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Soldier-Materiel Systems

Guide for Human Systems Integration in the System Acquisition Process

Headquarters
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SUMMARY of CHANGE

DA PAM 602–2
Guide for Human Systems Integration in the System Acquisition Process

This publication is certified current as of 23 October 2023. Aside from the following administrative changes, no other changes were made to certify the currency of this publication:

- Updates Department of the Army signature authority, suggested improvements statement, and history statement (title page).
- Replaces “Contract Data Requirements List” with “DD Form 1423” (para 1–5*d* and throughout).
- Removes references to invalid website for the Human Systems Integration Program (paras 4–2*e*(1) and app C).
- Updates references (app A).
- Updates abbreviations (glossary).
- Removes references to the Defense Acquisition Guidebook, which has been retired (throughout).

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Guide for Human Systems Integration in the System Acquisition Process

By Order of the Secretary of the Army:

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History. This publication is certified current on 23 October 2023. Aside from the administrative changes listed in the summary of change, no other changes were made to certify the currency of this publication.

Summary. This pamphlet is to be used with AR 602–2. It provides advice and recommendations for implementing human systems integration practices. This pamphlet has been prepared for force modernization, branch proponents, materiel developers, program/project/product managers, and human systems integration action officers and leaders—professionals who coordinate, guide, implement, and manage human systems integration in the acquisition of automated information systems and/or materiel systems.

Applicability. This pamphlet applies to the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated.

Proponent and exception authority. The proponent of this pamphlet is the Deputy Chief of Staff, G–1. The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this pamphlet by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific requirements.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to usarmy.apg.devcom.mbx.hq-hsi@army.mil.

Distribution. This publication is available in electronic media only and is intended for the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

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Chapter 1
Human Systems Integration Program Goals

1–1. Purpose
DoDI 5000.02 and AR 602–2 require that a comprehensive management and technical strategy for human systems integration (HSI) be initiated early in the acquisition process, specifically in the technology development and engineering and manufacturing development (EMD) phases within the Defense Acquisition System. The formal entrance point for the EMD phase is at milestone (MS) B approval and it is this milestone that marks the initiation of an acquisition program. The HSI Program is the Army's implementation of the direction given by the Under Secretary of Defense for Acquisition, Technology, and Logistics for HSI and the Army's compliance with Title 10, United States Code (10 USC). The program was established in 1984 with a primary objective to place the human element (functioning as individual, crew/team, unit, and organization) on equal footing with other design criteria such as hardware and software. The entry point of HSI in the acquisition process is through the capability based assessments (CBAs) or other studies to assess capability requirements and associated capability gaps.

1–2. References and forms
See appendix A.

1–3. Explanation of abbreviations and terms
See the glossary.

1–4. Overview
Army HSI ensures human considerations, such as capabilities and limitations, are incorporated into all steps during the system acquisition process. HSI is the voice of the Soldier and was initiated in recognition of the fact that the Soldier is a key component of the total system. For a system to function optimally, the Soldier must be able to perform required tasks efficiently. Decisions made with the Soldier in mind enhance overall effectiveness and reduce costs. HSI helps to ensure that our Soldiers can effectively operate our systems, providing the capabilities required in the projected operational environments to accomplish their assigned missions. Enhancements to human performance will correlate directly to total system performance in intended operational environments and reduce life cycle cost. To facilitate this, Army HSI is divided into seven domains which are listed below and detailed in paragraph 1–5.

a. Manpower.
b. Personnel.
c. Training.
d. Human factors engineering (HFE).
e. Soldier survivability (SSv).
f. System safety (SS).
g. Health hazards (HH).

1–5. Domains and key concepts
a. Manpower domain. Manpower addresses the number of military and civilian personnel required and potentially available to operate, maintain, sustain, and provide training for systems in accordance with Section 2434 of 10 USC. It is the number of personnel spaces (required or authorized positions) and available people (operating strength). It considers these requirements for peacetime, conflict, and low-intensity operations. Current and projected constraints on the total size of the Army/organization/unit are also considered. The HSI practitioner evaluates the manpower required and/or available to support a new system and subsequently considers these constraints to ensure that the human resource demands of the system do not exceed the projected supply. An example of a manpower constraint is there cannot be any increase to the manpower end strength of the Army to support the acquisition of a new system. If a system requires additional manpower, a funding agency (usually another military occupational specialty (MOS)) must be identified. Combat support and combat service support requirements are typically workload driven and determined by the system itself, the mission, the operational mode summary (OMS)/mission profile (MP), or manpower requirements criteria. Operator/combat requirements are more frequently determined by doctrine.

