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The Fifth Annual Navy Workforce Research and Analysis Conference: Building on the Pillars of the Navy's Human Capital Strategy

Anita U. Hattiangadi • Benjamin C. Horne



4825 Mark Center Drive • Alexandria, Virginia 22311-1850

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Henry S. Griffis, Director
Workforce, Education and Training Team
Resource Analysis Division

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14. ABSTRACT: At last year's Navy Workforce Research and Analysis Conference, The Chief of Naval Operations (CNO) announced that he would focus his efforts on developing a new human capital strategy for the Navy. In the subsequent year, much progress has been made towards this goal. This paper links presentations made at the Fifth Annual Navy Workforce Research and Analysis Conference to the five pillars and objectives of the Navy's evolving human capital strategy: Alignment to the Total Force, Competency focused, Professional and personal growth, Performance culture and Agile organizations.

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Introduction

As the Chief of Naval Operations (CNO) announced last year in his keynote address to the researchers, Servicemembers, policymakers, and members of the press assembled at the 2004 *Navy Workforce Research and Analysis Conference*, development of a new Navy human capital strategy was his project for the year.[1]

A year has now passed, and the CNO has made significant progress toward achieving this ambitious goal. This year's conference, held April 18th and 19th, 2005, brought together Navy leadership and the research community to discuss how today's research and development efforts are supporting leadership's continued development of a new human capital strategy for the Navy.

In this document, we relate the manpower, personnel, and training research that members of the research community presented at the conference to the five pillars and objectives of the Navy's evolving human capital strategy:[2]

- Alignment to the Total Force
- Focus on competency
- Professional and personal growth
- Performance culture
- Agile organizations.

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1. The conference was sponsored by VADM Gerald L. Hoewing (N1/CNP), with participation from the Office of Naval Research (ONR), the Navy Personnel Research, Studies, and Technology (NPRST) department, the Naval Postgraduate School (NPS), and the Center for Naval Analyses (CNA).

2. The authors gratefully acknowledge the assistance of John Magnuson, Naval Academy intern, and the conference presenters and chairs in the preparation of this report.

Each section of this document will discuss the presentations related to one pillar, or objective, of the Navy's human capital strategy in turn. As the Navy continues to refine its strategy, we believe that this work will help to guide, shape, and focus its efforts.

Alignment to the Total Force

The first pillar, or objective, of the Navy's human capital strategy is the alignment to the Total Force. This means that the Navy must optimize the best value mix of military (active, reserve, officer, and enlisted) and civilian (government and contractors) manpower to support Navy and Joint missions.

Several presentations examined whether certain military billets should be civilianized. Dr. Albert Monroe (CNA) discussed 1000/1050 billets—Unrestricted Line (URL) billets that are not specific to a particular officer community [1]. He showed which communities they support, what training and education they require, and who generally fills them.

He questioned whether officers need to fill all of these billets: Could civilians or contractors could do the job, leaving more officers available for warfare-related positions? Dr. Monroe proposed dividing 1000/1050 billets by Navy Officer Billet Classification (NOBC), Additional Qualifying Designation (AQD), and subspecialty code (especially noting education requirements). He suggested retaining only billets that fit into URL core competencies (see figure 1), making billets that require specific training available only to the Restricted Line (RL).

Dr. Monroe concluded that about 900 billets do not fit into URL core competencies. He noted, however, that cutting these could drastically reduce the size of the URL and reduce the number of shore billets (which are needed for sea/shore rotation). Instead, he suggested that the Navy rethink its core competencies and shape billets around them.

Mr. Alan Marcus (CNA) discussed lessons learned from past public-private competitions that relate to the Navy's efforts to reduce shore infrastructure [2]. He noted that CNA has done extensive analysis of

public-private competition and outsourcing that has evaluated the savings and performance effects of competition, program strategies (priority setting, packaging), and A-76 implementation strategies and incentives.

Figure 1. URL core competencies[a]



a. Source: [1].

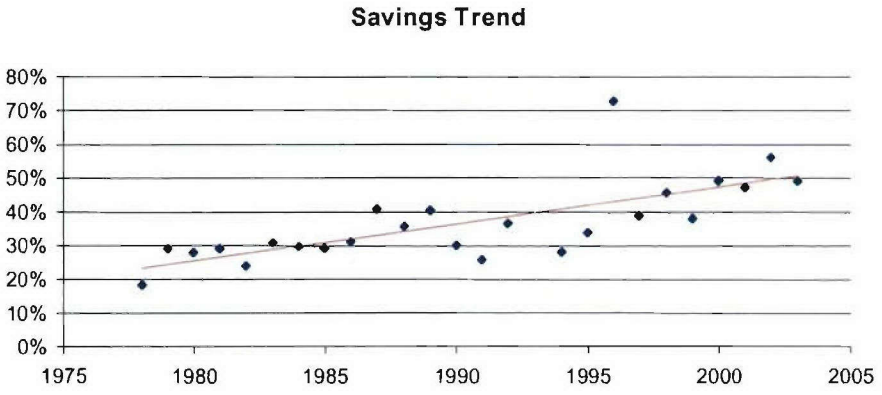
Mr. Marcus said that, in recent years, DoD has achieved savings of close to 40 percent, due to competitive sourcing, and that expected savings have increased over time (see figure 2). In addition, he noted that competitions can reduce military authorizations and lead to a smaller increase in either the civilian or contractor workforce.

To keep these savings, Mr. Marcus stated that the military must use competition effectively by finding opportunities that are attractive to industry, packaging related functions together, and focusing on functions rather than ratings or billets. He noted that, if competition is not used, there is not likely to be substantial cost savings.

Mr. Marcus concluded that, if the Navy looks beyond narrow seashore targets and takes a broad functional approach to reducing

shore infrastructure, it will realize significant savings from competition.

Figure 2. Expected savings from competition are increasing over time[a]



a. Includes full A-76 cost comparisons only. Streamlined cost comparisons and direct conversions are excluded. Source: [2].

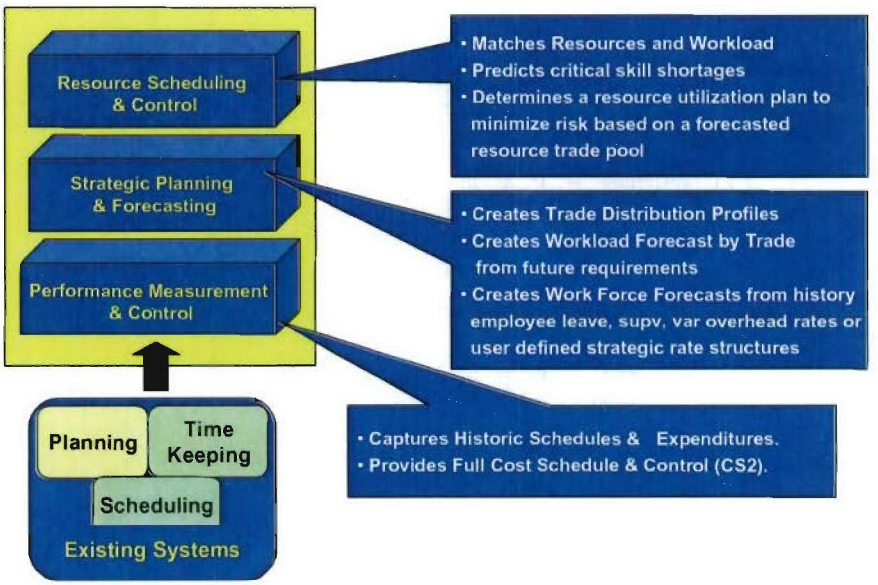
To make better manpower sourcing decisions, Navy manpower planners must be provided with accurate personnel cost estimates that allow them to compare the relative costs of various personnel mixes. Phase 2 of the Human Resources Cost Analysis Tool (HRCAT) was on display for conference attendees to operate [3].

The web-based tool asks the user to determine specific parameters concerning a military billet, such as specialty, grade, length of service, and location. The model then determines total annual cost for the billet and compares this cost to the billet's closest civil service and contractor equivalents. HRCAT contains a multitude of pay and compensation elements for the military as well as civilians and contractors, which enable the detailed creation of billets.

Dr. Stuart Rakoff (Rakoff and Associates) presented the Enterprise Workload Planning and Performance Systems (EWPS), a web-based management tool used to measure and manage performance, workload, and employment strategies [4]. Dr. Rakoff explained that EWPS

used a variety of data, including history, current workforce conditions, seasonal employment rates, procedures, and a catalog of skills, to integrate human resource, financial, and production data into a single graphical interface (see figure 3). By doing so, EWPS allows successful processes to be shared across the organization. Dr. Rakoff believes that data visibility promotes responsibility and accountability data can be used to pay for performance. He also noted that civilian, military, and contractor workforces can be optimized and stovepipes can be broken down in a transition to department-wide management.

Figure 3. EWPS architecture[a]



a. Source:[4].

Dr. Rakoff said that EWPS data can be used to track the performance of subordinates. In addition, time collection information can be used to build standard levels of support required for a given output or for simulation modeling and predictive forecasting.

Finally, Dr. Rakoff explained EWPS's relevance to the Navy's current effort to reduce manpower. He noted that, in the past, large force reductions led to significant mismatches between the workforce

needed to accomplish work and the workforce remaining after closures and RIFs. Drawing on the Navy's and the Army's joint work on workforce planning models, EWPS will apply relevant workforce information to efficient workforce resizing.

Mr. Jack Keenan (CNA) compared the Navy's ship manning procedures with those of the Military Sealift Command (MSC), other navies, and private-sector companies [5]. MSC ships have traditionally required significantly less manning than Navy ships (see table 1). Despite smaller crews, Mr. Keenan noted, Underway Replenishment (UNREP) performance has been comparable to Navy performance, and readiness and safety have been better. He attributed this to the fact that MSC crews are more experienced and have more at-sea time than their Navy counterparts.

Table 1. A comparison of Navy and MSC (civilian and MILDET) manning of various ship classes[a]

Class	Navy	Civilian Mariners	MILDET
Oilers(AOs)	324	106	21
Ammunition ships (AEs)	413	123	40
Provision ships (AFSs)	486	135	49
Multi-product ships (AOEs)	583	160	28
Salvage Ship (ARS)	106	25	19/28*

*Peacetime or wartime salvage

a. Source:[5].

He believes, however, that the Navy can significantly reduce ship manning without compromising performance by changing some practices, policies, and traditions. One option he presented was to minimize the number of non-mission-essential billets (alcohol

counselor, legal clerk, etc.). In fact, he observed that these are collateral duties in other navies. He also recommended that the Navy reduce certain other billets (including career progression billets, social requirement billets, and multiple individuals within the same NEC), schedule the work and watch-standing routine of crews to avoid sleep deprivation, and stop assigning A-school graduates to the food service function. Finally, he believes the Navy should minimize assignment mismatch, reexamine generalists vs. specialists, and eliminate manning above authorized levels. Mr. Keenan said that the Navy could test these changes in pilot programs to verify their effectiveness and develop plans for wider application.

The Reserves are an important part of the military manpower mix, and its sustainment is particularly important in today's environment. Several presentations examined Reserve issues. First, CDR Joseph Waite (NPS) noted that, because there are advantages to having a Navy Veteran (NAVET) affiliate with the Reserves rather than a non-prior-service (NPS) recruit, the Reserves would like to increase its share of NAVET affiliates [6].

Research from the early 1980s found (a) that higher unemployment and increased pay positively affected Reserve affiliation and (b) that affiliation varied by demographics and geography. CDR Waite re-examined this issue with more recent data. He found that the gender gap has narrowed and that minorities and high school graduates make up a greater percentage of Reserve affiliates today. As in previous work, E4s were the predominate group affiliating and technical ratings had the lowest affiliation rates (see table 2).

CDR Waite estimated that a $100 increase in Reserve pay leads to only a small percentage-point increase in the Reserve affiliation rate; a 1-point increase in the unemployment rate leads to a .77-percentage-point increase in affiliation rate. He found that pay has a greater influence today than in the past, but the unemployment effect has not changed.

Policymakers are concerned with Reserve attrition rates due to the increased role of reservists in the Global War on Terrorism. There is concern that the duration and nature of this mobilization will cause higher Reserve losses and a decline in the Reserves' ability to meet

retention goals. Dr. Michelle Dolfini-Reed (CNA) and her team set out to determine if there has been a significant change in Reserve loss rates since September 11th, 2001 [7].

Table 2. A comparison of NAVET affiliation rates over time, by demographic characteristics[a]

		Current	Shiells (1986)
	% of NAVETs	Affiliation Rate	Affiliation Rate
Affiliation Rate		11.2	16.4
Male	87.0	85.8	92.4
Female	13.1	14.3	7.6
Married	37.9	28.2	
White	67.8	62.6	89.8
Black	17.9	22.3	
Hispanic	9.3	11.1	
Other Race	5.1	4.0	10.2
Child	16.0	11.9	
HS Grad	93.7	94.7	83.7
E3	25.2	33.1	13.3
E4	57.0	56.1	49.5
E5	17.7	10.7	37.1

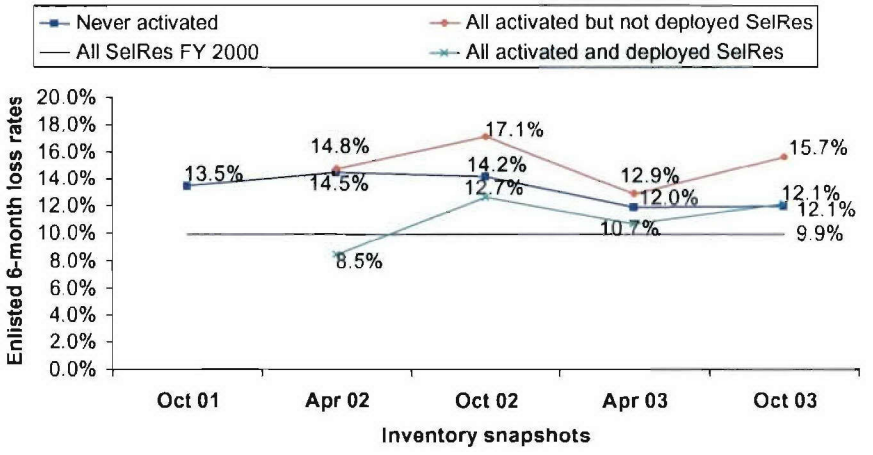
a. Source: [6].

She compared attrition rates of Selected Reservists both before and after 9/11. This presidential callup of reservists is the second major use of Reserve forces but, unlike the previous circumstance in Operation Desert Storm that lasted only 1 year, today's use of Reserve forces is still going on after nearly 4 years.

Dr. Dolfini-Reed examined loss rate patterns by activation status, deployment status, length of activation, and number of activations. For the enlisted force, she found that after 9/11 Selective Reservist 6-month loss rates were higher than those in FY00, a year in which a small number of reservists were activated. Loss rates are higher for those who were activated but not deployed (i.e., they remained in the continental United States) compared with those who deployed outside the continental United States (see figure 4). For some components, loss rates increased with activation length. She also found that those with multiple activations had similar loss rates to those with one

activation. Dr. Dolfini-Reed concluded, however, that the overall magnitude of the increase in loss rates since 9/11 is not as bad as that suggested in anecdotal evidence reported by the popular press.

Figure 4. Selected Reserves: Loss rates are highest for those who were activated but did not deploy[a]



a. Source: [7].

Given that more than 2 million people are in the Armed Forces, some have asked why it is difficult to find the personnel needed for contingencies (with approximately 300,000 used in Afghanistan and Iraq). Dr. Jim Jondrow (CNA) briefed a model meant to help understand and manage this difficulty [8].

The CNA study team used three tools to better understand Army troop rotation: a dynamic model (that derives for each year the number of active and reserve personnel available for deployment and activation), a steady-state model (that derives the maximum level of deployment and activation that could be extended indefinitely), and a stress index (that shows how many future rotations are available for each occupation). Figure 5 shows the variables used in the steady-state model.

Dr. Jondrow determined that only a minority of occupations show signs of stress and noted that these occupations are being expanded. He found that stress can be reduced greatly by expanding demand

(such as for Military Police (MPs)) from one component, such as the Army National Guard, to a larger group (an expansion he said is now happening). Finally, according to Dr. Jondrow, it is in DoD's short-term interest to use a Reserve rule that allows 24 months over a contingency rather than 1 year out of 6.

Figure 5. Steady-state model[a]

$$U = T - F - NDP + overlap$$

$$U = (1-f)*T - U*S + \min(f*T, o*U*S)$$

Solve for U

where U = number used
NDP = not deployable policy
T = total
f = fraction fenced
o = % of NDP that can do fenced activities
S = sum of (1-d)i, where d is % attrition and sum is taken over number of years not available for use

a. Source: [8].

Dr. Robert Levy (CNA) measured the effects of the FY03 Operation Iraqi Freedom 1 (OIF 1) deployment on naval hospital productivity, focusing on outpatient clinics at military medical treatment facilities (MTFs) [9]. His research examined the effects of movement of providers in and out (churn) and sought to determine whether Reservists raised MTF productivity.

Dr. Levy measured several MTF inputs and outputs. For outputs, he used a "resource-adjusted" measure, the outpatient relative value unit (RVU), associated with an encounter. For inputs, he measured the monthly full-time equivalent (FTE) labor hours of military, civilian, and contractor providers. Dr. Levy used monthly data for outpatient care at seven naval hospitals over FY02 and FY03. He defined four broad outpatient work centers: internal medicine, surgery, primary

care, and all outpatient care (OP). Finally, he created OIF 1 measures and used them in regression analysis to disentangle deployment/callup effects.

Dr. Levy concluded that OIF 1 led to large, if relatively short, deployments of naval medical personnel. He also found that churn had some effects on OP productivity, particularly in primary care, where productivity increased 10 percent during January to March 2003 and 7 percent during the next quarter (see tables 3 and 4). He concluded that the system adjusted despite the deployment, although he found little evidence that the arrival of reservists from the civilian sector alone increased productivity significantly—particularly since primary care productivity increased before reservists arrived in measurable numbers. He said that it is just as likely that the reduction in staff due to deployment caused all remaining workers to work hard and keep up workload levels.

Table 3. Percentage change in RVUs/FTE from 2002 to January through March 2003[a]

MTF	IM	Surgery	PC	All OP
NMC San Diego	14.4	-0.5	17.8**	-1.3
NNMC Bethesda	-15.8	15.5**	-13.1	-3.2
NMC Portsmouth	7.4	-1.0	21.5**	8.5
NH Pensacola	-19.5**	5.5	23.1**	4.5
NH Camp Lejeune	-11.4	-11.0**	-1.2	-8.2
NH Camp Pendleton	27.1**	-10.3	4.0	-6.3
NH Bremerton	5.3	8.9	15.9*	13.7**
Average at all 7	0.4	-1.0	9.8**	0.7

** Denotes significant coefficient at 95-percent level and * at 90-percent level

a. Source: [9].

Table 4. Percentage change in RVUs/FTE from 2002 to April through June 2003[a]

MTF	IM	Surgery	PC	All OP
NMC San Diego	19.7	-11.8	13.4**	-8.1
NNMC Bethesda	-17.0	-1.5	-13.1	-14.5*
NMC Portsmouth	-0.6	7.6	23.4**	10.0
NH Pensacola	-19.0**	4.0	14.4	2.0
NH Camp Lejeune	-27.7**	-4.7	10.3	-4.0
NH Camp Pendleton	24.8**	-39.4**	-3.3	-12.3**
NH Bremerton	-14.1	5.3	-3.9	-7.2
Average at all 7	-5.6	-7.2**	6.7**	-4.7*

** Denotes significant coefficient at 95-percent level and * at 90-percent level

a. Source: [9].

As the demand for and supply of skills in the Navy change, the Navy needs the ability to efficiently shape the personnel force structure. As the Navy moves forward with technological advances on various platforms, the need for more experienced personnel increases, whereas the total number of billets required decreases. Sea Warrior and force-shaping guidance call for not only the right number of personnel, but also the right skill and experience mix.

Mr. Rick Loffredo (CSC) presented a project to develop a standardized, effective force planning and policy development tool—the Objective Force Model (OFM)—the goal of which is to go beyond current continuation rate and gain distribution methods (see figure 6) [10]. To "surgically" shape the force over time, he believes it is important to express target Enlisted Personnel Authorizations (EPA) and Billets Authorized (BA) not only by paygrade, but also by length of service (LOS).

OFM begins with EPA/BA goals and certain characteristics of the enlisted force that quantify continuation and advancement behavior and include policy constraints. Mr. Loffredo explained that the

model constructs a steady-state force structure that would prevail from year to year given these behavior and policy constraints. It searches for constrained changes in advancement and continuation, such that the steady-state paygrade by LOS inventory distribution best meets paygrade targets.

Mr. Loffredo said that the model can determine the feasible, sustainable paygrade by LOS experience mix that best meets EPA/BA within policy constraints. In addition, OFM provides a standard methodology and better defines retention goals. It has proven utility through modeling and is being expanded to ECM and NEC levels. Mr. Loffredo concluded that the model is also applicable to Selective Reenlistment Bonus (SRB) and Career/Reenlistment Objectives (CREO) management.

Figure 6. OFM goals for force planning and policy development[a]

- **Provides crosswalk between paygrade-based manpower requirements and LOS-based inventory**
  - Describes feasible, sustainable experience mix that meets EPA/BA
  - Distribution is derived by flows of sustainable gains, losses and advancements
  - Flows generate inventory by LOS and paygrade striving to meet paygrade requirements
  - Advancement flows take place within Navy advancement zone constraints
  - Retention flows and changes take place w/in Zones A, B and C
  - Recruit gains and non-recruit gains replenish EMC/NEC losses by LOS and paygrade
  - Steady state time in service serving/advancing statistics facilitate comparison w/actuals
  - Useful for goal development and what-if drills
  - Provides a standard, justifiable methodology by paygrade and LOS
- **Proven utility**
  - Proof of concept based on proven modeling approach
  - Used previously to develop ALNAV reenlistment goals
  - Applicable to community mgmt; strength, CREO and advancement planning; and SRB/Retention Goaling

a. Source: [10].

As Ms. Angela Cho and Mr. Sanjay Nayar (CSC) explained, first-term enlisted personnel who are in ratings classified as CREO groups 2 or 3 apply for reenlistment under Perform to Serve (PTS) [11]. Personnel can decide to be evaluated for reenlistment within their existing

rate or convert to another rate that is considered to be undermanned. Their performance then is compared with the Navy's needs before they are allowed to reenlist.

