

United States Air Force

FY09 Human Systems Integration

Management Plan

(Annex to the OSD HSI Management Plan)



U.S. AIR FORCE

Air Force Human Systems Integration Office

Office of the Vice Chief of Staff

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1.0 Introduction

The Air Force invests in the finest systems in the world to provide our Airmen with warfighting capability that is second-to-none. Regardless of the sophistication of AF systems, optimized total systems performance is contingent upon the warfighter's ability to use systems fully and effectively to accomplish the mission. HSI is the vital link that optimizes the design of systems to achieve total system performance, maximizing human capabilities and overcoming human limitations. This document represents the AF Plan for implementing and managing Human Systems Integration.

The Air Force began to establish a comprehensive and sustainable HSI program following an Air Force Scientific Advisory Board Study (AFSAB TR-04-04). Following this report, the Air Force Chief of Staff (CSAF) accepted the AFSAB recommendations and charged the Air Staff to establish an HSI program. The Air Force Surgeon General and the Air Force Materiel Command jointly led an HSI integrated Process Team to bring an implementing construct forward. This construct was approved in 2005 (AFMS Presentation to CSAF and SAF/AQ) and an Air Force HSI Office (AFHSIO) was initially established in 2006 (CSAF Memo, 7 Aug 07), reporting to the Air Force Vice Chief of Staff (VCSAF). This office is now in its third year of operation and has made significant progress in addressing the concerns expressed by the AFSAB and in implementing many of their recommendations. This progress includes significant improvement in Joint HSI collaboration, improving policy and advocacy, integrating participation across the Air Staff, including HSI within the systems engineering process, and in laying the foundation for a comprehensive implementation of a sustainable HSI process within Systems Acquisition. The AFHSIO has built a sound and executable HSI strategy.

1.1 Purpose

The purpose of this plan is to outline the Air Force Strategy and Management Plan concepts for Human Systems Integration (HSI). The plan briefly details recent accomplishments and describes planned actions for FY09. It also describes challenges to fully implementing an Air Force HSI program and outlines solutions to meet these challenges. This plan supports the development of an overarching OSD Management Plan for HSI to be delivered to the House Armed Services Committee in response to tasking in the 2008 National Defense Authorization Act (NDAA) (Public Law 110-181).

1.2 Scope

The scope of this Management Plan includes policy, guidance, oversight and direction for Air Force HSI implementation, execution and sustainment. It outlines the various roles and responsibilities and a notional organizational construct under development. The plan addresses HSI form, functions and processes across the requirements/acquisition life cycle and the clear steps to integrate these within the acquisition framework. It also provides an estimate of resource requirements for a comprehensive Air Force HSI

program. It further addresses accountability, assessments, human capital development, and planned activities for the coming year along with detailed support plans.

1.3 Document Revision History

Table 1.1, Document Revision History

Version	Date	Description	Status
1.0	February 2009	United States Air Force Human Systems Integration Plan	Current

1.4 References

Table 1.2, References

Title	Doc. No.	Version	Date
Operation of the Joint Capabilities Integration and Development System	CJCSM 3170.01C	Version C	1 May 2007
Joint Capabilities Integration and Development System	CJCSI 3170.01F	Version F	1 May 2007
The Defense Acquisition System	DoDD 5000.1	N/A	12 May 2003
Operation of the Defense Acquisition System	DoDI 5000.02	N/A	2 Dec 2008
Capabilities-Based Requirements Development	AFI 10-601	N/A	31 July 2006
Determining Mission Capability and Supportability Requirements	AFI 10-602	N/A	13 Sep 2003
Capability-Based Planning	AFI 10-604	N/A	
Management of Air Force Training Systems,	AFI 36-2251	N/A	20 March 2003
Aerospace Medical Operations	AFI 48-101	N/A	19 Aug 2005
Acquisition and Sustainment Life Cycle Management (Policy)	AFPD 63-1/20-1	Final Draft Publication	When Published
Acquisition and Sustainment Life Cycle Management (Instruction)	AFI 63-101	Final Draft Publication	When Published

Life Cycle Systems Engineering	AFI 63-1201	N/A	23 July 2007
Capabilities-Based Test and Evaluation	AFI 99-103	N/A	
Report on Human-System Integration in Air Force Weapon Systems Development and Acquisition	AFSAB TR-04-04	Final	July 2004
Defense Acquisition Guidebook	DAG	N/A	December 2008
International Council on Systems Engineering Handbook	INCOSE-TP-2003-002-03.1	3.1	Aug 2007
National Defense Authorization Act (2008) – HSI Guidance / Tasking	Public Law 110-181 Section 231	N/A	28 Jan 2008
AF HSI Office Strategy	AFHSIO Strategy	N/A	Dec 2008
Air Force Human Systems Integration Handbook	AF HSI Handbook	N/A	Sep 2008
Air Force Human Systems Integration Requirements Development Guide	AF HSI Requirements Development Guide	N/A	Sep 2008
HSI Memorandum of Agreement (AFHSIO & 711 HPW)	HSI MOA	N/A	Dec 2008
Human Factors Considerations in Migration of Unmanned Aircraft System Operator Control	UAS Report	N/A	Feb 2006
Integrated Logistics Assessment Handbook	Integrated Logistics Assessment Handbook	Version 1.0	Jan 2006
USAF UAV Mishap Epidemiology	UAV Report	N/A	2004

2.0 Air Force HSI Organization and Responsibilities

2.1 Executive Level

Responsibility for AF HSI is assigned to the Vice Chief of Staff of the Air Force (VCSAF) with an Air Force HSI Office (AFHSIO) reporting directly to the VCSAF. A

Board of Advisors (BOA) has been chartered to advise the VCSAF with regard to Air Force HSI. This BOA is established by the Air Force Vice Chief of Staff to address long term HSI resources, organizational and integration requirements needed to support a more effective mission, as outlined herein.

