DETERMINING RETURN ON INVESTMENT IN TERMS OF READINESS

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Abstract

In recent years, the documented decline of Fleet aviation readiness during the Inter-Deployment Training Cycle (IDTC) has become a major concern with Navy leadership. Plans to reverse the IDTC readiness decline include the increased use of simulators; however, Navy aircrew trainers in use today were acquired to support the Fleet Readiness Squadrons (FRS). FRS trainer fidelity (IE. visual, tactile, and motion) and capacity requirements were defined by both FRS curriculum and newly winged aviator needs. Fleet aviators are afforded simulator time based on FRS excess capacity and availability. Today's technology can provide affordable, Fleet-centric simulation training with expanded mission training/rehearsal capability and a multitude of visual enhancements and sensor cues. The Chief of Naval Operations (OPNAV) N889 Naval Aviation Training mission is to resource aviation manpower and training at the appropriate time and level to sustain optimum Naval Aviation readiness. Readiness attainment and tracking is most critical during the IDTC. N889 responded to the IDTC "lost readiness" challenge with a multidisciplinary team formed from government and industry representatives. The result was AIRPLAN 21, a strategy composed of eight focus areas: Aviation Maintenance Supply Readiness (AMSR), Aircrew Combat Training Continuum (ACTC), Flight Hour Program (FHP), Aircrew Career Continuation Pay (ACCP) Program, DEPOT Maintenance, Joint Tactical Combat Training System (JTCTS), Navy Aviation Pilot Production Improvement (NAPPI) Program and Fleet Aviation Simulation Training (FAST) Plan. These eight focus areas were developed to identify and track OPNAV programs that would directly impact IDTC readiness. The first seven elements were funded and are producing positive results. N889 and the Naval Aviation Training Strategic Advisory Group (NATSAG) are aggressively championing the unfunded FAST plan. These AIRPLAN 21 focus areas provide Navy Aviation’s first attempt to gauge resource allocation success and provide a finite measurement of return on investment (ROI) in terms of readiness.

The FAST plan is based on the individual aircraft communities' Training and Readiness Matrix (T&RM) which, in turn, is tied to their individual Primary Mission Area (PMA) training requirements. The T&RM documents define specific training tasks along with their associated PMA readiness values. Completed training events, along with their resultant readiness values, are rolled up and closely tracked throughout the IDTC. Annual FAST technology assessments provide the requirements and acquisition communities with current aircrew training device technologies information that shows potential to improve readiness. OPNAV requirement officers, Fleet operations and training personnel, acquisition program managers, and simulator industry technical representatives all contribute to the development and update of the FAST Plan. An ongoing effort by the two major air type commanders, Commander Naval Air Force U S Atlantic Fleet (CNAL) and Commander Naval Air Force U S Pacific Fleet (CNAP), is the mapping of the Joint Mission Essential Task List (JMETL) to T&RM training events. This effort will further validate the T&RM and continue to refine simulator training devise fidelity requirements. Naval Aviation is now uniquely positioned to lead the Navy's overall effort to define the resource allocation strategies necessary to achieve and maintain optimal warfighting readiness.

Technology evolution and real world events move faster than the DoD budgetary process can accommodate. In reality, it may take years for a new simulator product or training capability to reach the individual aviator. However, AIRPLAN 21 and, in particular, the FAST plan for Fleet aircrew simulators provide the foundation to recapture "readiness lost," and the first viable metrics to measure ROI in terms of readiness for Naval Aviation resourcing decisions.

Biographical Sketch:

Captain Snyder completed jet training and was designated a Naval Aviator at Naval Air Station Kingsville following Aviation Officer Candidate School. He completed S-3A training and reported to VS-31, followed by assignment to VX-1 and staff duty with Commander, Carrier Group TWO.