The researchers hope the tool they have developed, the Skilled Personnel Projection for Enlisted Retention tool (SKIPPER), will help Enlisted Community Managers (ECMs) to estimate the Navy's need (i.e., the number of personnel to retain in order to achieve a desired Zone B manning level). SKIPPER, an easy-to-use, web-based model, is used extensively for enlisted community management and analysis related to skill-level inventory projection and accession/A-School planning.

In overmanned communities, SKIPPER may prescribe that a certain number of at-risk Sailors not be retained. However, as Ms. Cho and Mr. Nayar noted, these Sailors could potentially convert to other skills under PTS. Conversely, in undermanned communities, a number of additional personnel to be retained and/or converted into the skill would be prescribed to achieve the desired Zone B manning level.

Underneath SKIPPER is an integrated, expandable Navy Personnel Modeling Framework with such features as multi-year inventory projection, powerful scenario management, master-file-based historical data that can be easily overridden, recruit/A-School optimization and conversion planning, and an initial All-Navy LOS force strength planning capability (see figure 7).

By researching and developing functionality within the SKIPPER framework, Ms. Cho and Mr. Nayar found that it is possible not only to identify retention necessary to achieve the desired future manning levels but also to better understand related factors, such as A-School planning assumptions, necessary to support these levels. They added that SKIPPER can be used to perform tradeoff analysis and explore the downstream impacts using such metrics as average time in service, advancement opportunity, manning by grade, and SRB zone.

The SKIPPER framework can be expanded to examine other issues. As Dr. Chariya Punyanitya and Mr. Mark Icore (CSC) observed, the Navy needs a Selective Reenlistment Bonus (SRB) Analysis Tool to support effective SRB allocations in the context of projected reenlistment and manning ROI, SRB budgets, and training and distribution [12]. The researchers are developing a standardized data analysis and

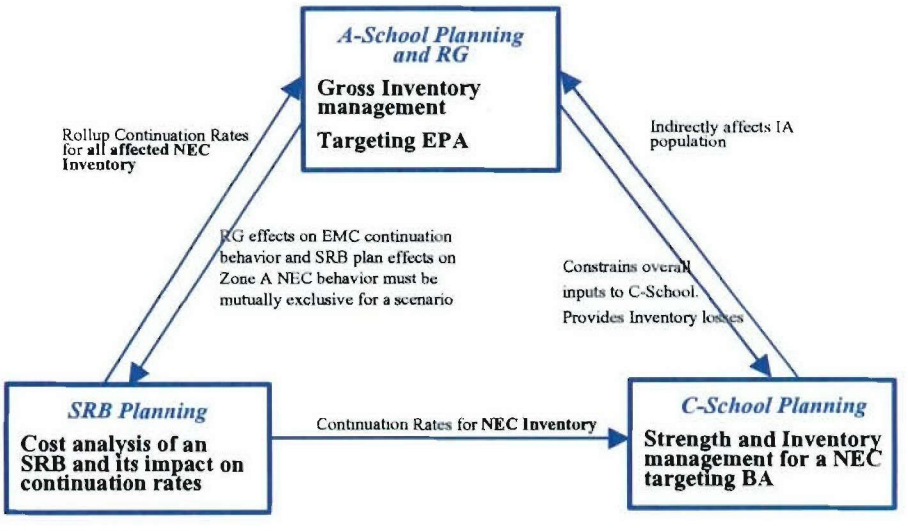
modeling framework for the Enlisted Community Managers, supporting SRB analysis at the NEC and the Enlisted Management Community (EMC) level of detail. They envision that the tool they are developing will fit into a larger, integrated system (see figure 8).

Figure 7. An outline of SKIPPER modeling[a]

- **Developed out of NPRST 6.2/6.3 R&D efforts (EMPIPS project)**
- **Proven Utility in Enlisted Plans & Policy Branch**
- **Web-based "Open Box" Model**
- **Powerful Scenario Management and Data Viewing Interface**
- **Integrated, Expandable Navy Personnel Modeling Framework**
  - **Multi-year Inventory Projection (Operational)**
  - **EMF-based historical data can be overridden (Operational)**
  - **Recruit/A-School Optimization and Conversion Planning (Operational)**
  - **ALNAV LOS Force Strength Planning Capabilities (Operational)**
  - **Sea/Shore Rotation and Advancement Models (in Development)**
  - **NEC SRB Justification, C-School planning and "What-if" Analysis (in Development)**
  - **Some current development efforts funded out of Model Modernization**
- **Skill Rollup Support (Planned)**

a. Source: [11].

Figure 8. Overview of the integrated system envisioned[a]



a. Source: [12].

The model being developed will leverage the SKIPPER modeling framework and project inventories (as a function of various factors, such as reenlistment elasticities) and manning percentages (compared to objective). They said that a high-level decision aid adjunct to the SRB Justification Tool will be developed to provide quick-response SRB cost estimating, skill-level SRB cost roll-up, and adjustments to stay within the SRB budget.

To fully develop this capability at the NEC level of detail, Dr. Punyanitya and Mr. Icore want to add a C-School Planning component to address new supplies of personnel into the NEC, as well as an NEC reutilization feature to model the reuse of existing inventories with these same skill sets. They are also adding a new capability to estimate the optimal number of personnel to enter C-School to achieve overall NEC manning goals.

Shaping the force may include reducing the number of personnel in some subspecialties using separation pays or cutting accessions. As Dr. Bill Gates (NPS) noted, past separation pay programs (VSI, SSB, and TERA) did not allow the Navy to control the payment offered or the number accepting the offer [13]. To determine the best auction mechanism for separation pays, he first compared each mechanism's costs and benefits. Then, he assessed each based on its efficiency, cost effectiveness, equitability (ability to equalize payments and surplus value over separated Servicemembers), and practicality, drawing on recent market design and auction theory research. He determined that a first-price sealed bid auction (involving a tradeoff between expected surplus value and probability of winning in which we expect the winner to be the lowest valued bidder at the second lowest value) best satisfies these considerations (see table 5).

Dr. Gates noted that his future research will further examine elements of auction design and also will include experimental and simulation modeling.

The CNO has aggressively sought endstrength reductions, pursuing a force that is better educated and more experienced. As Dr. Michael Hansen (CNA) explained, these significant reductions have raised concerns that sizable accession cuts will result in too few junior personnel to fill future requirements or that accessions could drop too

far below steady-state levels, leaving the Navy with a future shortage of experienced personnel [14].

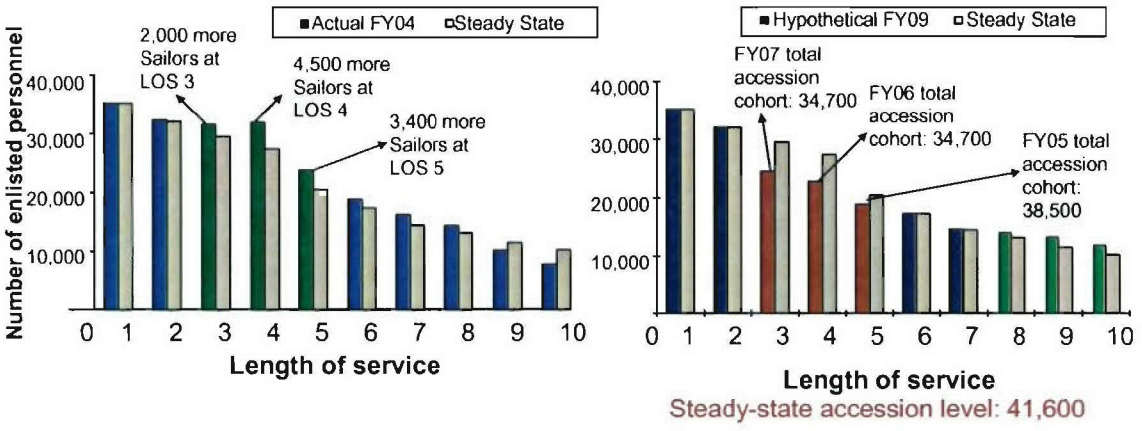
Table 5. Choosing the right auction mechanism for separation pay[a]

	Efficient	Cost Effective	Equitable (Pay)	Equitable (Surplus)	Practical
Dutch (Ascending)					
English (Descending)					
First-Price Sealed Bid					
Second-Price Sealed Bid					

a. Source: [13].

Dr. Hansen's analysis suggests that the Navy will not have difficulty filling junior work requirements. The Navy currently has more personnel in the junior paygrades than it has junior billets, and historical relationships between paygrade and years of service imply that this imbalance will persist in the steady state. Accessions would need to drop far below the current accession plan before it would be necessary to significantly slow down junior advancements. His estimates of steady-state accession requirements imply that the current accession plan poses moderate risk to the Navy (since it implies accessions below steady state). Dr. Hansen determined that the oversized cohort currently in its first term of service would offset a temporary drop in accessions below steady-state levels (see figure 9). He cautioned, however, that sustaining the current accession plan in the steady state would not be cost-effective since increases in reenlistment bonuses necessary to increase retention would generate more costs than benefits.

Figure 9. Current first-term cohort is larger than steady-state levels, so current accession plan could be offset by these oversized cohorts[a]



a. Source: [14].

Competency focused

The second pillar, or objective, of the Navy's human capital strategy is that it be competency focused. This means that the Navy must define the work, recruit the people, and develop the workforce around the competencies required to execute both the current and future Navy mission.

Define the work

To define the work, the Navy must both properly set requirements and determine what personnel/system mix best supports these requirements. Several of the conference presentations examined these issues.

Manpower requirements determination to support new Navy acquisition programs presents unique challenges and risks. Mr. David Hegland and Mr. William Mulholland (Whitney, Bradley & Brown, Inc.) described a structured, repeatable, and defendable template to develop Total Force manpower requirements for a new weapons system when no baseline comparison system (BCS) is available [15].

The process goes from a "blank sheet of paper" to a detailed billet-by-billet manning document by applying causal network methodology, optimization, and the Analytical Hierarchy Process (AHP). The researchers said that this process starts by identifying variables that drive both operational capability and manpower cost of the new system. Alternative manpower concepts then are assessed via cost and operational capability metrics in a collaborative stakeholder setting. Mr. Hegland and Mr. Mulholland explained that an optimal manpower concept then emerges, which serves as a basis for the preliminary manpower requirement. A surrogate BCS is created; preliminary manpower requirements are determined from it and are adjusted for differences in operational employment and specific maintenance, operations, and training requirements of the new system. Finally,

military essentiality criteria are applied and manpower life-cycle costs are estimated to determine the least-cost Total Force manpower solution. Figure 10 lists lessons learned from this process.

Figure 10. Lessons learned from the revised manpower requirements determination process[a]

- **Manpower ConOps critical for new systems**
  - Bounds manpower trade space
  - Shows that all reasonable alternatives were considered
  - Fleet participation fosters ownership of manpower solution (and bill)
- **Identifying a surrogate BSC is important**
  - Provides acceptable analytical framework for Milestone B manpower estimate
  - Translation from BSC to new system must be logical
- **New process – First USN MER in new OSD format**
  - Total Force approach and close coordination with N125, NPC and NAVMAC facilitated buy-in from Navy manpower community
- **Continuous involvement with Stakeholder generates concurrence**
  - N1, FUNCWINGs, TYCOMS, CFFC, PATWING
- **BAMS UAV Manpower**
  - Lead turned CNO's Human Capital Strategy initiatives
  - Total Force approach in sync (15% less people, 80% less uniforms)
  - Able to execute the program with no growth in end strength or robbing from Fleet
  - Contractors not necessarily cheaper than military (overseas)
  - Fleet does not understand the issue of personnel "right sizing" – sees problems with assignments, rotations, TAD billets ...

a. Source: [15].

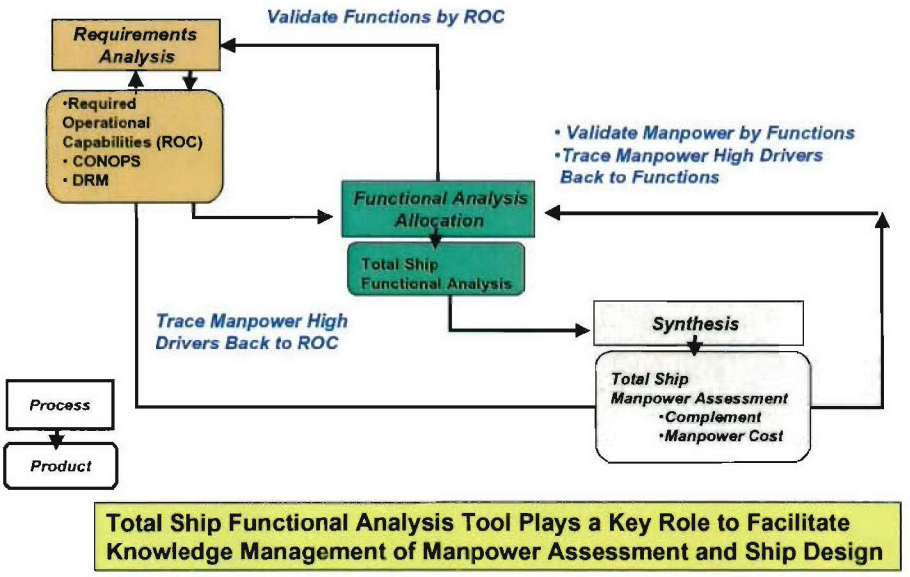
Mr. Hegland and Mr. Mulholland said that applying this approach to the Navy's Broad Area Maritime Surveillance (BAMS) Unmanned Aerial Vehicle (UAV) program reduced total program manning by 15 percent and active-duty manning by 80 percent compared with the traditional requirements determination methodology.

When ship size and performance are established during early stages of naval ship design, accurate manpower estimates are most critical. A Top-Down Requirement Analysis (TDRA) is the prescribed approach for establishing manpower requirements for a new design. However, TDRA requires extensive resources for shipwide data collections and analyses to cover many scenarios dictated by the mission requirements and related functions. Scenarios vary in time span

(months, weeks, and days) and sampling periods (days, hours, and minutes). Different scenarios drive different ratings and skills and, as a result, many scenarios are required to cover the entire ship under all operating situations.

CAPT Norbert Doerry (NAVSEA 05DB) and Mr. Bill Cheng (NSWCCD Code 223) noted that the starting point of a TDRA approach can be simplified by developing Total Ship Functional Analysis (TSFA) from mission, to function, to functional workload (see figure 11) [16]. They believe that a functional decomposition is not only critical to estimating manpower requirements during early stages of ship design but also should be used concurrently to identify specific systems and technologies employed. The manpower requirements and system selections must go hand-in-hand and synchronize.

Figure 11. Functional analysis tools[a]



a. Source: [16].

The TSFA approach, which provides a mechanism for establishing an initial functional decomposition of a ship, is based on naval ship manpower experience and data available from the Manpower Analysis

and Prediction System (MAPS) for 11 existing ship classes, including surface combatants, amphibious assault ships, and aircraft carriers.

In their presentation, CAPT Doerry and Mr. Cheng said that TSFA determines the associated functional workload of existing functions as a pre-processor to MAPS. Once the total ship functional decomposition and related workload are known, they added, high drivers can be determined and workload requirements can be further optimized and refined using the MAPS environment. They cautioned that, when new capabilities and functions are identified, analysts will still need to conduct Human Factors Engineering and establish functional allocations to personnel, hardware, and software, followed by task and workload analysis.

CAPT Doerry and Mr. Cheng concluded by observing that the overall TSFA approach provides:

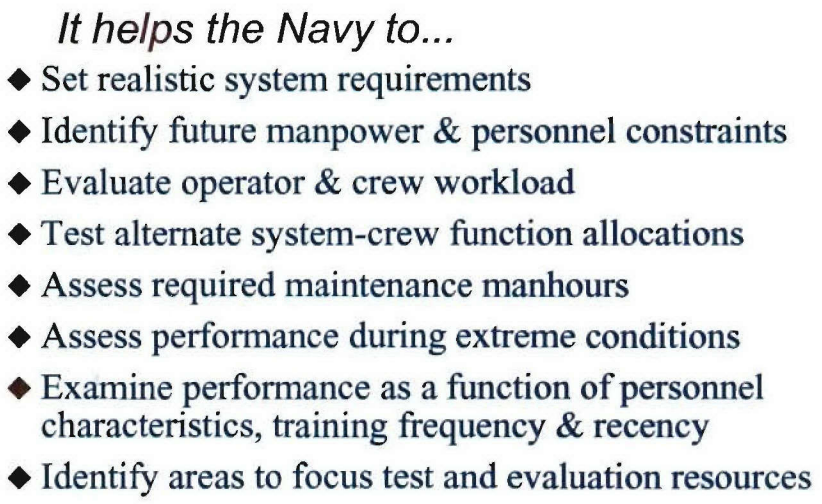
- Traceable linkages from mission to function, to functional workload, to ship complement,
- Practical aids to support program offices,
- Consistency among ship design, human factors, and manpower tools, facilitating more effective collaborations within the Navy.

The Navy also is trying to improve its requirement-setting process to better incorporate Human Systems Integration (HSI) and result in the best personnel/system mix. Dr. Jennifer McGovern Narkevicius (N-125) noted that the Systems Engineering, Acquisition, and Personnel Integration (SEAPRINT) initiative integrates several diverse disciplines within HSI—human engineering, manpower, personnel, training, systems safety, occupational health, personnel survivability and habitability [17].

Defining requirements is difficult because there are many variables and traditionally little concrete evidence and little solidarity in the human-related disciplines. Dr. Narkevicius noted that the current requirements process is reactive; as a result, demand signals occur too late. She described SEAPRINT as a single, integrated process that addresses all aspects of HSI—from capability definition through personnel delivery. It defines taxonomy for human elements of systems

and identifies tools and processes that allow successful implementation of mission systems. Figure 12 outlines SEAPRINT's functions.

Figure 12. SEAPRINT's functions[a]



a. Source: [17].

Dr. Narkevicius said that SEAPRINT was developed and exercised through a case study. To support system capability, she believes it is essential to understand the inherent "capacity" of user populations and the operational environment in which they work. This requires Target Audience Descriptions (TAD) illustrating the knowledge, skills, abilities, and tools (KSATs) of those who will be operating (and maintaining) systems as well as other attributes that may affect total system performance. She believes that these more diverse data must be included in systems engineering and trade space analyses to ensure that the system will perform as envisioned in the operational environment. She added that it is essential to address both organizational and policy issues.

Dr. Narkevicius contended that SEAPRINT will eventually standardize requirements/processes across the Navy and DoD, and that it already identifies tools that are useful for Navy application. The

developers hope that SEAPRINT will result in less redundancy, lower acquisition cost, more integrated solutions, better return on investment, and reduced management overhead.

Ms. Nancy Dolan (N-125) discussed the future of SEAPRINT—how the evolving SEAPRINT initiative fits with other Navy initiatives and where these efforts are going (see figure 13) [18]. She said that, as they move forward, the emphasis will shift from proving the concept of integrating these domains to exercising the overarching processes.

Figure 13. The future of the SEAPRINT initiative[a]



a. Source: [18].

Ms. Dolan noted that meaningful integration of human operators, maintainers, and support requires more than just inserting humans into a design enhanced through good but traditional human factors. She added that context and predictability measures, in addition to human-centered domains, contribute to the definition, specification, and utilization of the system. While tradeoffs must be made inside the human domains, Ms. Dolan believes that their integration allows for more balanced tradeoffs with other specialty engineering disciplines.

She concluded that the domains affect mission systems by identifying the work to be performed, the target audience, economical training, and the optimal design.

Dr. Richard T. Kelly (Pacific Science and Engineering Group, Inc.) discussed the benefits of HSI: it influences design to achieve performance goals while minimizing life-cycle costs, increases system effectiveness and efficiency, reduces the number and consequences of errors, shortens time to complete tasks, reduces required training, and improves users' acceptance [19].

Dr. Kelly advocates FORCEnet systems as a way to support functionally and geographically distributed teams (see figure 14). According to Dr. Kelly, the distributed workforce concept tries to move away from redundant workforces of autonomous units toward relatively small teams embarked in forward-deployed units. A shore-based staff of domain specialists would be available to provide technical support via web-based information systems. Another model he described is the many-to-many communications topology in which, instead of each ship communicating back to the single shore-based site, a greater communications web is created.

Figure 14. Key features of an effective distributed workforce[a]

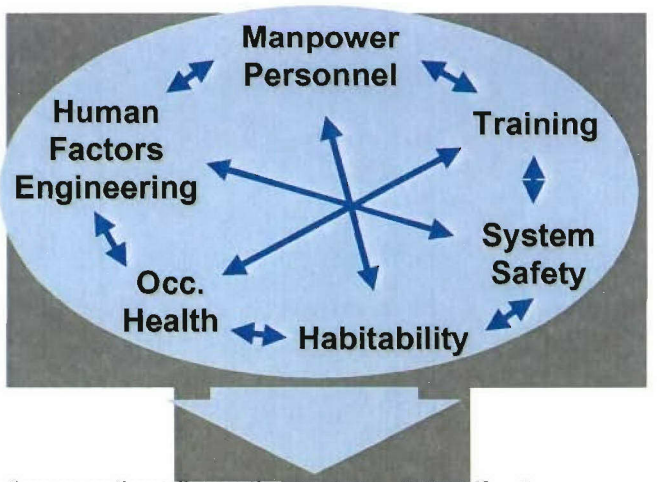
- **Common operational picture (coordinating representation) and collaboration tools (feedback)**
- **Shared understanding of team roles, capabilities, goals, deadlines, and priorities**
- **Operating tempo aligned across distributed teams**
- **Compatible technology and reliable communications**
- **Consistent, current, and easily accessible data**
- **Training and procedures for how to employ technologies in performing operational tasks**

a. Source: [19].

Dr. Kelly also discussed attempts to implement this distributed workforce configuration in Intelligence, Surveillance, and Reconnaissance (ISR) and Meteorologic and Oceanographic (METOC) applications during the Trident Warrior 2004 Sea Trial. FORCEnet capabilities included tactical decision-making, rapid response planning process, ISR and Fires, imagery exploitation, coordinated targeting, bandwidth management, network integrity, and collaboration. He found that FORCEnet drastically increased access to task-relevant information among distributed teams and operators, yielding increased awareness.

Mr. John Lockett (ARL-HRED) noted that, despite continuing research in the basic science areas that supports all of the domains represented in HSI, there is little research to support the overlap areas of the domains where, he believes, HSI gains occur (see figure 15) [20].

Figure 15. Integrating HSI[a]



a. Source: [20].