b. Personnel capability domain. Manpower and personnel are closely related. While the manpower domain looks at numbers of spaces and people, the domain of personnel addresses the cognitive and physical characteristics and capabilities required to be able to train for, operate, maintain, and sustain materiel and information systems. Personnel

capabilities are normally reflected as knowledge, skills, abilities, and other characteristics (KSAOs). The availability of personnel and their KSAOs should be identified early in the acquisition process and may result in specific thresholds. For most systems, emphasis is placed on enlisted personnel as the primary operators, maintainers, and supporters of the system. Personnel characteristics of enlisted personnel are easier to quantify since the Armed Services Vocational Aptitude Battery (ASVAB) is administered to potential enlistees. The Armed Forces Qualification Test determines if the individual is eligible for enlistment. The Aptitude Area scores determine the career management fields and MOSs the individual is qualified to enter upon completion of basic training. Qualification requirements for Commissioned, Warrant Officers and Enlisted are contained in DA Pam 611–21. Typically, enlisted personnel are operators and maintainers; however, that is not always the case, especially in aviation systems. In many cases, the technical and command and control demands placed on Officers and Warrant Officers is a major concern in system acquisition. With information systems, the primary operators and maintainers may be Civilians; depot-level maintenance and supply of materiel systems are often performed by contractors. This is a critical consideration that must be evaluated in the acquisition of a system. Early in the requirements determination process, identification of the target audience should be accomplished and used as a baseline for assessment as well as a guide in system design. Cognitive and physical demands of the system should be assessed and compared to the projected supply. HSI also takes into consideration personnel factors such as availability, recruitment, skill identifiers, promotion, and assignment.

c. Training domain.

(1) Training is defined as the instruction, education, institutional or collective training, on-the-job or self-development training, crew or team training required to provide all personnel and units with essential job skills and knowledge and includes the training devices necessary. Training is required to bridge the gap between the target audience's existing level of knowledge and that required to effectively operate, deploy/employ, maintain, and support the system within the context of the operational environment. The HSI goal is to assist with the development of systems that meet the Army's training thresholds for operation and maintenance and to provide suggestions as to what is required if the systems are outside the Army's training concept. Key considerations include developing an effective and efficient training strategy (which addresses facilities, new equipment, training devices, institutional, sustainment, and unit collective tactical training); determining the resources required to implement it in support of fielding and the most efficient method for dissemination (contractor, distance learning, exportable packages, and so forth); and evaluating the effectiveness of the training.

(2) Training is particularly crucial in the acquisition and employment of a new system. New tasks may be introduced into a duty position; current processes may be significantly changed; existing job responsibilities may be redefined, shifted, or eliminated; and/or entirely new positions may be required. It is vital to consider the total training impact of the system on both the individuals and the organization. Clearly, the cost and considerations of system ownership include initial and sustainment training, that is both unit and institutional. Embedded training is the preferred method of training. The program manager (PM) will develop training system plans (see DoDI 5000.02 for training requirements). HSI must be applied to all training methodologies. In addition, training must consider the unique needs of Commissioned Officers, Warrant Officers, Enlisted, and Civilian personnel. The system training plan (STRAP) is developed simultaneously with the capability development document (CDD).

d. Human factors engineering domain. The goal of HFE is to maximize the ability of an individual or crew to operate and maintain a system at required levels by eliminating design-induced difficulty and error. Human factors engineers work with systems engineers as well as other domain program experts to design and evaluate human system interfaces to ensure they are compatible with the capabilities and limitations of the potential user population. HFE is conducted during all phases of system development, to include requirements specification, design and testing, and evaluation. HFE also includes the requirements of the HSI domain of habitability. Habitability is typically an Air Force/Navy HSI domain, but the Army covers aspects of habitability in HFE and other domains. The PM is required to establish habitability requirements for the physical environment (for example, adequate space and temperature control). If appropriate, the PM will also establish requirements for personnel services and living conditions that have a direct impact on meeting/sustaining system performance or that have such an adverse impact on quality of life and morale that recruitment/retention is degraded. HFE activities during requirements specification include evaluating predecessor systems and operator tasks; analyzing user needs; analyzing and allocating functions; and analyzing tasks and associated workload. During the system development and demonstration (SDD) phase, HFE activities include evaluating alternative designs through the use of user juries with mock-ups and software prototypes; evaluating software by performing usability testing; refining analysis of tasks and workload; and using modeling tools such as human figure models to evaluate crew station and workplace design and operator procedures. During initial operational test and evaluation (IOT&E), HFE activities include confirming that the design meets HFE specification requirements; measuring operator task performance; evaluating doctrine implementation and identifying any hardware or software undesirable design or procedural features. HFE language should be incorporated into the contract development to

include the statement of work (SOW), performance specifications, request for proposal (RFP), DD Form 1423 (Contract Data Requirements List), and data item descriptions (DIDs). Between MS A and MS B, HFE activities include refinement of the CDD and development of the program contract. In the PM office during this timeframe, contract language is written that will set the stage for the rest of the PM's HFE effort. If the contract is poorly written for the HFE effort, it is very difficult and costly to make changes to the HFE effort once the contract is awarded. It is vital that the HSI practitioner remains fully engaged and an active member of the PM's effort during this timeframe. This ensures that appropriate HFE language is written into the contract and that specifications are correctly derived from the CDD requirements.

e. System safety domain. SS is the design features and operating characteristics of a system that serve to minimize the potential for human or machine errors/failures that cause injurious accidents. Safety considerations should be applied in system acquisition to minimize the potential for accidental injury of personnel and mission failure. For example, one primary concern may be electrical safety. The SS engineer should determine the requirements for grounding the system, procedures that must be followed to safely power-up or power-down the system and the potential system malfunctions related to more critical design aspects and safety attributes in software and system functionality.

f. Health hazards domain.

(1) HH addresses the design features and operating characteristics of a system that create significant risks of bodily injury or death. Along with safety hazards, an assessment of HH is necessary to determine risk reduction or mitigation.