Captain Snyder completed his staff tour and reported to VS-22 as Operations Officer before reporting to the Armed Forces Staff College. Upon graduation, he served first as Executive Officer of VS-27 then as the VS-28 Executive Officer. While deployed, he participated in numerous missions over northern Iraq in support of Operation Provide Comfort. During this deployment, in response to National Tasking, Captain Snyder flew an S-3B non-stop from the USS FORRESTAL (CV 59) in the Eastern Mediterranean to Andrews Air Force Base in Maryland. The 15.5 hour, 5100 NM flight set Naval Aviation endurance and distance records which still stand today.

Captain Snyder re-joined VS-22 to serve as Executive Officer and Commanding Officer. His first post-command assignment was to USS GEORGE WASHINGTON (CVN 73) to serve as Air Boss. He is currently on staff assignment to the Chief of Naval Operations (Air Warfare) in the Pentagon. Captain Snyder has accumulated over 4200 hours of flight time and 600 traps on eight different aircraft carriers.

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INTRODUCTION

Navy Aviation leadership is concerned over declining Carrier Air Wing (CVW) readiness trends during the InterDeployment Training Cycle (IDTC). These trends, identified and documented by recent CNA studies, are directly linked to training. CVW IDTC readiness declines, if allowed to continue, could degrade to the point that squadrons would be unable to recover to acceptable readiness levels for deployment. In today's environment of flat defense budgets, the Navy must invest its scarce training dollars to exploit affordable technology that will attack the declining readiness problem. The mission of CNO (N889), the Naval Aviation Manpower and Training Branch, is to resource aviation manpower and training at the appropriate time and level to achieve and sustain optimum Naval Aviation readiness. In that context, N889, working in conjunction with numerous other aviation branches, is aggressively attempting to reverse the current readiness decline. N889 has developed the Fleet Aviation Simulation Training (FAST) Plan, solely focused on Navy fleet simulators, as a cost effective course of action that can define its return on investment in terms of improved readiness. The USMC developed their Aviation Simulator Master Plan that has received significant funding. The Marines' program will not be addressed in this paper.

Background

Naval Aviation is an inherently dangerous business that requires extensive investments in time and dollars throughout the training continuum from entrance into flight school to full proficiency with Fleet weapons systems. From a training standpoint, the novice aviator or "nugget" is the primary focus for many aircrew training programs. The basic skills gained in the Naval Air Training Command are the foundation upon which more advanced warfighting proficiencies are built. Thus special emphasis is devoted to the undergraduate or early portion of the junior aviator's career path. Following flight training, the Naval Aviator moves to a Fleet Readiness Squadron (FRS) for initial Fleet aircraft training. The FRS curriculum is considered graduate level training and includes classroom, simulator, and aircraft instruction. After FRS completion, Naval Aviators begin post-graduate training in Fleet squadrons where weapons platform employment and delivery skills training continue. The quality and quantity of this advanced training is dependent upon how well the aircraft community's training program keeps up with the changes to the weapons platform.

As new aircraft come into the inventory, or existing aircraft are upgraded, new or modified training systems for both aircrew and maintenance personnel are required. While training systems are normally an integral component of aircraft acquisition and modification programs, unfortunately they must compete with all aviation programs during annual budget reviews. When budget cuts do occur, weapon system acquisitions normally take priority over the supporting logistic elements, which include training systems. Therefore, it is not unusual to see training system program delivery delays resulting in aircrew simulators that are not in configuration with parent weapons platforms. Unfortunately, this lag of configuration concurrency may last throughout the life cycle of the training device. The degree of configuration severity depends upon how much fiscal support simulator upgrades receive from the Chief of Naval Operations (OPNAV) headquarters staff program resource sponsors and the Naval Air Systems Command (NAVAIR) weapon system program managers. Maintaining simulator concurrency is an ongoing process with available fiscal resources always at the heart of the issue.

Meeting Fleet-specific training needs is another critical issue. Aircrew simulators in use today were acquired to support the FRS. FRS trainer fidelity (IE. visual, tactile, and motion) and capacity requirements were defined by both FRS curriculum and nugget aviator needs. Fleet aviators are afforded simulator time based upon FRS excess capacity and availability. Today's technology can provide affordable, Fleet-centric simulation training with expanded mission training/rehearsal capability and a multitude of visual enhancements and sensor cues.