Mr. Lockett said that the Navy may not be maximizing the domain inputs to the "soup" that occurs at these overlaps because there is little research to indicate what each domain should contribute to enhance the outcome of working with other domains. He added that there are no measures available to illustrate the gains.

According to Mr. Lockett, differences in each domain's tools and techniques obscure much of the overlap. If data could be shared across domains, he concluded, it would allow for interesting and relevant analysis.

Ms. Nancy Dolan (N-125) and Mr. Michael Brown (SkillsNet) spoke about the similarities and standardization between the Army's and the Navy's human-oriented domains: Manpower, Personnel, Training, Human Factors, Habitability, Safety, Survivability, and Health Hazards [21]. They said that integration of these domains both among themselves and with systems engineering improves mission performance and increases the likelihood of achieving mission capabilities.

The researchers noted that, as Joint programs proliferate, the similarities between the personnel requirements of the Services may create an environment in which a mission system can be populated with a member of any Service. This cross-pollination requires that Servicemembers have well-defined, shared capabilities (i.e., knowledge, skills, abilities, and tools (KSATs)) that are meaningful within each Service and are usable across the Services.

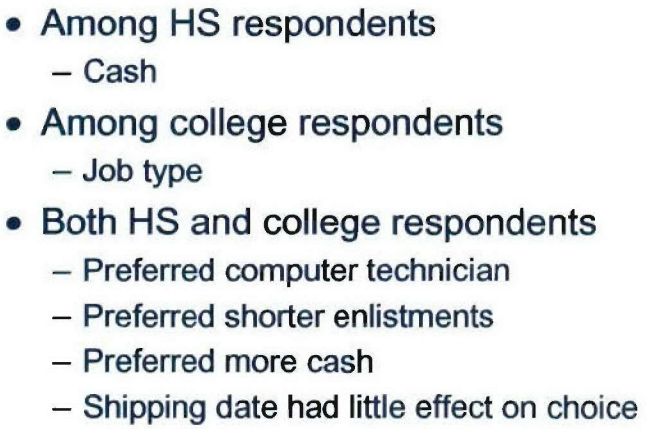
Ms. Dolan and Mr. Brown noted that it is necessary to define the work to be performed and optimize manpower through selection and training to achieve the capabilities desired. Only then could DoD appropriately train Servicemembers to share the performance and manpower load that these Joint systems will generated. The researchers presented the process used to identify, quantify, and share these manpower issues and discussed the potential benefits of a future Joint staffing system.

Recruit the people

The second component of the Competency Focused pillar of the Navy's human capital strategy is that it recruit the right people. Understanding the preferences of the target market (16- to 24-year-olds) as they relate to the variety of enlistment contracting options available is key to recruiting success. Mr. Michael Evans (CNRC) described his team's work with Synovate to investigate the appeal of various Navy enlistment packages to the target market [22].

CNRC staff worked closely with Synovate to develop a choice-based conjoint survey (CBC). They constructed several hypothetical enlistment packages using a number of attributes, including job type, term length, cash for training, cash for college credit, college loan repayment, and shipping date. Each attribute contained multiple levels, which made it more or less appealing to potential recruits. Participants were presented with the enlistment packages online and asked to express their preferences. Mr. Evans said that two separate conjoint packages were developed for the study: one for high school graduates and one for those with college credit (which included the cash for college credit or the college loan repayment program). Figure 16 summarizes some of the key findings from the analysis.

Figure 16. Preference findings from CBC survey on enlistment packages[a]

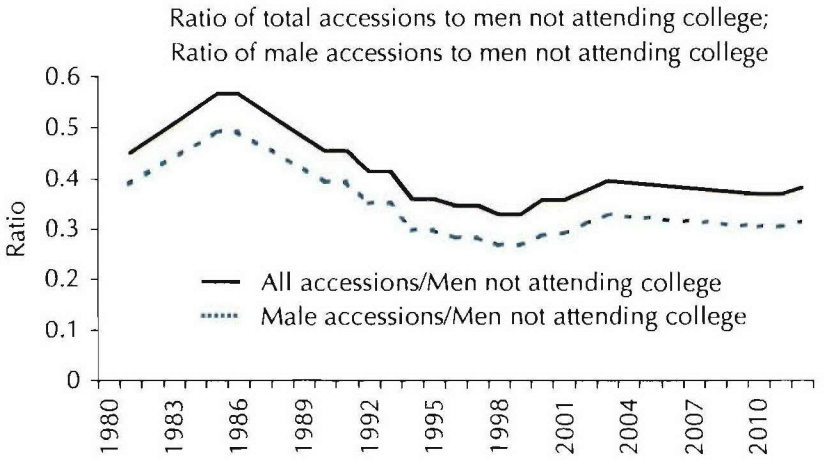


a. Source: [22].

The results revealed areas where the Navy can potentially conserve or better use EB resources. Mr. Evans said that the Navy may want to reduce bonuses for highly desirable ratings and programs, eliminate or reduce bonuses for seasonal channeling, eliminate the requirement for an additional year of service to receive a bonus, increase the EB to get desired behavior (i.e., longer time in DEP), and reserve high-tech billets for recruits with some college.

Dr. Amanda Kraus (CNA) and Dr. Jennie Wenger (CNA) examined the need for and feasibility of college-market recruiting for the enlisted Navy [23]. They found that, although college enrollments are predicted to increase over the next 15 years, offsetting increases in the youth population and other trends mean that recruiting college-degree-holders will not be necessary for maintaining force quality (see figure 17). That said, college recruits do have the potential to improve force quality. In particular, 2-year-degree-holders have high Armed Forces Qualification Test (AFQT) scores, achieve technical ratings, and compare well on continuation measures. High school graduates with some college also may be high-quality recruits.

Figure 17. The target-age population is growing faster than the force[a]



a. Source: [23].

Yet Dr. Kraus and Dr. Wenger found that college recruits currently yield no training savings. In fact, they cost more per day of training

and do not bypass any stage of training. However, changes to the classification and training systems (such as those in Sea Warrior) offer the potential for future savings.

Finally, the presenters found that recruiting in the college market is feasible. They determined that the Navy compares well with the civilian opportunities of many 2-year-degree-holders and most high school graduates with some college. Since the Navy has yet to significantly penetrate either market, Dr. Kraus and Dr. Wenger believe that increasing Navy presence in these markets should be feasible with existing incentives.

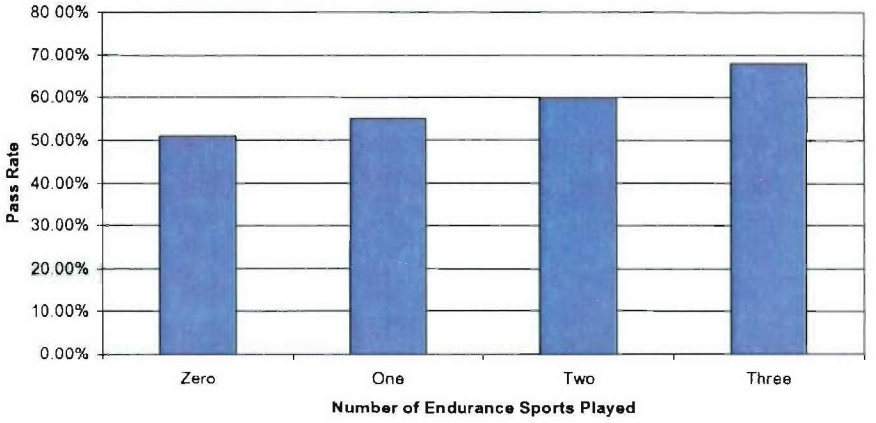
The Global War on Terrorism has generated increased manning requirements for Navy Special Forces, including Navy SEALs, who play a critical role in waging modern unconventional warfare. The demand for SEALs continues to rise, straining available supplies for those trained for this highly selective job. Dr. Lisa J. Mills (Navy Selection, Classification, and Surveys, N141) examined background and interest factors related to success in SEAL training in an effort to better inform SEAL recruiting and selection [24].

Various data were gathered from the training center at the Basic Underwater Demolitions/SEAL (BUD/S) school, including information on demographics and athletic interests, for 2,355 SEAL training candidates who attended the course over a 3-year period. Dr. Mills compared these data with performance outcomes using logistic regression analysis to evaluate characteristics related to successful training completion.

Dr. Mills found that athletic background (particularly participation in endurance sports) partially explained observed distinctions between graduates and nongraduates (see figure 18). She also determined that age, education level, and regional differences account for a small proportion of the variance in SEAL training outcomes.

Her recommendations based on this research include focusing on endurance sport programs and events for recruiting, advertising, and promotions, goaling SEAL recruiting based on regional concentrations, and expanding SEAL recruiting within college-educated populations.

Figure 18. Indoctrination pass rate for SEAL candidates by the number of endurance sports played[a]

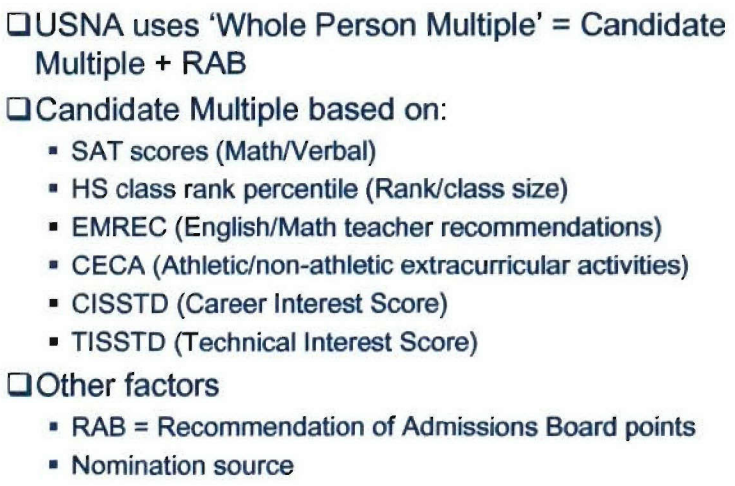


a. Source: [24].

Figure 19 shows a method of scoring Naval Academy applicants. Applicants are selected based on a model that combines academic, military, and physical education metrics to predict midshipman performance. Once combined with scores from personal interviews and interest inventory tests, this creates the "candidate multiple." Members of the admissions board then add points to better reflect the applicant's special achievements, awards, and other relevant experiences to create the "whole person multiple" index (see figure 19). This index is used to rank-order all applicants for each congressional nomination source and all remaining nominees for direct entry to the Academy or entry to a Navy-sponsored preparatory school with subsequent Academy admission.

Dr. Stephen Mehay (NPS) and Dr. William Bowman (USNA) reported, however, that the "whole person multiple" index may not be the best method of selecting Naval Academy candidates [25]. First, it is heavily weighted toward one's academic performance, whereas research shows that military leadership and performance are stronger indicators of fleet success. Second, the index is best suited for predicting the performance of white males not recruited to play a varsity sport at the Academy (the majority of Academy applicants) rather than for the growing more diverse pool of women and racial/ethnic minorities.

Figure 19. Scoring mechanism for Naval Academy applicants[a]



a. Source:[25].

Dr. Mehay and Dr. Bowman have developed a model that better predicts outcomes associated with a fully qualified warfare specialist, including (a) probability of completing the undergraduate USNA program, (b) probability of selecting a technical major, (c) earning a high cumulative academic grade point average, (d) earning a high cumulative military grade point average, (e) successfully completing warfare specialty training, and (f) extending service beyond the minimum service requirement (MSR).

Their models test for differences in factors that predict performance for each gender group. They differ from models currently used because they explicitly recognize that Naval Academy completion rates and continuation rates on active duty in the unrestricted line (URL) communities differ significantly between men and women. In particular, Dr. Mehay and Dr. Bowman developed separate predicting performance models by gender to allow for differing outcomes. In addition, their models allow weights of common factors to differ by gender, while still allowing "whole person multiple" scores of all applicants to be combined so that they still can be used to rank-order applicants by congressional district and to pool all remaining applicants for the remaining nomination sources.

The researchers are further developing the new selection method that, when completed, should provide the Naval Academy with the required number of technically trained graduates each year who are able to complete training in their warfare specialty and who are likely to make naval service a career.

All of the military Services use the Armed Services Vocational Aptitude Battery (ASVAB), which consists of several tests,[3] to select and classify enlisted personnel and to determine high school students' eligibility for the Services.

Ms. Janet Held (NPRST) and Mr. Paul Hogan (The Lewin Group) made a case for adding two tests, Assembling Objects (spatial ability) and Coding Speed (a Navy test), to the ASVAB [26]. They noted that doing so could add validity to the current military classification composites, lower the adverse impact of the ASVAB on women and minorities, increase classification efficiency, and lower recruiting costs. They cited several studies that have found that adding tests to the ASVAB could lower recruiting, compensation, and training costs while lowering attrition and increasing job performance.

Ms. Held and Mr. Hogan used two algorithms, the Rating Identification Engine (RIDE) and the Recruit Allocation Model, to simulate sequential (rather than batch) classification of individuals to jobs using both baseline and augmented composite sets. Recruits were selected at random to enter the system.

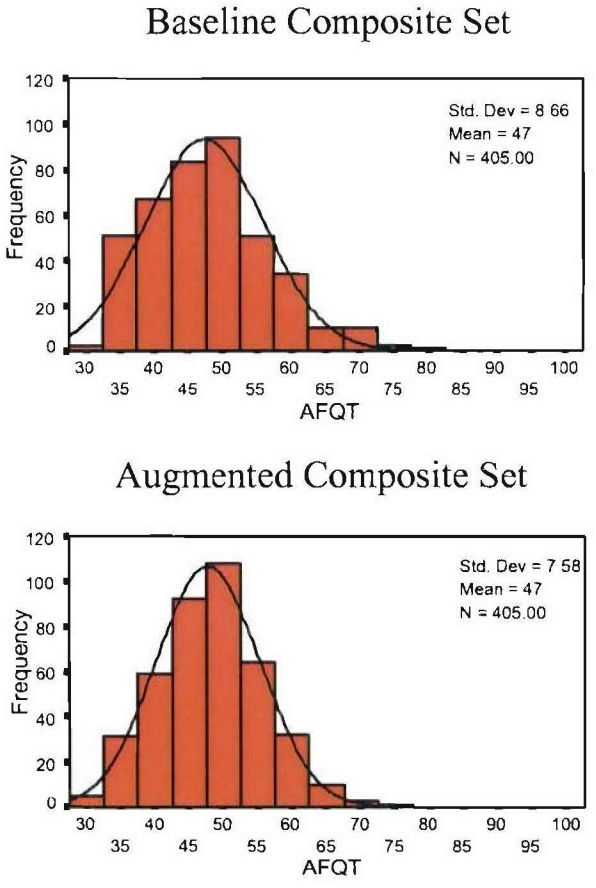
The decision criteria for job matching consisted of minimizing the difference between each rating's ASVAB composite cutscore and the recruit's ASVAB composite score. The model included features built for breaking ties for ratings, shaping each rating's ASVAB distribution, accepting ASVAB waivers, and limiting waiver points. The user inputs the costs associated with A-, B-, and C-cell recruiting and specifies the number of recruit allocation simulations desired. Outputs of the model include the average recruiting costs over simulations and the

3. Tests are in General Science, Verbal Skills (Word Knowledge + Paragraph Comprehension), Arithmetic Reasoning, Mathematics Knowledge, Mechanical Comprehension, Electronics Information, and Auto Shop Information (Auto Information + Shop Information).

original recruit file appended with each recruit's rating assignment for every simulation.

Ms. Held and Mr. Hogan found that more recruits were assigned to jobs with the augmented ASVAB—augmenting the composite set added 1 to 2 percent more recruits to jobs. Moreover, lower cost recruits who had relatively higher aptitude in the selected areas could be substituted for higher cost recruits, reducing total recruiting costs. Figure 20 shows these differences for AMEs.

Figure 20. Recruit allocation to AME for Aviation Structural Mechanics-Safety Equipment: Baseline and augmented composite set[a]



a. Source:[26].

When the model is constrained to fill all jobs, they also found a potential to save significant recruiting costs. In addition, they found that adding tests that are only moderately correlated to the AFQT does not severely deplete critical jobs of advancement potential talent.

Ms. Held and Mr. Hogan recommended that more performance predictors (such as a psychomotor test) be incorporated into military classification systems where the criteria for inclusion warrant.

Using groupware (WebIQ) to capture participant inputs, Prof. Bradd C. Hayes (Naval War College) facilitated a discussion on Navy recruiting and compensation issues [27]. The purpose was to allow those knowledgeable in these areas to exchange ideas in a new and innovative way. Information was gathered using a local area network (LAN) of computers loaded with groupware that permitted participants to make anonymous inputs.

Participants first were asked to indicate which supervisory and workforce trends (virtual support, automation, robotics, or the status quo) would lead the Navy in the future. Participants then discussed compensation through pairwise comparison of various forms of compensation (base pay, pensions, bonuses, healthcare, commissary privileges, exchange privileges, educational benefits, and leave). Participants also discussed the payoff vs. risk of various compensation strategies.

On the subject of recruiting, Prof. Hayes asked participants whether recruiting could be improved by "doing more" (i.e., fielding more recruiters, offering more recruiter incentives, paying for more advertising, or permitting more recruit "signing bonuses") or by "doing something different" (i.e., different message, different outreach, different audiences, or different recruiting force). The majority of participants responded "something different"—78 percent to 22 percent. Participants also discussed the optimal timing of recruitment, demographics of the military (including ethnicity and gender), effective recruiting messages, recruit standards, a professional recruiting force, required national service, and other recruiting-related issues (see table 6 for an example).

Table 6. Participants' perception of the most important message recruiters should use[a]

65%	1. **Personal development & self-esteem**
18%	2. **Educational opportunities**
12%	3. **Patriotism**
5%	4. **Economic security**

a. Source: [27].

Once the right person has been recruited into the force, they must be classified into the right job. Dr. Christina M. Underhill (NPRST) presented preliminary testing results for the Enlisted Navy Computer Adaptive Personality Scales (NCAPS), which assess personality attributes [28]. Dr. Underhill believes that NCAPS will improve the quality of classification decisions—reducing unwanted attrition, improving retention, and increasing job satisfaction and performance.

She noted that the current process assigns recruits to jobs based solely on ASVAB scores, manpower needs, a medical exam, and a short interview. The goal of NCAPS is to obtain more information on the applicants through personality assessments. Adding personality profiles can significantly increase performance prediction, beyond what can be explained by using cognitive ability alone.

NCAPS will allow Navy classifiers to create personality profiles of new recruits, which then can be matched to available Navy jobs for an optimal person-job fit. NCAPS measures ten different personality traits that experts have identified as important for performance in Navy jobs (see figure 21).

Dr. Underhill compared an adaptive version of NCAPS (questions asked depend on previous answers so that they hone in on the relevant characteristic) to a nonadaptive version to determine which test

format is most efficient. She presented preliminary results, which are still being analyzed. Next, NCAPS scores will be compared to job performance ratings from peers and supervisors. Initial assessments have shown a good correlation between personality traits and performance. Next, Dr. Underhill will update the test and conduct several additional validation studies.

Figure 21. Major personality constructs identified for NCAPS testing[a]

- ***Rating/Trait Matrix***
  - **10 most important and relevant for broadest coverage of ratings**

Traits Measured with NCAPS

• **Achievement motivation**	• **Self-reliance**
• **Stress tolerance**	• **Vigilance**
• **Social orientation**	• **Dependability**
• **Adaptation/Flexibility**	• **Dutifulness/Integrity**
• **Attention to detail**	• **Willingness to learn**

a. Source: [28].

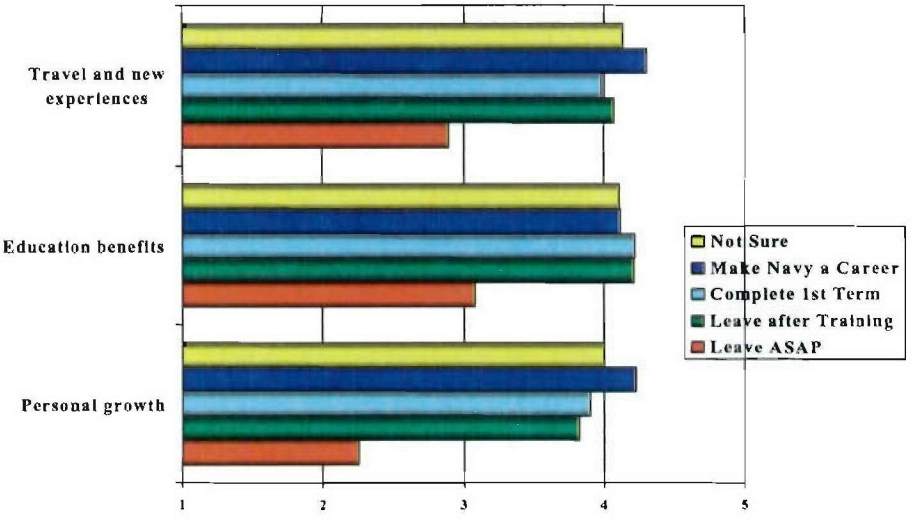
Making sure the right person stays in the Navy (i.e., does not attrite) is key to the human capital strategy's success. Ms. Naina Eshwar (NPRST) examined factors that influence a recruit's decision to join the Navy and to complete (or attrite from) basic training [29]. She also assessed career intentions of those who complete training.

Ms. Eshwar explained that recruits were surveyed to determine whether their motivation in joining the Navy was intrinsic or extrinsic, and whether their reinforcement for joining came immediately or in the future. She reported that the top three reasons to join were the same for all demographic categories and for graduates as well as attrites: to travel and gain new experiences, education benefits, and personal growth (which are also the top-selling points recruiters use).

She found that the type of motivation and reinforcement did not appear to predict successful completion of basic training.

Overall, Ms. Eshwar noted, almost half of Navy recruits are unsure of their career intentions. A very small percentage of people reported that they wanted to leave the Navy as soon as possible or as soon as they completed training. People in these two groups were not as strongly committed to their reasons for joining the Navy as those in other groups (see figure 22).

Figure 22. Rating of reasons for joining the Navy by recruits' stated career intentions[a]



a. Source: [29].

Ms. Marian E. Lane (NPRST) investigated whether self-confidence can be used as a predictor of first-term success [30]. She defined self-confidence as the belief in one's ability to accomplish a task or goal.

Self-confidence data were collected through a questionnaire administered on arrival at the recruit training center. Responses then were compared with the Enlisted Master File for retention data. Ms. Lane found that self-confidence was a significant predictor of first-term

success, with higher self-confidence levels associated with a lower likelihood of first-term attrition.

