FY2011 Naval Human Systems Integration

Management Plan

Version 3.0
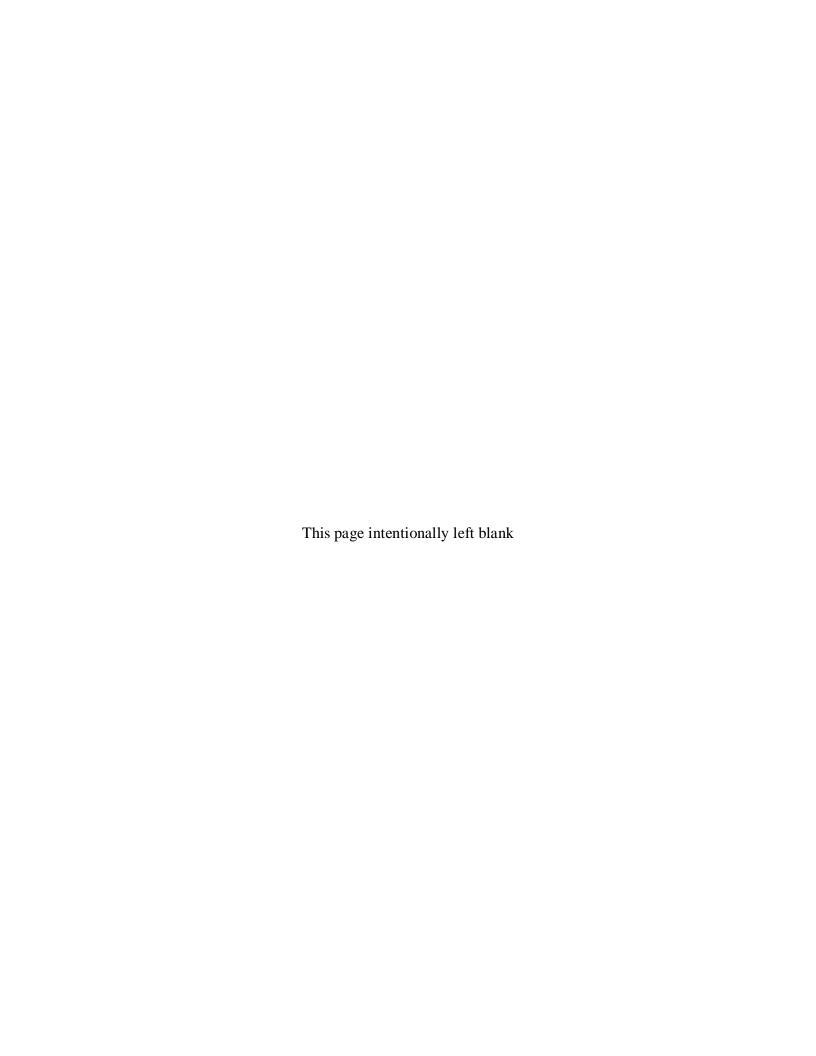
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Table of Contents

1.0   INTRODUCTION

Human Systems Integration (HSI) continues to be a key driver in increasing system performance and reducing total ownership costs. Throughout the Department of the Navy (DON), the effects of HSI, through innovative systems engineering practices, have resulted in improved effectiveness and suitability scores, increased cost savings and avoidance, and warfighter satisfaction.

In 2009, the DON greatly benefited from the implementation of the Office of the Chief of Naval Operations Instruction 5310.23 (OPNAVINST 5310.23), *Naval Personnel Human Systems Integration* (NAVPRINT), by developing requirements within the Joint Capabilities and Integration Development System (JCIDS), and executing and governing those requirements in major systems acquisition programs. Additionally, the Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN RD&A) approved revised Requirements and Resources Review Boards (R3Bs) briefing requirements that mandate reporting on HSI processes and activities at Gates 4, 5, 6 (post critical design review and sustainment). Concurrently, the addition of HSI metrics into the Probability of Program Success (PoPS) system and the Reduction of Total Ownership Costs (RTOC) initiative continue to accrue value added results. Overall, HSI considerations in R3Bs, PoPS, RTOC, and policy are providing decision makers with significant success.

These types of results are evident in several major acquisition programs. For example, Naval Surface Warfare Center – Dahlgren's Human Performance Lab constructed a full-scale mock-up of the DDG 1000 bridge design for HSI assessments. This investment of $20K resulted in 19 specific changes to the bridge design including five structural changes leading to a cost avoidance of $22M dollars. Additionally, Naval Air Systems Command's (NAVAIR) Naval Aviation Systems Team constructed an E-2D Advanced Hawkeye (AHE) cockpit simulator to evaluate the effectiveness of anthropometrics, lighting, hardware interfaces, and general usability. Their findings resulted in several value added changes to communications, navigation, mission computer capabilities, and crew tasks and roles. These changes resulted in cost savings greater than $1M dollars.

These successes, and many more like them, are due to the hundreds of dedicated HSI professionals planning and executing HSI requirements. Additionally, their efforts are supported with various research and development tools in order to provide technical solutions to complex warfighting tasks. These topics are further discussed in the following sections.

1.1 Purpose

The FY11 Naval Human Systems Integration Management Plan (HSIMP) provides an update to its predecessor, FY09 Naval HSIMP. The document reflects changes in the most critical areas of HSI in the Navy, including strategic objectives, education and training activities, maturity metrics, and HSI assessments.

1.2 Scope

The FY11 Naval HSIMP describes the coordination and collaboration of HSI activities in the Department of Navy (DoN). The HSIMP establishes a framework for planning, implementation, execution, and management of HSI activities and requirements within the DoN acquisition life cycle process. Furthermore, it describes the opportunities and challenges for HSI requirements and activities management in the future.

