

Manpower cost Estimating Tool for Enhanced Online Reporting (METEOR)

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ABSTRACT

Acquisition of major weapons systems requires an assessment of the program operating and support (O&S) costs. The largest O&S cost contributor is in the area of Manpower, Personnel and Training. To improve the quality of Total Ownership Cost estimates, the Navy recently released a new manpower estimating database/model to help cost analyst capture both the direct and indirect costs associated with Manpower, Personnel and Training.

The Navy cost community has a long history of studying manpower costs in new acquisition programs. Since the "Cost of a sailor" study in 1995, the Navy has sought to develop a capability to help identify both direct and indirect manpower costs. Until recently, the Cost of Manpower Tool (COMET) was the single source for estimating manpower costs. COMET uses historical billet cost data to estimate direct manpower costs. The real contribution of the model was its ability to capture and estimate variable indirect manpower costs. When direct and variable indirect costs are captured a more accurate cost benefit analysis can be accomplished.

As a result of changes in military benefits, health care, and retirement, the cost estimating relationships used in COMET has become sorely outdated. The Naval Center for Cost Analysis embarked on an effort to revise and update the direct and indirect cost relationships found in the old database/model. This new database/model, called Manpower Cost Estimating for Enhanced Online Reporting (METEOR) is a cost estimating tool that uses actual military manpower pay augmented with historical budgeting data that spans from 1975 to 2008.

This paper seeks to explore the concepts used in the new database/model for estimating manpower, personnel and training costs on ship platforms. It discusses the strengths and weaknesses of using actual manpower return costs compared to the Department of Defense Military Personnel Composite Standard Pay and Reimbursement Rates, otherwise known as forward pricing rates for estimating direct costs. Most importantly, this paper discusses how indirect cost factors used in the original "Cost of a sailor" study have changed as a result of an

more recent historical data. Finally, the paper outlines the model enhancements in terms of 5 major areas: 1) Model scenario parameters; 2) Cost elements; 3) Manning document preparation; 4) Life cycle cost (LCC) analysis; and 5) analysis capabilities.

INTRODUCTION

Manpower cost Estimating Tool for Enhanced Online Reporting (METEOR) is a manpower cost estimating tool for life-cycle cost (LCC) analysis of active duty personnel attached to platforms. For a defense acquisition program, LCC consists of research, development, test and evaluation (RDT&E) costs, investment costs, O&S costs and disposal costs over the entire LCC. These costs include not only the direct costs of the acquisition program, but also include indirect costs that would be logically attributed to the program. In this way, most manpower associated costs are included, regardless of funding source or management control.

The model was created to provide cost estimators with a tool that utilizes the combination of execution and budget data to model the direct and variable indirect costs tied to active duty personnel. With this capability, an analyst can assess the economic impact on LCC of manpower-hardware tradeoff alternatives in accordance with Department of Defense (DoD) Directive 5000.1, The Defense Acquisition System, and DoD Instruction 5000.02, Operation of the Defense Acquisition System.

METEOR is a web-based model that is accessible to a VAMOSC account without additional software installations. From the perspective of a user, there are five major components of METEOR: 1) Selecting scenario parameters; 2) Selecting cost elements; 3) Preparing manning document; 4) Performing LCC analysis; and 5) Performing delta analysis. Manning baselines are provided at the ship class level and can be manipulated to model a new platform, or can be built from scratch to model a system. For modeling and reporting purposes, the manpower costs can be modeled at three manning levels: 1) Pay Grade; 2) Designator or Present Rate Abbreviation (Rating); and 3) Advanced Qualification Designation (AQD) or Navy Enlisted Code (NEC). Cost baselines are created using a five year rolling average of execution data at the ship class level and can be manipulated by choosing to include or exclude cost elements.

Sample scenarios could assess the impact of adding or subtracting manning for an existing or new platform to model the deployment or retirement of a weapon system. The user would choose the pertinent details and manipulate the manning document to model personnel and skills associated with the weapon system to run an LCC analysis. Various permutations of the above analysis can be performed for comparisons and delta analysis.

The purpose of the paper is to familiarize the user community with the methodology applied in order to create the model. This paper will discuss in

depth the direct costs, the indirect costs and the cost allocation schemes to personnel on board a platform being developed. The reader will become aware of the different processes that are required to perform calculations and will be informed of any anomalies and special-case scenarios. Additionally, data sources and data validation sources will be provided.

DIRECT COSTS

Military personnel direct costs are those that are paid directly to a sailor. The types and amounts of pay received by a sailor ultimately depend on their jobs and rank. Certain jobs are eligible for special pays while others are not. The majority of direct costs in METEOR come from the VAMOSOC Personnel Annual Database, which is fed data from the Defense Manpower Data Center (DMDC). Selective re-enlistment bonus, enlistment bonus and nuclear career pay/bonus are allocated using Navy MPN budget data. In order to better understand the direct costs included in the model, below is a brief description of the costs and how they are organized into categories.

Basic Pay: Basic pay is a direct cost that is paid to everyone regardless of pay grade, job function and whether they are officer or enlisted. The amount of base pay is directly correlated with pay grade and years of experience.

Retired Pay Accrual: Since 1985, the “accrual accounting” concept has been used to budget for the costs of military retired pay in the future. This retired pay accrual is calculated as a certain percentage of Base pay.

Basic Allowance for Housing: This includes Basic allowance for housing (BAH), variable housing allowance (VHA), Oversea Housing allowance (OHA), and Move-in Housing allowance (MIHA). These are costs of housing when no housing on base is available or when a sailor is at a new permanent duty station or overseas.

Subsistence: Basic Allowance for subsistence is a direct cost that is paid to everyone regardless of pay grade, job function, and whether they are officer or enlisted. There is one flat rate for officers and one flat rate for enlisted.