Ms. Lane noted that the work implies that self-confidence should be fostered throughout the recruiting and training processes, and programs that target the development of self-confidence should be designed and implemented. She added that another approach would be to develop strategies that reduce self-deprecation (negative evaluations of the self) during the recruiting and training process.

Each quarter, CNA provides the Center for Career Development (CCD) with updated first-term enlisted attrition and retention statistics and analysis of a special topic. Over time, CNA has tracked bootcamp attrition, pre-fleet attrition, fleet attrition, and overall first-term reenlistment by Sailor characteristics, such as program of entry, gender, race/ethnicity, and quality.

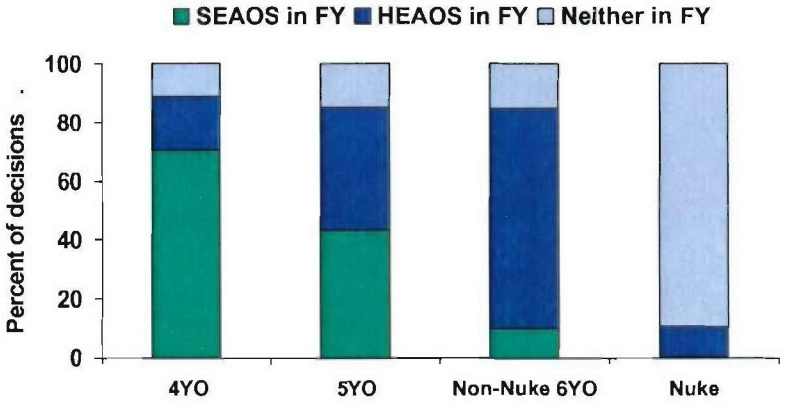
Dr. Peggy Golfin (CNA) reported that Navy bootcamp, A-school, and fleet attrition have fallen over time [31]. She noted that the most evident changes in Navy accessions are that there are fewer women and Gendets in bootcamp, but that all recruits were of higher quality. She also found that there have been fewer bootcamp drug losses and smaller differences in attrition by education, race/ethnicity, and age of recruits.

She then described one special topic: the timing of reenlistments and long-term extension (LTE) decisions. She noted that enlisted community managers (ECMs) must set retention goals, but it is difficult to do so because Soft End of Active Duty Obligated Service (SEAOS) does not define the entire reenlistment-eligible population. Dr. Golfin observed that this is because some Sailors decide early, there are lags in reporting decisions, and some make voluntary short-term extensions.

To help the ECMs, Dr. Golfin analyzed these data. She found that reenlistment patterns varied greatly by community (see figure 23). She also determined that 30 percent of Sailors in FY04 made their decisions early. Consequently, she suggested splitting the reenlistment goals by early, on-time, and late. That way, she noted, goal-setting could be achieved with information the ECMs have on hand.

Also, she said that recent historical reenlistment data could be used to set goals.

Figure 23. Percentage of reenlistment and LTE decisions by EAOS*: 4, 5, 6YOs[a]



*Only Sailors with less than 60 months LOS

a. Source: [31].

To attract and retain military personnel, the Department of Defense must offer a compensation package that is competitive with the civilian sector and must adequately reward Servicemembers for the rigors of military life.

The traditional method of comparing military and civilian compensation is to focus on the cash portion of the compensation package. Studies have shown that, on average, military personnel receive about the same cash compensation as civilians of similar demographics and skills.

Dr. Jim Grefer (CNA), however, noted that this ignores differences in the relative value of Navy and civilian noncash benefits [32]. In fact, the military spends a much higher share of total compensation on noncash benefits than civilian employers do.

Dr. Grefer estimated the differences in value of four benefits: the state and FICA tax advantage, health care, retirement benefits, and Navy technical training. He added these differences in values to Navy cash compensation to form a more accurate "benefits-equal" comparison of Navy and civilian compensation packages. The analysis confirmed that these benefits are $4,000 to $40,000 greater for Servicemembers, depending on rank and length of service. He recommended that future comparisons of Navy and civilian compensation packages include discussions of noncash benefits.

Retirement pay is an important component of compensation. Dr. Aline Quester (CNA) and SgtMaj (ret) Gary Lee (CNA) analyzed the cost to Servicemembers of a decision that they must make regarding their future stream of retirement benefits at 15 years of service [33].

Military personnel who entered service after 31 July 1986 and are eligible and intend to serve for 20 years must choose between two retirement plans at their 15th year of service:

- High-3 retirement plan: Retirement pay is based on the highest average basic pay for 36 months of a person's career, usually the last 3 years.
- REDUX retirement plan: Retiree gets a $30,000 bonus at the 15th year of service. In return for this bonus, REDUX provides smaller retirement checks.

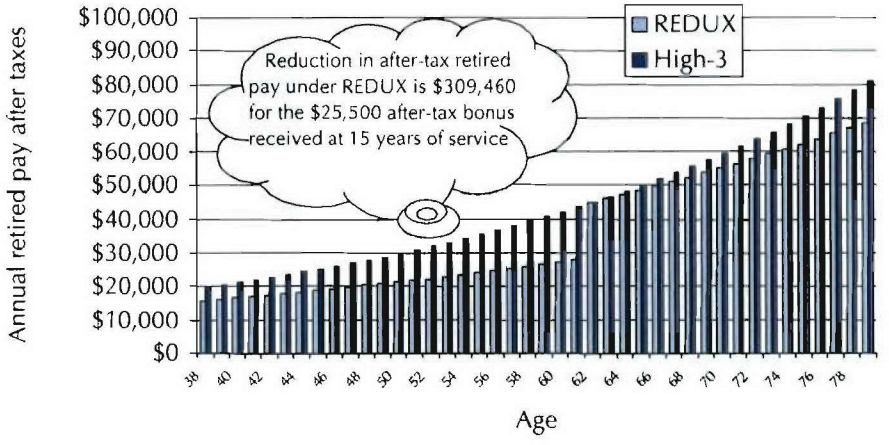
Figure 24 shows the two retirement pay streams for an E7 retiring at age 38 with 20 years of service. Once the final selection is made, the choice is irrevocable.

Because Sailors have been making this choice since 2001, there is now information available on which choice they made. Dr. Quester and SgtMaj Lee reported that take-rates for the bonus declined from FY01 to FY03, meaning that more Sailors are sticking with the High-3 retirement choice.

Dr. Quester and SgtMaj Lee also discussed the results of logistic equations they estimated for the choice between these two retirement options for enlisted personnel. After controlling for the implicit interest rate on the bonus and the prime interest rate, they found that

black Sailors and Sailors with dependents were more likely to take the bonus, whereas Sailors with educational backgrounds that included college and Sailors who made the decision at higher paygrades were less likely to take the bonus.

Figure 24. E7 retiring at age 38 with 20 years[a]



a. Source: [33].

The postservice earnings of military retirees have significant implications for military compensation policy, particularly relating to retirement benefits and downsizing incentives. Previous empirical research has shown that retirees experience a gap in earnings relative to otherwise similar nonretirees when they enter the civilian labor market, perhaps because the human capital acquired during a military career is not directly applicable to nonmilitary jobs. If this is true, the military retirement system must, in part, be designed to offset this earnings loss.

Using data from the 2003 Survey of Retired Military and the March 2003 Current Population Survey Annual Social and Economic Supplement, Dr. Pat Mackin (SAG Corporation) estimated the postservice earnings experience of those who retired from active military service between 1971 and 2001 [34]. He also measured the impact of VA disability rating on the labor-force participation and earnings of retirees.

Dr. Mackin's finding that retirees do not experience an earnings gap relative to non-retirees differs from that of previous empirical research.

He noted that his study may have captured a shift in the effect of military experience on postservice earnings; military members may now acquire more general human capital than previously thought.

He also found that a VA disability rating below 30 percent has no measurable effect on employment or earnings for both enlisted and officer retirees. However, employment and earnings fall for those with higher disability ratings (see figure 25).

Figure 25. Full-time work participation level by VA disability rating[a]



a. Source: [34].

Dr. Mackin noted that his study's data are purely cross-sectional, which does not allow him to easily control for cohort effects. In addition, the earnings data used are self-reported. In the future, Dr. Mackin would like to do the same analysis using time-series earnings data from the Social Security Administration or the IRS matched with service or VA data. Unfortunately, this may be very difficult for him to obtain because of privacy concerns.

Compensation is not the only factor that encourages Servicemembers to stay. Another important factor in their decisions is the satisfaction of their spouses and their ability to find work. Dr. Margaret Harrell

(RAND) presented her work on military spouse employment, which included a comparison of Census and DoD data (including inter-Service and "look-alike" civilian spousal comparisons) and interviews with 1,100 spouses [35].

RAND found that the average military wife, compared with her civilian counterpart, is younger, more likely to be a high school graduate or have some college, more likely to be a racial/ethnic minority, more likely to move and move greater distances, and more likely to live in metropolitan areas. RAND also found that military wives are less likely to work outside the home and, if they are employed, earn less than their civilian counterparts. RAND determined that civilian "look-alikes"—civilian wives with the same observable characteristics as military wives—not only were more likely to work and earned more than military wives, but also had better employment outcomes than the average civilian wife. RAND concluded that, although some military spouses choose not to work, others face hurdles to employment, including child care, the local labor market, a perceived stigma against military spouses' work schedules, frequent moves, and military demands on the family.

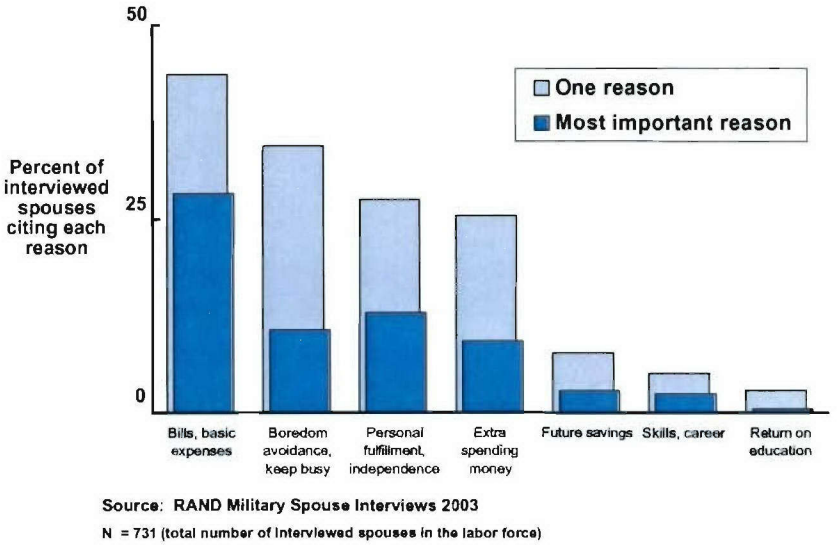
Given the positive effect of spousal employment on Servicemember performance and retention, Dr. Harrell recommended creating employment programs or policies that recognize that spouses work for different reasons (see figure 26). Other recommendations included continuing to address childcare availability and affordability (especially extended hours and part-time care availability), pursuing relationships with employers, considering incentives or requirements for military contractors and the civil service to prioritize the hiring of military spouses, addressing local licensing and certification issues, raising awareness of existing spousal employment programs, and becoming more accommodating to families.

One important part of recruiting and retaining the "right person" with the right competencies is creating an inclusive environment that embraces diversity. Successful diversity management allows the military to compete for top talent and to tap the wealth of skills available across the nation, providing better combat readiness and mission responsiveness.

The greater diversity of the U.S. workforce suggests that the Navy and the U.S. military need to continue the current trend of growing more diverse in both the enlisted and officer ranks. Diversity is increasingly the norm rather than the exception, and the military's efforts to attract and retain a diverse workforce will continue to be important components of Navy workforce research and analysis.

Whereas race-ethnic issues often have been at the forefront of diversity efforts, the presenters took a broader view of diversity, to include such topics as pregnancy and parenthood, mentoring, and citizenship status.

Figure 26. Military spouses work for different reasons[a]



a. Source: [35].

CDR John Hefti, Head of the Navy Diversity Directorate, provided an update on the CNP-sponsored strategic diversity effort [36]. The effort's implementation strategy is aligned with four pillars: Recruiting, Growth and Development, Organizational Alignment, and Communication. The Recruiting goal is to improve recruiting efforts for all accession sources by steadily increasing the diversity of applications so that, in the years ahead, the Navy accesses a more highly qualified

officer, enlisted, and civilian workforce equipped to deal with future leadership challenges. The Growth and Development goal is to embed the Navy's diversity vision in all Sailor and civilian leadership training and management tools. The goal of Organizational Alignment is to develop and maintain an organizational structure that ensures that diversity initiatives and programs are integrated and aligned within the Navy. The Communication goal is to inform and educate both internal and external audiences on the current diversity initiatives, programs, and opportunities. Each goal has associated strategies for achieving the goal.

CDR Hefti explained how the Navy is making progress on each of these four pillars. For example, in recruiting there has been an increase in recruit quality for 4 years in a row, and the marketing budget for diversity marketing has steadily increased. In the area of growth and development, detailers have been directed to ensure career-enhancing tours of duty, and NETC and NPDC are incorporating "Leveraging Diversity" competencies into all officer and enlisted leadership/development courses.

CDR Hefti described several challenges that remain, including determining whether diversity should be measured based on objective (race, gender) or subjective (desired performance) measures, how to measure diversity management, and how to measure diversity's effect on the bottom line. He also noted that benchmarking is difficult since it is hard to translate corporate benchmarks into something that can be useful to the Navy. Finally, he outlined the next steps in the diversity effort (see figure 27).

A team of researchers from the Air Force, CNA, and the University of Maryland described preliminary results of the Air Force's efforts to understand the relationship between force diversity and force capability [37]. As the entire defense community is transforming, both organizationally and operationally, to meet the new threats and challenges of the 21st century, Air Force personnel planners want to better understand how the two are related. The Air Force is seeking to define the role of diversity in its total workforce—active duty, civilian, and contractor.

Figure 27. Next steps in the CNP's Strategic Diversity Plan[a]

- Continue Diversity Senior Advisory Group / Fleet Diversity Council
  - Senior Leader and Corporate diversity guidance
  - Feedback from fleet to CNO on diversity progress / retention
- Continue to recruit the best quality personnel possible
- Continue Communications of diversity progress
  - Internal - Measure through polls and surveys
  - External - Navy Reputation: "Opportunity out trumps pay"
- Continually improve our growth and development processes
  - Train and develop Commanding Officers / All leaders
- Continue to build and refine diversity metrics – Flow Points

a. Source: [36].

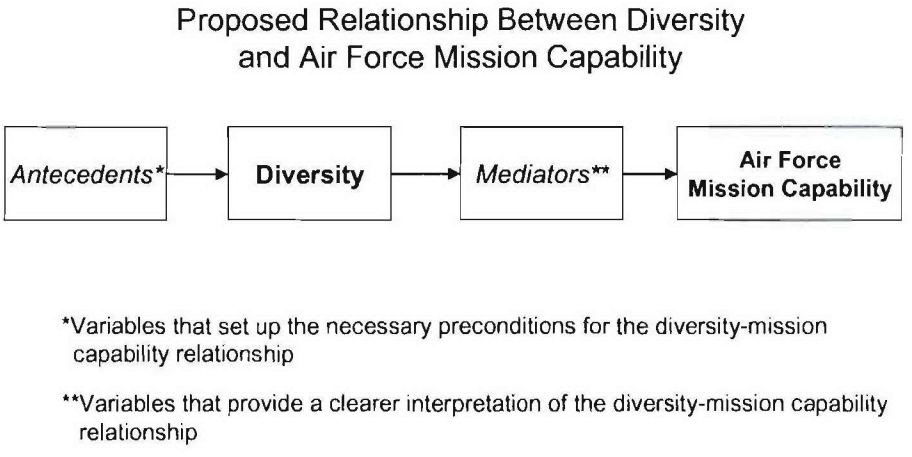
Dr. Kraus and Dr. Apriel Hodari (CNA) first summarized the growing body of empirical studies designed to quantify the relationships between group heterogeneity and group outcomes in corporate settings. The literature review examined more than 90 studies looking at diversity from the corporate perspective. As a body of work, the studies indicate that unmanaged diversity can negatively affect productivity—increasing absences and turnover, and decreasing team and organizational commitment. The good news, however, is that several mediators and moderators can be used to manage diversity so that it contributes positively to corporate performance.

Major Joseph E. Sanders III (USAF) and Dr. Willie E. Hopkins (University of Maryland-Eastern Shore) described the development of an Air Force-specific conceptual model of the relationship between workforce diversity and force capability. Figure 28 lays out a preliminary model, which focuses on identifying important mediators and moderators.

The next steps in the analysis will be to test the conceptual model to determine the nature of the diversity-mission relationship, to assess

the diversity culture and climate in the Air Force, and to identify core competencies for managing and leveraging diversity.

Figure 28. The Air Force's preliminary conceptual model linking force diversity and force capability[a]



a. Source: [37].

To gauge its progress toward achieving an inclusive climate, the Navy analyzes data from personnel surveys.

Dr. Paul Rosenfeld (NPRST) and Ms. Carol Newell (NPRST) presented results from the 2004 Navy Officer Survey, which is a reengineered version of the Navy Equal Opportunity/Sexual Harassment (NEOSH) survey[4] [38]. The survey was modified last year because it needed data on a broader range of diversity and career issues, including mentoring, retention, valuing diversity, professional development, and career satisfaction, to be able to gauge the effectiveness of leadership's emerging diversity strategy. In March 2004, the new survey was fielded to a stratified sample of 11,000 Navy officers.

Dr. Rosenfeld and Ms. Newell highlighted the survey's findings in the areas of diversity, mentoring, and career satisfaction. They reported that the survey finds strong awareness of and support for the Navy's

4. This survey had been conducted biennially since 1989.

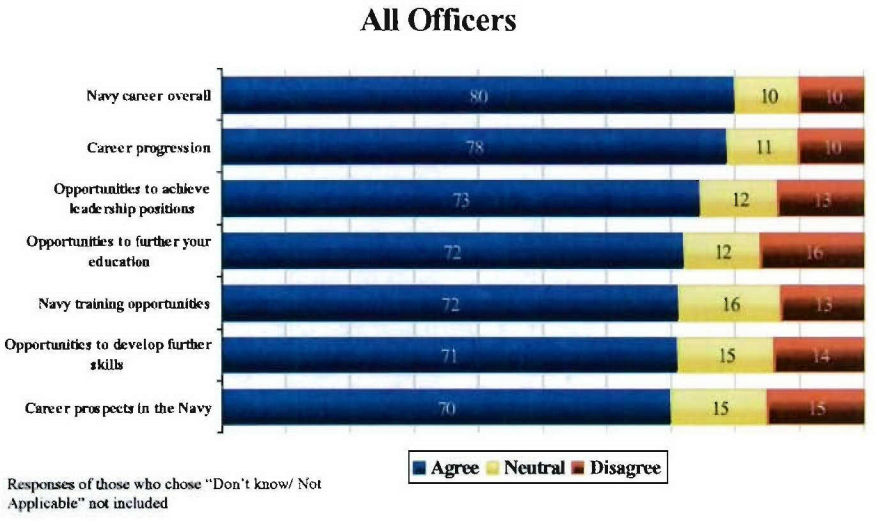
diversity effort. The survey shows that minorities (particularly black officers) are most positive about the Navy's diversity efforts. Over 75 percent of officers surveyed indicated that leadership at their commands supports diversity; 65 percent said that the Navy's senior leadership supports diversity.

There were, however, considerable differences by race and gender in officers' views of how diversity would help the Navy. For example, 79 percent of black officers thought that increased diversity would allow the Navy to better accomplish its mission, compared with only 34 percent of white officers.

Dr. Rosenfeld and Ms. Newell also found that mentoring is commonplace among Navy officers—over 80 percent have had an informal mentor at some time in their Navy careers. Most of those who had been a mentor were satisfied with the experience.

Finally, the survey found widespread satisfaction among naval officers across a spectrum of career issues (see figure 29). For many key career metrics (satisfaction, retention intentions, etc.), minority officers were as positive as white officers.

Figure 29. Results from 2004 Navy Officer Survey: Career satisfaction[a]



a. Source: [38].

Ms. Anita Hattiangadi (CNA) reported on noncitizens in the Services [39]. She noted that Legal Permanent Residents (LPRs) are eligible to enlist in the military and have served successfully since the Revolutionary War. In fact, about 35,000 noncitizens currently serve in the active military, with about 8,000 enlisting each year. Immigration also is expected to fuel future growth in the recruitable-age population.

She observed that noncitizen Servicemembers are more diverse than citizen recruits—not just racially and ethnically, but also linguistically and culturally. This diversity is particularly valuable as the U.S. faces the Global War on Terrorism.

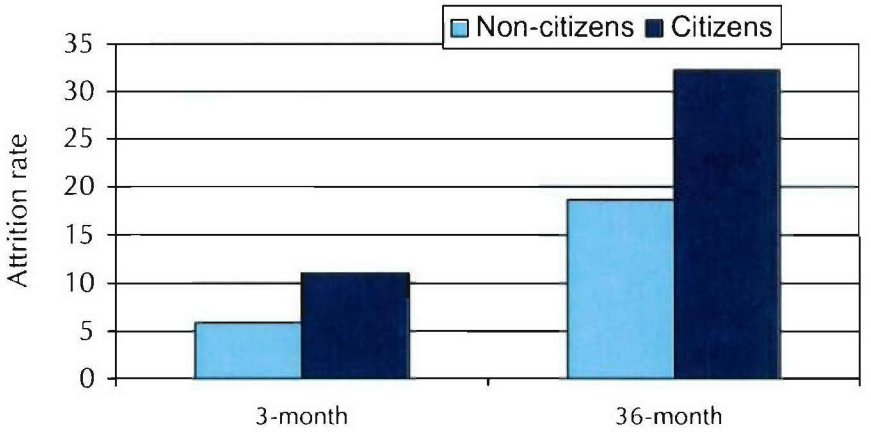
Ms. Hattiangadi said that there have been several recent changes in policy and practice that may encourage more noncitizens to consider military service—such as the executive order allowing noncitizens to apply for expedited citizenship after only 1 day of active-duty service. The 2004 National Defense Authorization Act further facilitated citizenship for Servicemembers and posthumously gave special immigration preference to the immediate family of Servicemembers. The military Services and the U.S. Citizenship and Immigration Services (USCIS) also have worked together to streamline the citizenship process for Servicemembers. Finally, the Services have initiated several programs (such as the Army's Translator Aide (09L) pilot program) that might be particularly appealing to noncitizens.

