transit at 16-18 years (\$ 20,200.68) totaling \$24,891.25/month per EDO.

4. EDOCTS

EDOs serving in their Crown Jewel CO tour will not receive training if training is given at EDOCTS. Addressing this training this late in the career will limit return on investment. Additionally, costs would be higher than those from EDO Senior and AMP. Therefore, costs were not calculated.

5. OJT – Timeline Based

OJT training values can range from who is conducting the training. Additionally, OJT training depends on when in the career timeline the training is conducted. If training is conducted as a Junior EDO, current Senior EDOs will miss the business acumen training opportunity; however, if it is conducted as a Senior EDO, it will cost more compared to a Junior EDO.

Initial Assumption: The calculations will utilize San Diego as the duty station for Active-Duty military and officers will require a billet replacement while undergoing training. For the costs of a GS-15 Step 5, the average cost of a GS-15 Step 5 is utilized. Additionally, measurements of class size will be estimated at ten (10) Sailors.

The cost of a GS-15 who trains an O-4 EDO:

The Cost of a GS-15 step 5 (\$12,646.28) / class size (10) plus the Opportunity Cost of two O-4s at 12 – 14 years (\$27,542.76) totaling \$28,807.39.

The cost of a GS-15 who trains an O-5 EDO:

The Cost of a GS-15 step 5 (\$12,646.28) / class size (10) plus the Opportunity Cost of two O-5s at 16 – 18 years (\$30,981.36) totaling \$32,245.99.

The cost of an O-5 military member who trains an O-4 EDO:

The Cost of an O-5 instructor at 16-18 (\$20,200.68)/ class size (10) plus the Opportunity Cost of two O-4s at 12 – 14 years (\$27,542.76) totaling \$29,562.83.

The cost of an O-5 military member who trains an O-5 EDO:

The Cost of an O-5 instructor at 16-18 (\$20,200.68)/ class size (10) plus the Opportunity Cost of two O-5s at 16 – 18 years (\$30,981.36) totaling \$33,001.43.

6. OJT – Continuous Training

Initial Assumptions: Due to the various locations and the amount of EDOs requiring training, four instructors will be required to continuously be paid for the sake of continuous training calculations. The total number of operational EDOs will consist of only LCDRs at 12-14 years and CDRs at 16-18 years. It is also assumed that there are 240 – LCDRs and 195 – CDRs (J. Keegan et al., PowerPoint slides, 2021). San Diego is used as the duty station for Active-Duty military calculations and officers will require a billet replacement while undergoing training.

Cost of GS 15 continuous training:

$4 \times \text{the Cost of GS-15 Step 5 (4 x \$12,646.28) divided by the number of EDOs trained (240 + 195) plus the Average Cost of an EDO trained (240 x \$27,542.76 + 195 x \$30,981.36) / (240+195) totaling \$29,200.49.}$

As seen above in Table 8 and in the OJT-time based training, the cost of an O-5 conducting the training will result in a higher cost than a GS-15 step 5. Therefore, calculations will not be conducted to determine exact value since the cost of a GS-15 Step 5 would be cheaper.

B. COMPARATIVE ANALYSIS OF RETENTION BENEFITS

A comparative analysis of adding Retention incentives is summarized in Table 9. The potential costs are SWO DHRB, SWO LRB, SWO SORB, and detailer costs. The benefits are non-quantifiable and the cost of a talented EDO.

Table 9. Comparative Analysis Summary of Adding Retention Incentives.
Adapted from Heames (2023)

	Measurement	Per Contract	Per Month (1 EDO)
Costs	SWO DHRB	\$105,000.00	
	SWO LRB	\$46,000.00	
	SWO SORB	\$48,000.00	
	Sum Retention Bonus	\$199,000.00	\$721.01
	Detailer Costs (\$12,820.68/month)		\$29.47
	Total Monthly Cost of Retention		\$750.49
Benefits	Non quantifiable Costs		***
	Average Monthly Cost of O-1 to O-6		\$12,909.81

1. Costs

The costs of adding retention incentives are assumed to be the SWO retention bonuses plus the costs of adding an O-5 Detailer. The SWO retention bonuses calculation will utilize the maximum SWO DHRB (\$105,000), SWO LRB (\$46,000), and SWO SORB (\$48,000). This yields an average contract size of \$199,000 or an average monthly contract size for 23 years of service of \$721.01/per EDO. The detailer’s monthly cost (\$12,820.68) was derived in the above chapter, *Retention: Detailer Cost*. For this comparative analysis the cost is distributed among the total operational EDOs to get a cost per EDO. This calculation assumes the total number of operational EDOs will consist of only LCDRs at 12-14 years and CDRs at 16-18 years. It is also assumed that there are 240 – LCDRs and 195 – CDRs (J. Keegan et al., PowerPoint slides, 2021) The total average monthly cost per EDO is \$750.49.