The BOA will oversee and help implement and address actions and/or policy necessary to support the AF HSI program in the following general areas as needed:

- (1) Resources necessary for the efficient and effective execution of the HSI processes throughout the Air Force.
- (2) Organizational alignments, interfaces and responsibilities between organizations and agencies with HSI functions, their respective headquarters, the Secretary of the Air Force (SAF) and HAF.
- (3) Integration of HSI into: Air Force-wide research and development, requirements development, capabilities and acquisition processes; policies, instructions, and guidance for capabilities development, system acquisition and sustainment of AF systems; enhanced training and testing programs; appropriate marketing strategies for diverse audiences.

2.2 Air Staff

This AFHSIO is charged with authoring implementing policies, instructions and guidance to the various MAJCOMs, Air Staff and field organizations and test and evaluation agencies. AFHSIO has coordinated HSI-related policy guidance with several HAF organizations, particularly the Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQ). When published, a newly revised Air Force Instruction (AFI) 63-101, *Acquisition and Sustainment Life Cycle Management*, will prescribe a number of HSI-related organizational roles and responsibilities.”

2.2.1 AF Human Systems Integration Office (AFHSIO)

In accordance with AFI 63-101, *Acquisition and Sustainment Life Cycle Management*, AFHSIO will:

Facilitate and advocate integration of HSI into the Integrated Life Cycle Management (ILCM) framework and AF policies and guidance to comprehensively implement, assess, and improve HSI.

Develop and deliver comprehensive HSI education and training, tools, technology and methods to support Program Executive Officers (PEO), Program Managers (PM), Systems Engineers, and others involved in requirements development, acquisition and sustainment.

Provide expert advice, real-time assistance, and implementation strategies of HSI.

Support the development, communication and implementation of HSI initiatives.

Oversee and advocate HSI focus in activities regarding systems integration, systems engineering, total system performance and total operating

2.2.2 Air Force HSI Integrated Process Team (IPT)

The HSI IPT is established as a service level working group and a corporate level coordination and decision-making body that cross functional elements of the Air Force. The IPT supports the HSI BOA by reviewing and taking appropriate action on HSI-related issues and concerns. The creation of this IPT reflects the continuing need to ensure that HSI requirements are effectively integrated and embedded throughout the Air Force's capability, force development, modernization and acquisition processes. A continuous assessment by this body will help to maintain and/or identify HSI process improvement opportunities. Continued attention will help ensure HSI requirements play an integral role in all related combat and materiel development efforts across the Air Force.

The composition of the HSI IPT includes primary and alternate representatives from the following organizations:

- 1) Undersecretary of the Air Force (SAF/US)
- 2) Assistant Secretary of the Air Force for Acquisition (SAF/AQ)
- 3) Assistant Secretary of the Air Force for Installations, Environment & Logistics (SAF/IE)
- 4) Assistant Secretary of the Air Force for Manpower & Reserve Affairs (SAF/MR)
- 5) Office of the Secretary of the Air Force, Chief of Warfighting Integration and Chief Information Officer (SAF/XC)
- 6) Deputy Chief of Staff for Personnel (AF/A1)
- 7) Deputy Chief of Staff for Installations, Logistics and Mission Support (AF/A4/7)
- 8) Deputy Chief of Staff for Air, Space and Information Operations, Plans and Requirements (AF/A3/5)
- 9) Air Force Surgeon General (AF/SG)
- 10) Air Force Chief of Safety (AF/SE)
- 11) Director Air Force Test and Evaluation (AF/TE)

The IPT will help ensure a strategic framework is maintained for integrating the human throughout the capability and acquisition processes so that human issues continue to be fully considered as part of the total system in the development and/or acquisition of all

systems and programs. The IPT will oversee and help implement and address actions and/or policy necessary to support the AFHSIO in the following general areas as needed:

- (1) Resources necessary for the efficient and effective execution of the HSI processes throughout the Air Force.
- (2) Organizational alignments, interface and responsibilities between organizations and agencies with HSI functions, their respective headquarters, and the Air Force headquarters.
- (3) Integration of HSI into: Air Force-wide research, development and acquisition programs and organizations; regulations, capabilities development, system acquisition and sustainment documentation; enhanced training and testing programs; appropriate marketing strategies for diverse audiences.
- (4) Serve as a key enabler to AF Smart Operations 21 (AFSO 21) efforts. Ensure HSI personnel are engaged where appropriate to help facilitate human-centered strategic analysis and decisions.

2.3 MAJCOMS

Air Force Instruction for Capabilities Based Requirements Development (AFI 10-601) requires that Lead Commands, Field Operating Agencies and Direct Reporting Units “ensure(s) that Air Force Human Systems Integration (HSI) concerns are addressed in all capabilities based development documents.” To support the development of these capabilities documents, AFI 10-604 (Capabilities-Based Planning (CBP)) assigns to the MAJCOMs the responsibilities to “*author the AF CONOPS documents guiding Air Force operations, when designated as the CONOPS Sponsor; Augment AF CONOPS with functional concepts to enhance both the Air Force CBP process and related MAJCOM planning processes; Produce complementary planning products to enable Air Force-level planning activities; inform Joint capability planning and development activities, and facilitate the timely delivery of relevant capabilities to the warfighter; and participate in the Air Force-level review of capabilities.*” This capability based planning then drives the development of all warfighter capabilities, inclusive of a sound HSI strategy and process.

2.4 Science and Technology

The 711th Human Performance Wing (HPW) has been organized under the Air Force Research Laboratory. Uniquely, this Wing pulls several organizations together to address “human centric” issues within the Air Force. The Human Effectiveness Directorate (711th HPW/RH) can provide tools and technology to support HSI within the Air Force. The Wing’s Human Performance Integration Directorate (711th HPW/HP) is a center of expertise for HSI in the Air Force. The Air Force School of Aerospace

Medicine (USAFSAM) also provides readily accessible expertise in many of the HSI domains to support the advancement and application of research, science, and technology pertaining to the human and HSI.