Ms. Hattiangadi found that noncitizens do extremely well in the military. She noted that noncitizen bootcamp and first-term attrition rates are substantially below rates for citizens (see figure 30). Results held even after controlling for other differences.

Her recommendations included providing military recruiters with information on what documents/information noncitizen recruits will need if they want to apply for citizenship while serving in the military and developing materials for applicants or new recruits that explain eligibility for expedited citizenship, the benefits of filing for citizenship while in the military, and the benefits of attaining citizenship. She also recommended investigating reasons for differences in Service policies regarding noncitizens and investigating the success of language efforts. Finally, she observed that the Services should consider committing to more structured installation-based assistance to

help noncitizen Servicemembers with their citizenship applications and providing installation-based immigration assistance to Servicemembers' dependents.

Figure 30. Noncitizens have lower attrition than citizens throughout bootcamp and the first term[a]



a. Source: [39].

As career opportunities for women in the Navy have broadened, Navy leadership has maintained an interest in determining the impact of pregnancy and parenthood issues. The Navy-wide Pregnancy and Parenthood Survey has been the tool used to assess rates of pregnancy and single parenthood and to examine related topics.

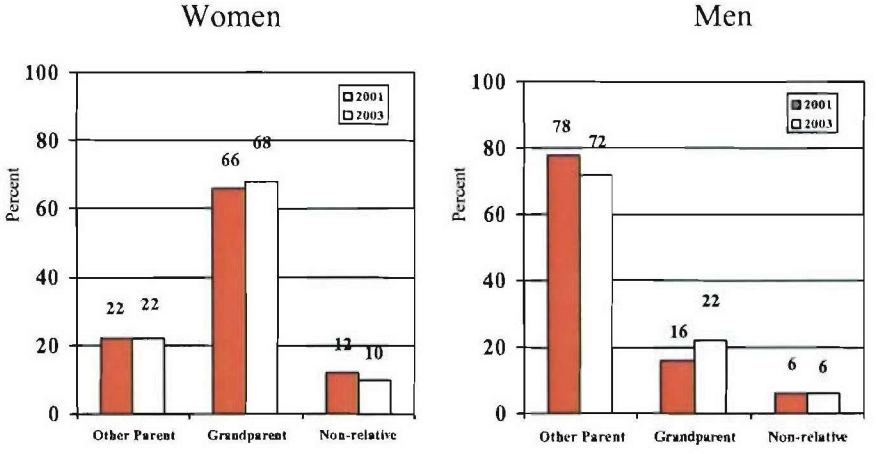
Ms. Zannette Uriell (NPRST) presented findings from the 2003 Navy Pregnancy and Parenthood Survey [40]. Administered from July to October 2003, the survey consisted of items from previous surveys and additional questions of current interest to Navy leadership.

Pregnancy rates have remained relatively stable since the survey began (in 1999). Rates of single parenthood have increased slightly for women and remained constant for men as compared to 2001. Single parents in 2003 were more likely to leave their children with grandparents than with the child's other parent when they deployed

(see figure 31). Compliance with the Family Care Plan was only about 75 percent for women and about 50 percent for men.[5]

Ms. Uriell recommended the development of a PAO/communications plan to publicize the survey results and a Family Care Program training plan. She also recommended increasing awareness of the web-based pregnancy toolkit, the Women's Policy website address, and birth control/unplanned pregnancy data. Finally, she recommended that the ISIC Family Care Program compliance assessment occur more frequently. She reported that some progress has been made, with the survey results being incorporated into the Navy's General Military Training.

Figure 31. Who cares for your child when you deploy? Results for enlisted single parents[a]



a. Note: Results for male enlisted should be viewed with caution due to low numbers. Source: [40].

5. Ms. Uriell cautioned, however, that the findings for men should be interpreted cautiously since they are based on relatively few respondents.

Develop the workforce around competencies

The third component of the Competency Focused pillar of the Navy's human capital strategy is that it develop the workforce around competencies.

Navy enlisted ratings, supplemented by Navy Enlisted Classification (NEC) codes, have historically served as the foundation for occupational categorization, placement, training, and even workforce requirements determination. In an effort to update occupational standards, the Navy is focusing on the actual work Sailors perform on the job by capturing job tasks and task groupings (SkillObjects™) and their associated KSATs—the knowledge, skills, ability, and tools needed to perform a job.

As Mr. James Gasch (CNA) explained, his team developed a taxonomy of Navy work that puts work functions and jobs into the context of the Department of Labor's Occupational Network Standard Occupational Classifications (O*Net SOC) [41]. This effectively groups similar work together and groups similar jobs into career communities that more closely align with civilian occupations.

Mr. Gasch said this taxonomy can help to restructure the enlisted rating program (see figure 32). Restructuring the system would mean combining similar ratings. The taxonomy is a tool that can detect overlapping job roles and, with appropriate consolidation, effectively lower training and overhead costs. Mr. Gasch estimates that the proposed changes will consolidate 80 current ratings to 48 or fewer. Not only does this help to accurately identify work being performed, and align jobs with civilian jobs, the taxonomy's occupational naming conventions eliminate archaic gender identification in job titles, and makes training more efficient by eliminating redundancies and focusing resources.

Part of developing the workforce around competencies is understanding what those competencies are and what others understand them to be. LCDR Andrew Jones, Ph.D.(NPRST), investigated the perceived gap between the support that Human Resources (HR) officers provide and what unrestricted line (URL) officers believe HR

officers can and should provide [42]. The Navy's HR officer community was established to bridge a divide between government civilian HR professionals, who may lack an appreciation of operational requirements, and URL officers, who may lack familiarity with HR theory and large-scale human resources management.

Figure 32. Characteristics of the new taxonomy for enlisted ratings[a]

- Easy to code
- Mnemonic (to the maximum extent possible)
- Hierarchical
- A crosswalk between
  - Ratings
  - Jobs
  - SkillObjects™
  - NECs
  - NOBCs
  - Training
- Uses O*NET SOC system

a. Source:[41].

LCDR Jones examined two specific questions:

1. What roles do URL officers perceive should be filled by HR officers?
2. Does the HR community have the skills and credibility necessary to provide warfighters with the HR support needed from these roles?

He administered a survey to address these issues. Figure 33 lists the categories of questions asked.

LCDR Jones found that URL officers believe that HR officers are filling MPT, ALM, SA, and POA roles. Neutral perceptions exist within

URL communities in response to issues of HR community credibility—in fact, it appears that the HR community might have a more negative view of itself than others have of the community. He concluded that credibility might not be at issue at all but, rather, might relate to self-efficacy, self-image, or self-respect issues.

Figure 33. Survey instrument used to examine URL officers' perceptions of HR officers[a]

- **The 71 questions are designed to elicit responses based on the seven sub-question categories of:**
  - **Activities HR officers perform**
  - **URLs' view of HR officers roles**
  - **HR officer assignment selection options**
  - **HR officers' role in operational positions**
  - **HR officers' role in support positions**
  - **HR officers' degree of participation in operational units**
  - **URLs' general attitudinal perceptions of HR officers**

a. Source: [42].

Promotions also are used to ensure that the workforce has the right competencies. Dr. Harry Thie and Mr. Peter Schirmer (RAND) considered changes to law, policy, and practice that could help to better align officer inventory with requirements [43]. They noted that there are many ways to match officer inventory with requirements, each with different secondary effects (such as cost and promotion opportunity). Their methodology treats the environment, inputs, and activities as an interconnected system.

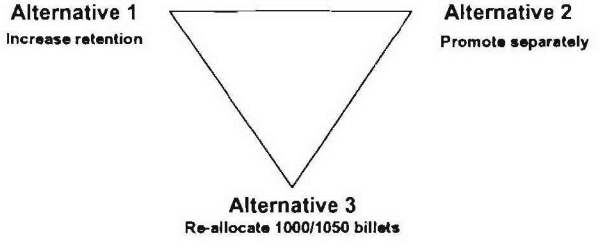
According to the RAND researchers, the current Baseline Management System overaccesses, allows officer continuation according to recent history, has a rigid allocation of generalist positions, promotes all officers at the same time using DoD policy, and uses a single competitive category for line officers. At present, authorizations and

retention differ significantly across communities, whereas promotion timing and opportunity are the same within any particular competitive category. Dr. Thie and Mr. Schirmer noted that the Baseline System is unsustainable if retention, promotions, and authorizations do not change.

They considered four alternatives to the Baseline System, which vary in their balance between the life-cycle functions of retention, authorizations, and promotion (see figure 34). The researchers found that with Alternative 1, continuation rates for SWOs and SUBs were high enough to meet O4 to O6 authorizations. However, there was a promotion bottleneck to O4 and some later promotion timing issues due to larger cohorts.

Figure 34. Alternatives to the Baseline System explore single policy changes to match inventory to need[a]

- **Alternative 1: Increase continuation rates, with authorizations and promotion policy unchanged**
- **Alternative 2: Promote communities separately, with continuation rates and authorizations unchanged**
- **Alternative 3: Re-allocate 1000/1050 billets, with continuation rates and promotion policy unchanged**
- **Alternative 4: Combine Alternative 1 & Alternative 2**



a. Source: [43].

With Alternative 2, Dr. Thie and Mr. Schirmer found that separate competitive categories would still leave continuation rates for SWOs and SUBs insufficient to meet authorizations, even without competing with pilots and NFOs for promotion.

Alternative 3 gave each community enough officers to fill designator-specific billets. In addition, excess pilots and NFOs filled more than their "fair share" of 1000/1050 billets at O4 to O6. With this alternative, they found that the only serious officer shortage would be O4 SUB.

Finally, Alternative 4 (a combination of Alternatives 1 and 2) implied that there could be lower accessions and fewer training billets, depending on early continuation rates.

Dr. Thie and Mr. Schirmer concluded that only increasing retention and competitive categories did not achieve the goal and that changing authorizations could do so, but perhaps in a costly way. They are still assessing the feasibility and advisability of combinations of the various alternatives.

CDR James Montgomery, Ph.D. (USCG), discussed the Coast Guard's Future Force 21 project, a conglomeration of workforce initiatives intended to attract, develop, retain, and deploy a high-quality workforce with the right competencies that can meet current and future mission requirements [44].

Although not historically part of the Coast Guard's mission, homeland security and defense have quickly grown to encompass over 50 percent of the Coast Guard's mission resources since 9/11. CDR Montgomery explained that a new way of business and setting priorities had to be established since there has been no resulting increase in personnel.

At the same time as this change, the Coast Guard was implementing Deepwater—an almost total replacement of the fleet that calls for larger ships with smaller but more technically trained crews. In addition, the entire Coast Guard organization is being physically and organizationally realigned with the Department of Homeland Security, which has affected Coast Guard career paths.

A consolidated team of commissioned officers, civilians, chief warrant officers, and contractors is formulating solution sets. Its recommendations include the disestablishment of the Communications (COMMS) specialty and the creation of three new specialties: Marine

Safety Specialist (MSS), Information Systems Management (ISM), and Operations Systems Specialist (OSS). Also, Future Force 21 has chartered a "tiger team" to determine the optimal balance of enlisted feeder ratings to allow for equitable promotion opportunities and to determine proper billet realignment.

CDR Montgomery also described several other workforce analysis initiatives centering on competency management, including an effort to better understand officer competency requirements and an effort to realign field commands to better provide unified response to threats, marine incidents, and disasters.

Professional and personal growth

The third pillar, or objective, relates to professional and personal growth. This requires the Navy to create opportunities for people through education, training, mentoring, and experience. Several presentations discussed how to better focus training and better spend training dollars.

Mr. Robert Hausmann (CNA) described his analysis of the effectiveness of online leadership training—specifically, the Situational Leadership II online course for the Navy's Chief Petty Officer (CPO) selectees [45].

Mr. Hausmann measured the training's effect on satisfaction, learning, behavior, and leading indicators of performance improvement. He found that participants generally liked the course, found it useful to their work, and learned the course material. The CPOs applied acquired leadership skills to their jobs and stated that their performance improved in both general and specific leadership areas (see figure 35). Finally, Mr. Hausmann determined that Aviation and Information Technology ratings showed leading indicators of improvement in critical incidents specific to their work fields.

Mr. Hausmann found that the online course cost the same or less in a dollar-for-dollar comparison with traditional brick-and-mortar courses. As such, he recommended other uses for the course and ways to improve the feedback and course evaluation parts of the training.

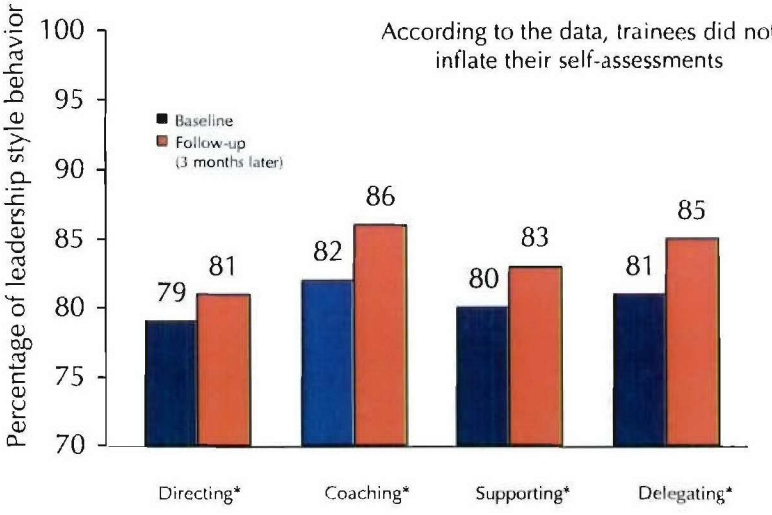
Dr. Denise Charbonnet (SPAWAR ITC) described the Navy Human Capital Development Project (NHCDP) Content Team's efforts to recommend training content appropriate for closing skill gaps identified through job task analysis [46].

The NHCDP Content Team, whose membership included people from the University of New Orleans (UNO), California State University at San Bernardino (CSUSB), and the National Center for

Research on Evaluation, Standards, and Student Testing (CRESST), had three main objectives:

1. To transform skill gaps into training requirements,
2. To develop and document a model for identifying relevant web-based distance learning courseware and selecting the best courseware (based on both quality and cost)
3. To locate and develop tools to support such a model.

Figure 35. Participants had small but significant behavior improvements (based on self ratings)[a, b]



a. Statistically significant at $p < .05$.
b. Source: [45].

The team developed the Government OTS/Commercial OTS Courseware Assessment Process (GCAP) and constructed a web-based tool to facilitate content selection to meet these objectives. The GCAP includes preparing scope objectives, determining and specifying requirements, forming GCAP team(s), incorporating requirements into the tool, identifying and assessing courseware candidates, and recommending best-fit courseware to clients. Dr. Charbonnet noted that it is flexible and can be adapted to the needs of anyone seeking courseware to fulfill a particular requirement.

Determining the right level of training resources is extremely important. Traditional methods to determine instructor manpower requirements for classroom training use broad calculations of the numbers of instructors required to handle yearly student input to training courses. Although these methods provide reasonable estimates of staffing levels to meet projected training demands by course, Dr. George Konstantinow (ISERA Group) noted that they do not capture the nuances of staffing responses to time-varying student loading on fixed annual class schedules [47].

Dr. Konstantinow described the development and implementation of the Automated Instructor Manpower Requirements Determination (AIMRD) system. Developed under the auspices of the Naval Education and Training Command (NETC) for the Human Capital Planning Group (HCPG) of the Naval Personnel Development Command (NPDC), the AIMRD system expands traditional models of instructor requirements estimation by tying requirement forecasts to annual course delivery plans and subsequent schedules of class convenings generated from those plans.

The AIMRD heuristics for instructor allocation account not only for the potential availability of instructors at training sites but also for instructor skill levels mapped topic by topic to specific course requirements. This method determines the numbers of instructors required for annual training, their projected utilization rate throughout the training year, and optimal instructor allocation in "what-if" scenarios by considering potential cross-utilization of instructors across courses and course convenings. Dr. Konstantinow described the AIMRD system's operation, reporting functions available to end users, such as the HCPG and Training Managers, and current applications of the system for decision support and resource assignment for class scheduling in a production environment.

Dr. Konstantinow also discussed the development of new algorithms, heuristics, and decision support methods of the Blended Training Solution (BTS) system to determine staffing requirements in the Integrated Learning Environment (ILE) [48]. He addressed instructional delivery methods beyond traditional brick-and-mortar training, such as self-paced training, computer-based group training,

simulator training, and distance or distributed learning methods. These BTS scheduling and resource management functions extend AIMRD.

He then described BTS resource allocation methods in the realm of human capital support for training activities (such as instructors, mentors, and facilitators). He discussed how instructional personnel requirements may be determined according to both time-varying training demand and training delivery methods employed. He then demonstrated how personnel utilization rates and optimal personnel allocation to training events are analyzed in "what-if" scenarios with different options for cross-utilizing "instructional human resources." Finally, Dr. Konstantinow examined how new BTS heuristics augment current AIMRD decision support functions and extend operational resource assignment to schedule training in the ILE.

Dr. Ann Parcell (CNA) examined the effect of demographic characteristics and performance measures on the probability of attriting from undergraduate Naval Flight Officer (NFO) training [49]. Using data on FY97–01 officer accessions, she estimated the probability of attriting from the whole pipeline or from particular training stages. She also estimated the probability of attrition from the pipeline by reason: academic, medical, flight failure, and drop on request (DOR). She used accession source, college information, Academic Qualifying Test (AQT), Flight Aptitude Rating (FAR) scores, and other demographic variables to estimate the probability of attrition.

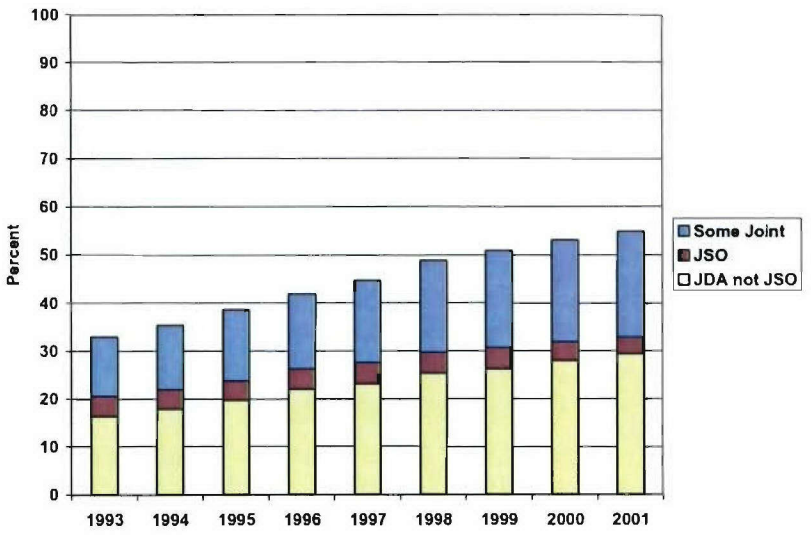
Holding other factors constant, Dr. Parcell found that United States Naval Academy (USNA) graduates had a substantially lower probability of pipeline attrition compared with other accessions. USNA graduates also had a much lower likelihood of attriting by DOR. Students who scored 6 or higher on the AQT were less likely to attrite from the pipeline than those with AQT scores less than 6. Accessions who had a college GPA of less than 2.50 were more likely to attrite than accessions who had earned GPAs of 2.50 to 2.99, who in turn were more likely to attrite than those who earned GPAs of 3.00 or higher.

The force must be appropriately managed to promote personal and professional growth. Dr. Margaret Harrell and Dr. Harry Thie (RAND) presented their framework for the development of a

strategic approach to joint officer management [50]. The Goldwater-Nichols Act (GNA) of 1986 mandated certain rules regarding jointness in DoD mission preparation; since then, several successful missions have demonstrated the effectiveness of joint force operations. However, recent studies and a GAO assessment have suggested that a strategic approach for joint officer management is necessary to address DoD's challenges, in terms of education, assignment, and promotion, in preparing officers to serve in joint organizations and leadership positions.

To be truly effective, the joint force must be intellectually, operationally, organizationally, doctrinally, and technically joint. But, in the absence of GNA-style rules, it is feared that backsliding on jointness may occur because military personnel managers have not fully embraced a joint culture. For various reasons (including a "check-the-box" mentality for filling joint positions), the Services generally claim that it is difficult to send a line officer to joint assignments. Even so, the inventory of officers with joint experience or exposure has been steadily increasing over the last 10 years (see figure 36).

Figure 36. The share of Navy O-6s with joint credit or exposure is increasing[a]



a. Source: [50].

Dr. Harrell and Dr. Thie said that, in determining the joint framework, Congress set somewhat arbitrary rules because of incomplete information and uncertainty about implementation. Congress might be willing to adjust rules if DoD met certain objectives, but initial rules have not been easily changed, perhaps because previous attempts to change them have lacked strategy.

The researchers have developed a strategic approach that will be able to determine which jobs require jointness, if they provide it, and how to implement it. Specifically, the study will address billets, management framework, and education and training with an analytical goal to interface with modeling and determine policy implications. The data collection effort was recently completed, so their analysis has begun and they will issue recommendations in March 2006.

Training personnel, particularly those in the aviation field, is expensive. In fact, it costs $1.3 million on average to train an aviator. According to Dr. Albert Monroe (CNA), the Navy could achieve a better return on training investment if aviators spent more time in seagoing squadrons [51].

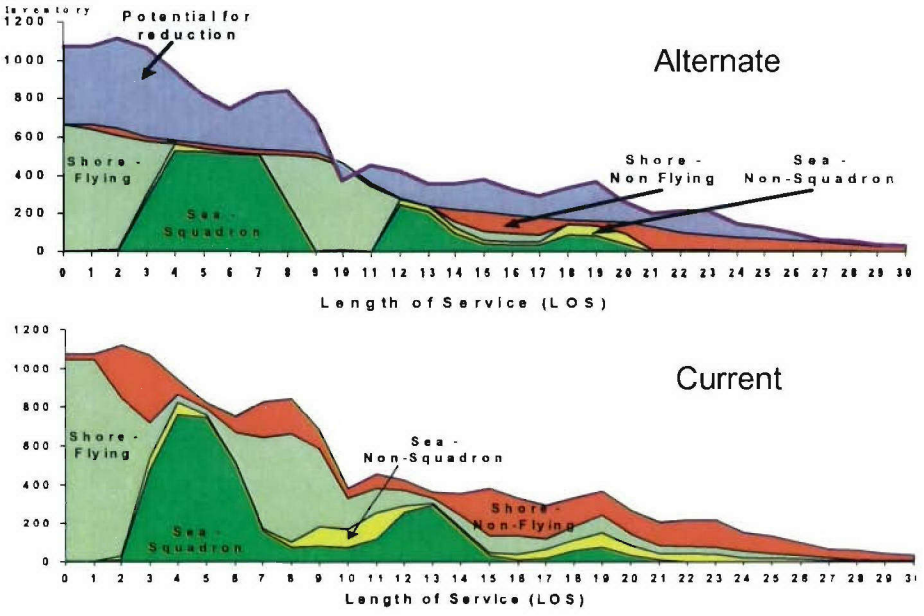
Dr. Monroe proposed an alternative aviation career path that would increase initial sea experience from 3 to 5 years through separate back-to-back sea tours (see figure 37). He said that this would allow the Navy to decrease the number of aviators by about a third while maintaining the same level of presence in seagoing squadrons. He estimated that this change could save the Navy $490 million annually by reducing costs associated with flight training and the Individuals Account. In addition, he anticipates that the overall effect of these changes on retention would be small.

