A NEW APPROACH TO TRAINING IN A REDUCED MANNING ENVIRONMENT

With personnel costs accounting for 60% of the total ownership cost of Navy ships, the role – and number – of people onboard has come under increased scrutiny. Target manning numbers for DD 21, the next-generation destroyer class, are approximately one quarter of the ship class it will replace. While automation and other advanced technologies can greatly decrease the need for a "human in the loop," the reduced manning environment presents new challenges for training. Redundancy in expertise and manning coverage for "on the job" training in this new environment is dramatically decreased; watchstanders and maintainers must come aboard as "Full Up Rounds," immediately ready to perform their duties. This philosophical shift must be accompanied by changes to current Navy training – from training management to training pipelines to training delivery methodologies. When viewed as an integral part of the ship's operational concept, training becomes an enabler for reduced crew sizes, rather than a burden to be dealt with after ship design.

From 1999 through 2000, a joint government/industry team met with several Navy groups to discuss the ramifications of greatly reduced crew sizes on Navy training. These focus groups – which ranged from representatives of pre-commissioning and post-deployment crews to members of training commands – provided great insight into today's Navy training experience: what works well, what doesn't, and what (sometimes subtle) changes can have a tremendously positive impact on crewmembers' ability to be "Ready to Fight."

This paper (1) briefly describes the methodology used to collect user input, (2) identifies and discusses the issues raised in these focus groups, (3) describes a training model suggested as an outcome of these sessions, and (4) suggests areas requiring further study.

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INTRODUCTION

With personnel costs accounting for an estimated 60% of the total ownership cost of U.S. Navy ships, the role – and number – of people onboard has come under increased scrutiny. Target manning numbers for DD 21, the next-generation destroyer class, are approximately one quarter of the ship class it will replace. While automation and other advanced technologies can greatly decrease the need for a "human in the loop," the reduced manning environment presents new challenges for training.

From 1999 through 2000, members of the DD 21 Blue Team met with several Navy groups to discuss the ramifications of greatly reduced crew sizes on Navy training. The primary objective of these User Conferences (USECONs) was to solicit input "from the front lines" related to Blue Team training approaches and concepts. The USECON participants included a wide range of Navy personnel, from representatives of pre-commissioning and post-deployment crews to members of training and detailing commands.

The purpose of this paper is to share some of the insight into today's Navy training that was provided by men and women who are currently living that experience. While the data was gathered with the DD 21 environment in mind, most of the issues raised in the USECONS – what works well, what doesn't, and what changes could have a significantly positive impact on crewmembers' ability to be "Ready to Fight" – apply to any Navy surface platform. This paper will first provide a brief overview that defines some of the challenges of building a training program for a platform such as DD 21. Second, this paper will present the methodology used to obtain feedback from various fleet personnel to help identify both successful and deficient areas in current Navy training. Third, this paper will highlight specific training issues – applicable to DD 21 and other future platforms, as well as current platforms – that were of particular concern to fleet respondents. Finally, this paper describes the implications of these issues for training and provides recommendations for areas where further research and development is required.

DESIGNING A TRAINING PROGRAM FOR A NEW SHIP CLASS

The DD 21 Land Attack Destroyer will be a multi-mission destroyer tailored to maritime dominance and land attack missions, capable of operating independently or with a Naval, Joint or Combined task force. DD 21 has aggressive affordability goals, including:

- Procurement cost objective of $750M per ship, beginning with the 5th ship constructed at each shipyard (FY'96$)
- Optimized crew size objective of 95 crewmembers (70% less than current surface combatants) while maintaining a high quality of life for the crew
- Operation & Support cost objective of $2700 per hour underway (70% less than current surface combatants).