(2) The goal of the health hazard assessment (HHA) is to incorporate biomedical knowledge and principles early in the design of a system to eliminate or control HH. Early application will eliminate costly system retrofits and training restrictions resulting in enhanced Soldier-system performance, readiness, and cost savings. HHA is closely related to occupational health and preventive medicine but gets its distinctive character from its emphasis on Soldier-system interactions of military unique systems and operations.

(3) HH categories include acoustic energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes and humidity, trauma, vibration, and other hazards. HH include those areas that could cause death, injury, illness, disability, or a reduction in job performance. For example, system evaluation should ensure that there is neither excessive noise nor opportunity for exposure to dangerous emissions.

g. Soldier survivability domain. SSv addresses the characteristics of a system that can reduce fratricide, detectability, and probability of being attacked, as well as minimize system damage, Soldier injury and cognitive and physical fatigue. SSv was added to focus attention on those aspects of the total system that can minimize the loss of friendly troops' lives. SSv is the only HSI domain developed to address the Army Chief of Staff's request, in this instance to do something during the acquisition process about reducing fratricide. Per an HSI study, approval was given to add the reduction of detection, probability of being attacked, damage, injury, and physical and mental fatigue. For example, ensuring the system does not have an identifiable electronic or thermal signature or create an unacceptable fratricide risk may enhance survivability. The SSv evaluation would also ensure that there is adequate ballistic protection for crew survivability (for example, application of anti-spalling material in crew compartments). Technical (survivability/lethality/vulnerability) issues may include, but not be limited to, conventional ballistics; nuclear; biological; chemical; nuclear, biological, chemical (NBC)contamination; electronic warfare; operations/information warfare; atmospheric/obscurants; directed energy weapons; jamming; electronic countermeasures; and personnel vulnerability.

h. Domain integration. Although each of the seven HSI domains have been introduced separately, in practice they are often interrelated and tend to impact one another. Changes in system design to correct a deficiency in one HSI domain nearly always impacts another domain. Consider the following examples:

(1) Working with the systems engineer, the human factors engineer determines that several particularly difficult tasks, currently performed manually, should be automated (analysis of function allocation to man, machine, or a combination). The result may be one or several of the following:

(a) A reduction in operator manpower requirements.

(b) Personnel would no longer need extensive training on these tasks.

(c) It is possible that someone with less experience or fewer qualifications could perform the job.

(d) An increase in personnel capabilities and training for new maintenance tasks (domains: HFE; manpower, personnel, and training (MPT)).

(2) A system is being designed for operation by two people in two shifts. It must operate 24 hours/day. An HFE workload assessment determines that the 12-hour shift produces intense fatigue. At the same time, a human factors engineering assessment (HFEA) determines that changing the background color of the screen from lime green to pacific blue will help to reduce, but not eliminate, the fatigue. The decision is made to change the background color, and a decision will have to be made between increasing manning, or accepting the potential degradation of mission performance (domains: manpower and HFE).

(3) Many conceptual designs are being considered. The least costly requires maintenance by personnel in a job classification that is currently under strength and is projected to remain so for the next six years. Another design, which will cost more, contains self-diagnostics. This system will not require the skills of the highly demanded personnel. The decision is made to acquire the second system because qualified personnel simply will not be available to maintain the first system (domains: MPT).

i. Future of the domains. This pamphlet reflects current policy at the time of publication, including the discussion of domains throughout the document. However, the Army HSI Directorate is making a move to standardize domains, working closely with the other services through the Joint HSI Working Group (WG). These new domains are listed in table 1–1.

Table 1–1
New Joint human systems integration domains

HFE	The integration of human characteristics into system definition, design, development, and evaluation to optimize human system performance under operational conditions.
Personnel	Ensure that the determination and selection of cognitive, physical, and social capabilities required to be able to train for, operate, maintain, and sustain systems are suitable and in alignment with the personnel inventory available or assigned to the mission.
Habitability	Establish and enforce requirements so that individual and unit physical environments (for example, adequate space and temperature control), personnel services (for example, medical and mess), and living conditions (for example berthing and personal hygiene), prevent or mitigate risk conditions that may have a direct impact on meeting or sustaining system performance or that have such an adverse impact on quality of life and morale that recruitment or retention is degraded.
Manpower	Determine the most efficient and cost-effective mix of Department of Defense (DoD) manpower, contract automation support. Economic analyses used to support workforce mix decisions will use costing tools, to include DoDI 7041.04 that account for fully loaded costs (that is all variable and fixed costs, compensation and non-compensation costs, current and deferred benefits, and cash and in-kind benefits) approved by the DoD Component manpower authority.
Training	Develop options for individual, collective, and joint training for operators, maintenance and support personnel, and, where appropriate, base training decisions on training effectiveness evaluations. Ensure that the major tasks identified in the job task analysis, training device documents, and training plans will provide options that enhance user capabilities, maintain skill proficiencies, and reduce individual and collective training costs.
Safety and occupational health	Ensure that appropriate HSI and environmental, safety, and occupational health efforts are integrated across disciplines and into systems engineering to determine system design characteristics that can minimize the risks of acute or chronic illness, disability, or death or injury to operators and maintainers; and enhance job performance and productivity of the personnel who operate, maintain, or support the system.
Force protection and survivability	Assess risks to personnel that are directly related to system design, to protect individuals and units from direct threat events and accidents (for example, chemical, biological, and nuclear threats). Design consideration will include primary and secondary effects from these events and consider any special equipment necessary for egress and survivability.