1.3 Document History

The document history for the Naval HSI Management Plan is provided in Table 1.

Table 1. Revision History.

Title	Version	Date
FY09 Naval Human Systems Integration Plan	2.2	March 2009

2.0 STRATEGIC OBJECTIVES

Upon revising the FY09 Naval HSIMP, the Navy adopted four strategic objectives to better align and achieve specific goals in strategic areas. These objectives mirror the Air Force's strategic pillars, thus creating the opportunity for standardization across the services for long-term HSI implementation and management of activities and requirements. The four strategic objectives are noted in Table 2.

Table 2. Naval Strategic Objectives.

Objective	Description
INTEGRATE	HSI processes into the Integrated Acquisition, Technology, and Logistics Life Cycle Management Framework to equip and sustain the warfighter.
INSTITUTIONALIZE	HSI as the way of doing business to increase total systems performance and decrease total ownership costs.
SUSTAIN	HSI through collaboration with partners in OSD, sister services, industry and academia.
IMPROVE	HSI processes through metrics, feedback, and lessons learned.

These objectives will be used to categorize and track maturity metrics, challenges, gaps, and opportunities in the implementation, management, planning, and execution of HSI requirements and activities.

3.0 ROLES AND RESPONSIBILITIES

The following sections outline the roles and responsibilities within HSI, including a) planning and execution of requirements, and b) executive and working level coordination groups.

3.1 Planning and Execution Organizations

Naval organizations with responsibilities related to HSI are shown in Table 3. However, the three major stakeholders involved in the implementation, management, planning, and execution of HSI requirements and activities are the following: a) Office of the Chief of Naval Operations Acquisition and HSI (OPNAV (N151)), Assistant Secretary of the Navy Research, Development, and Acquisition (ASN RD&A), and the Naval Systems Commands (SYSCOMs) (e.g., Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR), Naval Space and Warfare Systems Command (SPAWAR)), and Naval Facilities Engineering Command (NAVFAC)).

Program requirements and resources are established and controlled within the Office of the Chief of Naval Operations (OPNAV) organization. Program execution and technical oversight for HSI are provided from ASN RD&A and SYSCOM organizations. Each organization establishes policies for HSI within their respective areas of responsibility.

Table 3. Naval HSI Organizations and Responsibilities.

Organization	Major HSI Responsibilities and Activities
Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN RDA)	▪ **Acquisition Executive responsible for DON acquisition and reporting authority for PEOs and Direct Reporting Program Managers (DRPMs)**
OPNAV N15	▪ **Validates Joint Capabilities Integration and Development System (JCIDS) HSI Requirements for Naval & Joint Acquisition Programs** ▪ **Governance authority for policy, requirements, and resources; identifies shortfalls, investigates innovative approaches in Research, Development, Testing and Evaluation (RDT&E) and Science & Technology to optimize performance** ▪ **Supports the Program Executive Offices, Systems Commands, and Direct Reporting Program Managers by assisting in exploring options that maximize use of technology to reduce manpower, personnel, and training requirements and life-cycle cost**
Naval Personnel Command	▪ **Executes Personnel responsibilities**
Naval Education & Training Command (NETC) / Training And Education Command (TECOM)	▪ **Executes Training Agent responsibilities** ▪ **Develops, coordinates, resources, executes, and evaluates training and education concepts, policies, plans, and programs to ensure war fighters are prepared to meet the challenges of present and future operational environments**
Naval Manpower Analysis Center (NAVMAC)	▪ **Assists Naval Program Managers and Integrated Product Teams with manpower requirements estimates, independent manpower impact statements, and contractor-developed manpower estimates**
Naval Postgraduate School (NPS)	▪ **Executes HSI Graduate Education Program** ▪ **Develops and executes Distance Learning HSI Certificate Program**
OPNAV N1, N2, N4, N6, N8	▪ **Plans, programs, and budgets HSI and program requirements and resources** ▪ **Deputy CNO (N4) is designated as OPNAV Shipboard Habitability Manager and provides overall policy guidance and review for the program** ▪ **Provides training requirements and overall policy guidance for ship survivability training and coordinate efforts for such training** ▪ **Provides general and specific operational requirements for new and improved ship survivability equipment and techniques**
Program Executive Offices (PEOs)	▪ **Authority, responsibility and accountability for life-cycle management of all acquisition programs within their cognizance** ▪ **Applies HSI as part of a systems engineering approach**
Acquisition Systems Commands (NAVAIR, NAVSEA, NAVSUP, SPAWAR, NAVFAC, MARCORSYSCOM)	▪ **Maintains and executes HSI standards, policy, and guidance** ▪ **Coordinates and administers HSI training to the workforce** ▪ **Executes HSI tasks and activities across programs** ▪ **Independently assesses program HSI activities and progress through the Systems Engineering Technical Review (SETR)** ▪ **Executes Human Systems TA certification and provides oversight for acquisition programs** ▪ **Conducts applicable Human Performance/HSI research for Naval organizations and programs** ▪ **Coordinates HSI work practices with Joint and international partners** ▪ **Responsible for the development of the Naval HSI competency and development of a Competency Aligned Organization (CAO) business model for the optimization of HSI-related program support throughout the SYSCOMs**
Chief of Naval Research (Office of Naval Research, Naval Research Laboratory)	▪ **Conducts Science and Technology planning, research, and development efforts supporting Future Naval Capability and other HSI requirements. Approves technology readiness assessments for ACAT I, IA, and II programs**