Incentive, hazardous Duty and Aviation career: This category includes hazardous duty pay which is a direct cost that is paid to any personnel whose job is inherently dangerous, such as handling ordnance or fuels. Aviation and submarine pay are rolled into this category. All sailors who have are eligible job function can receive this pay. Additionally, proficiency pay which is paid to enlisted sailors in certain job functions and career sea pay which is paid to a sailor who is on sea duty for a set period of time is also included in the category.

Special pay: This category includes hostile fire pay, board certified pay, diving duty pay, foreign language proficiency pay, career sea pay premium, additional special pay, miscellaneous Officers Pay officers saved pay and variable special pay. Each of these has a special and application to a unique career field such a diver, interpreter, medical, dental, etc.

Allowances: This category includes Clothing/Equipment allowances, Family Separation Allowances (FSA), Continental U.S. cost of Living Allowances (CONUS COLA), and Cost of living Allowances (COLA). Clothing/Equipment Allowance is a direct cost element that is paid to everyone regardless of pay grade, job function, and whether they are officer or enlisted. However, while enlisted personnel receive this regularly, officers generally receive this once upon commissioning. FSA is a direct cost element that is paid when a sailor who has dependents has been on a deployment for 30 days and beyond. There is a flat rate that is paid each month regardless of pay grade, job function, or whether the sailor is an officer or enlisted. CONUS COLA is paid to a sailor who lives in a high cost area. This pay is for any non-housing related expense. COLA is similar to CONUS COLA but is for anywhere that is not in the continental U.S.

Separation Payments: This category includes Accrued Leave Pay and Separation pay. Accrued Leave Pay is a lump sum payment that a sailor can cash out when they leave the Navy. This amount depends on how much leave has been accrued. Separation Payment is a direct cost that is paid as a lump sum when a sailor is separated from the armed services.

FICA: The Federal Insurance Contributions Act (FICA) tax is a payroll / employment tax imposed by the federal government on both employees and employers to fund Social Security and Medicare.

Permanent Change Station (PCS): PCS is a direct cost paid to sailors when they change permanent duty stations. It is a pay that covers cost of moving. It is paid to all personnel regardless of rank, job function, and whether they are enlisted or officer.

Other costs elements (harvested from budget): As a result of antiquated reporting systems, some costs that get reported are rolled up into other categories. Without the budget, visibility into this roll-up would be impossible. Using the Presidents budget, information on Nuclear Officer Career Annual Incentive Bonus, Selected Reenlisted Bonus/Enlistment Bonus, can be separated out within the model. Nuclear Officer Career Annual Incentive Bonus is paid to nuclear-qualified officers. This qualification is identified by the AQD. It is paid in a lump sum every year. Selective Re-Enlistment Bonus is paid to enlisted personnel with a high

skill set that re-enlist in the Navy. The amount depends on what skill set they possess, their current time in service and how long they enlist for. Enlistment Bonus is paid to highly skilled enlistees who enlist in a specialty that is high skilled and is in high demand.

In the past, before this data was available, cost analysis would use the Military Personnel Composite Standard Pay and Reimbursement Rates to estimate the direct manpower costs. These rates provided an average for pay grade and separates out base pay and allowances and special pay. In order to prove the accuracy of the data being collected by VAMOSC, a comparison analysis between VAMOSC data as well as the standard composite rate data was performed. The results were that the base pay matched up closely, but there was more disconnects in the allowances which is likely due to the fact that not everyone receives every cost element (see table 1).