Each of these goals has a direct impact to the type, quality, and timing of training that crews must receive. The reduced manning environment pushes three overarching needs to the forefront. First, there is the obvious need to provide the ship

with personnel ready to perform their jobs upon arrival. The development of a "Full Up Round" requires significant changes to the structure and delivery of training from present day training pipelines. Second, the type of training personnel receive prior to coming onboard ship must be much more realistic and specific. Personnel can no longer be successful with generic skills and knowledge training; rather, individuals must be mission-qualified and ready to perform on specific equipment and in specific domains *on the hull to which they are assigned*. Finally, there is an urgent need to ensure a high Quality of Life (QoL) for sailors. While issues such as sea duty, ship spaces, and messing are certainly key factors in determining QoL, training also plays a significant part in the willingness of personnel to join and stay in the Navy. Training must provide meaningful opportunities for career advancement, and professional and personal development.

NAVY TRAINING USER CONFERENCES (USECONS)

Direct user input regarding training issues was seen as a critical component to the development of a training philosophy and training program that would meet the unique needs of the reduced manning environment of DD 21. Further, this fleet input was believed to be of great use to the Navy training community at large, which is facing similar challenges with declining recruitment and retention rates. Potential user groups (e.g., a pre-commissioning group, a Training Command group, etc.) were identified, data points were defined, and data collection tools were designed.

USECON Methodology

Participants. Five training USECONs were conducted between October 1999 and August 2000. For each USECON, a particular population was selected. These included: 1) the Pre-Commissioning Crew of the USS O'Kane (DDG 71); 2) instructors from the Naval Training Center, Great Lakes, IL; 3) a Post-Deployment Crew of the USS Carney (DDG 64); 4) staff and instructors from the Fleet Combat Training Center – Atlantic (FCTCLANT); and 5) the Navy Retention Team, Navy Personnel Command, Millington, TN. The average group size was twenty-five. In each case participants were selected by their respective command to represent as wide a range as possible in terms of Navy experience. Each command was asked to ensure female personnel were included and to provide individuals who were likely to be forthcoming with their opinions.

Procedure. Each USECON followed the same basic procedure. Contact was established with the appropriate military/government personnel and permission was obtained to speak with the targeted groups. In some cases, the groups were hosted at the contractor site (e.g., the USECONs with the crews of USS O'Kane and USS Carney); in others, the DD 21 Blue Team was invited on base to conduct the sessions (e.g., the Fleet Combat Training Center at Dam Neck, VA).

Each session began with an introduction by a senior-ranking officer, who first emphasized the importance of the opportunity to provide "frontline feedback" and then underscored the command's support of the activity. This was followed by an explanation of the USECON process and the Blue Team objectives for holding the session. To ensure each group understood the objectives of the DD 21 program, participants were provided an overview of the DD 21 Program and, more specifically, an introduction to some of the high-level training concepts being considered by the Blue Team (e.g., training organization and delivery, training management systems, etc.).

In order to obtain as much individualized feedback as possible, small group breakout sessions were conducted that limited the number of participants in each group. Groups were divided in terms of similar rank or function. Not only did this allow for a greater number of individuals to provide responses, it also provided a general context to each of the discussions (e.g., engineering, damage control, etc). Blue Team session leaders captured inputs on flip charts during small group sessions; this input was displayed and discussed in subsequent large group sessions. At the end of each USECON, Blue Team members provided participants with an end-of-session debrief. Each USECON participant also completed a written questionnaire at the end of each USECON; this provided the opportunity for participants to make comments they may not have been comfortable making in the presence of senior or peer-level personnel.

TRAINING ISSUES

During the USECONs, participants were asked to discuss various components of both the Blue Team training concept and Navy training in general. It should be noted that although participants were encouraged to articulate concerns with current training practices, they were equally encouraged to specify current training practices that provided key opportunities in the development of shipboard expertise. Care was taken to identify training mechanisms that are currently providing successful learning opportunities. These mechanisms could then be included in the new design – or built upon – where appropriate.

The following sections emphasize three major training areas that were specifically called out during USECONS. They include the need to provide "Full Up Rounds," the need to provide realistic training (both at the schoolhouse and onboard ship), and the need to address QoL issues associated with training.