Measure of Readiness

The Navy's assessment indicator of combat readiness is known as a "C" rating. It is comprised of such factors as: manning, number of aircraft and their maintenance condition, spare parts availability, and the squadron's level of training. These factors are rated as "C-1" (the best) to "C-4" (the worst). Each carrier air wing squadron is required to deploy with either a "C-1," or at

minimum, "C-2" readiness rating. Recently, air wings have had a much more difficult time achieving their targeted deployment readiness and are increasingly reporting "C-2" vice "C-1". In March 1999, Dr. Laura Junior and Ms. Jessica Oi of the Center for Naval Analysis (CNA) analyzed and charted readiness "C" ratings for all Navy air wings from FY95 through the present. Their efforts revealed a constant and continuing decline in readiness during the inter-deployment training cycle (IDTC).

The IDTC is that period of time between an air wing's overseas deployments. During the early stages of the IDTC, some readiness decline is normal and predictable. With post-deployment leave periods, aircraft transfers, personnel turnover, and purposely reduced flying hours, a lower unit "C" rating is expected. When monthly "C' ratings for each year are plotted against the IDTC timeline, the chart takes on a very distinct shape. That shape appears to be a cross-section of a "bathtub", and thus the term "bathtub effect" evolved to describe Naval Aviation's readiness trend during the IDTC. The "bathtub effect" in and of itself is normal. However, when historical readiness is plotted across the entire IDTC, the CNA study indicated a disturbing fact. "C" ratings, as well as the recovery profile prior to deployment, were consistently declining. Since 1995, the negative severity of each of these factors has steadily increased. The continuing trend of increased "bathtub" depth (readiness during the 18 month IDTC) and steepness of the recovery (time to recover from lower readiness to deployment standards) is of immense concern to Navy leadership and is the target of corrective actions (see figure 1).

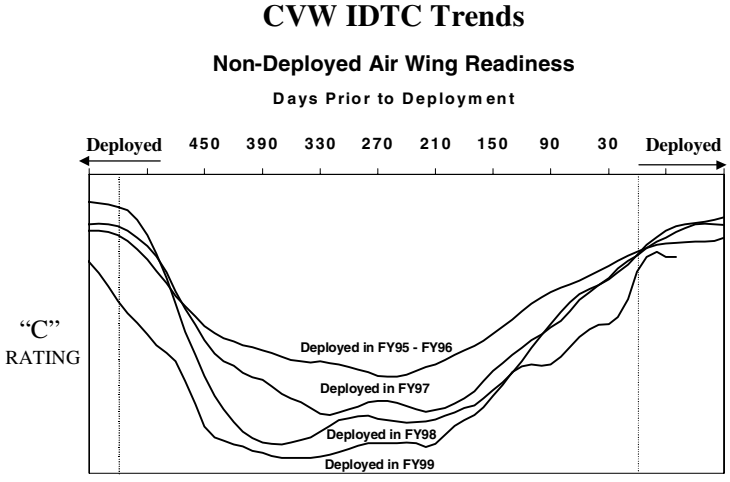

Figure 1 CNA 3/99, Junor et al

Loss-of-Readiness Factors

The following three issues are considered the most significant factors responsible for the increasing severity of the "bathtub effect." First is the growth of multi-mission aircraft and their ever-increasing capabilities. More complex mission capabilities equate to increased aircrew task loading and training requirements, which in turn impact readiness reporting. Looking to the horizon, and further exacerbating this situation, is the planned necking down of aircraft types that comprise our carrier air wings. Today six different aircraft types constitute a carrier air wing. Within ten years this number is envisioned to drop to three different carrier-deployable platforms that will have the capability to perform the missions of the previous six. Unfortunately, a wedge is growing between training funds available and the resources required to adequately train to the ever-growing number of mission training tasks. Second is the loss of quality training opportunities, especially for post-FRS aviators. A prime example is the recent loss of live fire capabilities at the Vieques range in Puerto Rico. It was the only live-fire range for Atlantic Fleet forces. The adverse impact of this loss has been real and immediate. Third is the lack of simulators to support high fidelity Fleet aviator training. As stated earlier, Navy legacy aircrew simulators were acquired to support FRS student throughput with little regard for post-FRS training fidelity or capacity requirements. Revised training system procurement objectives must account for both FRS and Fleet needs. New affordable simulator technologies do a very good job of replicating the real world visually, electro-magnetically, and optically, and could be used very effectively in advanced (Fleet) weapons training.