PG	VAMOSC Base Pay	CWRD	\$/Person	OSD Base Pay	Delta	% Difference	VAMOSC Allowances	CWRD	\$/Person	(+)MEHRC	OSD Allowances	Delta	% Difference
O01	\$215,303,130.00	6,145.83	\$35,032.39	\$34,737.00	\$295.39	0.85%	\$214,512,849.00	6,145.83	\$34,903.80	\$40,891.80	\$48,233.00	-\$7,341.20	-15.22%
O02	\$285,219,724.00	6,091.42	\$46,823.19	\$46,827.00	-\$3.81	-0.01%	\$263,037,028.00	6,091.42	\$43,181.56	\$49,169.56	\$56,448.00	-\$7,278.44	-12.89%
O03	\$1,079,761,565.00	18,176.42	\$59,404.52	\$59,340.00	\$64.52	0.11%	\$974,483,811.00	18,176.42	\$53,612.53	\$59,600.53	\$72,921.00	-\$13,320.47	-16.27%
O04	\$852,237,055.00	11,712.17	\$72,765.09	\$72,649.00	\$116.09	0.16%	\$738,756,258.00	11,712.17	\$63,075.95	\$69,063.95	\$79,025.00	-\$9,961.05	-12.60%
O05	\$680,622,889.00	7,943.92	\$85,678.47	\$85,732.00	-\$53.53	-0.06%	\$561,465,304.00	7,943.92	\$70,678.62	\$76,666.62	\$81,050.00	-\$4,383.38	-5.41%
O06	\$379,095,335.00	3,559.92	\$106,489.85	\$106,543.00	-\$53.15	-0.05%	\$273,159,947.00	3,559.92	\$76,732.05	\$82,720.05	\$88,149.00	-\$5,428.95	-6.16%
O07	\$14,832,965.00	117.17	\$126,593.54	\$126,738.00	-\$144.46	-0.11%	\$9,114,950.00	117.17	\$77,792.52	\$83,780.52	\$83,346.00	\$434.52	0.52%
O08	\$11,344,454.00	78.33	\$144,828.98	\$144,920.00	-\$91.02	-0.06%	\$6,278,816.00	78.33	\$80,158.51	\$86,146.51	\$88,161.00	-\$2,014.49	-2.29%
O09	\$5,282,717.00	32.50	\$162,545.14	\$158,312.00	\$4,233.14	2.67%	\$2,603,842.00	32.50	\$80,118.22	\$86,106.22	\$89,781.00	-\$3,674.78	-4.09%
O10	\$1,764,177.00	10.42	\$169,306.81	\$168,000.00	\$1,306.81	0.78%	\$943,410.00	10.42	\$90,538.39	\$96,526.39	\$86,312.00	\$10,214.39	11.83%
W02	\$26,537,110.00	509.83	\$52,050.90	\$52,659.00	-\$608.10	-1.15%	\$26,125,869.00	509.83	\$51,244.28	\$57,232.28	\$62,053.00	-\$4,820.72	-7.77%
W03	\$50,749,013.00	816.42	\$62,160.42	\$62,478.00	-\$317.58	-0.51%	\$42,710,029.00	816.42	\$52,313.80	\$58,301.80	\$62,407.00	-\$4,105.20	-6.58%
W04	\$18,601,281.00	251.50	\$73,961.36	\$74,213.00	-\$251.64	-0.34%	\$14,386,335.00	251.50	\$57,202.13	\$63,190.13	\$68,033.00	-\$4,842.87	-7.12%
W05	\$4,578,736.00	55.08	\$83,128.83	\$84,035.00	-\$906.17	-1.08%	\$3,229,296.00	55.08	\$58,629.19	\$64,617.19	\$71,551.00	-\$6,933.81	-9.69%
E01	\$222,295,644.00	15,713.42	\$14,146.87	\$15,143.00	-\$996.13	-6.58%	\$158,946,001.00	15,713.42	\$10,115.30	\$16,103.30	\$25,557.00	-\$9,453.70	-36.99%
E02	\$335,184,175.00	19,253.50	\$17,409.00	\$17,936.00	-\$527.00	-2.94%	\$259,553,408.00	19,253.50	\$13,480.84	\$19,468.84	\$27,178.00	-\$7,709.16	-28.37%
E03	\$980,514,189.00	51,057.33	\$19,204.18	\$19,610.00	-\$405.82	-2.07%	\$902,484,017.00	51,057.33	\$17,675.90	\$23,663.90	\$30,798.00	-\$7,134.10	-23.16%
E04	\$1,295,117,026.00	57,191.75	\$22,645.17	\$23,189.00	-\$543.83	-2.35%	\$1,405,769,104.00	57,191.75	\$24,579.93	\$30,567.93	\$36,155.00	-\$5,587.07	-15.45%
E05	\$2,130,078,434.00	75,341.58	\$28,272.28	\$28,712.00	-\$439.72	-1.53%	\$2,492,271,969.00	75,341.58	\$33,079.64	\$39,067.64	\$42,434.00	-\$3,366.36	-7.93%
E06	\$1,973,908,629.00	55,505.08	\$35,562.67	\$35,854.00	-\$291.33	-0.81%	\$2,189,768,842.00	55,505.08	\$39,451.68	\$45,439.68	\$47,768.00	-\$2,328.32	-4.87%
E07	\$1,117,017,220.00	25,628.50	\$43,584.96	\$43,946.00	-\$361.04	-0.82%	\$1,136,538,305.00	25,628.50	\$44,346.66	\$50,334.66	\$51,773.00	-\$1,438.34	-2.78%
E08	\$369,103,075.00	7,165.75	\$51,509.34	\$51,263.00	\$246.34	0.48%	\$347,223,956.00	7,165.75	\$48,456.05	\$54,444.05	\$54,961.00	-\$516.95	-0.94%
E09	\$196,751,923.00	3,055.17	\$64,399.66	\$64,455.00	-\$55.34	-0.09%	\$166,728,059.00	3,055.17	\$54,572.43	\$60,560.43	\$60,280.00	\$280.43	0.47%

Table 1: Comparison of VAMOSC to OSD Standard Composite Rates

DIRECT COST ALLOCATION

The direct costs fall into three categories namely, Standard, Unique-homeport, and Unique-other. Each of the categories has a different method of allocating costs. As discussed previously, METEOR enhancements now allow the analyst to obtain the direct costs in the standard and unique-homeport categories directly from VAMOSC data. The unique-Other category costs still are harvested from budget.

Standard Direct Costs Elements

Standard cost elements include such things as Base Pay, Basic Allowances for Subsistence and Retirement. The entire list of Standard Cost Elements is shown in table 2. Standard costs elements are calculated using a

combination of per-person payments (PPP) and a ratio to allocate the costs. The data comes from VAMOSC and is calculated as a five year rolling average of personnel data. These costs are then multiplied by the numbers the analyst selects or the number provided in the proposed manning document. The ratio comes into play because every sailor within the same designator or rating does not receive all cost elements or pays. VAMOSC offers three different Constant Year Dollars choices. The model will choose the Constant Year Dollars that matches up with the most recent year of data. For example, if the last year of personnel data we have is 2007, the model will use Constant FY07 Dollars to inflate the previous years to 2007 dollars to provide a more accurate average. The following equations are used to allocate the standard direct costs to sailors.

$$PPP(x) = \frac{[Constant\ FY\ Dollars_{sc}(x)]}{[Count\ Who\ Received\ Dollars_{sc}(x)]} \quad (1)$$

Ratio(x) =

$$\frac{[Count\ Who\ Received\ Dollars_{sc}(x)]}{[Count\ Who\ Received\ Dollars_{sc}(Base\ Pay)]} \quad (2)$$

Where

X = the cost element

subscripts = conditions set upon the query
 sc = all of the UICs of the user-selected ship class
 [] = denotes running a query in VAMOSC

Base Pay	Hostel Fire Pay	Foreign Language Proficiency Pay	Misc. Officer Pay	Separation Payment*
Basic Allowance for Subsistence	Board Certified Pay	Career Sea Pay	Officer Saved Pay	FICA
Clothing / Equipment Allowances*	Diving Duty Pay	Career Sea Pay Premium	Variable Special Pay	Retirement
Hazardous Duty Pay	Proficiency Pay	Additional Special Pay*	Accrued Leave Pay*	PCS*

* Denotes that an extra processing step is required. These cost elements are lump sum payments and not paid every month. In the model, these lump sum payments will be annualized to accurately view the number of people who receive this cost.