2. Benefits

The average monthly benefits contain the non-quantifiable costs of reducing costs, shortening maintenance periods, increasing knowledge, and lowering mishaps and contain the quantifiable cost of the average monthly cost of training a talented EDO from Commissioning to Command. This opportunity cost that can be seen as a benefit that was not lost by retaining the Sailor. This value equals \$12,909.81.

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VI. CONCLUSION / RECOMMENDATIONS

Improved talent management retention and business acumen exposure during the Engineering Duty Officer career path may contribute to the success of EDO commanding officers. Business acumen can be improved by On-the-Job training or via additional schooling. The three lowest estimated direct net costs to add training to improve business acumen are at NPS, during EDO Basic Course, and during EDO Senior Course and Advanced Management Program courses. These monthly costs per EDO amount to \$16,055, \$20,723, and \$24,891, respectively. The direct costs of the EDO Senior and AMP courses can be reduced further by combining and overhauling the material into one single one-month course. This may allow for EDOs to not feel overwhelmed with business related knowledge during their early stages of their career but still prepare an EDO for their Commanding Officer tour.

Retention might be improved in the form of improved detailer oversight and adding retention bonuses. One possibility is for the retention bonuses to be evaluated by the 28 leadership attributes identified in Figure 3 (Naval Sea Systems Command (NAVSEA), 2021). Appendix A, LDF proficient level, can be utilized to detail a requirement of proficiency for each attribute. Additional attributed proficiency requirements can be found in Naval Sea Systems Command, *Engineering Duty Officer (EDO) Leader Development Framework* (NAVSEA, 2021).

A direct net cost for one EDO per month of \$721 could be added for a retention bonus and an additional \$29 would be added for adding an additional detailer giving a total cost of \$750/month. With quantifiable benefits of \$12,909/month and unquantified benefits, a scalable retention bonus and an additional detailer should be added.

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VII. RECOMMENDATIONS FOR FUTURE RESEARCH

Recommended research for further projects would be to evaluate the two other themes identified in the Tick et al. report, earlier leadership opportunity and upward mobility.