AIRPLAN 21 and Readiness Initiatives

CNO (N88), Air Warfare Division, has advanced a number of initiatives to mitigate the decline in Naval Aviation IDTC readiness. N88 tasked N889 to consolidate these initiatives, along with the FAST Plan, into a comprehensive strategy to both arrest the readiness decline and restore lost readiness. AIRPLAN 21 became the resultant strategy. The AIRPLAN 21 components and their primary goals follow:

- Aviation Maintenance Supply Readiness (AMSR) Program is designed to provide metrics and predictability to logistic support requirements.
- Aircrew Combat Training Continuum (ACTC) Program is designed to standardize post-FRS tactical training within individual aircraft communities.
- Flight Hour Program (FHP) increases to meet the current, inflation-adjusted, program operating costs.
- Aircrew Career Continuation Pay (ACCP) Program (flight bonus) is designed to retain valuable and seasoned aircrew beyond the statutory aviation service obligations for new officers.
- DEPOT Program is designed to increase the resources for depot level maintenance that will improve squadron aircraft availability during the IDTC.
- Joint Tactical Combat Training System (JTCTS) Program is designed to replace the aging TACTS system on the current training ranges and to provide a deployable rangeless training capability.
- Navy Aviation Pilot Production Improvement (NAPPI) Program is designed to streamline the aviator training process in order to decrease training time and predictably replace squadron aircrews earlier in the IDTC.
- FAST Plan is designed to improve Fleet IDTC readiness through simulation.

(Note: A plan becomes a program once funding is allocated to it.)

One salient point of the FAST Plan, which will upgrade aircrew simulator training capabilities to improve Fleet readiness, is the N88 requirement to tie improvements for simulators directly to readiness. An enhancement to simulators for Fleet training that does not contribute to readiness is VERY difficult to defend in the budget arena.

Before describing the FAST Plan in detail, a discussion of the uniqueness of Navy Aviation Readiness is warranted. Navy Aviation readiness can be directly correlated to training. A 1999 CNA Flight Hour Program study headed by Dr. Greg Suess demonstrated this relationship while showing that a particular aviation unit's readiness levels (C-rating) plotted over time would produce the same curve as that unit's training level (T-rating) plotted over the same time frame. Aviation training requirements are detailed in the Joint TYCOM Training and Readiness instruction (CNAP 3500.63, CNAL 3500.67), commonly referred to as the Training and Readiness Matrix (T&RM). The T&RM assigns readiness points to each training event. To reach a desired state of readiness, aviation units complete T&RM events. There are only two ways to complete a T&RM event, fly aircraft or fly simulators. In order to fly or simulate, some combination of People, Parts, Planes, and Petroleum (Flight Hour Program) as well as support from Weapons, Adversaries, Ranges, TAD funds, and Simulators (4P's plus WARTS) are needed. Each of the 4P's plus WARTS is a *dependent variable*. That is, applying funding to one variable such as Petroleum (Flight Hour Program) will not impact readiness if spares are in short supply or if the unit is short of qualified pilots (People). Therefore, any program aimed at improving readiness must consider the optimization of the 4P's plus WARTS variables (of note, the most *INDEPENDENT* of these variables is the simulator). AIRPLAN 21 improvements target the 4P's plus WARTS to restore Naval Aviation IDTC readiness. But what is the acceptable IDTC readiness profile? The only apparent CNO readiness directive is the IDTC end-state of C1/C2 for deployment. A 1998 brief provided by COMNAVAIRPAC (CNAP) first described the "4P's plus WARTS" variables and continued to define an IDTC readiness profile that could be expected if those readiness component variables were all in place. The CNAP IDTC readiness profile is supported by two other arguments. (1) The CNA-developed "bathtub" chart (figure 1) FY95/96 profile appears to meet the same readiness profile described by CNAP brief. Also, 1995/1996 were the last years that Navy's Strike/Fighter community resources were in balance with FHP execution. (2) A related CNO directive sets pre-deployment and deployment aircraft material condition goals. When these two profiles are used as a baseline, the resultant air wing C-ratings align along the CNAP IDTC readiness curve (see figure 2). Consequently, the CNAP IDTC readiness profile is a good target.