Table 2: List of Standard Direct Cost Elements

Since data obtain from DMDC combines Hazardous Duty Pay (HDP), Aviation Career Incentive Pay (ACIP), and Submarine Duty Incentive Pay (SDIP) into the Hazardous Duty family of VAMOSC cost elements, a method was developed within the model to allocate these costs. The allocation method was developed from reviewing budget material and is shown below. Specifically, if personnel receive HDP, ACIP, or SDIP their payments were recorded in the Hazardous Duty I cost element. Personnel who receive HDP and ACIP have their HDP payments recorded in Hazardous Duty I and their ACIP payments in Hazardous/ Duty II. However, personnel who receive HDP and SDIP have their

SDIP payments recorded in Hazardous Duty I and their HDP payments in Hazardous Duty II. The point is that until the costs get reported with greater granularity, methods must be used to allocation costs within the Hazardous duty family of VAMOSOC costs.

Payments Received	Hazardous Duty I	Hazardous Duty II
Hazardous Duty Pay Only	HDIP	---
Aviation Career Incentive Pay Only	ACIP	---
Submarine Duty Incentive Pay Only	SDIP	---
HDP and ACIP	HDP	ACIP
HDP and SDIP	SDIP	HDP

Table 3: Breakdown of Hazardous Duty Pay I and II

Finally, since Hostile Fire Pay and Family Separation Allowance cost elements are only paid under certain conditions, these cannot be projected and so the model simply assumes that the method (timing & amounts) in which these were paid in the past will continue in the present.

Unique – Homeport Direct Cost Elements

Unique cost elements include such things as BAH, VHA and COLA are determined by geographic location. The entire list of Unique Homeport Cost Elements is shown in table 4. An example of what is meant by this cost element, it is cheaper to live in Norfolk, Virginia than it is to live in San Diego, California. Due to this, we give the user the option to take the ship’s homeport into account to most accurately calculate certain costs.

BAH	MIHA*
VHA	CONUS COLA
OHA	COLA

* Like the Standard cost element list, there are some cases where a cost element is paid as a lump sum. These cost elements will follow the same method as those in the standard cost element list.

Table 4: List of Unique Direct Cost Elements

Calculating these cost elements will follow suit with the standard cost elements but the calculations will be done only for a group of ships that are attached to a homeport.

PPP (x) =

$$\frac{[\text{Constant FY Dollars}_{sc\ hp}(x)]}{[\text{Count Who Received Dollars}_{sc\ hp}(x)]}$$

(3)

$$\text{Ratio (x) = } \frac{\boxed{\text{Count Who Received Dollars}_{sc\ hp} (x)}}{\boxed{\text{Count Who Received Dollars}_{sc\ hp} (\text{Base Pay})}} \quad (4)$$

Where

X = the associated cost element
 subscripts = conditions set upon the query
 sc = all of the UICs of the user-selected ship class
 hp = the months of data where specific/selected UICs were stationed in a particular homeport
 = denotes running a query in VAMOS

Unique – Other Direct Cost Elements

The List of Unique-Other Cost Elements includes Nuclear Officer Career Annual Incentive Bonus, Enlistment Bonus, and Selective Re-Enlistment Bonus. Some direct cost elements are not in VAMOS data. In many cases, for these direct costs outside sources were used. Because each is so unique they are addressed separately below:

Nuclear Officer Career Annual Incentive Bonus: For Unique-Other - Nuclear Officer Career Annual Incentive Bonus the METEOR tool takes a flat rate from the Military Personnel - Navy (MPN) budget and apply to it all qualified personnel.

$$PPP (x) = \text{President's Budget}_{(fy)} (x) / \text{count} \quad (5)$$

Where

x = Nuclear Officer Career Annual Incentive Bonus
 fy = budget cost data from most recent fiscal year available
 count = number of qualified personnel from VAMOS Personnel database*
 *Qualified Personnel Include all officer in pay grades O02-O06, and all warrant officers in pay grades W02-W05 with the following AQDs: SN1, KD1, KD4, KD6.

Since Nuclear Career Annual Incentive Bonus is identified by the AQD, we cannot do a simple multiplication in Manning Level I – Pay grade and II – Designator or Rating. For Manning Level I – Pay grade, we must take a ratio of how many eligible personnel are in each pay grade. For Manning Level II – Designator or Rating, we must take a ratio of how many eligible personnel are in each pay grade/designator or pay grade/rating combination.

For Example: If Manning Level I – Pay grade was chosen and there are 10 O01's aboard a platform and 3 of them are eligible for the nuclear bonus with the bonus amount equal to \$20,000.

Nuclear Bonus = Count Eligible/Count in Grade * Bonus Amount = (3/10)*\$20,000 or \$6,000/Person

By following this method, the model allocates the above amount to each sailor in that particular pay grade. Double checking the math shows 10 sailors * \$6,000 / Sailor gives us \$60,000; and those 3 eligible sailors * \$20,000 also gives us \$60,000.