Challenge: Produce "Full Up Rounds"

Unlike their subsurface and aviation counterparts, surface warfare sailors are typically not trained for a specific hull or to a level where they can immediately assume the duties of their billet upon arrival at their ship (see Figure 1). Beyond the training received in "A"-level and "C"-level schools, subsurface sailors receive training specific to their platform at schools such as the Trident Training Facility. Aviation sailors attend platform-specific training at Fleet Replacement Squadrons.

However, the enlisted Surface Warfare Community has traditionally used onboard On-the-Job Training (OJT) as the primary methodology to accomplish platform/hull-specific training. The same comparative situation is also true for officers. There is no physical training site with the specific mission to train enroute surface warriors on the equipment, configuration, and procedures specific to, for example, the DDG 51-Class of ships (pre-commissioning crews are an exception). To accommodate OJT instructors, students, and

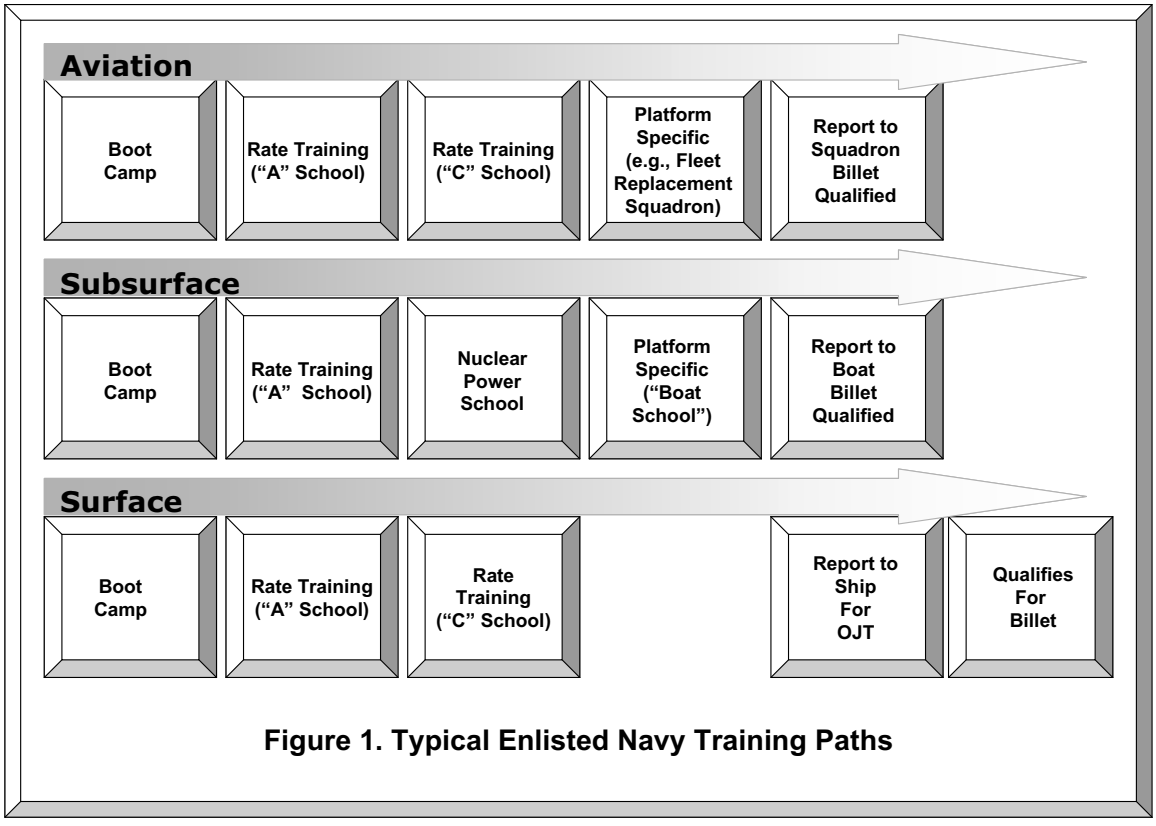

Figure 1. Typical Enlisted Navy Training Paths

training administration, increased manpower for each billet is required to allow the ship to achieve operational capability while OJT occurs. In a reduced manning environment, hull-specific "Full Up Rounds" must report aboard qualified and ready to contribute in the billet assigned.