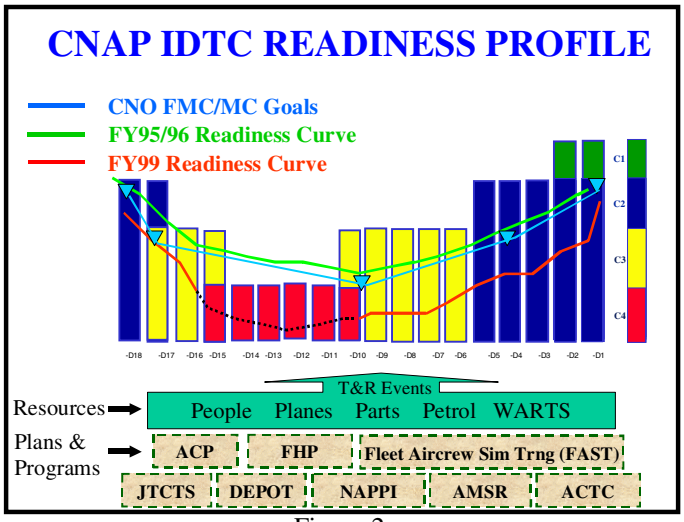

Figure 2

In March 1999, the AIRBOARD, comprised of the flag level Navy aviation type commanders, OPNAV resource sponsor (N88), and Deputy Chief of Staff (Air) for Headquarters Marine Corps, approved the AIRPLAN 21 concept, and agreed to the CNAP proposed IDTC readiness profile as the standard. Of the eight initiatives comprising AIRPLAN 21, only the FAST Plan has developed metrics to estimate a return on investment (ROI) in terms of readiness. Per AIRBOARD direction, the other components are attempting to establish such metrics.

Navy Aviation Simulator Strategy

While the FAST Plan is designed to recapture readiness lost, it is also integral to the overall Naval Aviation Simulator Strategy. To more clearly understand the framework within which the FAST Plan exists, exclusive of AIRPLAN 21, a review of the Naval Aviation simulator planning environment is provided. The Naval Aviation Simulator Strategy is centered upon the current and planned aircrew simulator inventories and the methods and funding required to ensure that these simulators satisfy evolving Navy and Marine Corps training needs. The strategy details are laid out in the Naval Aviation Simulator Master Plan that is comprised of:

- Training Command (TRACOM) simulator systems under the control of the Chief of Naval Aviation Training (CNATRA). These devices serve both Navy and Marine Corps student Naval Aviators pursuing their wings.
- FRS simulator systems under the Fleet Aviation Type Commanders. These devices support training for Naval Aviators on their way to specific type, model, and series (T/M/S) communities.
- Fleet aircrew simulator systems as delineated in the FAST Plan.
- USMC specific simulator systems as delineated in the USMC Aviation Simulator Master Plan.

Other significant adjuncts to the Simulator Strategy are the DoD mandated High Level Architecture (HLA) insertion for networking simulators, and the Deployable Tactical Aircraft Training System (DTATS), a series of reconfigurable tactical training devices that will be compatible with carrier/air wing operations. The challenges are many; however, technology continues to bring us closer to an affordable solution.