2.5 Acquisition

The responsibility for integrating HSI considerations into Air Force acquisition programs is assigned to the applicable Air Force Service Acquisition Executive (SAE) for space and non-space programs. Air Force SAEs may provide specific HSI-related program direction to Program Executive Officers, Designated Acquisition Officials, Program Managers, and functional offices that execute or support Air Force acquisition programs.

When published, AFD 63-1/20-1 will implement DODI 5000.02 and expand existing AF policy regarding HSI within the Air Force systems engineering process. This document will require Air Force program managers to have a plan for HSI that addresses all human-related domains across the life cycle of a system and is integrated with broader systems engineering implementation plans. When published, AFI 63-101 will further prescribe HSI-related management requirements and direct Air Force PMs to integrate manpower, personnel, training, human factors engineering, safety and occupational health, personnel survivability, environmental, and habitability considerations into the systems engineering process. It will also require PMs to identify HSI-related responsibilities in the acquisition strategy, to describe technical and management approaches for meeting HSI requirements, and to define roles and responsibilities for the overlapping domains of safety and occupational health.

2.6 Test and Evaluation

Test and evaluation responsibilities within the Air Force (AFI 99-103 “Capabilities-Based Test and Evaluation”) are assigned to the Air Force Director of Test and Evaluation (AF/TE). The Air Force Materiel Command (AFMC) has responsibility for Developmental Test and Evaluation. The Air Force Operational Test and Evaluation Center (AFOTEC) is the Operational Test Agency (OTA) for the Air Force. AF/TE is a member of the AF HSI IPT and the BOA. The Air Force Flight Test Center (AFMC/AFFTC) and AFOTEC both have small cadres of HSI personnel to ensure HSI is properly addressed in the development of test strategies and test plans.

2.7 Sustainment

Per the revised AFI 63-101 that will be published in early 2009, a number of responsibilities for product support planning and sustainment of Air Force systems and equipment will be assigned to SAF/IE and AF/A4/7. These organizations will be responsible for ensuring HSI requirements are considered and executed as part of a given system’s life cycle product support strategy and equipment sustainment plans. Given the important role these organizations will play in ensuring HSI requirements are executed

during the operation and support phase, both of these organizations are members on the AF HSI IPT and BOA.

3.0 Air Force HSI in the Acquisition Life Cycle Process

3.1 Organization

As currently constituted, the formal Air Force HSI program consists of the AF HSI Office (AFHSIO) reporting to the VCSAF; and the 711th HPW/HP reporting to AFMC. An HSI BOA and IPT are chartered to oversee and assist the Air Force HSI program. In addition, HSI is supported by: 1) a small “HSI Cell” at several of the MAJCOMs (e.g. Air Combat Command (ACC), Air Education and Training Command (AETC), Air Force Special Operations Command (AFSOC), Air Mobility Command (AMC), Air Force Space Command (AFSPACE)), 2) the Human Factors Division at Air Force Operational Test and Evaluation Center (AFOTEC/TSH), 3) the HSI branch of the 773 Test Squadron at the Air Force Flight Test Center (773TS/ENFH), 4) HSI representatives from each of the AFMC Product Centers; and 5) HSI representatives from the Space and Missile Center.

The formal Air Force HSI program will continue to mature and efforts are ongoing to better define working relationships, process models, and support mechanisms to ensure HSI is applied comprehensively across the life cycle of Air Force systems. Paragraph 6 of this plan outlines several key tasks for FY09 that will further strengthen the AF HSI process. The planned Air Force HSI implementation workshop listed in Table 6.1 will bring the “Users” (MAJCOMS), “Developers” (AFMC & AFSPACE), and “Testers” (AFOTEC, AFFTC, AEDC and AAC) together to recommend and implement an effective organization and supporting structures and processes for HSI.

3.2 Policy

With guidance from the Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQ) and the Air Staff, the AFHSIO is integrating HSI tenets into all relevant acquisition policies and instructions, as well as those that are specific to the domains of HSI (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, Survivability and Habitability). As an integrating process, HSI cuts across many organizations and communities and must be properly reflected in direction that is useful and pertinent to them. HSI policy has been inserted or updated within AFPD 63-1/20-1, AFI 63-101, and AFI 63-1201. Additionally, AFHSIO joined with the Army and Navy HSI organizations to assist OUSD in authoring specific guidance for HSI in DoDI 5000.02 and Chapter 6 of the Defense Acquisition Guidebook (DAG). AFHSIO also provided leadership in authoring an HSI appendix for the International Council on Systems Engineering (INCOSE) Handbook (INCOSE-TP-2003-002-3.1). Additional efforts are underway to identify and further integrate HSI concepts into other relevant guidance documents.

3.3 Air Force HSI Strategy and Initiatives

AF HSI strives toward presenting a single, integrated voice for the human into requirements, acquisition and sustainment processes. Therefore, the AFHSIO is committed to process integration within existing policies and to execution with existing resources and processes wherever possible. The overarching strategy is captured below:

3.3.1 Vision

“Integrate people and technology for total systems performance”

3.3.2 Mission

“Ensure all AF warfighting systems are designed, built, operated, and sustained in a manner that optimizes total systems performance at every warfighter level”

3.3.3 Purpose

“Permanent Air Force cultural & organizational changes – optimize & sustain total systems performance at every warfighter level.”

