DEEPWATER News

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Our vision: By focusing on ***People*** working collaboratively in full ***Partnership***, we will achieve ***Performance*** for "Keeping the U.S. Coast Guard the world's best ...properly equipped and fully prepared to meet every maritime challenge of the 21st Century."

HUMAN SYSTEMS INTEGRATION (HSI) AND DEEPWATER
In Search of the Holy Grail

By Mark Rutherford (G-WDW), Technical Director for Deepwater HSI

Human Systems Integration (HSI) represents an acquisition approach whose premise is that new systems, at their most basic level, are material solutions *made for people to use* to fulfill the mission needs of their organization. This presupposition undoubtedly seems reasonable, even obvious, to most. Certainly none would argue, for example, that the current state of technology and automation allows us to build cutters that sail uninhabited around the globe in support of Coast Guard missions. Nor, on the aviation side, would any contend that even an unmanned aerial vehicle (UAV) is free of human intervention; indeed, some of the thornier issues related to UAVs involve human operations and support aspects. So what bearing does the simple truth that systems are acquired for people have on Deepwater?

The answer begins with the well-known twin goals of the Integrated Deepwater System (IDS): 1) to maximize operational effectiveness (OpEff) while 2) minimizing total ownership cost (TOC). Deepwater's OpEff objectives will be met through a complex, networked system composed of modern and highly capable cutter and aircraft fleets to be operated and supported within the context of innovative concepts of operations and logistics. Meanwhile, because personnel-related costs comprise roughly two thirds of the Coast Guard budget, TOC objectives for Deepwater can be achieved only by targeting people-related expenses (i.e., reducing manpower requirements.

Thus, Deepwater's OpEff and TOC objectives lead to somewhat of a paradox when it comes to people. On the one hand, the fewer people we have in the system, the more financial resources we have to build the system's capability and capacity. On the other hand, the more capability and capacity we build into this complex system as a result of personnel cost reductions, the more that the system's viability depends on its assets being fully operable and sustainable by diminished crew complements. The Holy Grail for Deepwater, then, is to find the "right" (most efficient and effective) balance between people and assets. Getting out of balance on either side of this equation directly impacts TOC, system effectiveness, capability, capacity, and sustainability—in short, failure to achieve Deepwater's twin goals. This vital balance in a system of systems as complex as IDS can be achieved only through the consistent, systematic, and pervasive application of HSI in the Deepwater acquisition. For this reason, HSI must be a fundamental characteristic of how the Coast Guard and its Integrated Coast Guard Systems partner manage the program. It is the only approach that produces minimum asset crew sizes consistent with risk, affordability, human performance capability, and human workload. [1]

Ideally, HSI influence begins at the outset of the acquisition process in the Mission Needs Statement leading to Key Performance Parameters (KPPs) that are incorporated in an Operational Requirements Document. The idea is that the earlier that HSI is applied within the Systems Engineering process, the greater the opportunity for HSI to influence system design to fully account for the interdependent HSI elements of Manpower, Personnel, Training, Human Factors Engineering (HFE), Safety/Health, and Survivability. By designing the system with the human in mind, the probability of successful system performance increases while the probability of costly HSI-related "fixes" decreases. Regarding the latter, downstream system "fixes" to remediate the consequences of poor application of HSI become progressively more costly the farther the system progresses through its life cycle.

The National Security Cutter (NSC) provides an example of the need to harmonize HSI elements within the asset design process. The NSC will be a highly capable and complex asset with a tremendously challenging mission set with an extraordinarily constrained crew. If the reduced crew complement, which must be delicately balanced with ship configuration and mission, is to be truly capable of operating the NSC according to system expectations, then everything about the NSC design must facilitate human performance and nothing in the design must present an obstacle. Therefore, failure to couple a vigorous HFE component with a reliable and verifiable manpower determination component will spell failure for the program since the resultant sub-optimized asset and crew combination could not fulfill its prescribed and essential role in the IDS system. This situation is exacerbated by the criticality of personnel and training elements since NSC's effectiveness will depend upon the on-board availability of the proper number of the right types of people with the right

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[1] *Recognizing the essential value of HSI to major defense acquisitions, DOD has mandated this approach in two of its most recent acquisitions directives, both issued on 12 May 2003. DOD Directive 5000.1 ("The Defense Acquisition System") requires that acquisition Program Managers (PMs) employ a Total Systems Approach that includes "human systems integration to optimize total system performance (hardware, software, and human), operational effectiveness, and suitability, survivability, safety, and affordability." In addition, DOD Instruction 5000.2 ("Operation of the Defense Acquisition System") has an entire enclosure that outlines HSI-related acquisition strategy requirements and requires that the PM "shall have a comprehensive plan for HSI in place early in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure that the system is built to accommodate the characteristics of the user population that will operate, maintain, and support the system."*

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training who, in turn, have been matched against accurate workload projections and a thoroughly accommodating ship design.