Training personnel to the full extent necessary prior to arriving at the ship will drastically reduce the need for current OJT practices. However, many of the USECON participants cited specific benefits that result from OJT onboard ship. The following subsections represent endorsements to the current OJT process given by USECON participants.

Face-To-Face Competency Assessment Through OJT. The OJT instructor has greater insight into a trainee's true knowledge, skills, and attitudes (KSAs) than an independent assessor. Trainees who may "freeze" during formal testing situations with unfamiliar assessors are more at ease with OJT competency assessment; and trainees who have not truly mastered a skill are less likely to "fool" an OJT instructor.

Mentoring That Takes Place Through OJT. An instructor/trainee bond often develops during OJT that results in the instructor mentoring the trainee on competencies beyond the skill acquisition at hand.

"Sea Daddy" Aspect Of Shipboard OJT. USECON participants expressed the belief that OJT trainees have the feeling that someone on the scene and in touch with the current environment is determining his/her training, not someone onshore at a desk a thousand miles away.

While USECON participants pointed out several advantages associated with the current reliance on OJT for platform-specific training, they also underscored many frustrations they encountered with that methodology. These frustrations centered on the quality of the overall training experience and primarily stemmed from inconsistencies related to the timing of training and the assessment of performance.

When Training Is Delivered. Frequently a substantial lag time exists between when training is received on a system, process, or piece of equipment and when that competency is called upon. In some cases cited by USECON participants, training is received *after* an individual is held responsible for the maintenance or operation of the equipment.

Content Of Training/Application Of Sound Instructional Systems Design. OJT is often led by personnel who are not trained in instructional delivery; for whom training is a collateral duty; and who deliver OJT not in a systematic way, but as conditions onboard allow.

Time To Train And Qualify. On some ships, training is considered to be a preeminent priority; time and resources set aside for qualification, certification, and advancement training are considered sacred. On other ships, training is considered just one of many conflicting priorities; time and funding commitments are viewed as negotiable.

Instructor Competency. USECON participants showed concern that sometimes instructors for a given course were themselves only "one chapter ahead of the students." It was also frequently suggested that while subject matter experts may add to the technical accuracy and fidelity of the instructional material, "a good technician does not necessarily make a good instructor."

Performance Assessment. Personnel are frequently not held to the same standard, onboard the same ship or across the ship class. Suggested root causes included (1) assessment being done by individuals not trained to objectively assess the performance of others, (2) assessment being driven by the assessor's personal feelings about the trainee, and (3) needs of the ship, rather than competence level of the individual, driving the pass/fail criteria by which the trainee is judged.

Training Record Maintenance. Concern was expressed regarding currency of trainees' training jackets. USECON participants noted that onboard training management is typically a collateral duty and as such is often not treated as a priority unless an inspection was imminent. This frequently results in an individual's training jacket not being current with the actual status of their training progression. Additionally, there is not standardization in training record management across the fleet.

Challenge: Produce Realistic Training

A frequent concern raised by USECON participants concerned their lack of experience with the actual equipment and work environment prior to going aboard ship. This is not to say that all aspects of Navy training are plagued by these concerns. In fact, there were several comments related to successful, realistic training mechanisms that were seen as positive additions to Navy training.

Aegis Training. The Aegis Training and Readiness Center (ATRC) in Dahlgren, VA, provides training for crewmembers assigned to ships equipped with the Aegis weapon system. Although not platform- or hull-specific, this training normally occurs after "A" and "C" school and offers in-depth technical and procedural training. Many USECON participants felt this training was very helpful in speeding up the process of personnel becoming contributing crewmembers once aboard their ship.

Ship Navigation Training. Full Bridge simulators owned by commercial vendors offer ship handling training scenarios. Although not hull-specific, many USECON participants felt that this training was realistic and timely and enhanced their ability to contribute upon reporting aboard their ship.