3.3.4 Objectives

The overarching goal of AF HSI is to optimize warfighter capabilities and sustain readiness. The four main objectives of the AFHSIO program are to:

- a. **Integrate** Human Systems Integration (HSI) processes into the Integrated Acquisition, Technology and Logistics Life Cycle Management Framework to equip and sustain the warfighter
- b. **Institutionalize** HSI as the way of doing business to increase total systems performance and decrease total ownership costs
- c. **Sustain** HSI through collaboration with partners in OSD, AF, sister services, industry and academia, and;
- d. **Improve** HSI processes through metrics, feedback, and lessons learned

3.3.4.1 Supporting Initiatives

The following initiatives support the four AF HSI strategic objectives. Specific supporting tasks for these initiatives are contained in Table 6.1.

- Maintain senior OSD and AF leadership support and advocacy for HSI through effective change management and through formal coordination, publication and promulgation of pertinent policy and guidance

- Enable and direct development and maintenance of a comprehensive and effective education and training program / process for HSI
- Enable and direct incorporation of HSI considerations in capabilities based planning
- Develop HSI processes and tools, and coordinate with SAF/AQ to integrate them with systems engineering and product support processes and tools that are used during all phases of the defense acquisition framework and throughout the life cycle of a given system or product.
- Require and guide the inclusion of HSI planning requirements in product systems engineering plans (SEP).
- Develop incentive strategies to ensure industry meets human systems requirements
- Establish forums and processes to capture and communicate successes and lessons learned to improve AF HSI
- Use continuous process improvement strategies to improve HSI across the enterprise
- Maintain presence at specialty / professional meetings and industry days
- Conduct an “HSI marketing campaign” to heighten awareness of HSI within and outside the Air Force
- Recognize and reward HSI excellence

3.4 HSI Execution and Support

3.4.1 Capability Based Planning and Requirements Development

The Air Force MAJCOMs, Field Operating Agencies and Direct Reporting Units are responsible for capability requirements generation to accomplish the Air Force mission. AFHSIO and the 711 HPW/HP have conducted numerous investigative projects in the past two years. These projects confirmed that no comprehensive process exists to ensure the human is properly advocated during Capabilities Based Planning and Requirements Development. AFHSIO and the 711 HPW/HP will work directly with the Air Staff, the MAJCOMS, the Office of Aerospace Studies and other shareholders to ensure these gaps are met and HSI concerns are properly and comprehensively addressed in these documents. Additionally, AFHSIO will ensure that support is prioritized and provided to High Performance Teams (HPTs) and other Integrated Process Teams (IPTs) developing and integrating requirements throughout the Integrated Life Cycle Management (ILCM) process.

3.4.1.1 Capability Based Analyses

AFHSIO will work with the Air Staff, MAJCOMs and other Field Organizations to ensure that the human is comprehensively addressed in the development of CONOPs, Strategy and Doctrine and that Capability Based Assessments (CBA) and Capability Requirements and Risk Assessments (CRRA) are properly supported to facilitate HSI inclusion in all subsequent steps of the life cycle.

3.4.1.2 Capabilities Based Requirements

Air Force requirements policy (AFI 10-601) supports the inclusion of HSI. AFHSIO and the 711 HPW/HP continue to work closely with the MAJCOMs and the Air Force Requirements Policy and Process Directorate (AF/A5RD) to provide support for each program in the requirements process. AFHSIO attends selected Requirements Strategy Reviews (RSR) and participates as a core or support member on HPTs as they prepare requirements documents. Additionally, AFHSIO has been granted Observer status at the Air Force Requirements for Operational Capabilities Council (AFROCC) and Joint Requirements Oversight Council (JROC).

3.4.1.3 Recent Efforts in Capability Based Planning and Requirements Development

AFHSIO and 711 HPW/HP staff members have received hands on requirements training from Headquarters AF/A5RD and are now invited to participate in every High Performance Team (HPT) as a core member or in a supporting role as the specific system and process dictates. Significant inputs have recently been provided to the following Battlefield Air Operations (BAO) Kit Increment II CDD, UAS Flight Plan, AC-XX Gunship Lite CDD, Advanced Pilot Training (APT) ICD, Project Liberty Aircraft (PLA) DCR, MQ-X ICD, Presidential Aircraft Recapitalization (PAR) CDD, etc. A “Tiger Team” has been established to author and validate requirements language applicable to a wide number and type of systems to facilitate HSI improvements for the warfighter. AFHSIO has provided inputs to the SAF/AQ policy development process to strengthen requirements and acquisition interfaces. A “lessons learned” project has undertaken to survey HSI domain owners and Subject Matter Experts to identify gaps and strengthen the HSI processes.

3.4.2 Acquisition Support

Program Managers are ultimately responsible for implementation and execution of HSI within each program. The Air Force Materiel Command and its subordinate units are responsible for organizing, training and equipping the acquisition workforce to perform HSI. In order to support this, the 711 HPW/HP was established as the organizational focal point for HSI support within AFMC and to provide expertise to other customers and processes. This Wing provides a great capability to effectively support the integration of the human into all Air Force Systems. AFHSIO and the 711 HPW/HP work closely

together to ensure comprehensive development and deployment of HSI tools, technology, education and training, and supporting processes to facilitate HSI execution in all systems acquisitions, with the ultimate goal of improving systems effectiveness, designing systems better for operators and maintainers, and reducing life cycle costs.

3.4.2.1 Technology Development

The Air Force Research Laboratory's Human Effectiveness Directorate is a key component of the 711th Human Performance Wing. The directorate is composed of a diverse group of scientists and engineers developing technologies specific to the human element of warfighting capability. The Air Force Research Lab (AFRL) and the 711 HPW will work closely with the Air Staff, the MAJCOMs and the AFHSIO to develop and sustain a comprehensive portfolio of human-centric research and technology, with AFRL providing SME consultation as needed. Doing so will ensure a continuous linkage between specifiable gaps between threshold and objective technology requirements and both short and long term research and development plans and programs as they relate to Human Effectiveness and HSI.