A. LEADERSHIP OPPORTUNITY

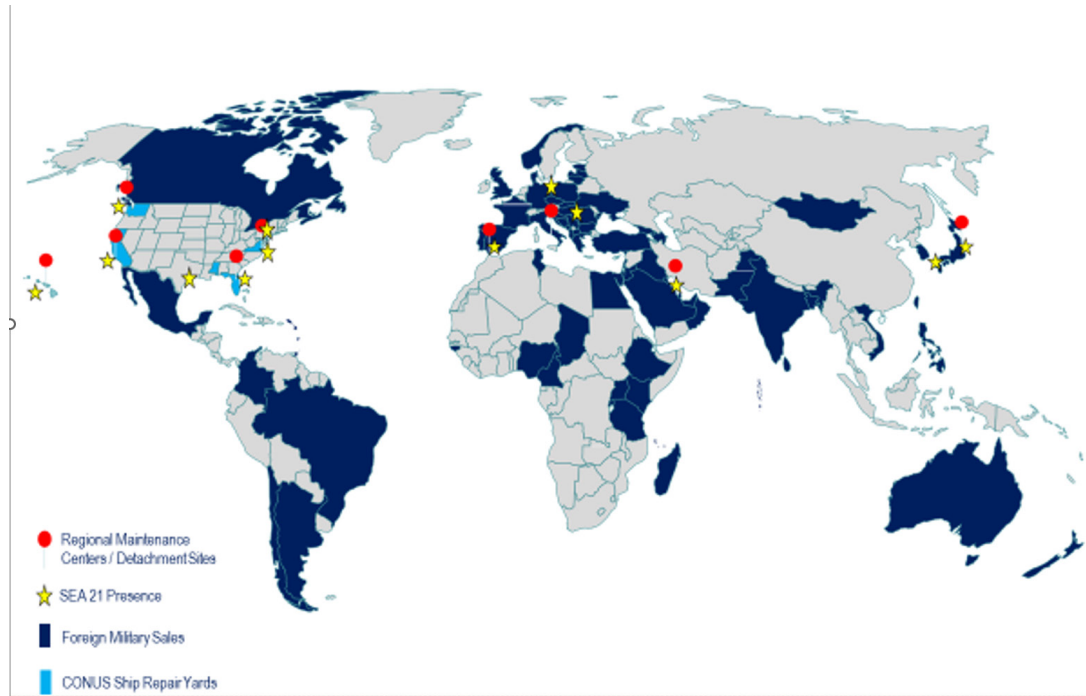


Figure 6. Regional Maintenance Center Distribution. Source: Tick (2022)

The EDO community gives leadership opportunities prior to CAPT (O-6). This can be seen in the Forward Deployed Regional Maintenance Center (FDRMC). The commanding officer is a CAPT (O-6) in Naples while there is leadership position as his XO as a LCDR (O-4). There are two CDR Officer in Charges (OIC) in the region at the Bahrain Detachment and Rota Detachment. Like the FDRMC, the U.S. Naval Ship Repair Facility and Japan Regional Maintenance Center (SRF JRMC) has numerous leadership opportunities. The commanding officer is a CAPT (O-6) and leadership position as Deputy

Commander for a CDR (O-5). Additionally, there is a CDR (O-5) officer in charge at the Sasebo Detachment.

1. SWO Community

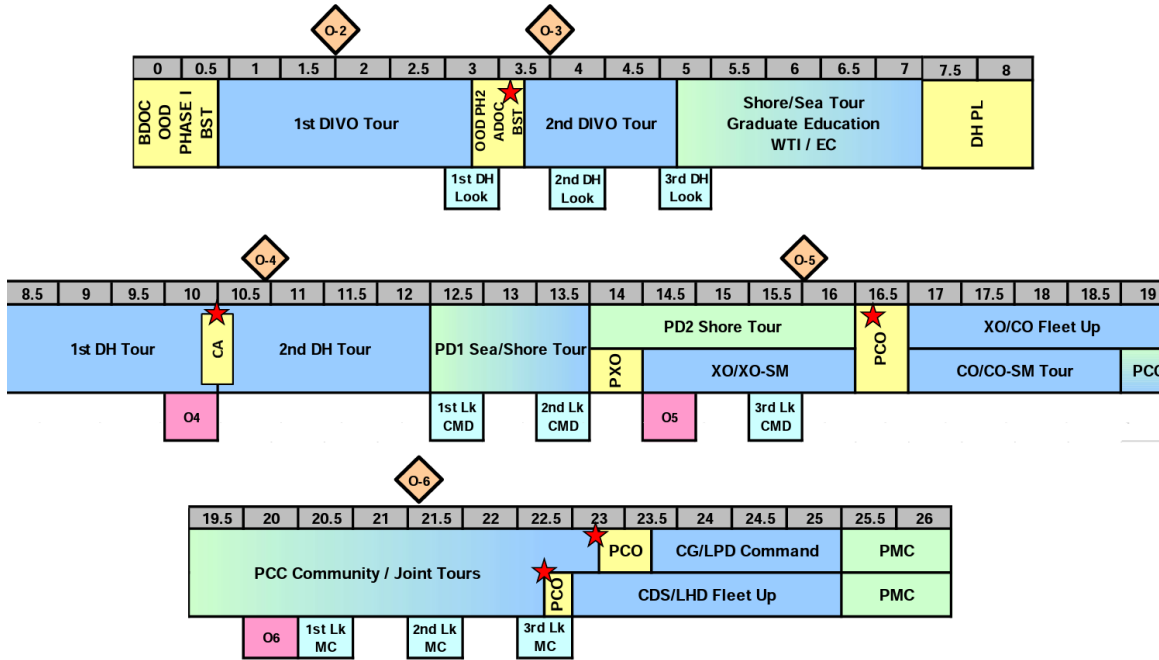


Figure 7. Legacy SWO Career Path. Source: Heames (2023)

SWOs have more opportunities to take early command than EDOs due to the increased availability. Some SWO leadership opportunities include mine counter measure (MCM) command, Naval Support Element commander, and Unmanned UxS Task Group command. These command opportunities can occur during the second Department Head tour or post Department Head tour (PD1) (Commander, Naval Surface Force, 2017).