Unique-Other - Selective Reenlistment Bonus/Enlistment Bonus: Data for the Navy Selective Reenlistment Bonus (SRB) does not exist in the VAMOSOC Personnel Database, as is the case for Enlistment Bonus (EB). As such, the METEOR tool will need to turn to an outside source of data for this cost element: the MPN budget. Given the variables involved in calculating the SRB (years experience, monthly base pay, and Navy SRB multiplier), METEOR uses a flat rate, to be distributed throughout all eligible personnel. EB is calculated using a strict budget rate. The Formula for SRB will be as follows:

$$PPP(SRB) = \left[\frac{Count_{Budget}}{Count_{VAMOSOC}} \right] * \left[\frac{Cost_{Budget}}{Count_{Budget}} \right] \quad (6)$$

Where

- [] = the associated line item from the President's budget
- Count_{Budget} = Number of people receiving payment according to the budget
- Count_{VAMOSOC} = Number of eligible people receiving payment
- Cost_{Budget} = Total dollars spent on Selective Re-Enlistment Bonus

Eligible Personnel
 Pay Grades E03-E09
 Experience 21 Months >14 Years

Like in the Nuclear Career Annual Incentive Bonus, if Manning Level I – Pay grade is chosen, we will use a ratio of the eligible personnel in each pay grade. If Manning Level III – AQD/NEC is chosen, we will still apply the cost to all eligible PRAs shown in Table 5 below.

Eligible PRA	
FC	STG
ETSS	ET, MM, EM (Nuclear)
CTR	GM
AW	OS
DT	EW
IT	LN
MM	HM
AC	CTT
CTI	CTM
MA	

Table 5: Eligible Ratings for Enlistment Bonus and Selective Reenlistment Bonus

Enlistment Bonus: This Cost is allocated to all personnel in pay grade E01. Like the previous costs, we will have to take a ratio of eligible personnel within the pay grade.

$$PPP(EB) = \frac{Cost_{Budget}}{Count_{Budget}} \quad (7)$$

INDIRECT COST ALLOCATION

This section discusses the indirect costs component of the model, its descriptions, data sources and allocation methodologies used. As discussed previously, for a defense acquisition program, life-cycle costs not only include the direct costs of the program, but also the indirect costs that would be logically attributed to the program. In a typical life-cycle cost estimate, the estimated indirect costs would include only the costs of infrastructure support specific to the program's military manpower (primarily medical support and system-specific training) and the program's associated installations or facilities (primarily base operating support and facilities sustainment, restoration and modernization). Many other important infrastructure activities (such as recruiting and accession training of new personnel, individual training other than system-specific training, environmental and safety compliance, contract oversight support from the Defense Contract Management Agency and the Defense Contract Audit Agency, and most management headquarters functions) should be considered in the scope of a acquisition program life-cycle cost estimate. These costs are incurred by the Navy in support of the entire establishment and are not paid out directly to active duty service members. With no access to actual indirect costs, The Presidents Budget material was chosen as the primary and only data source for the indirect costs.

As in the case with COMET, the model concentrated on only those indirect costs that have an unambiguous link to personnel support. The below Figure 1 indicates the general scheme and linkage to ship, squadron and other direct personnel.

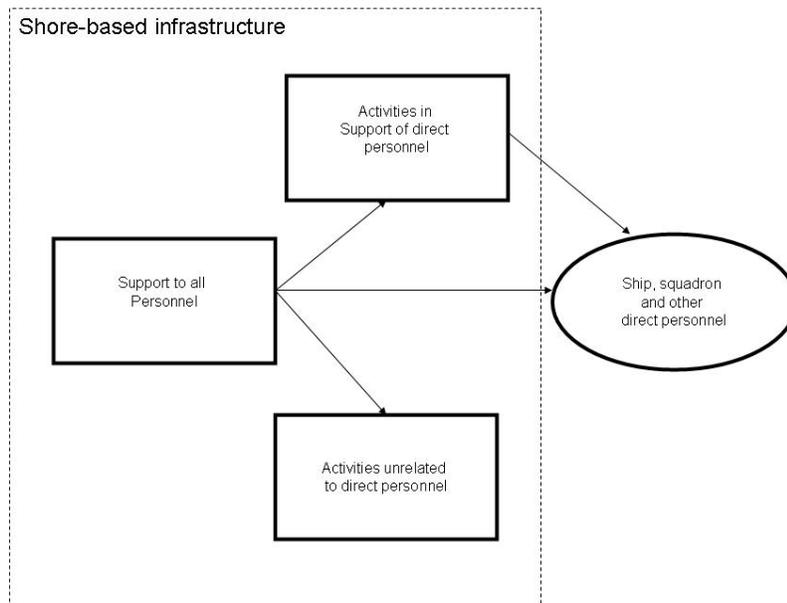


Figure 1: Linkage between direct and indirect personnel

Several things are implicit in the use of the Presidents Budget material for indirect costs. First, that program elements (PE) were used to map costs to the various categories and that these elements change over time. As one goes back in time, or forward into the future, the program elements change – significantly in some cases. Second, the data source is budgeting numbers based on the historical Future Year Defense Planning (FYDP). Third, for most of the indirect cost categories, there will be three dependent variables; number of officers, number of enlistees, and type of funding. Finally, the cost estimating relationships developed for COMET were based on a time period of end strength growth. The new time period for METEOR (1975 to 2008) reflects the opposite. Figure 2 displays the total officer and enlisted end strength over the period of time that the data was collected.