They also provide support to assess and assist technology maturity development in various Air Force programs and help to support HSI improvements. The organizational structure of the 711 HPW under the AFRL umbrella further facilitates this process.

3.4.2.2 Systems Design and Development

HSI is included as a vital process within systems engineering. Newly published acquisition and sustainment enterprise policies and instructions incorporate HSI language. The Air Force instructions for Life Cycle Systems Engineering (AFI 63-1201) contains an appendix for HSI. This instruction requires that: programs “*Implement robust HSI and System Security Engineering (SSE) processes as part of the overall SE effort.*” It also requires that within this implementation, that HSI: “*.....must be addressed throughout the life cycle, and must be consistently integrated into SE implementation to balance total system performance (hardware, software, and human), OSS&E assurance, survivability, safety, and affordability.*” AFHSIO and the 711 HPW/HP will work with the programs to ensure the development of appropriate plans and structure that includes and facilitates execution of HSI within systems engineering.

3.4.2.3 Recent Efforts in Acquisition Support

A Memorandum of Agreement (MOA) was signed between the AFHSIO and the 711th Human Performance Wing's Human Performance Integration Directorate (711 HPW/HP) to define roles and responsibilities for accomplishing Air Force HSI. A planned Air Force HSI workshop will bring together users, developers and testers to define the execution model, processes and organizational structure to move HSI forward within the Air Force. HSI support has been or is being provided to the following programs: Aircrew Laser Eye Protection (ALEP) Block 2, Integrated Aircrew Ensemble (IAE), Battlefield Air Operations – Human-Machine Interface (BAO-HMI) Kit (Increment I), Modular Aircrew Helmet (MACH), Aircrew Helmet Noise Reduction (AHNR), MQ-1

Predator UAS, MQ-9 Reaper UAS, Aeromedical Evacuation Electronic Health Records, Joint Nuclear Biological, Chemical Reconnaissance System, Advanced Pilot Training, KC135 Aircraft Extension Program, Presidential Aircraft Recapitalization, and Joint Counter Radio-Controlled Electronic IED Warfare. Systems Engineering Plans (SEP) written for Air Force programs are being reviewed for adequacy of HSI. SEP content modification recommendations have been made and continue to be made to clarify and resolve HSI concerns within the Air Force Acquisition processes.

3.5 Test and Evaluation

A small cadre of HSI personnel is located at both AFFTC and AFOTEC to ensure adequate HSI considerations are made in the various test and evaluation planning documents and in conducting all mandated / required testing. As HSI processes mature within the Air Force, additional resources may be required to better support the test community. The upcoming AF HSI Implementation Workshop will provide an opportunity to examine these potential requirements. AFHSIO works closely with AF/TE and the test units to ensure pertinent policies and instructions and test planning documents are inclusive of HSI.

3.6 Deployment, Operations and Sustainment

AFHSIO, in conjunction with the users, program managers, and other stakeholders will track HSI issues for each system. This will be done primarily through review of deficiency reports, hazard analyses, accident reports, and other products to capture concerns, recommendations, lessons learned and successes. Existing systems, methods and data bases will be used to the maximum extent possible. The resulting products will be used to build case studies, improve new requirements, and to support modifications to both materiel and non-materiel solution sets.

4.0 Air Force HSI Process Integration

4.1 Joint

A Joint HSI Steering Group at the OSD AT&L level and a Joint HSI Working Group at the Service level, are in place and meeting on a regular basis. The Air Force will continue to actively support and participate in these groups. Of significant importance is the need for improvement of processes and joint development of education, training, tools, technology and systems.

4.2 Air Staff

The Air Force continues its support of an HSI Board of Advisors at the General Officer/SES level and an HSI IPT at the Colonel/GS-15 level to integrate the Air Staff in support of HSI and the integration of the various domains and processes. These groups will provide the forum to keep the staffs informed and working together to deliver a well coordinated program.

4.3 MAJCOMs (Users)

The Air Force plan for HSI execution includes a small HSI cadre or “cell” at each of the six MAJCOMs to integrate the functional staffs, ensuring human concerns are properly addressed in planning, requirements, and support for systems development, test, deployment and sustainment. MAJCOM HSI personnel will be supported by the 711 Human Performance Wing, Human Performance Integration Directorate (711 HPW/HP) which will serve as a consultation resource and center of expertise. A Human Weapon System Capability Gap Analysis (CAPGAP, AFI 48-101) program provides a method of field assessments for fielded systems and the feedback for improving existing and future systems. The 711 HPW/HP will act as a hub for connecting MAJCOM cells with domain owners and with AFMC resources to execute HSI in research, development, test, and evaluation phases of the life cycle.

4.4 Developers

711 HPW/HP and AFMC will develop and support sustainable HSI processes to support Air Force programs, with priority to be given to ACAT I, high visibility, and new programs. 711 HPW/HP will chair an Air Force HSI Working Group made up of HSI functional representatives from all product, test and sustainment centers, and HSI reps from each of the MAJCOMs. The new Air Force enterprise instruction for acquisition and sustainment (AFI 63-101) includes specific responsibilities for HSI. In order to accomplish these responsibilities, the AFHSIO will work closely with other stakeholders and shareholders to develop implementing instructions and working agreements / relationships. The AFHSIO has already signed a Memorandum of Agreement with the 711 HPW/HP clarifying roles and responsibilities, with the AFHSIO relying upon AFMC and the 711 HPW/HP as the primary execution arm for AF HSI.

4.5 Test and Evaluation

AF/TE will be a member of both the AF HSI BOA and IPT. AFFTC and AFOTEC are both members of the Air Force HSI Working Group. They have recently been called upon to be members of the Tiger Team to develop measurable and testable requirements language for HSI considerations in future programs. Each group will be consulted on a regular basis and the overarching test and evaluation policies and instructions will be inclusive of HSI. As a supporting function to the test community, AFHSIO and 711 HPW/HP will ensure that all HSI requirements are both measurable and testable.