Looking at the SWO career track, multiple operational tours are completed prior to any leadership position is offered. It is important for SWOs to have requisite knowledge prior to taking command.

2. EDO Community

Like in the SWO community, it is essential for EDOs to have sufficient requisite knowledge before assuming command or having a leadership position. LCDR leadership opportunities may not be beneficial for the EDO community since technical and business knowledge is valued. In the EDO leader development framework (LDF) the attributes the EDO community looks at are:

1. Leadership experience at-sea and ashore
2. Technical Education and Acquisition Training
3. Linking Fleet and Shore infrastructures
4. Problem solving
5. Championing innovation (NAVSEA, 2021)

B. UPWARD MOBILITY

It is important to know that promotions are due to vacancies. Vacancies are created in two ways 1) Promotions 2) Losses (J. Keegan et al., PowerPoint slides, 2021). Therefore, if there are no losses, upward mobility will not occur.

To have upward mobility, the EDO community desires leaders to have some of the 28 leadership attributes.

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APPENDIX A. LDF PROFICIENCY LEVEL EXAMPLE

Financial Management - Understands the organization's financial processes. Prepares, justifies, and administers the program budget. Oversees procurement and contracting to achieve desired results. Monitors expenditures and uses cost-benefit thinking to set priorities.		
Proficiency Level	Proficiency Level Definition	Proficiency Level Illustrations
Level 5 - Expert	<ul style="list-style-type: none"> ● Applies the competency in exceptionally difficult situations ● Serves as a key resource and advises others 	<ul style="list-style-type: none"> ● Designs and implements an agency-wide financial management system to meet organizational objectives ● Develops agency-wide financial procurement procedures and policies ● Audits major acquisitions having agency-wide impact, presents findings, and recommends corrective actions
Level 4 - Advanced	<ul style="list-style-type: none"> ● Applies the competency in considerably difficult situations ● Generally requires little or no guidance 	<ul style="list-style-type: none"> ● Develops and implements new procurement system to support agency program within time and budgetary constraints ● Ensures financial commitments and deadlines are met by facilitating and assessing processes, situations, and issues and takes corrective action, as needed ● Considers implications of financial decisions and suggests methods for meeting needs of staff and the organization overall ● Develops, justifies, and manages organization-wide budgets for annual projects and programs
Level 3 - Intermediate	<ul style="list-style-type: none"> ● Applies the competency in difficult situations ● Requires occasional guidance 	<ul style="list-style-type: none"> ● Conducts research to determine resource needs and guides the procurement process to acquire resources ● Conducts a cost-benefit analysis to develop sound financial plans with programmatic impact ● Follows established guidelines and procedures to ensure approval of funding for key initiatives ● Prepares and monitors office's annual operating budget
Level 2 - Basic	<ul style="list-style-type: none"> ● Applies the competency in somewhat difficult situations ● Requires frequent guidance 	<ul style="list-style-type: none"> ● Justifies requested budget allocation to management in relation to program objectives ● Allocates program budget across multiple projects
Level 1 - Awareness	<ul style="list-style-type: none"> ● Applies the competency in the simplest situations ● Requires close and extensive guidance 	<ul style="list-style-type: none"> ● Ensures inventory accounting is accurate and complete ● Monitors income and expenditures for projects

Source: NAVSEA (2021).

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APPENDIX B. INTERVIEW QUESTIONS

1. For how long were or have you been in the Navy?
2. Can you tell me about how your career has progressed to this point?
3. What attracted you to the EDO Community?
4. What is or was your current or final EDO job?
5. Which education and training opportunities prepared you best for that job?
6. Which job assignments prepared you best for that job?
7. What education and training opportunities or job assignments could have prepared you better?
8. What were your greatest achievements through that job?
9. What were your greatest difficulties with that job?
10. What advice would you give to someone contemplating applying for or accepting that job?
11. What advice would you give to the Navy for helping someone succeed at that job?
12. Tell me a story about someone who excelled at that job and one about someone who failed. (Tick et al., 2022).

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