USECON concerns related to the need to produce realistic training are itemized below.

Artificial Training. USECON participants frequently emphasized that the training they did receive onboard was typically not realistic, often involving the use of "Post-It" notes attached to equipment – or people – to indicate they were no longer functional.

Predictable Training. USECON participants indicated that training was often unexciting and predictable – to the point where they knew the canned scenarios so well that they could relax in the middle of the exercise, knowing they would not have to perform any tasks for a specific period of time.

Integrated Team Training. Another issue raised was the limited or non-existent amount of integrated team training (i.e., Battle Force and Battle Group) available to them. This issue was of particular concern because typically the ship's primary mission was to function as a contributing member of a Battle Force or Battle Group.

Lack of State-of-the-Art Training Technology. The realism of training directly contributes to the quality of training received and to increased retention of the material learned. Through technology, the potential realism of training has increased dramatically over the last decade. Simulators used by the aviation community are configuration-specific and have provided realistic training for years. In fact, some commercial airlines and military transport aircraft are so reliant on simulators for training, qualification, and certification that they have no flights devoted strictly to training. Embedded training allows operational equipment to be used in a training mode. This offers the potential for realistic hands on, configuration-specific training during deployment. Although some mock-ups, small-scale part-task trainers, and signal insertion in operational equipment currently exists, when compared to other warfare areas, the Surface Navy has not leveraged the potential of technology (such as simulation and embedded training) to achieve realistic platform-specific training.

Challenge: Improve Quality Of Life Related To Training

While perhaps not immediately obvious, training issues can have a significant impact to Quality of Life for personnel, particularly related to job satisfaction. USECON participants cited several factors related to training that had either significantly positive – or significantly negative – impact to their QoL, depending upon how a particular Command handled the situation.

Where Training Takes Place. USECON participants frequently cited the disruption to personal life related to temporary additional duty (TAD), e.g., being sent to school for twelve weeks in Moorestown, NJ when their homeport – and families – are in Mayport, FL.

When Training Takes Place. Latency of training (i.e., period of time between when training occurs to when the individual is called upon to use those KSAs) can be substantial, from many weeks to many months – or even years. This can impact QoL in several ways. First, the individual can become frustrated when they learn new skills and then have no outlet for them; this can lead to discouragement about future training (i.e., "Why bother paying attention in class? I'll never get to use this knowledge anyway"). If this scenario occurs frequently enough, negative feelings

toward the Navy may result, particularly if the individual is temporarily assigned to tasks they do not desire (i.e., "They trained me to be an Electronics Technician, but instead I'm compartment cleaning"). Finally, personnel may experience significant levels of anxiety when they are called upon to perform skills for which they were trained some time ago, but may have forgotten.

Access to Training for Personal and Professional Development. Access to and time allotted for personal and professional development also present QoL issues, particularly during deployment. Many USECON participants cited the fact that they were held responsible for pursuing advancement training onboard, but had only limited or, in some cases, no access to training. Adequate time for training was also a concern, given that a normal workday aboard ship is often several hours longer than ashore. Participants underscored the point that if professional development time is limited onboard, personal development opportunities (e.g., pursuing a college degree over the Internet) are typically non-existent. The Navy is just now starting to leverage the potential for Distributed Learning (DL). DL presents the opportunity to have wide-reaching access to numerous educational and training opportunities. To take full advantage of DL, each ship must have sufficient classroom or desktop access so that every crewmember can pursue the learning opportunities most important to their professional and personal growth. Currently, access to DL is very limited across the fleet.

Training Administration and Management. USECON participants frequently referenced the heavy administrative burden associated with most onboard training. In many circumstances, more time was spent scheduling, updating training jackets, reviewing course evaluations, finding instructors, and completing all the paperwork related to training than was spent on the training itself. As one Chief Petty Officer remarked, "I want to spend my time as an instructor and a mentor, not as a paper-pusher."