1–6. History

a. In the 1960s, 70s, and early 80s, the U.S. Army introduced hundreds of new weapons and additional equipment into the force. This force modernization was designed to increase Army capability and readiness. The Army turned to technology to generate greater combat power. In doing so, however, the Army encountered two persistent problems. First, when a new system was put into the hands of Soldiers, actual field performance did not always meet the standards predicted during the system's development. For example, a system designed for a 90 percent chance of a first-round hit achieved only 30–50 percent when fired by Soldiers. Second, the replacement of an existing system with a technologically complex system, generated requirements for more highly skilled Soldiers and a higher ratio of Soldiers per system for operators, maintainers, and support personnel.

b. These systematic problems could only be solved by putting more systems in the field; recruiting more highly skilled Soldiers; expanding training (as well as increasing training dollars); and increasing the size of the Army. This

approach unfortunately led to additional problems. In the 1960s, the Director of the U.S. Army Human Engineering Laboratory at Aberdeen Proving Ground in Maryland, pointed out that the Army can no longer afford to develop equipment and merely hope that the necessary manpower can be found to operate and maintain it in a relatively short time. The cost of training and time available to conduct it on a mass basis may not permit this process under wartime conditions.

c. In 1980, concerns surfaced with mobilization, readiness, and sustainability brought on by increases in weapon complexity. The conclusion was that human performance assessments were often not integrated and made too late to influence the design stages of the system acquisition process. The General Accounting Office published reports in 1981 and 1985 which attributed 50 percent of equipment failures to human error and stressed the need to integrate considerations into the system acquisition process.

d. In 1982, the then Army Deputy Chief of Staff (DCS) of Personnel tasked the U.S. Army Research Institute to look at the development process of several recently fielded weapon systems to determine what the Army could have done differently to better integrate MPT issues. This initiative known as the "Reverse Engineering Project" showed that the integration of MPT considerations early in the design process could have made a difference. The term manpower and personnel integration or "MANPRINT" was coined in 1984.

e. In 1986, the MANPRINT Directorate was established to address the systematic inattention to human issues within Army systems acquisition. The Office of the Secretary of Defense (OSD) adopted the concept in 1987 and named it human systems integration. Since then, Army HSI (MANPRINT) has successfully worked to comprehensively inform Army capability developers (CAPDEVs) and acquisition PMs about the criticality of addressing the usability of systems throughout their life cycle.

f. After nearly 30 years, Army HSI (MANPRINT) achievements have strongly influenced what has emerged as a wide-ranging Joint-Service HSI Community of Practice. As the other services have taken on the HSI mantle, often adopting lessons learned from MANPRINT, the OSD has codified the requirement for HSI within the DoDI 5000 acquisition regulations.

g. A strong HSI Program is a part of the cultural change within the Army centered on how we build, strengthen, maintain, and assess individual performance and unit readiness. As the proponent for HSI, the G–1 ensures that the practice of HSI is of the highest priority when it comes to equipping our Soldiers to be ready and resilient for operational missions. Since then, HSI remains with the DCS, G–1 and is heavily engaged with the Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA (ALT)).

Chapter 2
Human Systems Integration in the Systems Acquisition Process

2–1. Joint Capabilities Integration and Development System

The HSI process is a comprehensive management strategy applied to systems development in order to ensure that human performance is optimized by continuously considering the human as part of the total system. The emphasis of the HSI effort is on the integration and trade-offs within and across HSI domains to ensuring that Soldiers with the correct training can effectively use equipment under varying conditions, survive, and endure. HSI optimization evaluates all options for systems in the acquisition process in terms of human and overall system performance, cost, schedule, and risk.

a. Organizations such as ASA (ALT), U.S. Army Materiel Command (AMC), and program executive offices (PEOs) exist to get new technology into the hands of Soldiers, however, the U. S. Military goes through a process called Joint Capabilities Integration and Development System (JCIDS) to ensure that all avenues for combat improvement are explored prior to selecting a materiel approach. The reason the U.S. Military goes through this process is that materiel solutions tend to be the most expensive and take the longest to implement. All avenues refers to the examination of doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF–P). JCIDS is the process for examining potential DOTMLPF–P solutions.

b. JCIDS plays a primary role in identifying the capabilities needed by warfighters to support the National Security Strategy (NSS), the National Defense Strategy, and the National Military Strategy. The successful delivery of those capabilities relies on JCIDS working in concert with the resourcing and acquisition decision support systems, including supporting the Chairman and Joint Requirements Oversight Council (JROC) in advising the Secretary of Defense on identifying, assessing, and prioritizing the capability needs of the joint military.

c. Further, the primary objective of the JCIDS process is to ensure the capabilities needed by joint warfighters to successfully execute their missions are consistent with their associated operational performance attributes. This is accomplished through an open process that provides the JROC with the information needed to make decisions on needed capabilities, the requirements development process that provides validated capability needs and associated

performance attributes used by the materiel provider as the basis for acquiring the appropriate weapon systems, and the planning, programming, budgeting, and execution process that informs the JCIDS with affordability information and goals through the CBA, which identifies needed capabilities, capability gaps, and potential non-materiel and materiel solution options. The analyses that are conducted at this stage only include Soldiers in very general terms and although the JCIDS Manual provides more detail on the actual process, it provides little guidance for implementation of HSI into the creation of the capabilities documents.