He cautioned that longer initial sea tours for aviators would mean that the Navy would have to fill many billets now filled by aviators with either civilians (for shore billets) or other officers (for disassociated sea billets, this includes LDO/CWO). Dr. Monroe concluded, however, that these costs would fall significantly below the current cost of filling these billets with aviators.

Maj Brian Lambert (CNA) presented a method he developed to help determine whether the aviator inventory is sufficient and properly

distributed to meet the Marine Corps' current and future manning and training requirements [52]. The long time required to produce an aviator means that a large lead time is needed to head off any shortages. Although DC Aviation and DC M&RA collect information on pilot retention, aviator time-to-train, aviator resignations, and the aviator bonus program (Aviation Continuation Pay), Maj Lambert identified the Initial Service Obligation (ISO) ending date as the critical data element that would enable a better determination of aviator manning requirements.

Figure 37. Alternate vs current career paths for aviators[a]

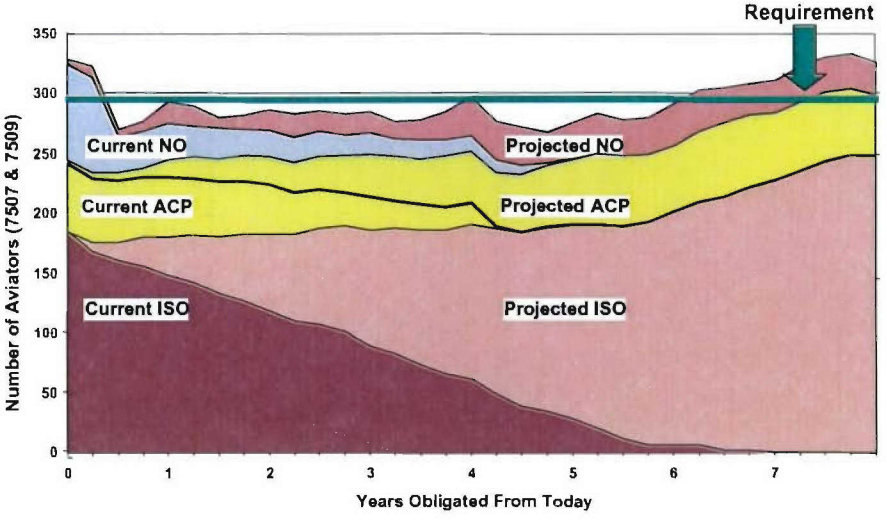


a. Source:[51].

Maj Lambert's alternative method of measuring the aviator inventory's distribution will support a more direct determination of manning needs. His method, which is based on obligated service, will enable a more accurate forecast of future available inventories and will provide sufficient lead time (years) to address impending shortfalls. (Figure 38 provides an example for AV8B aviators.) This would

allow a quantitative analysis of training throughput and bonus tradeoffs and give Marine Corps manpower planners the ability to more accurately understand the aviator inventory over time.

Figure 38. Aviator inventory forecasting concept: AV8B aviator inventory[a]



a. Source: [52].

Performance culture

The fourth pillar, or objective, of the Navy's human capital strategy is the creation of a performance culture in which the organization sets clear expectations against measurable objectives in support of the Navy mission. People are viewed as proactive, result-oriented professionals who embrace the sea warrior ethos in their service to the nation.

Dr. Tanja F. Blackstone (NPRST) presented a model that estimates the joint probabilities that a person will achieve a variety of career goals as of a particular time, conditional on the person's record and other factors outside his or her control [53]. She explained that career goals could include promotion, geographic stability, next assignment, education opportunities, or training opportunities.

Dr. Blackstone reviewed her data collection, observations, and methodology and described how promotions are done in the Navy. For the analysis, she developed a first-order Markov model that can be used to forecast a person's promotion probabilities. The basic model is based on the understanding that Navy promotion is a discrete "game" in which:

- Promotions are decided once or twice a year,
- There is a minimal required time in each grade, and
- There are voluntary and involuntary exits.

In addition, complex dynamics (feedback) may arise for several reasons. First, the number of vacancies at each promotion period, at each grade, and at each skill is limited. Second, people can be promoted quickly or slowly, meaning the person's competing cohorts change over time. These issues are considered in the model, which determines the jobs for fast advancement, taking into account factors that affect promotion speed, including sea duty, exam scores, duty locations, education, and geographic stability.

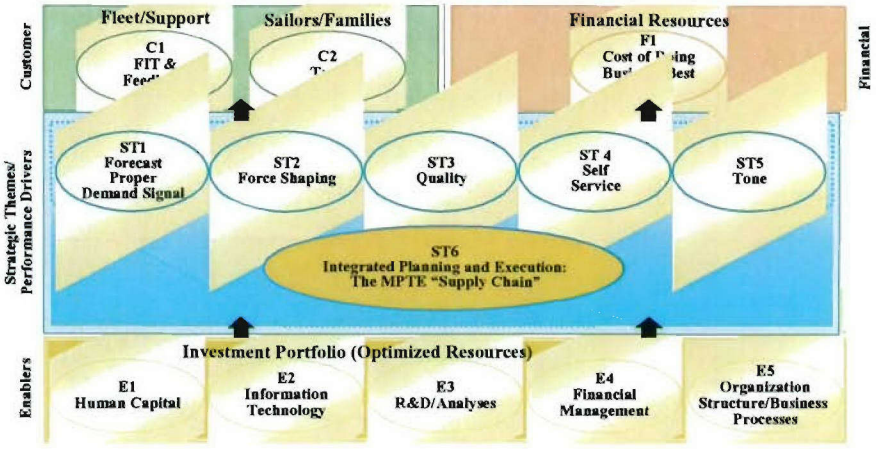
Dr. Blackstone presented average results over the entire sample, noting that individual effects will vary from overall model estimates. The output, however, allows advancement probabilities to be forecast using individual characteristics. She also said that marginal effects that can be predictors include education, sea duty, number of times that people sat for the exam, current activity (CA) changes before and after advancement, and sea months. The estimation method is a semi-parametric, Information-Theoretic approach and is statistically and computationally efficient. Dr. Blackstone concluded that extended models that incorporate external constraints, allow for serial correlations, and accommodate for further individual heterogeneity also are possible.

Establishing metrics that can be used to measure progress toward objectives is key to creating a performance culture. Several of the presenters described metrics being developed to assist in this goal.

Mr. Ilia Christman (N143) compared previously developed Navy MPT&E metrics, which he said were independent and unintegrated efforts, to today's metrics, which he believes are better integrated and focused on the Navy's warfighting capabilities [54].

Mr. Christman focused on the "supply chain," which exploits commercial supply chain management (SCM) tools and business practices to provide end-to-end enterprise visibility of products and costs (see figure 39). He noted that SCM focuses on enterprise outcomes instead of optimizing individual functional processes by highlighting metric and system interrelationships—cause-and-effect relationships throughout the enterprise. Metrics used in the supply chain include the average time to produce FIT ("cycle time"), Awaiting Instruction Time and Awaiting Transfer Time (AI/AT), Individuals' Account (IA), Manpower Effectiveness, and Excess Capacity. He also outlined several supply chain initiatives, including the SCM Feasibility Study, the Enterprise Management System, Activity Based Costing and Management, Warrior Reachback, and the Balanced Score Card (BSC) initiative (now known as the Sea Warrior Transformation Strategy Map).

Figure 39. Managing the Navy enterprise by supply chain[a]



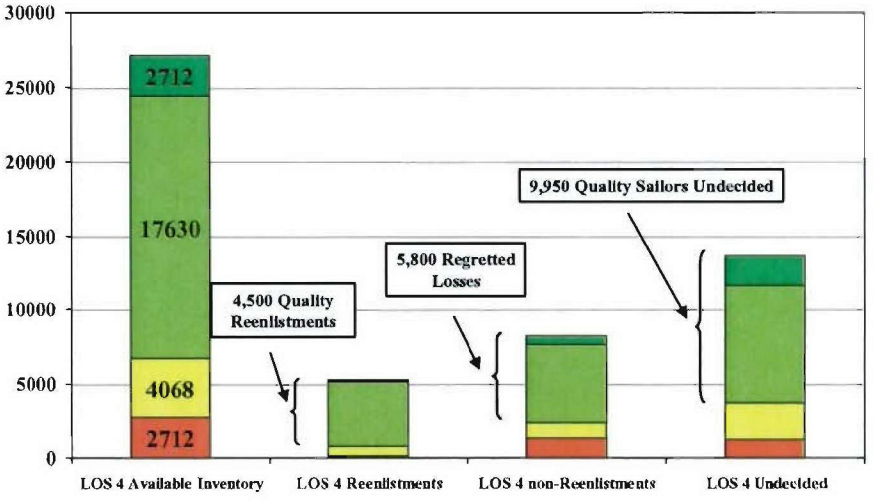
a. Source: [54].

CDR Robert Weitzman (Center for Career Development) presented several metrics for data evaluation [55]. First, he presented a metric used by Pers-4 called the Enlisted Future Fit metric. This metric estimates the apprentice, journeyman, and master FIT rates (inventory divided by EPA) based on several parameters.

CDR Weitzman also described a tool that can be used to evaluate data in the absence of a goal or metric: the self-starting Poisson CUSUM plotter. The CUSUM plotter allows the user to easily vary targets and parameters through use of a spreadsheet-based desktop application.

Finally, CDR Weitzman outlined an effort to develop more accurate retention and attrition statistics to measure the Navy's effectiveness in shaping the force. He presented a notional example of how LOS 4 could be broken down to more closely examine the quality of reenlistments (see figure 40). At a minimum, CDR Weitzman noted, metrics for measuring the quality of reenlistments will include Fitness Report/Evaluation measures and measures of the level of training and education invested.

Figure 40. Quality reenlistments: Notional example of 'LOS-4' quality execution[a]



a. Source: [55].

CDR Shri' Stroud (PERS-45M) discussed Manpower Effectiveness, or M(eff), a distribution metric that mimics the business concepts of Return on Investment (ROI) and Return on Equity (ROE) [56]. She explained that M(eff) brings these concepts into the personnel distribution world, dividing personnel inventory by personnel requirements (see figure 41).

M(eff) is a single point-in-time number, CDR Stroud explained, used to represent the percentage of Navy personnel correctly assigned to valid billets. It is reported monthly along with the Individuals' Account (IA) overage and misalignments.

CDR Stroud cautioned that there are several current limitations in using M(eff) to its fullest capability, including the fact that enlisted personnel are not assigned to discrete billets and that IA controls and execution are inconsistently managed. Also, she noted that unfunded or unauthorized billets (misalignments) directed by senior leadership (directed fills) are considered a "cost of doing business" and currently are not visible within the M(eff) equation. She noted that, without tracking M(eff) changes and identifying influencing metrics,

no insight is gained into how the "business" is operating. Although it is a useful benchmark, CDR Stroud also explained that M(eff) does not tell how well business is done, is cost independent, and, while graphically simple, does not provide the complete picture.

Figure 41. Manpower Effectiveness, M(eff)[a]

$$M(eff) = (ES - IA_{(o)} - Mis) / (BA)$$

- End Strength (ES) is planned OPA / EPA for 30 SEP of execution year.
- Individuals Account (IA) is made up of Student and TPPH data.
- Individuals Account Overage (IA_O) is over-executed student, transient, patient, prisoner, and holdee days measured in man years.
- Misalignments refer to gaps, double stuffs, 9999 assignments - mis-matches in body and billet assigned.
- Billet Authorized (BA) are funded billets planned for 30 SEP of execution year.

a. Source: [56].

CDR Stroud and CDR Michael Harber (PERS-451) described ways in which business practices can be applied to personnel logistics [57]. Figure 42 provides their methodology for understanding business practices and applying them to the Navy environment.

They noted three business objectives on which to focus:

- Increasing Distribution Efficiency (percentage reduction in Permanent Change of Station (PCS)/TDI expenditure annually)
- Increasing PERS-4 Overhead Efficiency (percentage reduction in overall overhead costs
- Improving Operational Efficiency (percentage reduction in turnover annually).

Figure 42. Understanding business practices[a]

- **Define Mission**
- **Identify and Understand the Environment**
- **Determine Benchmark Metric(s)**
  - Tied to mission
  - Well-defined variables
  - Understand all subcomponents and process owners
  - Data granularity conducive to cascading metrics
  - Understand limitations
- **Establish Business Objectives**
  - Measurable
  - Goal-oriented (annual and long term)
  - Consistent
- **Create Relational Measures**
  - Identify impact of actions taken to obtain objectives on benchmark metric(s)
  - Benchmark metric becomes a decision-making tool

a. Source: [57].

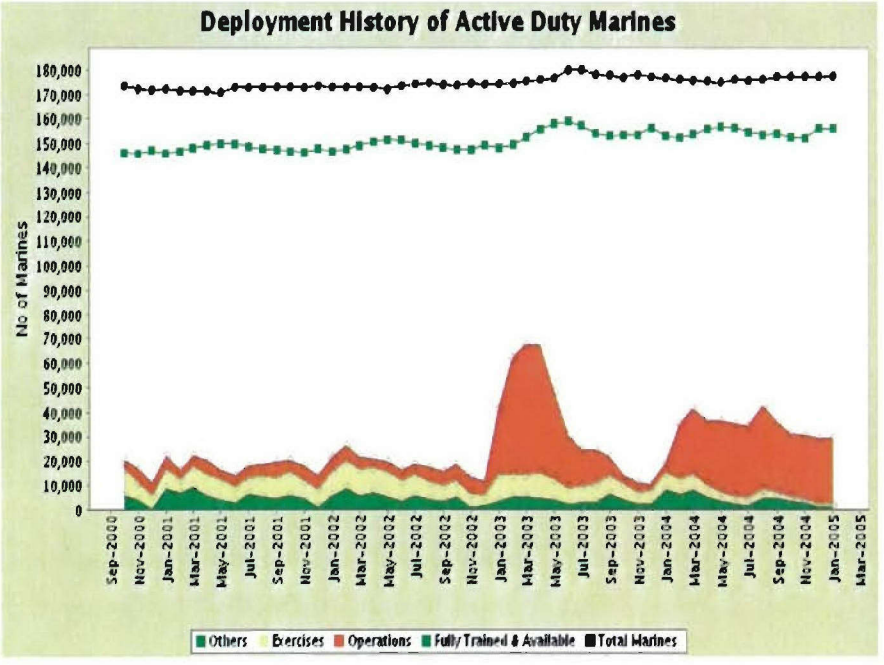
By tying the M(eff) to these objectives, CDR Stroud and CDR Harber concluded that the Navy will be able to tie its mission to well-defined, measurable, business objectives and will be able to construct a relational measure for decision-making analysis.

Deployment Tempo (DEPTEMPO) is a person's deployed time, which includes any 24-hour period in which a Servicemember cannot return to his or her own bed at night. It includes time spent on operations, exercises, unit training, home station training, and mission support TDY. Mr. Marshall Thames (InfoReliance Corporation) described his group's effort to use Marine Corps manpower data, specifically DEPTEMPO data, to provide increased visibility on the force [58].

Mr. Thames noted that, in the past, unit DEPTEMPO was tracked—meaning that, at a particular point in time, one could see how much deployed time the members in the unit had *at that particular time.* It did not, however, allow one to go back in time to access the deployment history of Marines currently in a unit. Mr. Thames observed that this approach masks the impact of staffing changes, such as new recruits and losses, on a unit.

To overcome this problem, Mr. Thames and his team created a web-based application in Java, JavaScript and DHTML residing in an Oracle Portal environment, using data from the Total Force Data Warehouse (TFDW) and the Operational Data Store Enterprise (ODSE). With these new data, the Marine Corps can now track which units (and which current Marines) have the lowest measured DEPTEMPO. Results can be viewed by unit, PMOS, grade, and deployed status. The system also reports the total number of Marines deployed and the number of fully trained Marines compared with total endstrength (see figure 43). In addition, it can make some projections and it allows the user to customize several of the application's parameters (i.e., all ground combat arms or all flying squadrons).

Figure 43. Deployment history of active-duty Marines[a]



a. Source: [58].

Mr. Thames said that this program has given decision-makers real-time access to DEPTEMPO data for Marines currently in units and allows them to do some "what-if" analysis.

Often Navy leadership cannot wait to develop and track metrics before making a decision. Large-scale, paper-and-pencil mail-out surveys can be used as a substitute.

In recent years, first-term attrition in the Navy has exceeded 40 percent. Dr. Rorie Harris (NPRST) described a data collection effort, called 1st Watch, which is designed to help the Navy better understand the transformation of civilians into Sailors over the first enlistment term [59]. By gaining a better understanding of first-term dynamics, the Navy will be able to identify those recruits or Sailors who are at risk for leaving and will be able to determine whether interventions could help. The data also will allow the Navy to link attrition and performance to a variety of unique measures, including levels of person/organization fit, commitment, stress coping skills, perceived social support, expectations of the Navy, and training experiences.

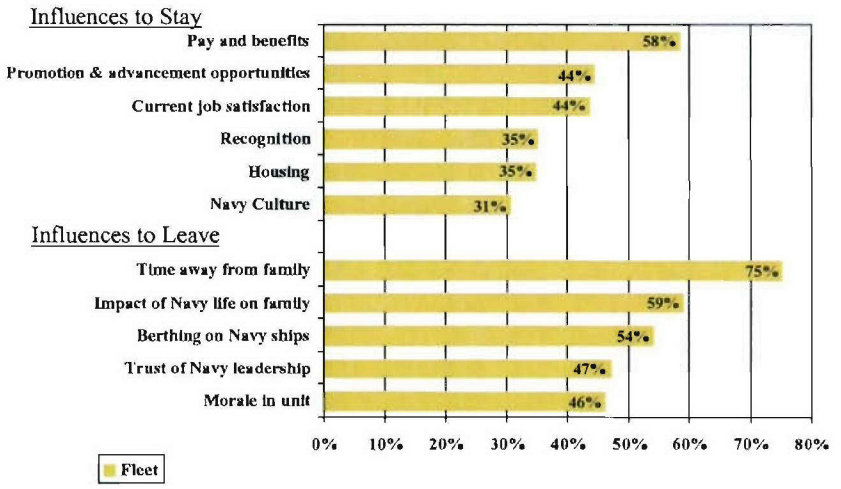
To determine and track the causes of retention and attrition, five surveys are given at specific points during a Sailor's first term:

1. The New Sailor Survey: administered to new recruits as they enter recruit training
2. The Exit Survey: administered to those who drop out of recruit training
3. The RTC Graduate Survey: administered to recruits as they complete recruit training
4. The "A"/Apprentice School Graduate Survey: administered at the end of "A" school
5. The Fleet Survey: administered to first-term Sailors in the fleet to examine attrition and retention.

Dr. Harris reviewed the survey findings, including characteristics of those who attrite and reasons Sailors choose to stay in or leave the Navy. Those who are not sure of their career intentions made up the largest group; large percentages also planned on making the Navy at least a part of their professional career. Still, a notable group planned to leave the Navy as soon as possible.

Dr. Harris explained that both stress and morale fall from RTC to "A" school and on to fleet; commitment ratings also fall consistently. Pay and benefits were the top factors cited as an influence to stay in the Navy, with promotion and advancement opportunities in second place. Time spent away from family was the most often cited reason given for leaving the Navy; the impact of Navy life on family was second (see figure 44).

Figure 44. Top influences to stay in or leave the Navy[a]



a. Source: [59].

Although large-scale mail surveys can give decision-makers valuable information, they are costly and time-consuming. Information is sometimes needed on a quick turn-around basis to make decisions and formulate policy more rapidly. Ms. Carol Newell (NPRST) explained that the goal of the Quick Polls study is to provide Navy leaders with a means to obtain reliable and valid fleet opinions on DON personnel policies and programs in a rapid manner that can then be used to facilitate personnel policy and program decisions [60].

Quick Polls are conducted on topics selected by DON leadership. The goal is to conduct these polls within 13 to 21 business days, depending on the poll's complexity. Ms. Newell noted that probability-based

sampling is used, which yields a quantifiable sample error, and random sampling is used to ensure that the results are representative of the Navy. Sailors selected for polls are contacted through their commands via the Navy message system and are directed to the poll, which is Internet-based. Table 7 shows the stages of the Quick Poll process. The polls typically contain no more than 25 questions and involve the participation of a sample of 3,000 to 4,000 Officers and Enlisted personnel. Respondents are requested to complete the poll online within 5 days. After data collection, the data are analyzed and the results are presented in a standard results template.

Measures of the polls' success include the number of days to completion, the response rate, the use of data for sponsor-actionable results, and the number of flag-level briefings of poll results. Through FY04, 9 Quick Polls had been administered and 12 will be deployed in FY05. In the future, Ms. Newell's team will further investigate the survey methodology and in FY06 will develop a Total Force Quick Poll capability that will expand the polls to include Navy Reserve and civilian personnel.

Table 7. Stages of the Quick Poll process[a]

1. Select Target Population	2. Contact Target Population	3. Deliver Polling Instrument	4. Analyze Data
• Random samples extracted from electronic personnel files	• Navy Messaging *Until NMCI/ IT-21 fully implemented*	• Internet based poll • Poll open 5 days	• Minimal Breakouts • Standardized reporting for all polls • Graphical representation of data; limited text

a. Source: [60].