4.6 Sustainment

SAF/AQ recently revised the AF’s overarching acquisition and sustainment program management policy documents to reflect HSI considerations that must be addressed during the operations and sustainment phase. AFHSIO participated in the revision of these documents, and will remain actively involved as these policies are revised in the future. We expect a number of AF product support and sustainment-related policy directives and instructions to be revised in the near-future, and will participate in these policy revision efforts to ensure HSI requirements are incorporated where appropriate.

5.0 Air Force HSI Human Capital Development

As HSI is institutionalized within the Air Force, a comprehensive plan for professional education and training will be formalized for existing and future systems engineers and HSI practitioners who will be responsible for the human element across the system life cycle. Few personnel in DOD have the requisite educational background and specific training necessary to implement HSI in an acquisition program. For successful implementation of HSI, HSI-trained systems engineers and/or HSI functional practitioners will be needed at MAJCOM capability planning and requirements development offices, and throughout all levels of the AF acquisition and sustainment enterprise, particularly acquisition and sustainment program management offices. Therefore, AFHSIO has initiated a task to establish the baseline of current education and training opportunities for HSI content within existing systems engineering, human factors engineering and other domain-specific education across Service and civilian institutions of higher learning.

5.1 Background

AFHSIO has worked closely with SAF/AQR and the Joint HSI community to evaluate existing and planned HSI courses and determine future requirements. Through an Education and Training Baseline Task and a planned comprehensive Education and Training Project, AFHSIO is working with OSD and the other Services to develop an education and training program for HSI. Notional training plans have been developed with several courses now deployed and others in development.

5.2 Human Capital Development Philosophy

The Air Force focus toward development of human capital in the AF HSI construct will concentrate on the education and training of personnel at each location or node in the organizational construct, across the acquisition life cycle. The goal is to develop the appropriate level HSI practitioners and experts across a number of categories of personnel in the Defense Acquisition Workforce. The categories or career fields initially identified include: Systems Planning, Research, Development and Engineering (SPRDE); Life Cycle Logistics; Test and Evaluation; and Program Management. Education and training in HSI must also include domain functional and be tailored to the target audience based on the level of expertise demanded and the skill sets required for the positions and career tracks that trainees are intended to fill.

In order to efficiently support development of the different career fields and levels within each, the Air Force is working with the other Services through the Joint HSI Working Group to identify essential HSI additions to existing Defense Acquisition University courses taken within certification standards and Core Plus courses. A Continuous

Learning Module for *Awareness of HSI* is approved by the SPRDE Functional IPT and in development. Expected availability date of 4th Qtr FY09.

5.3 Education and Training Requirements

Examination of job descriptions for those responsible for the human element in systems acquisition identified several tiers of knowledge necessary to execute HSI. HSI awareness training is appropriate for the greater number of acquisition professionals and others HSI participants across other Air Force communities (e.g. MAJCOMs, Air Staff, Test, Sustainment, etc.).

In addition to HSI awareness training, at least four classifications are identified as requiring development and oversight. Program Managers in a System Program Office should receive training on management-level HSI. Chief Engineers or Chief Systems Engineers in a Program Office are responsible for the integration of HSI across the acquisition life cycle and should receive appropriate training.

Medical professionals (e.g. pilot physicians and physiologists) constitute another career category that will touch a system's acquisition as they bring human performance concerns to the table. These career professionals will also require HSI training, perhaps in a set of courses tailored to their unique backgrounds.

The final classification identified for professional education, development and training is the HSI Subject Matter Expert (SME). These individuals will have differing levels of pre-requisite knowledge in one or more of the HSI domains. An HSI SME will require a wide range of knowledge and skills in all nine domains, as well as knowledge of domain tools, modeling, simulation and tradeoffs.

The Figure 5.1, Air Force Education and Training Framework, below, provides an overview, the categories of personnel who will likely require differing levels and depth in education and training in HSI. (NOTE: HSI Courses are notional)