d. Requirements should be stated in terms of capabilities rather than as technical solutions and specifications. The word "capability" is used here, not materiel, because many different solutions could potentially provide the capability that the U.S. Army Training and Doctrine Command (TRADOC) wants. Consequently, the initial capabilities document (ICD), CDD, and capability production document (CPD) are called capability documents which detail capability requirements as opposed to the system specification (SysSpec), which details design and performance requirements for a chosen materiel solution.

e. Consequently, after the JCIDS process has been completed and a decision is made that a new materiel program is required, TRADOC prepares an ICD, CDD, or CPD to specify the new capability desired by the Army. HSI action officers (AOs) need to know who within TRADOC has responsibility for writing the ICD, CDD, or CPD for their program area. For example, documents for individual Soldier or Infantry programs are prepared at the Maneuver Center in cooperation with the U.S. Army Capabilities Integration Center (ARCIC), while Armor systems are created by the Armor Center. Some systems that make use of an armored vehicle for a specialized purpose, such as mine-clearing systems, may be prepared at the Maneuver Support Center.

2–2. Army and U.S. Army Training and Doctrine Command regulations

There are many regulations that impact preparation of capability documents within the Army acquisition process. The flow from one document to another is seldom smooth or complete and conflicting guidance is often provided where the HSI AO would benefit from having support. Consequently, this section will highlight some of those conflicts as well as areas of strong support for HSI.

a. The fundamental documents that drive the development and fielding of new materiel are the ICD, the CDD, and the CPD. The ICD is prepared prior to MS A, the CDD prior to MS B, and the CPD prior to MS C. These documents are prepared by TRADOC and describe the capability that TRADOC wants. Therefore, they drive development of materiel solutions as well as the associated test program. HSI AOs should be involved in the creation of the ICD, CDD, and CPD, to ensure that HSI is included. Although AR 71–9 and AR 70–1 provide some support for HSI involvement in capability document preparation, DA Pam 70–3 provides several strong statements that can be used to help influence TRADOC and PMs (see DA Pam 70–3 for HSI involvement).

(1) An HSI representative should be on the CAPDEV WG. This is the organization usually responsible for drafting the capabilities documents.

(2) U.S. Army Research Laboratory (ARL), Human Research and Engineering Directorate (HRED) participates on the CAPDEV WG.

(3) HSI requirements are addressed in paragraph 6 of the CDD or CPD.

(4) All HSI domains should be addressed in paragraph 14 of the CDD and CPD.

b. The ICD documents the results JCIDS analysis.

c. Reference the JCIDS Manual for additional information on the nature and role of the ICD, CDD, and CPD. The CDD and CPD each have a template developed by TRADOC; although the formats are essentially identical. The templates state in paragraph 14 that doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) areas must be considered. Paragraph 15 is typically where the HSI requirements are located. The HSI AO and the TRADOC counterparts work together to incorporate the HSI requirements into the documentation.

d. The ARL HRED HSI practitioner supporting the U.S. Army Test and Evaluation Command (ATEC), as a member of the U.S. Army Test and Evaluation Command Systems Team (AST), shall participate in the preparation of the system evaluation report (SER) as per AR 73–1, to ensure that human performance factors and other HSI considerations are fully documented in the dependent evaluation of the system's operational effectiveness, suitability, and survivability. The ARL HRED HSI practitioner shall work with ATEC to review and comment on requirements documents to ensure HSI considerations are embedded in existing requirements or derived to provide a measurable and testable evaluation approach that includes requirements of the interaction and integration between user(s) and system(s), in context of mission(s), that will impact overall system effectiveness, suitability, and survivability. This ensures that the range of measurable and testable HSI factors affecting total system performance are provided to the decision maker at each acquisition milestone review, and that HSI findings are linked directly to test data, reports, studies, simulations, and other appropriate sources. HSI test data, modeling and simulation, and other reports shall

address and answer critical operational issues and criteria (COIC) and additional evaluation focus areas outlined in the system evaluation plan (SEP).

2–3. AR 602–2

The primary justification for an HSI AO to reference in supporting the capability requirements document process is AR 602–2 (see AR 602–2 for the specific responsibilities).

2–4. The integrated capability development team

a. The decision to acquire a new system is the end-product of the JCIDS analysis process that is composed of a structured, four-phased methodology that defines capability gaps, capability needs, and solution sets within a specified functional area. JCIDS is based on national defense policy and centered on a common joint warfighting construct, the analyses of joint force operations, and DOTMLPF capabilities and deficiencies. The JCIDS analyses, performed by the sponsor, provide the necessary information for the development of the ICD. This vision is translated into a more detailed concept by integrated capability development teams (ICDTs). The TRADOC ARCIC establishes ICDTs, supported by TRADOC and non-TRADOC proponents, to develop concepts or concept capability plans (CCPs), conduct the CBA, and prepare capability documents. In coordination with the TRADOC staff, the TRADOC ARCIC directs, integrates, and manages the efforts of the ICDTs and the TRADOC and non-TRADOC proponents as they develop capabilities for the Army.

b. Although the TRADOC staff, major subordinate command (MSC), TRADOC and non-TRADOC proponents, and the TRADOC Analysis Center all contribute to capabilities integration and development, TRADOC uses a collaborative approach to concept and capabilities development (see AR 602–2 for HSI requirements for the Commanding General (CG), TRADOC).