FAST Plan Specifics

N889B is the originator and N88 sponsors the FAST Plan. The Plan has been briefed to all Navy Aviation communities and Air Type Commanders and has Fleet support. This is demonstrated by its ranking as the number two priority among all training issues by both the 1999 and 2000 Naval Aviation Training Strategic Advisory Group (NATSAG). The NATSAG is the official CNO (N88) forum chartered to review Naval Aviation training issues and develop strategies that enhance readiness through affordable training.

The FAST Plan, per N88 direction, is keyed directly to individual T/M/S community training and readiness matrices (T&RM). Each aircraft community has its own specific listing of required training events that comprise their T&RM. Based upon an aircrew's level of experience, these events must be performed at specified intervals to maintain certain "Training (T)-ratings." T-ratings, when

incorporated into aviation readiness reporting algorithms, correlate directly to "C-ratings." Most importantly for purposes of the FAST Plan are the objective credits (either full or partial) given toward readiness "T-rating" for events performed in the aircrew simulator.

The FAST Plan was built upon three pillars: a simulator Technology Assessment, T/M/S community T&RM event reviews, and costing estimates for selected improvements. The Technology Assessment entails visits to a broad base of the simulator industry who represent the spectrum from military labs, Original Equipment Manufacturers (OEM), to flight simulator producers, to simulation component companies, and major simulator component integrators. The purpose of the Technology Assessment is to baseline the most up-to-date information on the "art-of-the-possible." Specifically, to document what aircrew simulator technological improvements are now available outside the research and development area. From this information, an extensive list of possible simulator enhancements is derived, which is instrumental in building the second pillar. That second pillar begins with in-depth discussions with aircrew training subject matter experts (SMEs) from each Navy T/M/S. These discussions are keyed to individual T&RM events focusing on which, if any, of the possible simulator enhancements derived from the Technology Assessment would enable that event to be accomplished for readiness credit if incorporated in their simulator. The final pillar, a cost versus benefit relationship, comparing readiness enhancements versus acquisition cost, can also be established. To this end, NAVAIR (PMA205) and NAWCTSD provide cost estimates to N889 for each enhancement selected by the Fleet SMEs. The government cost estimates of those enhancements can then be directly correlated to the resultant composite readiness increases for individual enhancements for each T/M/S. Pillars, or steps, two and three are performed individually for each of the communities on an annual basis. While the exact financial estimates for each of the nine T/M/S cannot be publicly released, it can be noted that the overall approximate cost of the FAST Plan exceeds $300 million. Estimated additional T&R events achievable if FAST Implemented (see figure 3) displays the latest estimates for improved readiness if all sections of the FAST Plan were funded and operational. It is important to note that FAST is devised in such a way that if only partial funding is available, segments of the Plan can still be implemented and calculable ROI will result. It is also important to keep in mind that although the FAST Plan is primarily applicable to Fleet aviator training, any simulator upgrades or new acquisitions will equally benefit FRS students. The enhanced Fleet training capabilities are in such areas as: better visual systems, more extensive databases, better sensor replication, increased target/weapons generation capability.

Estimated Additional T&R Events Achievable If FAST Implemented

Increase in both:

- **Number of T&R events**
- **Percentage of matrix completed**

F-14:	**4 Events / + 6%**	**SH-60B:**	**13 Events / + 26%**
FA-18:	**17 Events / + 26%**	**P-3C:**	**6 Events / + 24%**
E-2C:	**13 Events / + 18%**	**EP-3E:**	**12 Events / + 63%**
S-3B:	**17 Events / + 31%**	**MH-53**	**6 Events / + 16%**
EA-6B:	**18 Events / + 45%**	**E-6A/B**	**11 Events / + 69%**
SH-60F	**23 Events / + 41%**		

*** CVW: + 26% avg**

Figure 3

While the FAST Plan is presently tied to accomplishing events outlined in the most current community T&RM, this Plan will easily dovetail with the Joint Mission Essential Task Listing (JMETL). Today the T&RMs are mapped to the Navy Tactical Task Lists (NTTL). The NTTL's have been organized into logical sequences called Operational Templates, which support the Carrier Battlegroup Operational Capabilities, which, in turn support Joint warfighting CINC's Mission Essential Tasks (JMETLs). Consequently, as JMETLS and NTTLS are modified over time, annual FAST Plan reviews will also capture changing training requirements from the top down that can be accomplished through modern simulation.