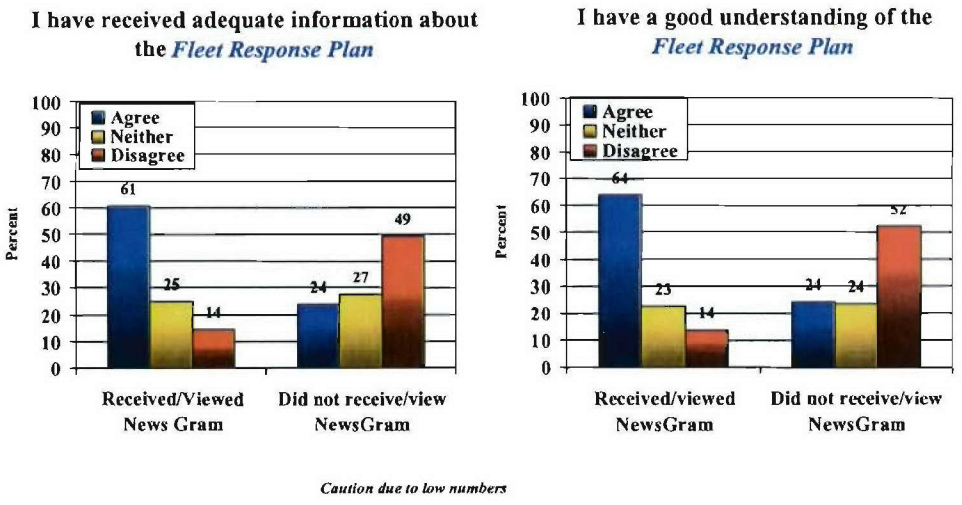
Dr. Kimberly Whittam (NPRST) reviewed results from Quick Polls to evaluate the effectiveness of a media campaign designed to increase knowledge and understanding of the Fleet Response Plan (FRP) and

Summer Pulse '04, to assess Sailor attitudes regarding the FRP and Summer Pulse '04, and to identify information sources that Sailors use to keep up on current Navy operations [61].

Dr. Whittam explained that two polls were conducted—one before the FRP/Summer Pulse '04 media campaign and a second 1 month after the campaign. For each poll, two representative samples were selected: a sample of Sailors currently assigned to UICs involved in Summer Pulse '04 and a cluster sample of the "rest of Navy" not involved in Summer Pulse '04. Results were weighted to match the Navy's paygrade distribution. She reported that response rates (31 and 29 percent) were similar to DoD-wide web-survey response rates for the Navy.

The results showed that those reporting they had received adequate information about the programs and understood them increased after the media campaign. Dr. Whittam found that the Navy E-News Gram did much to promote understanding of the programs (figure 45 shows this for the FRP). Finally, she reported that many of the results remained constant across the two poll administrations—supporting the reliability of the Quick Poll's methodology.

Figure 45. Adequacy of information and understanding of FRP: Rest of Navy by receipt/viewing of Navy News Gram[a]

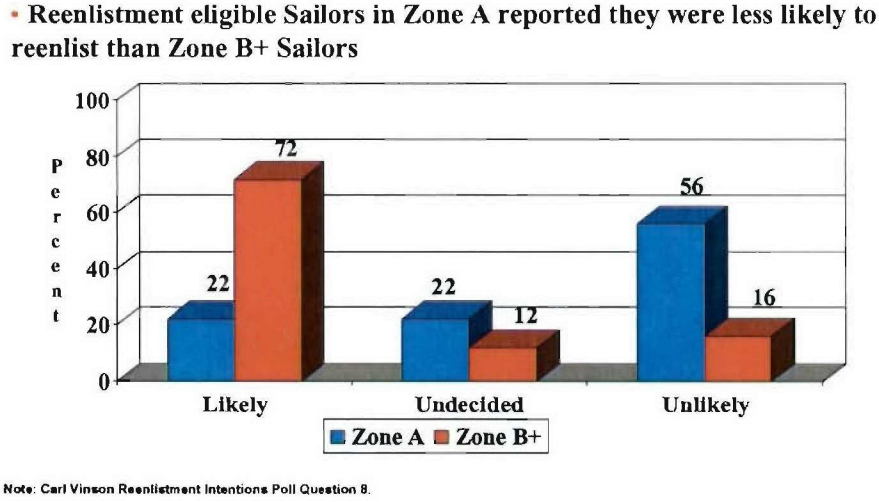


a. Source: [61].

Ms. Carol Newell (NPRST) presented the results of three Quick Polls focused on retention issues: the Carl Vinson SG Reenlistment Intentions poll, the SWO Continuation Intentions survey, and the IT Reenlistment Intentions survey [62].

The Carl Vinson SG Reenlistment Intentions poll surveyed reenlistment-eligible Sailors about their reenlistment intentions and factors affecting those intentions. Ms. Newell reported that Zone A Sailors were less likely to report the intention to reenlist than those in other zones (see figure 46). Satisfaction with their previous deployment was an important factor in their reenlistment decisions. "Stayers" cited medical/dental benefits, current job satisfaction, pay and retirement, and promotion/advancement opportunities as reasons to stay in the Navy. "Leavers" cited time away from home, current job satisfaction, command climate, and civilian job opportunities as reasons to leave the Navy.

Figure 46. The Carl Vinson SG Reenlistment Intentions poll survey: Likelihood of FY04 reenlistment-eligible Sailors to reenlist[a]



a. Source: [62].

The SWO Continuation Intentions survey examined reasons for staying in or leaving the Navy and the impact of proposed continuation

incentives, particularly on junior and female SWOs. Ms. Newell found that mid-grade and former enlisted SWOs were more likely than junior SWOs to report intentions to remain in the Navy. Guaranteed education and geographic stability ranked higher than SWO Continuation Pay and sabbatical leave for junior SWOs as incentives to remain. Guaranteed lateral transfer also was rated highly by junior SWOs.

The IT Reenlistment Intentions survey assessed the likely impacts of various IT reenlistment incentives on decisions to accept overseas Naval Communication Activity (NCA) billets. Ms. Newell reported that the majority of E4s/E5s do not have enough information to make a decision to accept an overseas billet and that most believe that overseas assignments have no impact on their promotion chances. Close to one-third indicated that they would accept an overseas billet. The poll found that a number of nonmonetary incentives would increase ITs' desire to accept overseas NCA duty, including a guaranteed "C" school of choice, guaranteed next location of choice, paid family visits, and a rating test credit. In terms of monetary incentives, most indicated that an additional $1,000 to $2,000 of monthly pay would entice them to accept overseas duty.

Ms. Zannette Uriell (NPRST) presented a review of two Quick Polls aimed at awareness and use of two Navy programs: the Personal Financial Management (PFM) program and the Sexual Awareness Victims Intervention (SAVI) program [63].

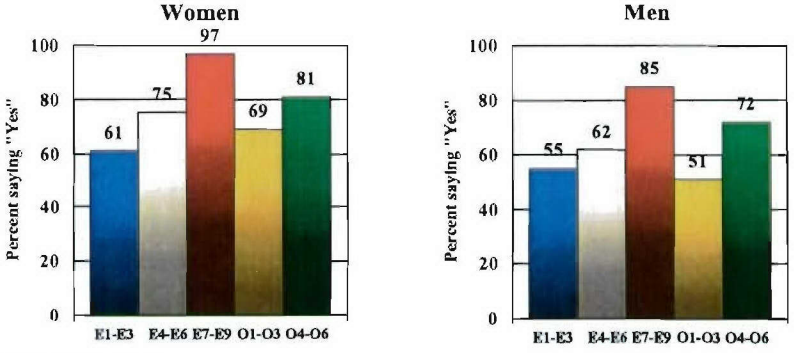
The PFM poll showed that most respondents were familiar with the Thrift Savings Plan (TSP), while only about half reported some familiarity with the PFM program. Ms. Uriell said that only 8 percent of respondents reported using the PFM in the past year. The top three programs for users were Budgeting Service, TSP Counseling, and Savings and Investment, whereas the top three of interest to nonusers were Savings and Investment, Home Buying Service, and Budgeting Service. Lack of awareness was the most common reason cited for not using the PFM program.

The Sexual Awareness Victims Intervention poll found that most had heard of the SAVI program and were aware of the services offered (see figure 47). Ms. Uriell found that over 62 percent of women and

54 percent of men know the SAVI point of contact at their command. Two-thirds or more attended sexual assault (SA) prevention training in the last year; enlisted were more likely to report attendance than officers. Finally, Ms. Uriell observed that over 90 percent understood that SA is a criminal act and knew what actions are considered SA.

Figure 47. Awareness of SAVI program services by gender and paygrade[a]

- **Junior, enlisted and officer, women were less likely to know what services are offered by SAVI. Similar trend for men, although even less likely to know what services are offered.**



Note: SAVI Poll Question 7.

a. Source: [63].

Agile organizations

The final pillar of the Navy's human capital strategy is that it will be agile—an adaptive and responsive organization that optimizes productivity across the enterprise to support emerging or changing mission requirements.

The Navy needs to be particularly agile in recruiting as needs and populations change. CNRC's WEBSTEAM web-based model focuses on analyzing, locating, and placing recruiting stations, manning stations, and other recruiting resources. Mr. Walter Aldridge (CNRC) demonstrated WEBSTEAM, which was developed in FY02 [64]. Conference participants were able to view WEBSTEAM's reports and mapping capability using Windows-based point-and-click technology.

Determining the right level of recruiting resources is key to the military's success. As Dr. Larry Goldberg (IDA) noted, the Services often add recruiting resources too slowly during economic expansions and overbudget during recessions [65]. This leads to accession crises and waste.

An innovative alternative is Crisis Prevention Management, which uses enlistment forecasts to allocate resources as needed over the business cycle. To provide the required forecasts, Dr. Goldberg and his team constructed an Enlistment Early Warning System (EEWS) for each Service. Dr. Goldberg explained that the EEWS forecasts high-quality enlistment contracts 1 year ahead using national monthly level data.

Dr. Goldberg described the Navy Enlistment Models, which relate high-quality enlistments to a variety of factors, including relative military pay, unemployment, and the number of recruiters. He then showed how these data can be used to estimate a variety of effects, such as the effect of economic booms and the risk of a recruiting shortfall (see table 8). Finally, he cautioned that more research is needed to accurately estimate the effects of enlistment policies.

Table 8. Effect of economic boom on high-quality enlistments: FY93 vs. FY00[a]

Service	Effect on GSMA	Effect on GSFA
Army	-38.7%	-25.7%
Navy	-27.5%	-30.7%
Air Force	-17.3%	-32.5%
Marine Corps	-11.4%	-29.2%

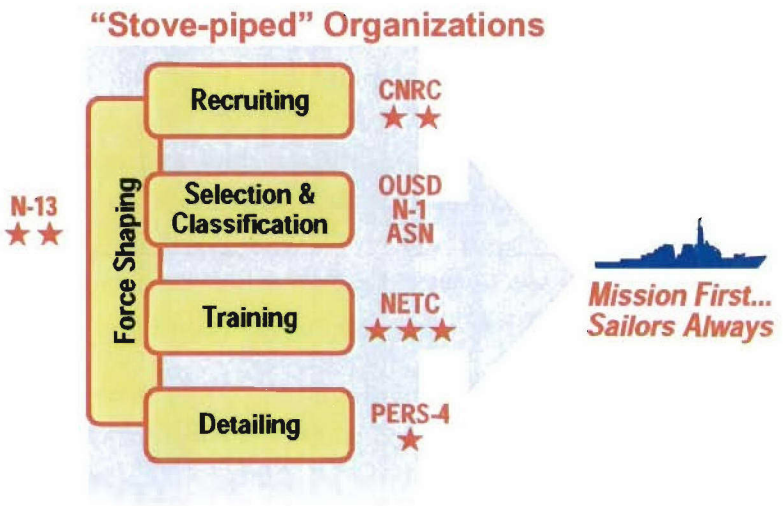
- Unemployment declined by 43.0 %
- Relative Pay declined by 14.3%

a. Note: A GSMA is a male high-school graduate or high-school senior who has achieved a 1-3A test score (i.e., is in the top half of the population distribution). A GSFA is a female with the same characteristics. Source: [65].

Agility also requires that the Navy be able to quickly assess the impact of changes in personnel policies. Mr. David Cashbaugh (NPRST) discussed an alternative system to model personnel called COMPASS, an acronym for Comprehensive, Optimal Manpower and Personnel Analytic Support System [66]. COMPASS represents the Navy personnel enterprise as a modified supply chain. It will facilitate optimization, forecasting, and simulation routines—allowing decision-makers to ascertain the net benefits and net costs of various policy alternatives. COMPASS will monitor the status of the personnel enterprise, project future environments, and alert users to emerging challenges and opportunities. Mr. Cashbaugh discussed and demonstrated several of COMPASS's modular components.

Beginning with recruiting and progressing through specialization and force shaping, COMPASS will reduce or eliminate the issue of analytic visibility across functional areas. As a result, instead of working independently of each other, those responsible for each function within the personnel process (see figure 48) can see forcewide effects and better make decisions to serve the enterprise as a whole.

Figure 48. Current Navy manpower and personnel supply process[a]



a. Source: [66].

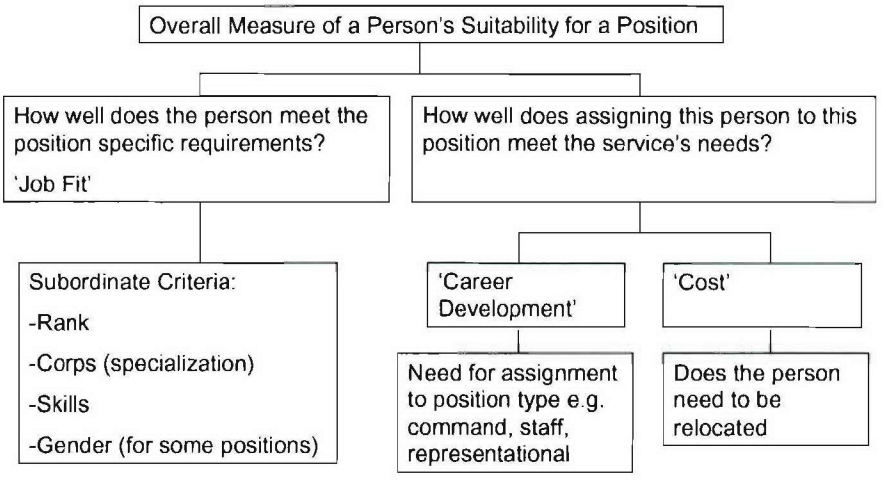
Mr. Cashbaugh envisions a system that is analogous to the combat information system of a modern battle group, which establishes a network of the threat sensors from every ship. The goal of COMPASS is to create a decentralized, adaptive, and self-organizing personnel supply network. It will be decentralized in the sense that decisions are made at the lowest levels and are based on both local knowledge and a complete understanding of the implications that local decisions have on the extended enterprise. It will be adaptive in the sense that, as external and internal changes affect the flow of personnel and information through the supply network, policies and strategies will adapt to maintain optimal performance. In addition, it will be self-organizing because as new personnel requirements (knowledge, skills, and abilities) or new nodes (new platforms and weapons systems) are introduced into the supply network the system will notice these changes and will reorganize to maintain optimal performance.

Mr. Cashbaugh hopes that the tool will stimulate interaction between the various Navy components involved in the process, will allow better adaptation to unusual situations and events, and will help to identify emergent behaviors.

The assignment of the right person to the right position is essential for the effective functioning of an agile organization. Despite this, the military generally uses subjective, manpower-intensive processes to assign personnel which limit the system's agility and responsiveness. Maj Paul Robards (Australian Regular Navy) noted that preliminary experiments indicate that assignment quality varies with the individual detailer's skills and that it is difficult to equitably balance the requirements of large numbers of personnel and positions [67]. Consequently, Maj Robards is involved with the development of a decision support system to recommend assignments.

Maj Robards is developing a two-sided matching process (based on rank-ordered individual preferences) for assigning Australian officers to positions. A similar system is already in use in several markets, most notably the National Residents Matching Program and the NYC Department of Education. Maj Robards said that this program, used in a military context, can help to improve the assignment process. The system focuses on the basic functions of the assignment process (filling positions, developing personnel for the future, making assignments to fit budget constraints, and satisfying personnel preferences) and measures job fit, career development, and cost (see figure 49).

Figure 49. Assignments: Criteria for two-sided matching process[a]



a. Source: [67].

Through a web-based tool, the job fit, career development, and cost scores identify the person best suited for each job. Maj Robards concluded that a two-sided matching system has many benefits: (a) providing detailers with better information regarding assignment outcomes, (b) consistently applying multiple criteria, and (c) creating the ability to adjust weights according to job requirements.

Unlike those in the Active Component, Navy Reserve personnel are assigned to specific billets. However, personnel can be assigned to a billet at one training center yet support requirements that reside at another training center. This causes difficulty in monitoring health, training requirements, and bookkeeping for various training centers. Mr. Ricky Hall (NPRST) discussed this problem as well as a solution—a Reserve assignment optimization tool known as D2K [68].

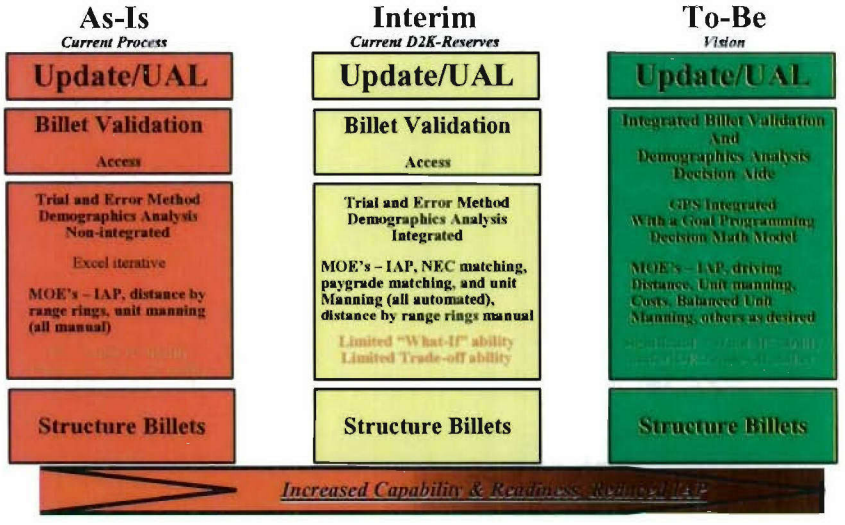
D2K is a system designed to optimize assignments at various geographic levels and for various personnel criteria to reduce the IAP account and restructure assignments or billets as needed. Mr. Hall noted that D2K is a demand-driven requisition system that projects vacancies based on the billet file and a "good" estimation of the personnel who are filling the billets. It does optimized matching, uses prioritized policies, generates requisitions, supports assignment decisions, provides manning information, and allows for scenario management. He added that Version 1.0 was made available in May 2005, and can be accessed via the Internet. Figure 50 shows the evolving vision for the Reserves assignment process.

Mr. Hall explained that D2K functions on the following premise: if reservists are to drill together as a team, they need to be assigned to the same geographical area. He believes that D2K will alleviate "cross-assigned" personnel and misaligned assignments, paygrades and skills, and IAP assignments.

For some hard-to-fill positions, the Navy awards Assignment Incentive Pay (AIP) using an auction, which is designed to enhance the agility and flexibility of the assignment process. The assignment auction prototype developed potentially offers efficiency gains over the current system by combining the power of an auction to elicit Sailors' lowest acceptable compensation for a job with the power of an optimization routine to quickly identify the optimal assignment set out of

millions of possibilities. Since there are over 3.6 million possible ways to match 10 Sailors to 10 jobs, optimization algorithms offer significant advantages.

Figure 50. Reserves assignment process transformation[a]



a. Source: [68].

Dr. R. Wesley Nimon (NPRST) presented a three-step assignment auction process that leverages the power of optimization to generate recommended matches [69]. The prototype, referred to as the Distribution Incentive System (DIS), was developed in a web-enabled environment. First, the Career Policy Administrator (CPA) selects the jobs for which auctions will be held and assigns weights to the Sailor bid/preference and Navy measures of effectiveness (MOEs), such as PCS cost, training cost, and on-time arrival. Second, the Sailor bids for the job. Finally, a detailer examines the recommended matches and decides on the final assignments.

A priori, the CPA cannot know the optimal weights to place on alternative Navy MOEs because it is usually not readily apparent how sensitive each MOE is to the weight placed on it. Will additional weight on PCS cost drive average PCS cost down considerably, or will it

remain largely unchanged? Dr. Nimon presented a decision support tool that quickly displays the tradeoffs associated with alternative weighting schemes, done with a unique graphical display over selected MOEs.

Dr. Nimon also discussed his research on determining the best auction design for Assignment Incentive Pay (AIP) [70]. He noted that the goal is to design auction rules that minimize the amount over a Sailor's true valuation (i.e., his or her reservation wage) that the Sailor bids and the Navy pays. If this is not accomplished, the Navy ends up paying inefficient economic rent (i.e., money) that could have been used to entice another Sailor to volunteer for a hard-to-fill billet. Dr. Nimon hopes this research will determine the auction design that most discourages strategic bidding, which is bidding more than one's reservation wage.

Since multiple factors, such as PCS cost or qualifications, must be considered in determining optimal matches, the bid alone cannot be used in making job assignments. Dr. Nimon examined how small the bid weight can be before Sailors begin inflating their bids because they believe their bids do not meaningfully affect the likelihood that they will be assigned to a particular billet. He noted that a Sailor's bid for a job will be a function not only of how much he or she wants a particular job,but also of how that bid will affect the probability that he or she is selected for all other jobs on which the Sailor will bid. For example, the less the Sailor bids on a specific job, the more likely he or she is to get that job (and the less likely he or she is to get another job). The Sailor knows this, so his or her bid is a complex function of all the available jobs.

The auction engine developed and tested combines the power of optimization and the efficiency of auctions. Dr. Nimon used this software to conduct laboratory experiments at three universities (see figure 51). The data generated allowed him to address a variety of issues, such as the optimal weight to apply to the Sailor's bid, the most efficient auction format (i.e., first price versus a variant of the second price auction mechanism), and the degree to which the contention level matters. In his presentation, Dr. Nimon showed screen shots that the research subjects viewed in these experiments.

Figure 51. Basic structure of the auction experiments[a]

- Subjects are presented with list of jobs
- Total Score = Fitness Score + Bid Score
- Optimization across Total Scores determine assignments
- For each job the bidder's reservation wage (RW) is given
- For the awarded job the subject receives Gamebucks = Bid-RW
- Subjects exchange their Gamebucks for US dollars at a pre-announced exchange rate. This is their payment.

a. Source: [70].

The results of Dr. Nimon's work will inform the auction design decisions and development of AIP in the Sea Warrior Career Management System (CMS).

To be an adaptive and responsive organization, the Navy must fully capitalize on the benefits of technology. Several of the presenters discussed technological architectures, programs, or tools that could make the Navy a more agile organization.