c. The ICDTs maximize the efforts of reduced resources by early resolution of issues through involvement of appropriate agencies and expertise as a team with a commitment to aggressively identify and resolve issues. TRADOC employs multi-disciplinary ICDTs to shorten the JCIDS/Capabilities Integration and Development System (CIDS) and acquisition processes through the early, collaborative involvement of key stakeholders and subject matter experts (SMEs). ICDT membership includes appropriate representation from the following organizations. HSI domain SMEs are dedicated or on-call members of the ICDT and any integrated product teams (IPTs). Further, ARL HRED Field Elements act as focal points to ICDTs and IPTs with DCS, G–1 assisting to identify support personnel (see AR 602–2 for HSI support personnel).

d. The ICDT chair, the deputy chair (typically an O6), the core membership, and the staffing membership form the elements of an ICDT.

(1) Led by the deputy chair, the core members serve as the ICDT nucleus. The core members develop the concept, conduct the CBA, and develop the capability documents. On-call members provide input to the product and assist in resolution of issues and adjudication of comments within their subject matter expertise, or provide experimental, analytical, operational, and technical advice and support to the dedicated core team.

(2) The staffing members review the initial draft of the concept/CCP, the results of the CBA, the resulting capability documents and submit their issues and comments. Adjudication of comments and issues to the satisfaction of the staffing member constitutes concurrence by that member's organization. Unresolved issues from either the core or staffing members constitute a non-concurrence by that member's organization and are addressed and resolved during the approval process.

(3) The ICDT membership and participants vary, depending on the specific product; however, core membership always includes representation across the DOTMLPF domains. The ICDT identifies the membership, the participating organizations, and the expected deliverables. While industry and academia are not members of the ICDT, their input is a key to the process. Techniques to obtain industry and academia input must be executed properly to avoid significant consequences for Government, academia, and industry participants.

2–5. Capability document summary

The JCIDS process provides the mechanism for the Army to determine what material solutions will be required. After a decision is made to pursue a new program, the user initially prepares the ICD and staffs with the respective approval authority's staff agencies for a MS A decision. This process also occurs for CDD, CPD, and full-rate production decisions. A program may not necessarily develop all three documents; some programs may start at the CDD for example. The HSI AO community as a group maintains close coordination with approval authority staff agencies and with PMs to know when and where new capability documents are in development. The HSI AO will have to be proactive in getting HSI statements incorporated into a capability document. Membership on an ICDT ensures that HSI will be appropriately considered in the development of capabilities documents. The HSI AO also works with the

PEO and PM to ensure that the HSI domains are considered during development (see AR 602–2 for HSIs role in the acquisition process).

2–6. Acquisition strategy process

a. While TRADOC is preparing a capability document, a PM develops and documents an acquisition strategy (AS) that serves as the roadmap for program execution from program initiation through post-production support and retirement. The AS guides the program (see DoDI 5000.02 for additional information on acquisition procedures). In addition, a program must have an approved AS prior to release of final RFPs for contracting efforts. When referencing the document, the acronym AS will be used and when this guidebook refers to the general approach to developing a strategy, the phrase "acquisition strategy" will be spelled out, all in lower case font.

b. The AS is used by the PM as the primary means to define the approach for an acquisition program. The AS contrasts with the acquisition plan, which affects a single contractual action. A primary goal is to minimize the time and cost of satisfying an identified, validated need that is consistent with common sense and sound business practices. An AS evolves through an iterative process and becomes increasingly more definitive in describing the essential elements of a program (see DoDI 5000.02 for the use and purposes of the AS). The strategy is tailored to meet the needs of the individual program, including management requirements imposed on the contractor (see DoDI 5000.02 for statutory topics required in an AS).

c. DoDI 5000.02 directs the PM to have a comprehensive plan for HSI in place early in the acquisition process and considered at each program milestone during the program life cycle (see DoDI 5000.02 for a description of the HSI policy and procedure applicable to defense acquisition programs). Additionally, the PM should integrate system requirements for the HSI domains with each other, and with the total system as well as ensure integration efforts are reflected in updates to the requirements, objectives, and thresholds in the CDDs. The development of the AS provides opportunities for the HSI AO to embed HSI in the program and assist the PM. See DA Pam 70–3 which indicates that the materiel developers (MATDEVs) strategy for pursuing an HSI strategy is addressed in the HSI section of the AS and provides a solid basis for inclusion of HSI in the manpower and human factors sections of the AS (see DoDI 5000.02 and AR 602–2).Some key actions might include:

(1) Participating in working-level integrated product team (WIPT) meetings associated with planning and developing the AS.

(2) Ensuring that sufficient time has been allocated to HSI analyses and planned test and evaluation (T&E) events.

(3) Reviewing the logistics concept to ensure that it is synchronized with the target audience description (TAD) and training concepts.

(4) Reviewing the PM and contractor management concept to ensure that HSI is considered.

(5) Ensuring that HSI efforts take the AS (schedules, events, management structure) into account. For example, if an incremental or spiral AS is planned, then the system will be fielded in capability "blocks." As successive blocks are designed and fielded, HSI issues may either arise or be resolved. What may have been a problem in one version of the system may not be an issue when the next block is fielded. On the other hand, what was not a problem when the 1st block was fielded may become a problem (For example, will an upgrade affect the maintenance concept and hence the target audience?).