FAST Plan ROI Demonstration

While the funded portions of AIRPLAN 21 are beginning to impact "bathtub" readiness issues, those programs have yet to provide predictive ROI metrics. The FAST Plan can provide quantifiable measurements of readiness improvement for funds expended. The FAST Plan provides community SMEs with a list of enhancements for their simulators that enable readiness credit for T&RM events accomplished in a simulator. The EA-6B Prowler community at NAS Whidbey Island, Washington will serve as an ROI example.

The current EA-6B T&RM lists 40 events. Of these 40 events, 7 events or 18%, may be performed for readiness credit in a simulator. During annual FAST Plan reviews with the SMEs (Wing Operations and Training Officers), the non-simulator events were analyzed for insertion of technologies into the simulator that could conceivably meet training and readiness requirements. As a result of that review, the number of potential simulator-capable events increased by 18 for a total of 25 events, an increase of 45% over the current TR&M. Armed with the list of potential EA-6B simulator technology enhancements, the NAVAIR PMA205 APMTS, with the assistance of NAWCTSD, provided a government cost estimate for those enhancements. Evaluating the value of potential readiness enhancements verses costs of implementation provides the ROI and, the simulator program/resource sponsor can make informed decisions on investments in the EA-6B simulators. This process was repeated across all Navy aviation communities. In Carrier Air Wing (CVW) communities, for which the IDTC "bathtub" was calculated and charted, the composite airwing readiness increase was 26%. The 26% figure assumes that each event yields 100% readiness credit. Across all communities this amount actually varies from 50% to 100% based on SME evaluation of the fidelity of the simulator for that specific event. Assuming the "worst case" (maximum readiness credit of 50% for all events) the CVW could realize a minimum of 13% readiness improvement if all desired simulator enhancements are provided and their T&RMs are modified to incorporate community SME decisions. CNA concurs with the conservative and straightforward analytical method employed by the FAST Plan.

It is imperative to understand that the new simulator training capabilities envisioned in the FAST Plan will be a beneficial augment to the existing flying hour program. Simultaneously it will reduce the readiness deficit that exists between the IDTC readiness profile and desired profile provided by CNAP. There is absolutely no intent to substitute simulator time for actual flight hours. If substitution of simulator hours for flight hours were to occur, the readiness degradation issues associated with the "bathtub effect" would not be reversed, only transferred from one training media to another.

CONCLUSION

The FAST Plan is focused on Navy aircrew simulator improvements that will enhance training and readiness for Fleet aviators. It is a component of CNO's (N88) AIRPLAN 21 which was developed to reverse the "Bathtub" IDTC readiness trend and to recapture readiness lost. FAST is also an integral part of the Naval Aviation Simulator Strategy, which lays out simulator requirements for all facets on Naval Aviation, not just for Fleet aviators.

The FAST Plan is based on a sound analytical methodology and reflects the Fleet aviator desires. It is structured to accommodate the real-world Planning, Programming and Budgeting System (PPBS) and Navy Program Objective Memorandum (POM)/Program Review (PR) processes. The Plan provides a prioritized acquisition strategy that addresses individual T/M/S community simulator enhancements. Although still unfunded at this writing, the FAST Plan is ready to be fully executed or incrementally implemented based on the resources that can be made available. To accommodate changing technology and training requirements, the FAST Plan is updated on an annual basis to ensure it reflects current Fleet requirements. Naval Aviation training is a dynamic and changing environment. The FAST Plan can link potential technology to aviation training and, for the first time, defines ROI in terms of readiness.