In a recent GAO report (Navy Actions Needed to Optimize Ship Crew Size and Reduce Total Ownership Costs), the Navy was criticized for its inconsistency in systematically applying HSI to ship acquisitions: "Because the Navy did not consistently apply HSI principles and set goals for reducing crew size for three of the ships we reviewed, it may have missed opportunities to reduce crewing requirements and lower total ownership costs, which are determined largely by decisions made early in the acquisition process, but will be incurred through these ships' 30-40 year life spans." There are clear indications, however, that the Navy is embracing and institutionalizing HSI in its acquisitions programs as an organizational imperative. ADM Vern Clarke, the chief of naval operations (CNO), has asserted that HSI is the key to the Navy's success in meeting profound post-9/11 challenges with constrained resources. Moreover, the commander of Naval Sea Systems Command (NAVSEA), VADM Philip Balisle, has stated that HSI efforts within the LCS, CVN-21 aircraft carrier, and DD(X) next generation destroyer programs would "make or break these warfighting platforms of the future, both in how we operate and how we maintain them." VADM Balisle spoke to the practical realities of applying HSI within acquisitions stating that HSI "...must be established as a budget line item in all programs, not buried in the murky word 'logistics.' Sailors are not logistics elements." It is significant that NAVSEA has recently established an HSI Directorate (SEA 03) to certify HSI compliance of ships and systems delivered to the fleet.

Like the CNO and NAVSEA, Deepwater Program Executive Officer RADM Patrick M. Stillman has declared his intentions to fervently pursue robust HSI influence in Deepwater - convinced that this is the only way to optimize the human component such that TOC is minimized through crew efficiencies and OpEff is realized through the effective balance between a lean crew composition and asset design and workload. Moving farther down this road will require a serious commitment— not only from the Deepwater Program (e.g., elevating HSI's organizational position, committing necessary resources, enhancing responsibility and authority, demonstrating programmatic commitment, and ensuring contractual reinforcement), but also from senior Coast Guard leadership.

~ Mr. Mark Rutherford (CDR, USCG Ret.) has served aboard CGC DURABLE and has commanded cutters CGC POINT ESTERO, CGC PONTE VERDE and CGC VASHON. He joined the Deepwater HSI staff (G-WDW) in 1999 and is currently the Technical Director for Deepwater HSI .

COAST GUARD HISTORY

December 22, 1837

Congress authorized President Van Buren "...to cause any suitable number of public vessels, adapted to the purpose, to cruise upon the coast, in the severe portion of the season, and to afford aid to distressed navigators." This was the first U.S. statute authorizing activities in the field of maritime safety, thus interjecting the national government into field of lifesaving for the first time. Although Revenue cutters were specifically mentioned, the performance of this duty was imposed primarily upon the Revenue Marine Service and quickly became one of its major activities.

DEEPWATER UPDATE BRIEF PRESENTED TO LOCAL RETIRED FLAG OFFICERS DECEMBER 11, 2003 AT COAST GUARD HEADQUARTERS

As part of its external outreach program, Deepwater program officials hosted a semi-annual briefing at Coast Guard Headquarters for local retired flag officers on December 11, 2003. Coast Guard Commandant ADM Thomas H. Collins, and senior officials from the Integrated Deepwater System addressed the group and fielded questions. Approximately 100 Deepwater outreach events were conducted during the past year.

Above, from left to right, VADM Robert Scarbough (retired), ICGS Liaison Mr. Jay Boyd, ADM Paul Yost (retired), Coast Guard Commandant Admiral Thomas H. Collins, and Coast Guard Vice Commandant VADM Thomas Barrett.

Above, from left to right, RADM Patrick M. Stillman, Program Executive Officer Integrated Deepwater Systems, Commandant ADM Thomas H. Collins, and Deputy Secretary of the Department of Homeland Security ADM James Loy (retired).