2–7. Acquisition approaches

a. Types. There are five different types of development programs in use today ranging from short-term quick reaction programs in which the HSI AO may have very limited opportunities to influence design to more traditional full development programs in which the HSI AO will have opportunities that stretch over many years:

(1) Research.

(2) Product improvement (PI).

(3) Nondevelopmental item (NDI)/commercial off-the-shelf (COTS).

(4) Developmental.

(5) Joint.

(6) Warfighting Rapid Acquisition Programs (WRAPs).

b. Product improvement. Priority consideration shall always be given to the most cost-effective solution over the system's life cycle. Generally, use of or modification to a system or equipment that the Government already owns is more cost-effective than acquiring new materiel. There are two types of PI: pre-planned product improvement (P3I) and modification. Typically, if an HSI AO has been working on a system, they will already be aware of what modifications or planned improvements are required. If the AO comes into a PI effort that is already underway, the AO will have to become educated quickly on system functions and issues.

(1) Modification is simply a change made to a weapon or information system that is in production so that it will better suit the intended purpose and/or target audience.

(2) P3I is used when market research or testing indicates current technology will not meet the requirements of the user but a cost-effective, near-term solution with current technology exists. The program will continue planning to add or upgrade capabilities as better technology becomes available.

c. Nondevelopmental item/commercial off-the-shelf. The PM is strongly encouraged to use NDI/COTS products as the primary source of supply. Acquisition of NDI/COTS may be particularly attractive because the time and cost required to get the system to the user can be significantly reduced. Whenever possible, an HSI representative should participate as a member of the market research team. Acquisitions involving NDI/COTS pose unique challenges to the representative because the ability to influence actual system design can be minimal. As the names NDI and COTS imply, no development is planned and consequently, few changes in design will be pursued. So, if the system has problems, the options are limited for fixing them. This is not to say, however, that HSI does not play a role. In fact, HSI issues, risks, and concerns should be a major determinant of whether an NDI/COTS solution is viable. Many HSI considerations should be addressed completely and early in the decision process such as: suitability to the aptitudes, knowledge, and skills of the intended target audience; trainability (anticipated training costs) of the system; the human-machine interface; and the ability of the NDI/COTS components to satisfy total system performance requirements. These characteristics are primarily examined during market surveillance and market research.

(1) Market surveillance and research play a key role in NDI and COTS Programs. The more an HSI AO knows about the commercial market associated with a type of acquisition system, the better the AO can anticipate potential problems.

(2) Market surveillance activities are conducted on a continual basis by the AMC and Army Research, Development, and Engineering Centers. The purpose is to keep abreast of developing trends and new technologies in the commercial marketplace with potential for military application. When the user defines the need as expressed in the ICD, the AMC commodity-oriented MSC will determine whether NDI/COTS is feasible. If so, the MSC will begin market research.

(3) Market research is used to identify what is currently available in the commercial marketplace or in use by other agencies. Market research will also identify current and emerging technologies and their potential application to the specific Army need. If the market research indicates that a commercial solution is available, requirements documents must be written so they do not preclude the adoption of the commercial solution. If the research indicates that there is not a commercial item available, the materiel or information system requirements must be supportable with the current technologies identified in the market research. The decision may also be made to assume the risk associated with writing requirements that depend on emerging technologies identified in the market research. This constitutes a P3I Program (see para 2–8*a*).

(4) HSI considerations should be incorporated into market research. Issues, risks, and concerns identified by the ICDT for inclusion in the ICD and the HSI plan (see chap 3) will form the basis for HSI evaluation of NDI/COTS hardware and software. This information should be cross-walked into independent evaluation plans and other pertinent capabilities documents. A primary avenue of HSI influence in NDI/COTS acquisitions is to make HSI (or preeminent domains thereof) a major criterion in the RFP and source selection process.

(5) The HSI AO should carefully evaluate any information provided by industry for HSI implications. Most importantly, the HSI AO should work closely with the PM to ensure that all relevant issues, risks, and concerns are fully understood as important decisions are made about the system.

d. Joint programs. Any acquisition system, subsystem, component, or technology program that involves a strategy that includes funding by more than one DoD Component during any phase of a system's life cycle is considered a joint program (see AR 602–2 for HSI requirements for joint programs).

(1) Capability needs and acquisition management systems use Joint Concepts, integrated architectures, and an analysis of DOTMLPF in an integrated, collaborative process to define needed capabilities to guide the development of affordable systems.

(2) The designated lead DoD Component Head will select a single qualified PM for the joint program. It will have one quality assurance program, one program change control program, one integrated test program, and one set of documentation and reports to include one Joint ICD, CDD, or CPD; one Test and Evaluation Master Plan (TEMP), one acquisition program baseline, and so forth HSI is the correct term for HSI in joint programs.

e. Warfighting Rapid Acquisition Program. The WRAP is directed at accelerating procurement of systems identified through warfighting experiments as compelling successes that satisfy an urgent need. WRAPs are implemented within the existing Army structure. WRAP is compatible with and supports Federal Acquisition Regulation (FAR), DoD, and Army acquisition policy (DoD 5000– series and AR 70– series). Advanced warfighting experiments (AWEs), concept experimentation programs, advanced technology demonstrations (ATDs), advanced concept

technology demonstrations (ACTDs), and similar experiments where integrated concept teams, supported by a battle lab, are directly involved may be used to identify WRAP candidates (see DA Pam 73–1 for information on WRAP). WRAP implements the Army's accelerated procurement of systems (see AR 602–2 for integrating HSI practices and policies). This process links TRADOC experimentation with systems acquisition.