Commander, Operational Test and Evaluation Force (COMOPTEVFOR) / Marine Corps Operational Test and Evaluation Activity (MCOTEA)	▪ **Responsible for independent OT&E of assigned Navy and Marine Corps acquisition programs**
Naval Center for Cost Analysis (NCCA)	▪ **Prepares life cycle independent cost estimates for Major Defense Acquisition Programs designated ACAT IC at Milestone B and C and Full-Rate Production Decision Reviews and for component cost analysis of Major Automated Information System programs at Milestone A/B and Full Rate Production Decision Reviews** ▪ **Conducts component cost analyses for joint ACAT IAM programs for which DON is the lead**
Naval Safety Center	▪ **Develops and implements safety policy, doctrine, and guidance** ▪ **Develops safety education, training, professional development and certification programs for CNO and CMC through the Naval Safety and Environmental Training Center** ▪ **Maintains a database of mishap and hazard information and supports safety analysis and research to identify potential hazards, safety trends and preventative measures for human factors and systems safety** ▪ **Advises CNO in human factors and human factors engineering to ensure the acquisition process results in inherently safer systems** ▪ **Exchanges mishap and hazard report information, and identifies and recommends improved safety procedures, processes and designs**
BUMED/Navy and marine Corps Public Health Center	▪ **Conducts Environmental & Occupational Health evaluations** ▪ **Conducts specialized health hazard evaluations (consistent with a category of risk relevant to system design)** ▪ **Provides technical guidance for industrial hygiene and occupational health evaluations**
Fleet Users	▪ **Provides Domain Subject Matter Expert (SME) input to design requirements** ▪ **Participates in fleet feedback and usability evaluations**

3.2   Executive and Working Level Coordination

To facilitate the implementation, management, planning and execution of HSI requirements and activities, the Naval HSI Executive Steering Group and Naval HSI Working Group (NHSIWG) were established. The NHSIWG develops common SYSCOM level HSI and domain processes, tools, standards, and training and integrates these elements into Systems Engineering (SE) to deliver systems that maximize performance at the lowest total ownership cost. Integration of HSI processes, analyses, activities into the SE processes implemented during acquisition is essential to fully achieving HSI goals. The executive steering group ensures NHSIWG recommendations are consistent and support the HSI competency area goals of each SYSCOM. The NHSIWG is aligned with the Naval Systems Engineering Stakeholders Group (SESG) as an engineering sub-working group. The NHSIWG reports to the Naval SESG and

develops an annual work plan. The annual work plan outlines a series of deliverable products which facilitate better integration of human systems processes into the Navy systems acquisition and systems engineering processes.

The NHSIWG is represented on the Joint HSI Working Group (JHSIWG) through coordination with OPNAV (N151). The JHSIWG serves a forum for the services and the Department of Homeland Security to coordinated high-level HSI activities and initiatives under the guidance and support of Office of the Secretary of Defense (OSD) leadership. Additionally, many members of the NHSIWG hold leadership positions in the Department of Defense Human Factors Engineering Technical Advisory Group (DoD HFE TAG), established in 1976 and encompassing 17 SubTAGs (including HSI) at the federal level. In summary, Naval HSI remains highly involved in the numerous HSI management areas through participation at the service, joint, and federal levels.

4.0   ACQUISITION LIFE CYCLE INTEGRATION

Department of Defense Instruction 5000.02 (DoDI 5000.02), *Operation of the Defense Acquisition System*, requires HSI planning be summarized in the acquisition strategy and Systems Engineering Plan (SEP). Additionally, the instruction requires HSI planning "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."[1] At the Program Manager's discretion, detailed HSI planning may appear in the SEP, or the SEP may include summary HSI planning with a reference to a standalone HSI Plan (HSIP). Secretary of the Navy Instruction 5000.2D (SECNAVINST 5000.2D), *Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System*, further clarifies the HSI planning requirement by mandating the Program Manager (PM) "apply HSI as part of the systems engineering process."[2] Additionally, the instruction requires PMs and resource sponsors to address HSI as noted in DoDI 5000.02. These instructions provided the justification for HSI requirements planning and execution in the Department of Navy (DON) acquisition life cycle.

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[1] DoDI 5000.02, Enclosure (8), pg. 60.
[2] SECNAVINST 5000.2D, Enclosure (7), pg. 12.

The following sections describe the role of HSI planning and execution within the DoN acquisition life-cycle.

4.1   *Materiel Solutions Analysis Phase*

4.1.1   Capabilities Based Assessment

A Capabilities Based Assessment (CBA) defines the capability needs and gaps associated with a particular military problem and provide materiel and non-materiel solutions to the identified gap. OPNAV resource sponsors or program sponsors coordinate with HSI subject matter experts, most notably manpower analysts, to address HSI concerns when evaluating the identified problem. The CBA produces either an Initial Capabilities Document (ICD) and/or Doctrine Organization Training Materiel Leadership Personnel Facilities (DOTMLPF) Change Request (DCR). The CBA is the first opportunity for HSI in the DON acquisition life cycle.

4.1.2   Analysis of Alternatives

To determine the solution to a capability need or gap, the PM conducts, with the approval of the R3B, an Analysis of Alternatives (AoA) to compare and contrast differing solutions for the identified problem. In preparation for the AoA, HSI domain SMEs coordinate and collaborate with other stakeholders to include HSI considerations in the solutions set. The preferred solution(s), AoA results, are validated at Gate 2. Once validated, HSI domain SMEs once again engage with program sponsors to establish HSI requirements, including manpower and training Key Performance Parameters (KPPs) and Key System Attributes (KSAs). These requirements are identified in the Capabilities Development Document (CDD) and reviewed by OPNAV requirements officer for validation.