IMPLICATIONS FOR TRAINING

The primary training drivers related to producing "Full Up Rounds" are the restructuring and delivery of curriculum to enable hull-specific training. As the Navy continues to focus on reduced manning and the resultant requirement to provide "Full Up Rounds," the opportunity exists to deliver platform- and hull-specific training that builds on the basics provided by traditional "A" and "C" schools. This training must occur prior to arrival aboard ship. This can be accomplished by establishing an Integrated Training Facility (ITF) for a specific class of ship that will use state-of-the-art technology and the disciplined Instructional Systems Development (ISD) process to ensure training is accomplished effectively and efficiently (see Figure 2). A critical point of departure from today's training is that instead of providing ISD for

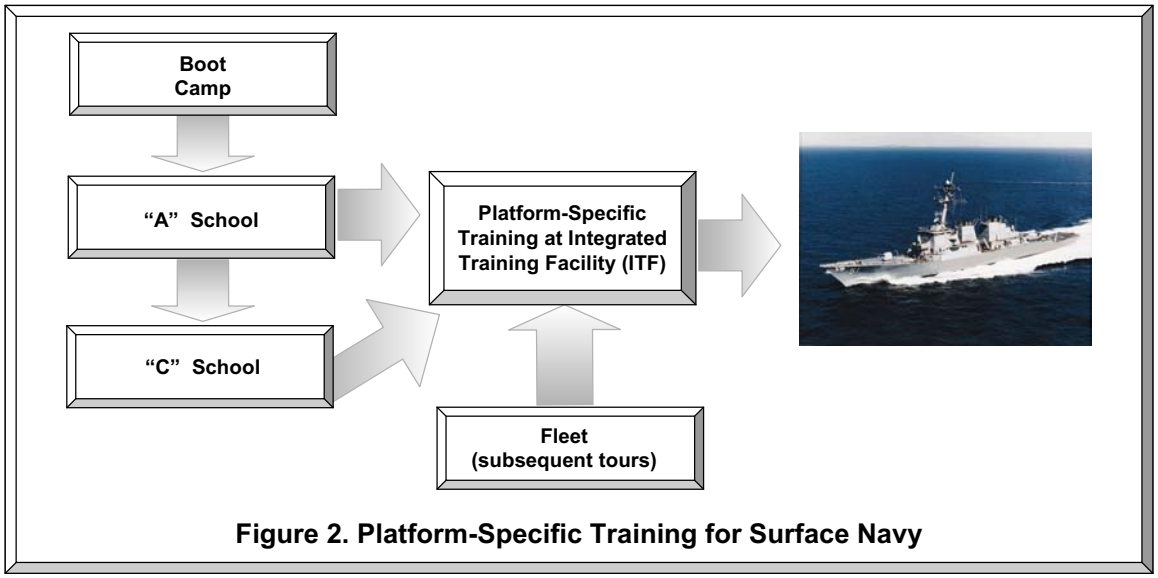

Figure 2. Platform-Specific Training for Surface Navy

a course or group of courses, ISD must now be applied to the entire training system for the ship.

After “A”/”C” school or Surface Warfare Officer School and assignment to a ship, each crewmember, regardless of experience, would undergo a training needs analysis in order to build a training path at the ITF that is tailored to the assigned billet and hull configuration. The ITF would have responsibility to graduate “qualified” crewmembers, ready to contribute and perform in their assigned billet.

Because of the accountability of the Commanding Officer for operational readiness of his/her ship, “certification” for individual and team performance would remain with him/her.

The notion of applying more realistic training applies to training delivered both before and after arrival at a ship. Currently, individuals responsible for the maintenance and operation of ship equipment frequently do not confront the actual piece of equipment with which they will work until they arrive onboard. It is imperative that trainees have the opportunity to work with watchstation-specific technical training equipment. An ITF, such as the one described above, provides an enormous opportunity to apply individualized instruction to maintainers and operators that will detail the specifics of the equipment to which they will be assigned. This training should also go beyond cursory “buttonology” and functional training. Training should include simulated battle scenarios that require communication, teamwork, and integrated response.