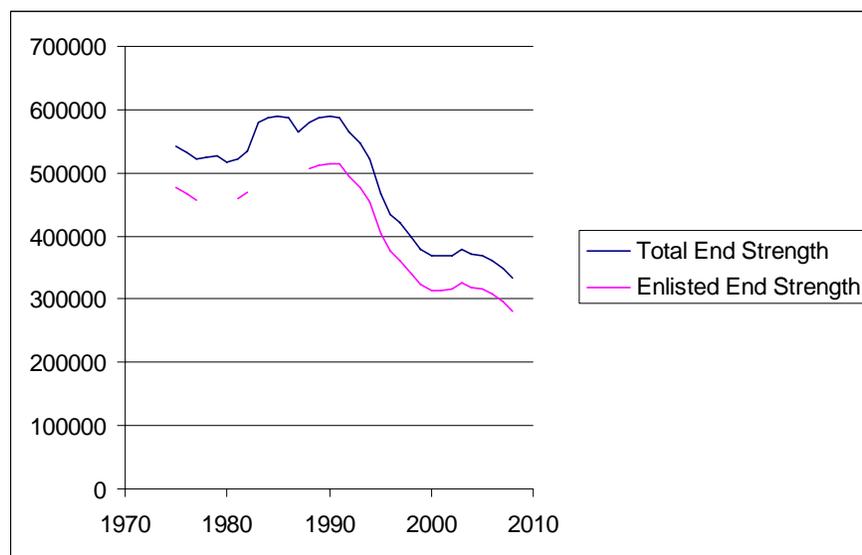


Figure 2: Total End Strength

Indirect Costs are broken down into lower levels: Military Pay-Navy (MPN), Operations and Maintenance (OMN). Student Pay and Allowances (SPA) attribute to the MPN costs. Some indirect costs incorporate one or more of these subcomponents (See Table 6). MPN Costs are associated with the pay of instructors, recruiters, administrators or anyone whose pay makes up a part of an indirect cost. OMN accounts for the operations and maintenance of facilities that are related to each indirect cost. Student Pay and Allowances are payments made to sailors while they are a student. The correlation of cost elements are shown in Table 6.

	MPN	OMN	SPA
Recruiting	X	X	
Officer Acquisition	X	X	X
Training (Basic)	X	X	
Training (Professional)	X	X	X
Base Support/Admin		X	
Medical	X		
TPPH	X		

	Enlisted	Officer
Recruiting	X	
Officer Acquisition		X
Training (Basic)	X	
Training (Professional)	X	X
Medical	X	X
Base Support/Admin	X	X
Medical	X	X
TPPH	X	X

Table 6: Indirect Cost to applicable Funding and Personnel

A sample of the MPN data for the indirect categories is shown below in Figures 3 through 7.

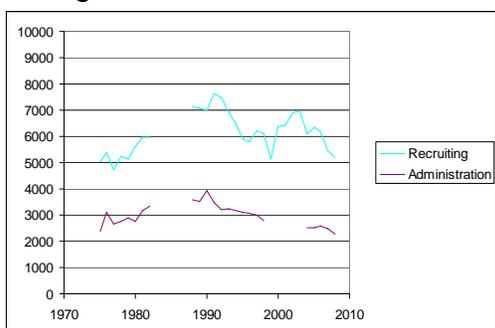


Figure 3: Recruiting & Admin End Strength

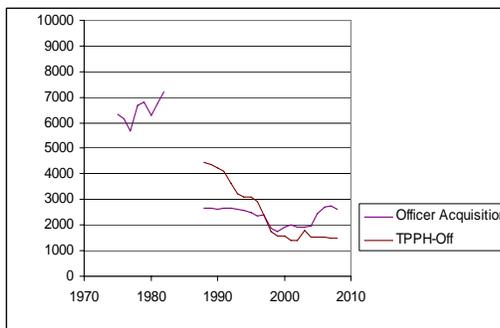


Figure 4: Off Acq & TPPH Off End Strength

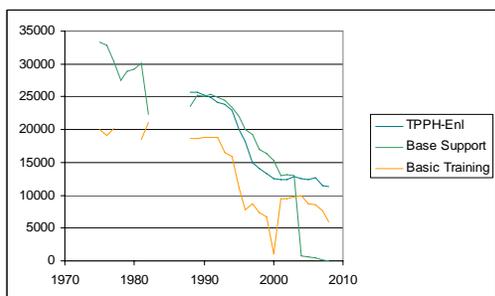


Figure 5: TPPH Enl, Base Supp & Basic Training

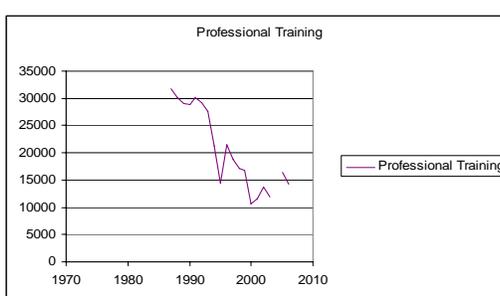


Figure 6: Professional Training

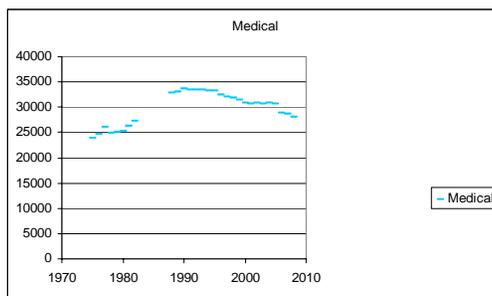


Figure 7: Medical

INDIRECT COST DEFINITIONS

In order to better understand the direct costs included in the model, below is a brief description of the costs and how they are organized into categories.

Recruiting: Recruiting costs account for the pay of the recruiters and all others who work for the Navy Recruiting Command (MPN). It also takes into account the operating costs of all the recruiting centers (OMN). This indirect cost is only applicable to enlisted personnel.