4.2   *Technology Development Phase*

Milestone A begins the Technology Development Phase. Within this phase, the CDD is approved and its requirements translated into the system design through the SEP. HSI practitioners, OPNAV requirements officers, and domain SMEs coordinate to ensure HSI requirements are integrated into the systems design. At the midpoint of the concept development phase or Gate 4, the Systems Design Specification (SDS) is approved. The

SDS documents the flow of CDD requirements into functional system requirements and major programmatic actions to deliver the system.[3] HSI practitioners' contributions are critical to ensuring the SDS includes the proper balance of hardware, software, and human elements.

Concurrently, to better illuminate the HSI requirements of manpower, personnel, and training (MPT) in acquisition programs, OPNAV (N15) submitted and ASN RD&A approved R3B, gated review slides that require reporting on Naval Training System Plans (NTSPs), job task analyses (JTAs), manpower estimate reports (MERs), front-end analyses (FEA), and other MPT specific actions. These slides are required at Gate 4, Gate 5, and Gate 6 (post critical design review) R3Bs.

4.3   Engineering and Manufacturing Development Phase

At Milestone B or Gate 5, the Engineering and Manufacturing Development Phase commences. PMs are required to deliver an approved Manpower Estimate Report (MER) and NTSP. The MER and NTSP are planning documents that provide decision makers with programmatic data for program objective memorandum funding requirements for a system's life cycle. Additionally, the Independent Logistics Assessment (ILA) is required. The ILA requires extensive input from HSI practitioners and domain SMEs as a part of a systematic review of the program's ability to meet established performance requirements. Moreover, "the milestone decision authority approves the program initiation, low rate initiation (LRIP) strategy, and LRIP quantities."[4]

4.4   Production and Development Phase

Low Rate Initial Production (LRIP) and the Full Rate Production Decision Review (FRP DR) are the key events in this phase. LRIP produces a small amount of units necessary to evaluate initial operational test and evaluation requirements. These tests ensure sufficient achievement of HSI requirements and/or standards in the systems design. Additionally, they aid decision makers in the FRP DR. The FRP DR requires the Milestone Decision Authority (MDA) to review all the significant and risk related information, including HSI

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[3] SECNAVINST 5000.2D, Enclosure (2), pg. 60
[4] SECNAVINST 5000.2D, Enclosure (2), pg. 24.

requirements, in preparation for authorizing the full production of the system. Once the FRP DR is approved, the remaining units will be produced and delivered to the fleet.

4.5   *Operations and Support Phase*

Logistics support and modifications are HSI focus areas in this phase. To deliver the required personnel to the system, training support is critical in ensuring the system operates at the maximum capability. Additionally, if modifications are required to existing legacy systems, HSI application is critical to ensuring the system modification incorporates human requirements. For example, the DDG 51 Modernization effort is currently exploring ways to improve training and reduce manpower through HSI applications and techniques including embedded training systems and task analysis.[5] Whether major or minor modifications are warranted to system hardware, software, or human elements, HSI is critical to supporting the system throughout the life cycle.

5.0   HSI SETR APPLICATION

The SETR process ensures appropriate systems engineering aspects are included in required acquisition gate reviews. This process provides a framework for structured systems engineering and technical health of a program. The Navy's SETR process provides PMs with independent assessments of program readiness to enter the next technical phase. Despite the primary focus of each SETR review being technical issues, the SETR process should also include cost, schedule, and "total system" attributes including HSI considerations. In order to provide adequate assessments, detailed analyses must be performed to determine where there are issues with respect to human performance, workload, required skills, costs, safety, and operational readiness.

6.0   HUMAN CAPITAL MANAGEMENT

The following section describes the Navy's activities in human capital development and management, including a) personnel structure, b) education, and c) training.

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[5] DDG 51 Modernization Hull, Mechanical, Electrical Human Systems Integration Plan, August 2007.

6.1   Personnel Structure

The HSI personnel portfolio resembles a mix of active duty, government civilian, and contractor personnel. These individuals are distributed throughout the various commands identified in Table 3. However, the majority of these individual are located at the SYSCOMs and ASN RD&A.

6.2   Education

The Naval Postgraduate School (NPS) serves as the Navy's leading educational vehicle for HSI advanced education. NPS offers advanced education through two programs: a) Masters of Science in HSI, and b) HSI certificate program. OPNAV (N15) serves as the major area sponsor for the masters program. The certificate program is funded through tuition paid by participants and/or their respective commands.

6.3   Training

The SYSCOMs provide executive and working level HSI training. Currently, they are developing an introductory web-based course for PMs, systems engineers, and leadership via Navy Knowledge Online. In addition to the executive level training, NAVSEA offers a one-day resident HSI course to all of its engineers and program managers. These courses encompass one-hour HSI training modules offered in "Principles of Logistics" and "Acquisition Program Overview." Moreover, the Naval Safety and Environmental Training Center, with the support of NAVFAC, provides safety related training including basic and advanced ergonomics courses. These are mostly focused on retrofits for existing industrial operations, but provide a basic understanding of "industrial" ergonomics and might be influenced to more completely encompass acquisition related considerations. The Naval Safety Center also maintains an "acquisition safety" website with an extensive section on ergonomics and HSI.

At the Joint level, ASN RD&A, in coordination with OPNAV and SYSCOM staffs, provides input for Defense Acquisition University modules related to HSI in various disciplines, including systems engineering, logistics, and acquisition. These activities are coordinated through the NHSIWG (see section 3.2).