E&T Baseline/Workshop Analysis

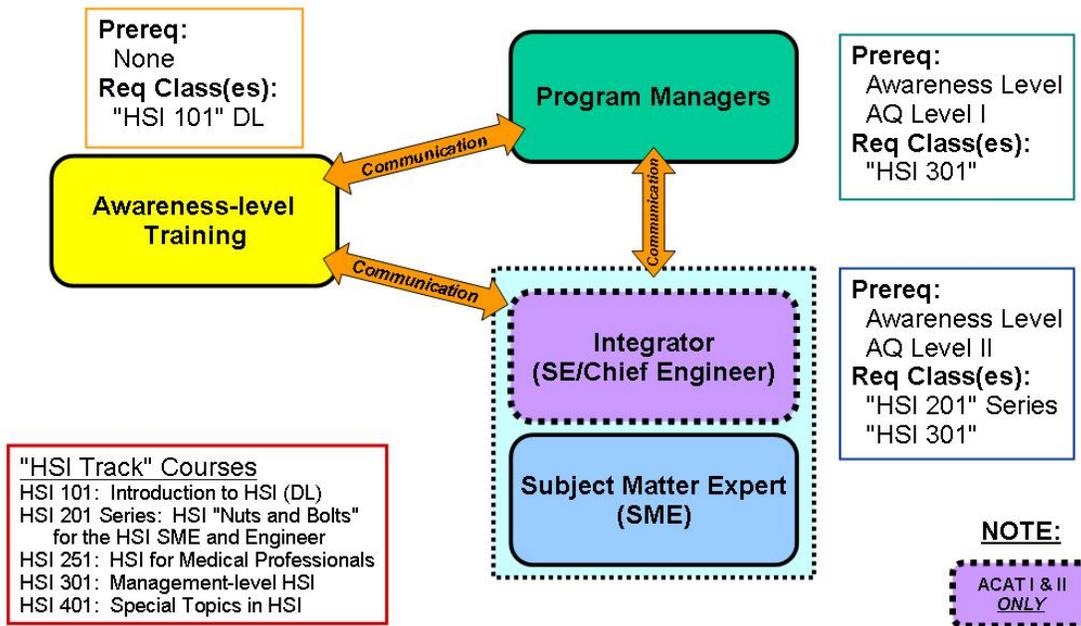


Figure 5.1, Air Force Education and Training Framework

6.0 Air Force HSI FY09 Key Tasks

The AFHSIO Strategic Plan outlines four objectives for the effective and measurable inclusion of human systems integration in the integrated framework, across the entire life cycle of the system. These objectives are (1) integrate HSI into requirements and the acquisition framework, (2) institutionalize HSI within the Air Force culture and business model, (3) sustain HSI efforts within the Air Force, and (4) improve HSI through metrics, lessons learned programs, and other feedback mechanisms.

6.1 Overarching tasks

AFHSIO has a number of tasks currently underway that globally support all four Strategic Plan objectives with the following strategic aims: (1) assist Combatant Commanders, Air Force leadership and Support Major Commands (MAJCOMs) in determining how best to implement OSD and SAF/AQ policy to more effectively support programs and acquisition products throughout the life cycle; (2) create an Air Force-wide assessment and accountability process for HSI verification and validation; (3) ensure personnel are trained and deployed to develop HSI requirements, and education and

training processes are maintained; and (4) maintain and enhance AF HSI professionalism, consistency, and functional area connectivity, and create a Joint HSI professional venue for participation

AFHSIO and the strategic objectives they support are shown in Table 6.1, AFHSIO below:

Table 6.1, AFHSIO Key Tasks FY09

Task #	HSI Objectives Supported	Key Tasks FY09	ECD
1	All	Air Force HSI Implementation Workshop	2Q 2009
2	All	Comprehensive Education and Training Project	4Q 2009
3	All	HSI Assessment and Accountability Processes/Tools	4Q 2009
4	All	HSI Professional Development	4Q 2009
5	Integration	Capability Assessments and Requirements	1Q 2009
6	Integration	Joint and AF HSI Strategy Refinement / Development	2Q 2009
7	Integration	Industry and Professional Outreach	3Q 2009
8	Institutionalize	Requirements Refinement and Inclusion	2Q 2009
9	Institutionalize	Update Systems Engineering Guidance / Templates	3Q 2009
10	Institutionalize	Tools and Processes Analyses & Recommendations	4Q 2009
11	Sustainment	Maintain Senior AF Leadership Support (Resources & Advocacy)	3Q 2009
12	Sustainment	Begin Training HSI SMEs	4Q 2009
13	Sustainment	Promote awareness of HSI across the spectrum of Leaders, Users (MAJCOMs), Developers, Testers, and Sustainers.	3Q 2009
15	Improvement	Develop and Deploy AF HSI Website	3Q 2009

16	Improvement	Develop and Deploy HSI Wikipedia	3Q 2009
17	Improvement	Conduct annual strategy review and update	4Q 2009
18	Improvement	Develop AF HSI Annual Report	4Q 2009

7.0 Air Force HSI Resource Requirements

Efforts are underway in the Air Force to identify existing expertise and resource requirements to execute a comprehensive HSI program. Adequate sustained financial and manpower resources are essential to continued progress and success. Current resource constraints make this especially challenging. The initial HSI construct that was presented to the Air Force Chief of Staff and the Air Force Council to begin the AF HSI program in 2006 recommended a core cadre of approximately 60 HSI experts. It was also recommended that approximately 30 personnel be trained at the MAJCOMs, product, test and logistics centers to provide leadership expertise for HSI.

As of January 2009, a portion of the 60 subject matter experts are in place to execute HSI. The AFHSIO is now staffed and operating with 10 HSI personnel. The 711 HPW has been formed. There are currently 31 personnel in the new 711 HPW Human Performance Integration Directorate (711 HPW/HP) dedicated to working Human Performance and Human Systems Integration. This organization will be the AFMC center of expertise for the human. This organization currently has components at Wright Patterson AFB, Ohio and Brooks City Base in San Antonio, TX.

Additional personnel resources exist within the various Air Staff organizations, at the MAJCOM staffs, at AFMC product, test and logistics centers, and within the various program offices. These resources are generally working in HSI domain specific areas (Manpower, Personnel, Training, Environment, Safety, Occupational Health, Human Factors Engineering, Survivability, and Habitability). They can be aligned with the emerging HSI process to accomplish HSI in an integrated manner. The Air Force will develop resource requirements and program the resources necessary to ensure HSI tools and technology development, studies and analyses, education and training development and deployment, and other support functions for HSI implementation and execution. The AFHSIO will work within the Air Force resourcing process to identify a specific Program Element (PE) for HSI with an appropriate Program Element Monitor (PEM). All financial resources will be coded properly to provide flexibility to execute tasks ranging from basic research through equipment purchases, tool development and into actual systems operations and sustainment.

8.0 Air Force HSI Maturity Metrics

The Air Force HSI program is in the formative process. Since its inception great strides have been made to define meaningful metrics for the program. Performance metrics for

HSI will be developed to correlate between HSI activities and their contribution to achieving or exceeding total mission performance or on total life cycle cost savings of a system. HSI metrics must be derived from existing data collection sources. Assumptions for collecting and reporting this information follows:

8.1 HSI Metrics Assumptions:

8.1.1 Use of existing databases and metrics to extent possible (SE and program/system metrics) is highly encouraged and recommended

8.1.2 Need to define HSI activities across system life cycle, measuring level of effort and cost

8.1.3 Need for a method to trace and measure an HSI “thread” through acquisition lifecycle – human-centered requirement traceable from analysis phase through to system disposal

8.1.4 Need to express the correlation between HSI activities and mission performance, as well as total life cycle cost (total ownership cost)

8.1.5 Will be determined as specific policy and guidance documents are written and implemented to track HSI activities being done as a goal measured; if HSI is being done as described in the policy and guidance documents.