Officer Acquisition: Officer Acquisition shares some similarities to recruiting and basic training except that it applies only to officers. There are three common ways to come through the Navy as an officer: The United States Naval Academy (USNA), Navy Reserve Officers Training Corps (NROTC), and Officer Candidate School (OCS). Officer Acquisition includes the pay of instructors and all others who work at USNA, NROTC, and OCS. This makes up the MPN portion of this cost. The OMN portion is the operating costs of all facilities that are associated with Officer Acquisition. Students in these programs receive pay and allowances which make up the SPA portion.

Training (Basic): Basic training is the initial training that all enlisted personnel goes through upon joining the Navy. This does not apply to officers because they undergo their basic training during their accession programs such as USNA, NROTC, and OCS. This cost accounts for all instructors and other personnel attached to basic training which is the MPN portion of this cost. The OMN portion of this cost would be the operating costs of any facilities where basic training takes place.

Training (Professional): Professional training is any kind of training that is received following basic training or officer accession programs. These costs account for instructor pay (MPN), training center operating costs (OMN), and student pay and allowances (SPA).

Base Support: Base support costs account for the operation and maintenance that occur at a base. Additionally, this cost includes any personnel who work with these activities. Base support is associated with MPN and OMN costs.

Medical: Medical costs include the cost of healthcare and the cost of Medicare. This is strictly a manpower or MPN cost.

TPPH: TPPH stands for transients, prisoners, patients, and is the Navy's way of assessing manpower overhead costs. It is the cost of

manpower when a sailor is not doing value-added work. Sailors in this situation will fall into TPPH status. Since this is based off how much these sailors were paid, there is only an MPN component.

Administration: Administration costs cover any high-level MPN and OMN costs that are associated with Navy administration. The majority of these costs fall under the command level.

INDIRECT COSTS ALLOCATION

As previously stated, the Presidents Budget is used as the data source for indirect costs and Program Element (PE) codes are used to map indirect costs to the cost categories. Costs are allocated per sailor using different methodologies dependent on the recipient of the indirect funds. Simple allocation by inventory end strength was performed where it is understood that an increase in one sailor would result in a direct increment in that category. For example, Student Pay and allowances under Officer Acquisition. For costs that do not increase in such a direct manner, regression methods were employed to assess a factor for change per sailor. For example, Base Support where an increase in one sailor would not necessitate an increase in Base Support costs

Indirect costs are recorded by categories displayed in Table 6 and by PE mapping as displayed in Table 7. Data was analyzed from 1975 to 2008 for generating indirect cost factors.

Cost Element	PE	PE LABEL
Recruiting	0801712N	(U)ADVERTISING ACTIVITIES
Recruiting	0801713N	(U)EXAMINING ACTIVITIES
Recruiting	0801711N	(U)RECRUITING ACTIVITIES

Cost Element	PE	PE LABEL
Officer Acquisition	0804722N	(U)OFFICER CANDIDATE/TRAINING SCHOOLS (OCS/OTS)
Officer Acquisition	0804723N	(U)RESERVE OFFICERS TRAINING CORPS (ROTC)
Officer Acquisition	0804721N	(U)SERVICE ACADEMIES

Cost Element	PE	PE LABEL
Base Support	0101896N	Base Operations - Offensive
Base Support	0204696N	Base Operations - Naval Air Base
Base Support	0204796N	Base Operations - Fleet Support Surface
Base Support	0204896N	Base Operations - Fleet Support SubSurface
Base Support	0204996N	Base Operations - Fleet Logistic Support
Base Support	0205096N	Base Operations - Other Base Support
Base Support	0208720N	Family Centers
Base Support	0808719N	Child Development
Base Support	0808720N	Family Centers
Base Support	0908720N	Family Centers

Cost Element	PE	PE LABEL
Basic Training	0804711N	(U)RECRUIT TRAINING UNITS

Cost Element	PE	PE LABEL
Medical	0806721N	Uniformed Services University of the Health Sciences
Medical	0806761N	Education and Training - Health Care
Medical	0807700N	Defense Medical Centers, Station Hospitals and Medical Clinics - CONUS
Medical	0807705N	Military Public/Occupational Health
Medical	0807710N	Office of Civilian Health and Medical Program of the Uniformed Services
Medical	0807711N	Care in Regional Defense Facilities
Medical	0807714N	Other Health Activities
Medical	0807715N	Dental Care Activities - CONUS
Medical	0807724N	Military Unique Requirements - Other Medical - Health Care
Medical	0807725N	Aeromedical Evacuation System - Health Care
Medical	0807778N	Maintenance and Repair - CONUS - Health Care
Medical	0807785N	Armed Forces Institute of Pathology
Medical	0807790N	Visual Information Activities - Medical
Medical	0807791N	Defense Medical Programs Activity
Medical	0807792N	Station Hospitals and Medical Clinics
Medical	0807795N	Base Communications - CONUS - Health Care
Medical	0807796N	Base Operations - CONUS - Health Care
Medical	0807798N	Management Headquarters - Health Care
Medical	0807900N	Defense Medical Centers, Station Hospitals and Medical Clinics - OCONUS
Medical	0807915N	Dental Care Activities - OCONUS
Medical	0807996N	Base Operations - OCONUS - Health Care

Cost Element	PE	PE LABEL
Admin	0808716N	Other Personnel Activities
Admin	0808796N	Base Operations - Other General Activities
Admin	0901220N	Personnel Administration

Cost Element	PE	PE LABEL
TPPH	0808732N	Transients
TPPH	0808721N	Personnel Holding Account

Table 7 Cost Categories and Program Elements

For MPN and OMN categories, regression methods were used to generate indirect cost factors. Count of people involved with particular cost element categories was regressed against end strength to generate a count factor for each cost element category. Table 8 displays the statistical results of MPN regression. Sample years of data indicate the years of data used in the regression process. Subsets of reported data were used in some instances due to outliers and lack of complete information in certain years.