7.0   KEY TASKS

Enclosure (1) provides key tasks. The tasks are aligned to strategic objectives noted in section 2.0, and categorized into the following sub-groups: (1) organizational coordination, (2) workforce sustainment and improvement, (3) program implementation and assessments, (4) processes, methods, and measures, (5) analytical tools, and (6) policy.

8.0   MATURITY METRICS

Naval HSI maturity metrics mirror the key task sub-groups described in section 7.0. At the end of each sub-section, the maturity metrics are correlated to the strategic objectives annotated in section 2.0.

8.1   Organizational Coordination

Formal coordination continues to improve with OPNAV staff, ASN RD&A, and SYSCOM representatives in acquisition programs. The Broad Area Maritime Surveillance (BAMS) program is a prime example of HSI coordination across the different entities. The BAMS working group encompasses members from the various OPNAV codes, 10th Fleet, United States Fleet Forces Command, and NAVAIR's BAMS unmanned aerial systems HSI office. Additionally, delegation of activities, including education and training programs, continues to improve. Recently, OPNAV (N151) delegated Defense Acquisition University (DAU) training module input responsibility to ASN RD&A. Moreover, OPNAV staff, including N151 and N153 (Education Branch), continue to work closely with various stakeholders, most notably NPS, to remedy billet structuring issues (see section 8.2). *Institutionalize, Sustain*.

8.2   Workforce Sustainment and Improvement

The requirement to build and sustain the Navy's HSI military and civilian workforce requires maintaining a proper personnel balance. While the government civilian practitioner component remains healthy, the active duty HSI subspecialty code graduate education demand requires attention. From discussions and follow-on analysis, the need for HSI practitioners is apparent; however, whether or not the requirements should be filled from the active duty ranks through the 4600 (HSI) subspecialty code (SSC) remains

a focal area for OPNAV staff in the current year.

Recently, under Vice Chief of Naval Operations' direction, OPNAV (N15) tasked the various Budget Submission Offices (BSOs) to prioritize their subspecialty code billets to properly align command needs to graduate education quotas. Concurrently, under the direction of the Joint Human Systems Integration Working Group (JHSIWG), the Naval HSI community provided quota and throughput inputs for NPS HSI advanced education. The two initiatives suggest (a) the masters program is currently meeting the minimum billet requirement to justify a masters program, (b) the masters program shows stagnant growth for quota inputs provided by community managers, and (c) the certificate program described in Section 6.2 shows increasing throughput demand and high potential for growth, and (d) the certificate program is critical to the Joint HSI advanced education. These facts provide justification for the OPNAV (N15) to continue to support HSI advanced education in the near and long-term future. *Sustain.*

8.3   *Program Implementation and Assessments*

The section outlines the maturity metrics for program implementation and assessments.

8.3.1   Program Implementation

In an OSD report to the United States Congress entitled, *Human Systems Integration Activity in DoD Weapons Systems Programs: Part III,* several programs were identified as HSI success stories, including AEGIS Combat Information Center, Tactical Tomahawk Version 5, P-8 Multi-Mission Aircraft, and E-2D Advanced Hawkeye (AHE). Based on the aforementioned OSD report, the savings achieved from the application of HSI exceeds several million dollars.

Additionally, the increased emphasis on instituting HSI requirements in JCIDS continues to show improvement. DoDAF defined and documented manpower, personnel, and training standard processes, methods, and measures coupled with NAVPRINT policy compelling HSI domain requirements has resulted in increased HSI consideration in the development of JCIDS documents and in major acquisition events including the AoA . *Integrate, Institutionalize*.

8.3.2 Program Assessments

Independent evaluations and assessments are critical to the integrity of the acquisition process.

Technical Authority Program Assessments – Provide independent HSI review and evaluation of programs in advance of technical reviews, giving PMs awareness of HSI risks and risk mitigation opportunities. The workload associated with the large number of naval programs necessitates qualified personnel to provide adequate oversight.

Modernization Assessments (SHIPMAIN) – Incorporation of HSI assessments into the Surface Ship and Carrier Entitled Process for Modernization Management and Operations Manual, which covers Ship Change Documents (SCDs) developed under the Navy Modernization Process. This will reduce costs incurred to correct HSI and training deficiencies.

HSI Assessment Criteria - Draft common set of HSI assessment criteria associated with each Systems Engineering Technical Review point.

8.4 Processes, Methods, and Measures

Specific guidance on assessment methods and evaluation measures are contained in the DoDI 5000.02, SECNAVINST 5000.2D, and a NAVSEA Best Practices Guide for Human Systems Engineering. *Improve.*

8.5 Analytical Tools

HSI infrastructure, including analysis and design tools, is required for effective execution of HSI requirements. Analytical tools (e.g., Total Crew Model (TCM)) have been developed and applied to acquisition programs yielding valuable and promising results. Commercial-of-the-shelf tools were applied to the DDG 1000 program, and Littoral Combat Ship (LCS) used the TCM to evaluate the effectiveness and feasibility of mission module packages.[6] Table 4 lists a variety of analytical, design, and trade-space tools used within Naval HSI, broken down by process area.

Additionally, NAVAIR's Crash Simulations laboratory and NAVSEA Integrated

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[6] *Human Systems Integration Activity in DoD Weapons Systems Programs: Part III*, pg. 42-43.

Command Environment (ICE) laboratory conduct research and development on human performance issues, such as conditions of extreme temperatures, three-dimensional motion, command staff decision environments, and virtual decision making. The ICE laboratory conducted the researched noted in section 1.0 concerning the DDG 1000 bridge design. These laboratories are vital to the application of HSI in acquisition programs. *Integrate, Institutionalize, Improve.*

Table 4 Common Naval HSI Tools.