9.0 Air Force HSI Assessment Process

The AFHSIO and 711 HPW/HP have concentrated their efforts on defining policy, instructions and processes to implement a comprehensive and sustainable AF HSI program. An assessment process for HSI is vitally important in the accomplishment of this objective and will be a desired outcome from the planned Implementation Workshop. This workshop will bring users, developers and testers together to build out the processes to support new policy and instructions for HSI. Assessments to date have been focused on evaluating new requirements documents, systems engineering plans, policies and instructions for inclusion of HSI or HSI domain specific language. Additional work has been done in building case studies and in conducting reviews of education and training courses, tools and technology and existing acquisition processes for HSI relevance and opportunities for improvement. Results from these efforts will be used to support the planned Air Force HSI Implementation Workshop. From a conceptual standpoint, any assessment process should be a natural outcome and an ongoing process which occurs in the normal course of doing business. Normal reviews of programs within the existing requirements, acquisition, engineering, test and sustainment processes should reveal the adequacy of the HSI efforts. HSI practitioners should be assisting and assessing on a continual basis and providing inputs and recommendations to improve both the systems and the processes. Formal reporting should be through the already established reviews with seamless inclusion of HSI where appropriate.

10.0 Air Force Supporting Detailed Plans (available upon request)

10.1 AFHSIO Strategy & Operations Plan

10.2 Joint HSI charters

10.3 AF IPT and BOA charters

10.4 FY10 POM

10.5 MOA between 711 and AFHSIO

ACRONYMS

Appendix 1, Acronyms

AAC	Air Armament Center
ACAT	Acquisition Category
AEDC	Arnold Engineering Development Center
AF	Air Force
AF/A1	Air Force Deputy Chief of Staff for Personnel
AF/A3/5	Air Force Deputy Chief of Staff for Operations, Plans and Programs
AF/A4/7	Air Force Deputy Chief of Staff for Installations and Logistics
AF/A5RD	Air Force Requirements Directorate
AFFTC	Air Force Flight Test Center
AFIT	Air Force Institute of Technology
AFMC	Air Force Materiel Command
AFOTEC	Air Force Operational Test and Evaluation Center
AFPD	Air Force Policy Directive
AFRL	Air Force Research Laboratory
AFROCC	Air Force Requirements for Operational Capabilities Council
AFSAB	Air Force Scientific Advisory Board
AFSC	Air Force Safety Center
AF/SE	Air Force Chief of Safety
AF/SG	Air Force Surgeon General
AF/TE	Air Force Director of Tests and Evaluation
ALEP	Aircrew Laser Eye Protection

AoA	Analysis of Alternatives
APT	Advanced Pilot Trainer
BAO	Battlefield Air Operations
BOA	Board of Advisors
BRAC	Base Realignment and Closure
CAPGAP	Capability Gap
CBA	Capability Based Assessment
CBP	Capability Based Planning
CCD	Concept Capability Document
CDD	Capability Development Document
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CLM	Continuous Learning Module
CMMI	Capability Maturity Measurement Index
CONOPs	Concept of Operations
CPD	Capability Production Document
CRRA	Capability Review and Risk Assessment
CSAF	Air Force Chief of Staff
CSE	Center for Systems Engineering
DAG	Defense Acquisition Guidebook
DAU	Defense Acquisition University
DCR	DOTMLPF Change Recommendation

DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education,
E&T	Education and Training
HASC	House Armed Services Committee
HPT	High Performance Team
HPW	Human Performance Wing
HSI	Human Systems Integration
HSIP	Human Systems Integration Plan
IAC	Information Analysis Center
IAT&L	Integrated Acquisition, Technology and Logistics
ICD	Initial Capabilities Document
IED	Improvised Explosive Device
IPT	Integrated Process (or Product) Team
ILCM	Integrated Life Cycle Management
ILCMP	Integrated Life Cycle Management Plan
INCOSE	International Council on Systems Engineering
JCIDS	Joint Capabilities Integration Development System
JROC	Joint Requirements Oversight Council
MAJCOM	Major Command
MPT	Manpower, Personnel and Training

NDA	National Defense Authorization Act
OSD	Office of Secretary of Defense
OTA	Operational Test Agency
OUSD(AT&L)	Office of the Under Secretary of Defense for Acquisition, Technology
OUSD/PR	Office of the Under Secretary of Defense for Personnel and Readiness
PE	Program Element
PEM	Program Element Monitor
PEO	Program Executive Officer
PM	Program Manager
POM	Program Objective Memorandum
SAF	Secretary of the Air Force
SAF/AQ	Assistant Secretary of the Air Force for Acquisition
SAF/IE	Assistant Secretary of the Air Force for Installations, Environment and
SAF/MR	Assistant Secretary of the Air Force for Manpower and Reserve Affairs
SAF/US	Under Secretary of the Air Force
SAF/XC	Chief of Warfighting Integration and Chief Information Officer
SEP	Systems Engineering Plan
SME	Subject Matter Expert
SSE	System Security Engineering
S&T	Science and Technology
TR	Technical Report

T&E	Test and Evaluation
UAS	Unmanned Aerial System(s)
UAV	Unmanned Aerial Vehicle
USAFSAM	United States Air Force School of Aerospace Medicine
VCSAF	Air Force Vice Chief of Staff
Wiki	Wikipedia