In addition to technical and operational training, personnel must have access to personal and professional development opportunities. This not only ensures career progression but also contributes to QoL and increased retention. One way to address a significant portion of this issue is to fully leverage the potential of Distributed Learning. This will require the Navy to make larger investments in the tools that allow access. More desktop PCs and spaces designated specifically for electronic classrooms with interconnectivity to the Internet and/or DL networks, and investment in bandwidth to accommodate DL are required. The technology exists today to allow such access, but it will require a significant investment to backfit current ships and ensure this capability is a requirement in new ships.

Policy/Cultural Issues

Execution of the “Full Up Round” concept requires several policy and cultural changes for the Navy. First and foremost, the concept must be accepted by the Fleet. The standup of a new ship class dependent upon the ITF model helps facilitate this new concept for the Surface Navy. However, despite the responsibility of the ITF to provide qualified crewmembers, the Commanding Officer will still be held accountable for the performance of his or her ship and crew. Even though in this model the Commanding Officer is the final authority on certification, relinquishing the qualification reins to a land-based operation will not come easily, and the modifications required to the Personnel Qualification Standards (PQS) process are likely to be substantial.

Assuming the Navy establishes a platform-specific ITF to provide “Full Up Rounds,” detailing policies and procedures will require alteration to align the training pipeline with the ship class. Again, while this is a new concept for the Surface Navy, it has been successfully accomplished for years in the submariner and aviation communities. It is critical that the manner in which sailors are assigned to ships is altered to allow for identification of assigned ship class as soon as possible. The training pipeline will appear longer due to the time required at the ITF. However, it must be noted that actual time from start to billet-certified will be less because (1) each crewmember arrives aboard fully qualified to perform individual and team tasks, and (2) there is minimal OJT. The assignment community will also need to change their concept of turnover. Because reduced crew size implies that each member is more critical, gapping billets cannot not be the norm because there will be no redundant crewmembers to fill the gap. On the other hand, the time required for face-to-face turnover is greatly reduced because newly arrived crewmembers are already qualified.

If the ITF is responsible for qualification of personnel, the status and quality of those individuals providing training must be elevated to a higher level to ensure career opportunities for trainers and quality training to students. “Train the trainer” as a standard procedure will require a culture change as well.

A shore-based ITF with connectivity to the fleet also holds the promise of off-loading much of the shipboard training administrative burden. The

inherent Training Management System (TMS) that any modern ITF uses to schedule courses, keep track of student progress, update training jackets, etc. can also provide that service directly to each ship. As with Distributed Learning, access to the TMS requires computing and bandwidth investments by the Navy. Off-loading the majority of the training administrative burden is, however, a direct contributor to achieving reduced manning objectives – which in turn lowers ship lifecycle cost.

Research and Development Issues

Several factors related to the production of "Full Up Rounds" require research and development. Perhaps most central to this concept is the identification and quantification of the traditional OJT that currently occurs aboard ship. If this training is to shift to the ITF, quantification of OJT must be done so that the ISD process can be applied to this training and formal training developed. Consistent and comparable data related to the time and resources spent by instructors and trainees on OJT is not readily available. Thus, there are currently no cost models to capture the true cost of shipboard OJT across the fleet. For the reasons identified above, conventional wisdom indicates that an inordinate amount of time is spent getting crewmembers qualified (as compared to, for example, a concentrated period of time spent in a more formal instructional setting). Until a way is found to capture OJT costs across the fleet, however, making a solid case to shift funding from the Surface Navy's operational forces to the Navy's training infrastructure will be difficult.

CONCLUSION

With the trend toward reduced manning environments, it is clear that alterations to current Surface Navy training methodologies will be required to maintain crews' ability to be "Ready to Fight." The Surface Navy already has a long, successful track record in producing personnel to operate the greatest seapower in the world; it is incumbent upon the contractors and Navy agencies given oversight of future training programs to appropriately leverage "lessons learned" and advanced training methodologies and technologies to build on those successes.