Process Area	HSI Tool
Cost	True Planning
	Relex Architect
	Cost Analysis Strategy Assessment (CASA)
	Army Military-Civilian Cost Sys (AMCOS)
Functional Analysis	Any Logic
	WebSphere Business Modeler
	TIBCO Business Studio
	Enterprise Architect
	System Architect
	Task Architect
	Task Modeler
	BizAgi Process Modeler
	OPSAT
	Intalio Designer
	Interfacing VISISON BPM Add On
	Trade Space for System Analysis
Health & Safety	RiskSafe
	SafeWork
Human Factors Trade-Off	Force Logistics Composite Model (LCOM)
Human Reliability	EPRI HRA Calculator
	Relex Architect
Manning Estimation & Validation	MicroSaint
	Integrated Performance Modeling Environment
	IMPRINT
	ISMAT
	Total Crew Model (TCM)
	MORAE
Requirement Analysis	Task Modeler

	System Architect
	Task Architect
	Enterprise Architect
Task & Team Design	C3TRACE
	Relex Architect
Workspace Design & Evaluation	Wonderware
	SALT
	Iconics Genesis
	SimSmart
	ManneQuin Series of Human Modeling
	HPAT
	3KEYMASTER
	Crew Station Design Tool (CSDT)
	DI-GUY
	MIDAS

8.6   Policy and Guidance

On November 10th, 2009, Chief of Naval Operations Manpower, Personnel, Training and Education (CNO (N1)), Vice Admiral Mark E. Ferguson signed OPNAVINST 5310.23. The instruction requires HSI requirements in JCIDS documents, describes the roles and responsibilities of resource sponsors, program sponsors, SYSCOMs, and PMs in HSI planning and execution.

Additionally, OPNAV (N15) submitted updated language in the latest SECNAVINST 5000.2 revision (SECNAVINST 5000.2E) to parallel guidance provided in OPNAVINST 5310.23. The revised language includes the establishment of the milestone decision authority having the opportunity to require an HSIP, identification of OPNAV (N15) as the Navy's authority on HSI policy and guidance, and downgrading manpower to a KSA vice KPP due to concerns over delegation authority in determining manpower requirements. *Institutionalize, Integrate.*

Table 5 Naval HSI Governing Documents

Document Title	Doc. No.	Date
The Defense Acquisition System	DoD Directive 5000.01	May 03
Operation of the Defense Acquisition System	DoDI 5000.02	Dec 08
Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System	SECNAV Instruction 5000.2D	Oct 08
Joint Capabilities Integration and Development System	CJCSI 3170.01G	Mar 09
DON Policy for Safety, Mishap Prevention, Occupational Health and Fire Protection Program	SECNAVINST 5100.10J	Oct 05
Independent Logistics Assessment (ILA) and Certification Requirements	SECNAVINST 4105.1B	Dec 08
Navy Total Force Manpower Policies and Procedures	OPNAVINST 1000.16K	Aug 07
Navy System Safety Program Policy	OPNAVINST 5100.24B	Feb 07
Shipboard Habitability Program	OPNAVINST 9640.1A	Sep 96
Standard Practice for System Safety	MIL-STD-882D	Feb 00
Naval Training System Requirements, Acquisition, and Management	OPNAVINST 1500.76B	Apr 10
Surface Ship Survivability Training Requirements	OPNAVINST 3541.1E	Mar 95
Environmental Readiness Program Manual	OPNAVINST 5090.1C	Oct 07
Logistic Support Analysis	MIL-STD-1388-1A	Apr 83
Department of Defense Design Criteria Standard: Human Engineering	MIL-STD-1472F	Aug 99
Department of the Navy (DON) Acquisition and Capabilities Guidebook	SECNAV M-5000.2	Dec 08
Memorandum of Agreement to Achieve a More Common Approach to Human Systems Integration	NAVSEA 5400 Ser 00/087	Oct 03
Navy Safety and Occupational Health (SOH) Program Manual	OPNAVINST 5100.23G	Dec 05
Naval Systems Engineering Technical Review Handbook	DRAFT 1.0	Dec 08
Independent Logistics Assessment	NAVSO P-3692	Sep 06

Handbook, Department of the Navy Guide for Conducting Independent Logistics Assessments		
DDG Modernization Hull, Mechanical, and Engineering Human Systems Integration Plan		Aug 07
Procedures for Obtaining Health Hazard Assessments (HHAs)	BUMEDINST 6270.8A	Jan 02
Human Systems Integration (HSI) Policy in Acquisition and Modernization	NAVSEAINST 3900.8A	May 05
Navy Personnel Human Systems Integration (NAVPRINT)	OPNAVINST 5310.23	Nov 09
Standard Practices for Human Engineering Design for Marine Systems, Equipment, and Facilities	ASTM F116-07	Jan 07