Indirect Cost Category	Dependent Variable	Explanatory Variable	Sample Yrs.	Factor Est.	t-ratio	R ²
Recruiting	Total count in recruiting activity	Enlisted End Strength	75-83; 88-08	0.0106	11.40	0.82
Officer Acquisition	Total count in officer acquisition	Officer End Strength less count in acquisition activities	88-04	0.0408	9.68	0.86
TPPH-Officer	TPPH Off	Officer End Strength less TPPH Off	88-08	0.1498	18.64	0.95
Medical	MPN Costs	End Strength	92-04	1057.00	4.43	0.64
TPPH-Enlisted	TPPH Enl	Enl End Strength less TPPH Enl	88-08	0.0702	33.63	0.98
Base Support	Total count associated with base support	End Strength	75-82; 88-03	0.0628	6.31	0.64
Administration	Total count associated with admin. Activities	End Strength	75-82; 88-98; 04-08	0.0037	5.18	0.55
Basic Training	Total count associated with basic training	Enlisted End Strength	75-82; 88-08	0.0665	9.67	0.79
Professional Training	Total count associated with professional training	Total End Strength less total count associated with professional Training	88-04; 06-07	0.0803	11.04	0.88

Table 8: Statistical results of MPN Regression

The count factor was subsequently multiplied by an average composite rate to be used in the manpower cost estimation calculations. OMN cost was regressed against end strength to generate an indirect cost factor for OMN. Table 9 displays the factors generated from the President's Budget data with the application of methodology.

Indirect Cost Category	Dependent Variable	Explanatory Variable	Sample Yrs.	Factor Est.	t-ratio	R ²
Recruiting	OMN Costs	Enlisted End Strength		USR		
Base Support	OMN Costs	End Strength	80-83; 89-95; 97-04	1029.03	5.50	0.64
Basic Training	OMN Costs	Enlisted End Strength		USR		
Officer Acquisition	OMN Costs	Officer End Strength		USR		
Admin	OMN Costs	End Strength		USR		
Professional Training	OMN Costs	Officer End Strength		USR		

USR – unacceptable statistical result

Table 9: Statistical results of OMN Regression

In the case of OMN, only Base Support data yielded marginally acceptable results. SPA allocation was accomplished through a simple end strength allocation using five years of data. The factors recorded in the METEOR tool as default are displayed in Table 10.

Indirect Cost Category	MPN Factors	OMN Factors	SPA Factors
Recruiting	\$825.24	USR	
Officer Acquisition	\$5,552.43	USR	\$1,679.21
TPPH-Off	\$20,386.14		
Medical	1056.99	USR	
TPPH-Enl	\$4,760.06		
Base Support	\$4,889.18	\$1,029.03	
Administration	\$288.06	USR	
Basic Training	\$5,177.24	USR	
Professional Training	\$6,251.61	USR	\$11,205.37

USR - unacceptable statistical result

Table 10: Summary of Indirect Costs factors

STRENGTHS AND WEAKNESSES

METEOR has some significant improvements in estimating manpower cost over its predecessor COMET beyond the mere computer functionality improvements. The single largest benefit is the data used to calculate direct costs. The use of actual direct costs provides the cost analysis with a far better understanding of what took place in the past. The number of direct cost categories has increased as METEOR now includes BAH, incentive, hazardous duty and, separation pay, FICA and other cost categories that were not in COMET because of the use of the Navy composite Standard Rates. The second benefit that METEOR has over its predecessor model is its use of sample manning documents. Here again, since data is pulled directly from the VAMOSC Personnel database which is all tied to a Unit Identification Code (UIC), the analysis can select any ship or class as the basis for its ship manning document. The analysis can also be more specific, and choose a specific year for a given ship. This would be useful if there is a specific condition that caused the manning levels to change. Thirdly, and possibly the greatest improvement is in the indirect costs. The COMET model used variable indirect costs from NCCA's Cost of a Sailor (COAS) studies, based on budgeting data from 1980 – 1996. METEOR augments this data with current budgeting data from 1975 – 2008, taking into account changes made in retirement and health care services.

METEOR is not without weaknesses. Most notably is the initial released version can only be used for Ship Platforms. Since METEOR gets its data from Visibility and Management Operating and Support Costs (VAMOSC), it has the potential to be expanded to include any platform, base, or squadrons. Secondly, the indirect categories were exclusively based on NCCA COAS studies. Recent analysis indicates that the number of categories & PEs can be greatly expanded to capture more known indirect costs to further improve the quality of our Total Ownership Cost estimates.

CONCLUDING REMARKS

The VAMOSC Manpower Model provides users with a tool to make decisions about manpower or hardware tradeoff using actual manpower costs augmented with current budgeting information. The Model includes ACTUAL Historical direct costs (MPN) and structured by UIC. Variable indirect costs (MPN and OMN) associated with acquiring, training, locating and supporting personnel, incorporates parameters from NCCA's Cost of a Sailor (COAS) studies augmented with current budgeting data from 1975 – 2008. For modeling and reporting purposes, the manpower costs can be modeled at three distinct manning levels including pay grade, designator or PRA (Rating), and AQD/NEC. Major enhancement include model scenario parameters pull from actual manning on existing ship/units with actual salaries allowing for easy preparation of manning documents. New features including an LCC analysis and delta analysis capabilities further aid in the never ending “what if” scenarios that are routinely requested. The functionality of the model/data is web enabled and can be accessed on Navy Marine Corp Internet (NMCI) Computers. ColdFusion environment allows users to easily manipulate data and download into Microsoft products.