Dr. Bruce Wetherby (SAIC) presented the Open Systems Interconnection (OSI) model, an abstract conceptualization for communications and computer-network protocol design [71]. The OSI model applicable to the Navy has seven layers and can be extended to include human factors (see figure 52).

If there is a commonality of workforce duties and tasks, the tasks would require a common skill set. Dr. Wetherby stated that the subtasks, procedures, and steps would be different for unique variants of systems/products/applications, yet would still fall within a common structured knowledge set. By addressing the human functions and tasks associated with each layer and the rollup of these functions, the skill set requirements can be identified to support system design and

manpower reduction. In addition, he found that a corresponding cognitive approach to the presentation of data and information based on a user-defined skill set would enhance operational capability and a Sailor's ability to operate, maintain, and support net-centric local-area and wide-area networks (LANs and WANs) and communications systems. Dr. Wetherby suggested that application of the OSI seven-layer architecture would allow for the construction of viable MPT protocols and standards that support a versatile workforce capable of being assigned to multiple network-centric jobs with improved warfighting effectiveness.

Figure 52. The OSI seven-layer reference model and its extensions[a]

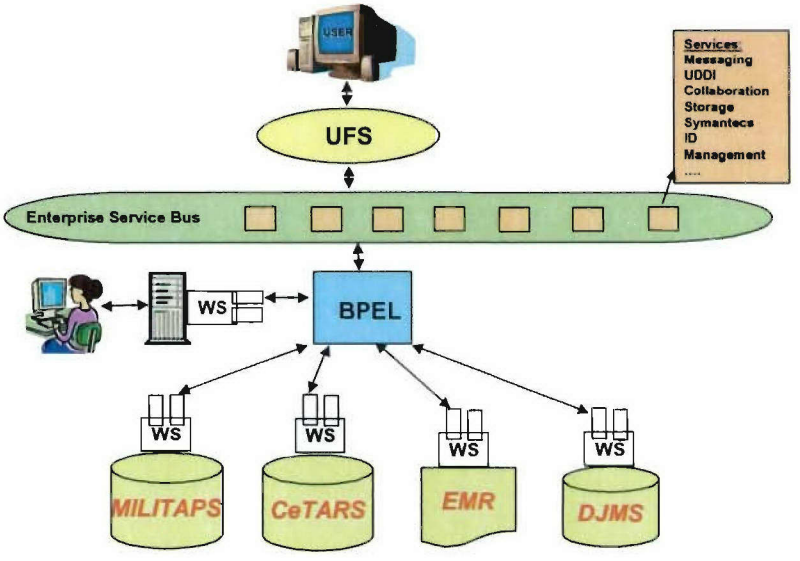
	OSI
1.	**Physical Layer** - The Physical layer defines all electrical and physical specifications for devices.
2.	**Data Link Layer** - The Data link layer provides the functional and procedural means to transfer data between network entities and to detect and possibly correct errors that may occur in the Physical layer.
3.	**Network Layer** - The Network layer components provide the functional and procedural means of transferring variable length data sequences from a source to a destination while maintaining the quality of service requested by the Transport layer.
4.	**Transport Layer** - The purpose of the Transport layer is to provide transparent transfer of data between end users.
5.	**Session Layer** - The Session layer provides the mechanism for managing the dialogue between end-user application processes.
6.	**Presentation Layer** - The Presentation layer is responsible for the delivery and formatting of information to the application layer for further processing or display.
7.	**Application Layer** -The Application layer provides services for an application programs to ensure that effective communication with another application program in a network is possible.
	Bauer, B., & Patrick, A.S EXTENSION FOR HUMAN FACTORS
8.	**Display Layer** - Represents that aspect of the hardware, software and interfaces that a user experiences.
9.	**Human Performance Layer** - Captures the information-processing features and limitations of users.
10.	**Human-Needs Layer** - Captures the essence of why a user would interact with technology—i.e.,to get something done to satisfy a purpose. That need should be defined in a technology-independent way.

a. Source: [71].

Finally, Dr. Wetherby noted that application of the seven-layer approach would reduce complexity, improve teaching and learning, create interoperable technology and standard user interfaces, allow for commonality in skill level and cognitive similarity, accelerate evolution, and modularize engineering.

Ms. Valerie Hall (SPAWAR) discussed the development of the Bonus Relocation Analysis and Decision Support (BRADS) system [72]. The Navy invests about $100 million annually in numerous enlistment incentive programs that several Navy organizations, including CNRC, N13, and PSAs (Personnel Support Activities), must manage and distribute. The time from obligation to execution of these incentive dollars ranges from 1 to 48 months, requiring the tracking of funds across several Navy budget cycles. Sailors' progress though various training gates also must be tracked. The Navy currently tracks this information using various semi-automated processes that force program managers to rely largely on estimated execution rates. Ms. Hall estimated that by doing so the Navy loses as much as $56 million annually because unexecutable obligations cannot be identified in time to be recouped and reallocated. Figure 53 shows the proposed BRADS architecture.

Figure 53. Proposed BRADS architecture[a]



a. Source: [72].

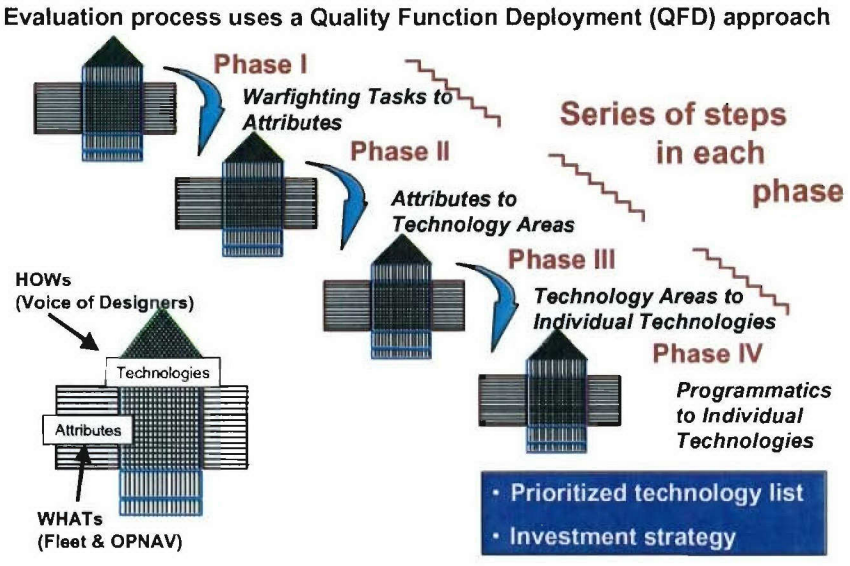
Ms. Hall noted that the BRADS system will provide state-of-the-art business processes, giving the Navy's program managers real-time visibility of program status. She explained that BRADS will tie together disparate automated systems, including CeTARS, PRIDE, EMR, and MILITAPS, and will be capable of tracking, analyzing, reporting, and monitoring all incentive programs.

Ms. Hall said that BRADS would facilitate timely payment of incentives and allow the Navy to identify, recapture, and redistribute incentive dollars. She added that it will also save the Navy many fleetwide man-hours currently spent tracking, accounting, analyzing, and reporting on incentive programs. She estimated that this alone could save the Navy $1 to $2 million monthly. Finally, Ms. Hall noted that BRADS will take 1 year to develop at a cost of $700,000 to $900,000, with an annual maintenance cost of $250,000.

Mr. Stephen Moretto (N11) discussed how to determine which technologies make the best investments [73]. Central to this is determining how to balance modern technology needs, such as increased performance, lower system costs, longer operating capacities, and improved productivity and efficiency, against the constraints of limited resources, scant/unknown data, the identification and resolution of conflicts, and resource allocation.

Although technologies are assessed throughout the acquisition process, Mr. Moretto believes that there is a need for an integrated and systematic framework that stakeholders at each stage of the process can use to identify potential problem areas, assess system effectiveness, and aid in resource allocation and the decision-making processes. He noted that by beginning with the endstate in mind and using existing tools as a starting point, stakeholders can contribute to reduced program support costs, better justification of source selections, and better end products. To this end, ONR has developed two tools: the Technology Identification, Evaluation, Selection (TIES) tool and the Proposal Evaluation Tool (PET). The evaluation process uses a Quality Function Deployment (QFD) approach (see figure 54). Mr. Moretto described each tool and demonstrated the PET by presenting several screen shots.

Figure 54. Technology evaluation methodology[a]



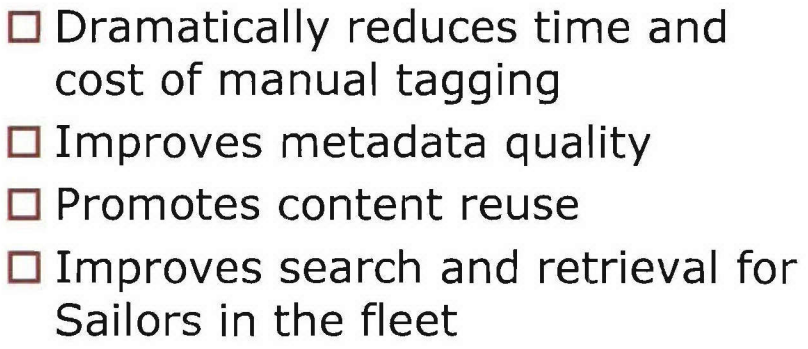
a. Source: [73].

Ms. Sarah Aust (HPC N74) discussed the underutilization of technology, including the slow recognition of its advantages [74]. She noted that computers and other technologies often are used as a substitute for paper; users do not take advantage of the full range of computing resources and greater computer capabilities. She contends that the reason we do not see a large return on investments in IT solutions is because we often neglect to evaluate and change the operating rules that existed before the technology was adopted.

An overarching goal of the Navy's Revolution in Training (RIT) is to improve individual and mission performance by making knowledge available to Sailors when and where it is needed. Ms. Aust noted that, rather than using standard methods of text-searching, for instance, the Navy should update its methods. Whereas simple word searches can return irrelevant matches or no matches if the correct terminology is not used, Latent Semantic Analysis (LSA) takes advantage of technology's greater capabilities and allows text-searching without requiring the searcher to decipher the author's particular terminology. A Sailor would be able to quickly search for a very specific piece of information in his or her "natural language" to help with job

performance. LSA also would have other potential payoffs, as described in figure 55).

Figure 55. Payoffs from LSA use[a]



a. Source: [74].

Ms. Aust explained that LSA works by processing a large sample of language and specifying the contexts in which words occur. LSA can organize any set of these words in a high dimensional semantic space. The similarity of the contexts in which a word appears is a reliable indicator of the similarity of the meaning of words to each other.

Ms. Aust also spoke about efforts to develop automatic metadata tagging and aids for human tagging, vocabulary selection, and free-form description authoring by applying advanced techniques based on LSA and related machine-learning technologies. Such a system would permit very rapid development of SCORM[6]-conformant tagged components with minimal human intervention, provide "natural language" search capability based on meaning, and provide summary sentences. She noted that the payoff from investing in LSA would

6. SCORM is a reference model used to ensure that content and management systems are compatible.

include dramatically reducing the time and cost of manual tagging, improving metadata quality, promoting content reuse, and improving search and retrieval for Sailors in the fleet.

Mr. Jeff Moseley (CIV, SSC NOLA) discussed SSC NOLA's proposal to create a distributed and collaborative engineering environment linking Navy Commands in New Orleans (M&P focus), San Diego (FORCEnet, CHENG, and HSI), and Charleston (architecture repository) [75]. The goal is to create a Net-Centric Service Oriented Architecture (SOA) that supports increased mission capabilities for operating and maintaining Navy-developed business IT systems.

He noted that the NetCentric Navy Transformational Roadmap identifies the importance of the Global Information Grid as a communications/networking backplane on which next-generation Navy tactical and business capabilities will be constructed. He said that capabilities would be created through the federation of globally available enterprise services loosely coupled with domain-specific, community-of-interest services. Using business IT solutions to support a mission-oriented workforce, SSC NOLA's proposal will help create an event-driven, services-based, metadata-centric enterprise architecture. He added that this would leverage the Navy's current investment in MPT&E applications while delivering on the future promise of SOA and composite applications.

Mr. Moseley stated that by designing MPT&E operational activities as federations of loosely coupled services built on Net-Centric platforms, solutions can be rapidly provided for a wide variety of personnel, training, and education needs. He said that by using a service-oriented approach, new processes could be created without touching underlying code or worrying about platform incompatibility. In addition, this proposal integrates information that is locked in stovepipe applications and process components and disparate systems developed for separate business processes.

Mr. James Simien (NPRST) examined how to best provide IT support for the Navy's future distributed business processes involving Sailors and commands [76]. He noted that distributed processes give the Navy the opportunity to increase efficiencies across the enterprise.

Mr. Simien and his colleagues are developing a Multi-Agent system incorporating software agents to intelligently assist users in performing tasks. In FY04, the initiative (called Web-Based Marketplace, or WBM) solicited information on Sailor preferences, examined CPA functionality within the system, and developed a rudimentary counselor agent and command agents. In FY05, the effort will focus on developing a formal methodology for knowledge acquisition and management for the Navy's business rules used in the assignment process, exploring the use of algorithms in Sailor-to-job matching, developing agent bilateral negotiation for assignment matches that occur outside the general matching process, and experimenting with multiple forms of distributed architecture to determine performance and scalability. Mr. Simien concluded that this work will help to refine the Navy's agent-based Sailor detailing.

Conclusion

The *Fifth Annual Navy Workforce Research and Analysis Conference* brought together researchers from a variety of organizations, each working toward a common goal—supporting the Navy's continued development of a human capital strategy. Individual organizations' approaches and techniques may differ, but their contributions combine to form a comprehensive and coherent body of work. The research community's work presented at the conference builds on the pillars of the CNO's human resource strategy for the Navy.

By providing a forum for the exchange of ideas and information, the *Navy Workforce Research and Analysis Conference* ensures that the research community will continue to support leadership's workforce priorities for years to come.

References

[1] Dr. Albert Monroe, "1000/1050 Coded Billet Analysis," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[2] Mr. Alan Marcus, "Reducing the Shore Infrastructure: Lessons from Past Competitions" presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[3] Resource Consultants, Inc., "Human Resources Cost Analysis Tool (HRCAT) Phase 2," demonstration at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[4] Dr. Stuart Rakoff, "Matching Work and People: Enterprise Workload Planning and Performance Systems (EWPS) and Navy Downsizing," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[5] Mr. Jack Keenan, "Applying Civilian Ship Manning Practice to USN Ships," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[6] CDR Joseph Waite, "The Affiliation of Naval Veterans in the Reserve Component," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[7] Dr. Michelle Dolfini-Reed, "Determining Reserve Attrition Since September 11, 2001," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[8] Dr. Jim Jondrow, "Deployment Arithmetic: Modeling Sustainable Troop Rotation," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 2005

[9] Dr. Robert Levy, "Measuring the Effects of the OIF Deployment on Naval Hospital Productivity," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[10] Mr. Rick Loffredo, "EPA-by-LOS Goal Development using the Objective Force Model for Force Planning and Policy Development," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[11] Ms. Angela Cho and Mr. Sanjay Nayar, "Retention Goal Determination for Navy Force Shaping and Planning Analysis," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[12] Dr. Chariya Punyanitya and Mr. Mark Icore, "SRB and C-School Planning and Analysis Tool for Force Planning and Policy Development," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[13] Dr. Bill Gates, "Analysis of Separation Pay Options," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[14] Dr. Michael Hansen, "Steady State Accession," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[15] Mr. David Hegland and Mr. William Mulholland, "Manpower Requirements Determination for New Programs, A Structured Approach—BAMS UAV," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[16] CAPT Norbert Doerry and Mr. Bill Cheng, "Total Ship Functional Analysis in Support of Manpower Assessment in Ship Design," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[17] Dr. Jennifer McGovern Narkevicius, "Systems Engineering, Acquisition, and PERsonnel INTegration (SEAPRINT) Today," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[18] Ms. Nancy Dolan, SEAPRINT Tomorrow," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[19] Dr. Richard T. Kelly, "Human-System Integration Impacts of Distributed Workforce Configurations in the Trident Warrior 2004 Sea Trial," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[20] Mr. John Lockett, "There's the Engineering, Where's the Science? Suggestions for Research To Support Implemented HSI," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[21] Ms. Nancy Dolan and Mr. Michael Brown, "And Then They Were One: How HSI Can Improve Acquisition and Capabilities Across the Services," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[22] Mr. Michael Evans, "Towards Understanding the Preferences of the Navy's Target Market—Choice-Based Conjoint (CBC) Survey," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[23] Dr. Amanda Kraus and Dr. Jennie Wenger, "College Recruits in the Enlisted Navy: Navy Outcomes and Civilian Opportunities," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[24] Dr. Lisa Mills, "Individual Characteristics Related to SEAL Training Success," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[25] Dr. Stephen Mehay and Dr. Buzz Bowman, "Selection and Classification Criteria for Commissioned Officers: A Case Study of Applicants to the United States Naval Academy," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[26] Ms. Janet Held and Mr. Paul Hogan, "A Recruit Allocation to Ratings Model that Evaluates the Value of Adding Tests to the Armed Services Vocational Aptitude Battery," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[27] Dr. Bradd Hayes, "Out Brief on Recruiting and Compensation Issues from Facilitated Discussions," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[28] Dr. Christina M. Underhill, "Results of Preliminary Testing of a Computer Adaptive Personality Measure on First-Term Enlisted Sailors," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[29] Ms. Naina Eshwar, "Enlisted Motivation," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[30] Ms. Marian E. Lane, "Self-confidence as a Predictor of First-term Attrition," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[31] Dr. Peggy Golfin, "First-term Enlisted Attrition and Retention," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[32] Dr. Jim Grefer, "Comparing the Relative Value of Active Duty and Civilian Compensation Packages," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[33] Dr. Aline Quester and Sergeant Major Gary Lee, USMC (retired), "The Retirement Choice at 15 Years," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[34] Dr. Pat Mackin, "The Post-Service Earnings of Military Retirees: Evidence from the 2003 Survey of Retired Military," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[35] Dr. Margaret Harrell, "Working Around the Military: Challenges to Military Spouse Employment," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[36] CDR John Hefti, "An Update on the Navy's Strategic Diversity Effort," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[37] Major Joseph Sanders, Dr. Willie E. Hopkins, Dr. Amanda Kraus, and Dr. Apriel Hodari, "Evidence Based Transformation: Mission Case for Air Force Diversity," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[38] Dr. Paul Rosenfeld, Ms Carol Newell, "The Navy Officer Survey: Mentoring and Diversity Findings," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[39] Ms. Anita Hattiangadi, "Study of Non-Citizens in the U.S. Military," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[40] Ms. Zannette Uriell, "Key Findings of the 2003 Navy Pregnancy and Parenthood Survey," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[41] Mr. James Gasch, "Proposal for a New Navy Enlisted Ratings Structure," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[42] LCDR Andy Jones, Ph.D., "Human Resources Officers' Role in Supporting Fleet Operational Requirements," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[43] Dr. Harry Thie and Mr. Peter Schirmer, "A Strategic Approach to Naval Officer Management," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[44] CDR James Montgomery, Ph.D., "Coast Guard Future Force 21," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[45] Mr. Robert Hausmann, "Is Online Leadership Training Effective?" presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[46] Dr. Denise Charbonnet, "Government OTS/Commercial OTS Courseware Assessment Process (GCAP) Navy Human Capital Development Project (NHCDP)/SPAWAR Systems Center New Orleans," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[47] Dr. George Konstantinow, "Instructor Resources for Navy Training," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[48] Dr. George Konstantinow, "Optimizing Resources for Navy ILE," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[49] Dr. Ann Parcell, "Naval Flight Officer Attrition," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[50] Dr. Margaret Harrell and Dr. Harry Thie, "Framing a Strategic Approach to Joint Officer Management," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[51] Dr. Albert Monroe, "Aviation Officer Career Paths," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[52] Major Brian Lambert, USMC, "Forecasting the Inventory of USMC Aviators," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[53] Dr. Tanja F. Blackstone, "Estimating U.S. Navy Enlisted Career Path Promotions: An Information Theoretic Approach," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[54] Mr. Ilia Christman, "NMAPs," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[55] CDR Rob Weitzman, "Red Cell Analysis," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[56] CDR Shri' Stroud, "Understanding Manpower Effectiveness," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[57] CDR Shri' Stroud and CDR Mike Harber, "The Business of People Logistics," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[58] Mr. Marshall Thames, "Measuring Deployment Tempo," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 19, 2005

[59] Dr. Rorie N. Harris, "1st Watch on the First Term of Enlistment: Examining Retention and Attrition in the U.S. Navy," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference,* April 18, 2005

[60] Ms. Carol Newell, "CNP Navy Quick Polls: Turning Questions into Answers in 13 Days," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[61] Dr. Kimberly Whittam, "Quick Polls: Pre- and Post- Evaluation of a Media Campaign," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[62] Ms. Carol Newell, "Quick Polls: Retention Intentions of Navy Personnel," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

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[64] Mr. Walter Aldridge, "WEBSTEAM," demonstration at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

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[66] Mr. David Cashbaugh, "Comprehensive, Optimal Manpower & Personnel Analytic Support System (COMPASS)," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[67] Major Paul Robards, Royal Australian Army, "Applying Two-Sided Matching to the Assignment of Military Personnel," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[68] Mr. Ricky Hall, "USNR Assignment Optimization Tool," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[69] Dr. R. Wesley Nimon, "An Assignment Auction System," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[70] Dr. R. Wesley Nimon, "An Experimental Analysis of the Relative Efficiency of Alternative Assignment Auction Formats," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 18, 2005

[71] Dr. Bruce Wetherby, "Manpower, Personnel and Training (MPT) Integration as a Result of Application of the Open Systems Interconnection (OSI) Reference Seven Layer Model," presentation at the Fifth *Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[72] Ms. Valerie Hall, "Bonus Reallocation Analysis and Decision Support (BRADS)," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[73] Mr. Stephen Moretto, "Technology Management Best Practices: Reducing Technology Identification, Evaluation, and Selection Costs," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[74] Ms. Sarah Aust, "Faster Than You Can Say, Automated Metadata Tagging," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

[75] Mr. Jeff Moseley, "Net Centric Enterprise Services Engineering," presentation at the *Fifth Annual Navy Workforce Research and Analysis Conference*, April 19, 2005

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