ENCLOSURE (1) KEY NAVAL HSI TASKS

Item #	Title	Key Strategic Objective	Sub-Group	Lead	Duration	Scope	Output
1	Various Manpower, Personnel, Training, Future Naval Capability Research Projects	Institutionalize	Organizational and Coordination	OPNAV-N1, N4, N6, N8, Marine Corps TECOM, USFF, ASN(RDA), and ONR	In Progress	Provide the ability to recruit and match Sailors and Marines to the right jobs at the right times, design affordable systems centered on the Warfighter, and equip Sailors and Marines with effective mission essential competencies.	Develop and deliver quantifiable products (i.e., prototype systems, knowledge products, and technology improvements) in response to validated requirements for insertion into programs of record upon meeting exit criteria within five years.
2	Various Performance, Affordability, Reliability, Science and Technology Focus Area Projects	Institutionalize	Organizational and Coordination	ONR	In Progress	Sustain our Sailors and Marines at the peak of their effectiveness under all war fighting conditions. Enhance individual and team decision-making and combat effectiveness. Ensure the health and viability of our war fighters afloat and ashore.	Science and technology products, e.g., improve personnel recruitment & selection and create effective performance-based measures of personnel readiness, integrate human performance considerations into system design, acquisition and operations, reduce training time and improve training impact.
3	Various HSI Joint Working Group Coordination Meetings	Sustain	Organizational and Coordination	OPNAV/SYSCOMs	In Progress	Maintain organizational coordination meetings and working groups (JHSIWG, etc). Joint working group and Executive steering group meetings conducted quarterly. Conduct periodic (monthly) meetings or telecons between SYSCOMs and OPNAV N151 to coordinate on common and critical issues. Prioritize allocation of resources across organizations and develop common products such as guides or templates for application across organizations.	Shared plans, resources, and products.
4	Various Future Naval Capability Projects: Force Utilization through Unit Readiness and Efficiency, Personnel Integration of Selection, Classification,	Sustain	Workforce Sustainment and Improvement	ONR	In Progress	Web-based suite of tools that will serve as the simulation environment to assess the impact of alternative human resource allocation policies on individual, team, and unit efficiency and readiness.	1) A simulation environment for MPTE HQ to test proposed policy changes, observe and measure their anticipated impact, and identify intended and unintended "ripple effect" consequences and 2) A prototype web-based suite of tools to serve as the fleet's operational environment to optimally trade off FIT (Right Person in the Right Position at the Right Time) cost, and risk.
5	, Various Symposiums Commitees, Working Groups	Sustain	Workforce Sustainment and Improvement	NAVSEA w/support from other Naval and Joint organizations	In Progress	Organize conference (typically biannual) for American Society of Naval Engineers (ASNE) in the field of HSI, providing an opportunity for practitioners, managers, and leadership to exchange information on technical, management, and policy topics.	Forum for communication on HSI topics across the Navy, Services, and overall HSI community.
6	NPS HSI Advanced Education	Sustain	Workforce Sustainment and Improvement	OPNAV/NPS	In Progress	Not Provided	
7	Navy Erognomic Program	Integrate	Workforce Sustainment and Improvement	Naval Safety Training Center	In Progress	Technical training for safety and health professional engaged in ergonomics work/benefit: Professional training applied throughout navy work areas.	
8	DAU HSI Training	Sustain	Workforce Sustainment and Improvement	ASN RD&A/OPNAV	In Progress	Provide Naval HSI inputs to support the DAU HSI Continuous Learning Module and develop HSI inputs to existing career field training.	On-line continuous learning module for all Defense Acquisition professionals.

9	Technical Warrant Holder Pyramids	Integrate	Workforce Sustainment and Improvement	SYSCOMs	In Progress	TA requires detailed analysis and oversight of evolving designs and system concepts. The workload associated with the large number of programs necessitates a technical pyramid of qualified personnel to provide adequate oversight.	Personnel resources available to support Technical Warrant activities.
10	Technical Authority Program Assessments	Improve	Program Implementation and Assessments	SYSCOMs	In Progress	Provide independent HSI review and evaluation of acquisition programs in advance of engineering milestones such as technical reviews.	Awareness of HSI risks and risk mitigation opportunities for evaluated programs.
11	Modernization Assessments (SHIPMAIN)	Integrate	Program Implementation and Assessments	NAVSEA	In Progress	Incorporation of HSI assessment process for modernization into the Surface Ship and Carrier Entitled Process for Modernization Management and Operations Manual.	Reduction of costs incurred to correct HSI and training deficiencies introduced as the result of HSI assessments not being conducted on Ship Change Documents (SCDs) developed under the Navy Modernization Process.
12	HSI Assessment Criteria	Improve	Program Implementation and Assessments	SYSCOMs	In Progress	Develop Draft Set of HSI assessment criteria associated with each Systems Engineering Technical Review point.	Naval HSI Common System Engineering Technical Review Checklist
13	Various Capable Manpower Future Naval Capability: Game-Based Training, Sea Basing, Affordability, Maintainability, and Reliability Technology Focus Area Enabling Capabilities	Integrate	Infrastructure and Tools	ONR	In Progress	Develop several game-based learning environments in critical Naval tasks, and systematically evaluate learning and performance in them.	(1) Improved tactical language proficiency and regional expertise, (2) Advanced capabilities for performance assessment, measurement, diagnosis, and remediation, (3) Reduced authoring time of game based scenario generation, and (4) Improved instructional effectiveness.
14	Various Technical Standards Development, Engineering Guides, International coordination, and metrics	Integrate	Infrastructure and Tools	ONR	In Progress	Establish and update technical guidance associated with standards and best practices used to support HSI TA assessments, certifications, and recommendations. These include MIL-STD 1472, MIL-STD 2525 (funded by PEO IWS), ASTM 1337, NAVSEA 03-01 (Common Presentation Layer), Habitability Specifications and Shipboard Habitability Materials/Design Criteria and Practice (SHMDCP) manual.	Documentation provides clear guidance to system developers (in accordance with best practices) and supports validity of TA decisions.
15	Various Capable Manpower Future Naval Capability Science and Technology Projects including: Affordability, maintainability, reliability, Sea Basing, Human Resources Data Bases, Tool improvements, Improved manpower Optimization Program,	Integrate	Infrastructure and Tools	ONR	In Progress	Develop several game-based learning environments in critical Naval tasks, and systematically evaluate learning and performance in them.	(1) Improved tactical language proficiency and regional expertise, (2) Advanced capabilities for performance assessment, measurement, diagnosis, and remediation, (3) Reduced authoring time of game based scenario generation, and (4) Improved instructional effectiveness
16	SYSCOMS Training Acquisition (SEATRACQ,, CMAT, AVTRAQ) Website	Institutionalize	Infrastructure and Tools	SYSCOMs	In Progress	Provide online resource for training acquisition info, tools and guidance and the SYSCOM Navy Training System Plan (NTSP) Virtual Library.	Automates NTSP formal Fleet review and comment process per OPNAVINST 1500.76A and provides one stop shopping for latest training guidance.
17	Capable Manpower Future Naval Capability: Various Exceptional Expertise for Submarine Command Team Decision Making, Unmanned Surface Vehicle Monitoring & Control Human Computer Interface for Amphibious Operations	Institutionalize	Policy	ONR	In Progress	To understand the principal attributes of submarine commanding officer and crew decision making processes.	(1) Principles of Information Flow Design to aid NAVSEA technology design, (2) Evaluate Structure of Tracking Party to determine whether the mix or qualifications should be changed, and (3) Improve Training Products to focus more on team training.

18	Draft OPNAVINST (ONI) 5310.23	Institutionalize	Policy	OPNAV	Complete	Naval HSI Personnel Integration (NAVPRINT).	Establishes HSI requirements in JCIDS documents.
19	Systems Engineering Technical Review (SETR) Implementation	Integrate	Policy	SYSCOMs	In Progress	Establish standard process for independent review of acquisition programs, allowing integration of HSI criteria and review authority into the review process for acquisition programs.	Uniform process for review and assessment of Naval programs.
20	HSI policy and guidance updates, HSI Technical Authority criteria	Institutionalize	Policy	SYSCOMs	In Progress	Work with DASN ACQ and RD&A CHENG to incorporate HSI inputs into Naval acquisition and engineering policy and guidance documents (Including Systems Engineering Plan, MIL-STD-882, etc).	Revise Systems Engineering and Acquisition Policy and Guidance.
21	4600 SSC Program Health	Sustain	Workforce Sustainment and Improvement	OPNAV/NPS/SYSCOMs	In Progress	Improve the overall health of the 4600 SSC. Coordinate with various stakeholders to define active duty requirements for HSI skill sets and improve utilizations rates.	Increased number of 4600P coded billets.

ACYRONYM LIST

ACAT	Acquisition Category
AHE	Advanced Hawkeye
AoA	Analysis of Alternatives
ASN RD&A	Assistant Secretary of the Navy for Research, Development, and Acquisition
BAMS	Broad Area Maritime Surveillance
BSO	Budget Submission Office
CBA	Capability Based Assessment
CDD	Capabilities Development Document
CMC	Commandant of the Marine Corps
CNO	Chief of Naval Operations
CPD	Capabilities Production Document
DAU	Defense Acquisition University
DCR	DOTMLPF Change Request
DoD	Department of Defense
DoDAF	DoD Acquisition Framework
DoDI	Department of Defense Instruction
DON	Department of the Navy

DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities
DRPM	Direct Reporting Program Manager
EOA	Evaluation of Alternatives
FEA	Functional Area Analysis
FRP DR	Full-Rate Production Decision Review
FY	Fiscal Year
HHA	Health Hazard Assessment
HSI	Human Systems Integration
HSIMP	HSI Management Plan
HV	Human View
ICD	Initial Capabilities Document
ICE	Independent Cost Estimate
ILA	Integrated Logistics Assessment
IOC	Initial Operational Capability
IPT	Integrated Product Team
JCIDS	Joint Capabilities Integration and Development System
JHSIWG	Joint Human Systems Integration Working Group
KPP	Key Performance Parameter

KSA	Key System Attribute
LRIP	Low Rate Initial Production
MARCORSYSCOM	Marine Corps System Command
MDA	Milestone Decision Authority
MDD	Materiel Development Decision
MER	Manpower Estimate Report
MOA	Memorandum of Agreement
MPT	Manpower, Personnel, and Training
MPT&E	Manpower, Personnel, Training, and Education
NAVAIR	Naval Air Systems Command
NAVFAC	Naval Facilities Engineering Command
NAVMAC	Naval Manpower Analysis Center
NAVPRINT	Navy Personnel Human Systems Integration
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NCCA	Naval Center for Cost Analysis
NETC	Naval Education and Training Command
NHSIWG	Naval Human Systems Integration Working Group
NPS	Naval Postgraduate School

NTSP	Navy Training System Plan
OPNAV	Office of the Chief of Naval Personnel
OSD	Office of the Secretary of Defense
OT	Operational Test
OT&E	Operational Test and Evaluation
PEO	Program Executive Office
PEO IWS	Program Executive Office Integrated Warfare Systems
PoPS	Probability of Program Success
PM	Program Manager
R3B	Resource and Requirements Review Board
RD&A	Research, Development, and Acquisition
RDT&E	Research, Development, Testing, and Evaluation
RTOC	Reduction in Total Ownership Costs
RFP	Request for Proposal
SALT	Spatial Analysis Link Tool
SCD	Ship Change Document
SDS	System Development Specification
SE	Systems Engineering
SEP	Systems Engineering Plan

SETR	Systems Engineering Technical Review
SME	Subject Matter Expert
SSC	Subspecialty Code
SYSCOM	Systems Command
TA	Technical Authority
TCM	Total Crew Model