(1) *Advanced warfighting experiments.* AWEs are the culminating efforts in evaluating major increases to warfighting capability. They cross the TRADOC domains of DOTMLPF. They synergistically combine new force structure, doctrine, and materiel to counter a tactically competent opposing force. Moreover, they impact most, if not all, of the battlefield dynamics and battlefield operating systems. AWE managers must ensure that their technology demonstrations include appropriate consideration of HSI, tailored to the scope and nature of their program.

(2) *Network integration evaluation.* Recent concept test programs such as network integration evaluation (NIE) at Fort Bliss/White Sands Missile Range have led to rapid procurement of new network systems as part of the Army's movement to a more agile acquisition process. NIE examines a full brigade's operations with potential capability sets of equipment rather than one system at a time.

(3) *Advanced technology demonstrations.* ATDs are a category of technology demonstrations. They are risk-reducing, integrated, "proof of principle" demonstrations designed to assist near-term system developments in satisfying specific operational capability needs. They accelerate introduction of new technologies into the operational systems. ATD managers, like AWE managers, must ensure that their technology demonstrations include appropriate consideration of HSI, tailored to the scope and nature of their program.

(4) *Advanced concept technology demonstrations.* ACTDs accelerate the application of mature technologies configured in a way that is useful in response to a critical military operational need. ACTDs provide an evaluation of the military utility of proposed solutions and are jointly planned by users and technology developers to enable operational forces to experiment in the field with new technologies. The experiments are designed to evaluate potential changes to doctrine, warfighting concepts, tactics, modernization plans, and training. ACTD Managers must also ensure that their technology demonstrations include appropriate consideration of HSI, tailored to the scope and nature of their program.

f. Research. In order to appropriately and cost effectively transition research, Category 6.2 and 6.3-level research that is expected to transition to a PM shall incorporate HSI practices and policies in accordance with the most recent version of MIL–STD–1472.

2–8. Acquisition phases

a. Phases. DoDI 5000.02 shows that the acquisition of a system is broken down into five phases and three milestone decision reviews (MDRs) (A, B, and C). The phases are materiel solution analysis (MSA), technology development, EMD, production and deployment, and operations and support (see DoDI 5000.02 for an explanation of the five phases).

b. Capability gaps. Capability gaps must first be evaluated to determine if they can be satisfied by non-materiel solutions. Non-materiel solutions include changes in DOTMLPF–P. As stated in paragraph 2–2, when a need cannot be met by such changes, a broad statement of mission—expressed in terms of an operational capability (not a system-specific solution)—is identified in the ICD. Approval of the ICD is gained at concept refinement. Approval of the concept refinement does not yet mean a new acquisition program. The approval authorizes initiation to explore an analysis of alternatives (AoA). Approval of the concept refinement phase (MS A) authorizes entry into the technology development phase that examines technology risk and appropriate technology to be incorporated into the system. Approval to proceed into the technology development phase (MS B) typically launches the chartering of a PM and system development. The CAPDEV, MATDEV, and system HSI AO should attend all system ICDT meetings to ensure HSI domain constraints are captured in the ICD.

c. Materiel solution analysis. The system acquisition starts with the concept decision in the concept refinement phase. The ICD and the AoA establish the need for a materiel approach to resolve a specific capability gap. The ICD also supports the technology development strategy, the MS A acquisition decision, and subsequent technology development phase activities. The AoA should consider HSI impacts on cost, schedule, and performance pertaining to each of the alternatives. The capability gap is defined in terms of functional area(s). The ICD should illustrate the evaluation of different materiel approaches that were proposed to provide the required capability. The ICD proposes the recommended materiel approach(es) based on analysis of the relative cost, efficacy, sustainability, environmental quality impacts, and risk posed by the materiel approach(es) under consideration. The ICD is not updated after MS A approval. There is a new initiative entitled "Moving HSI to the Left." The DCS, G–1 and the Soldier Battlefield Integration Division of ARL HRED are working to ensure HSI involvement at the very beginning of program initiation. Additionally, they are working to move HSI into the very early concept formulation and analyses such as the AoA. The reasons for this initiative are:

(1) The earlier the involvement the earlier HSI can positively impact a materiel approach.

(2) The Army makes a substantial investment in the HSI technical base which is best leveraged prior to the official designation of a project.

(3) PMs are more likely to integrate HSI fully into their acquisition program and schedule if HSI is already on board and can show a significant impact on the system design concept. Moving HSI to the Left is a relatively new initiative; for more information contact either of the offices mentioned above.

d. Technology development. This phase is used to reduce technology risk and determine the appropriate set of technologies to be integrated into a full system. Technology development is a continuous technology discovery and development process reflecting close collaboration between the science and technology (S&T) community, the user, and the system developer. It is an iterative process designed to assess the viability of technologies while simultaneously refining user requirements. The project shall enter technology development at MS A when the milestone decision authority (MDA) has approved the technical development strategy. A favorable MS A decision does not mean that a new acquisition program has been initiated. Multiple technology development demonstrations may be necessary before the user and developer agree that a proposed technology solution is affordable, militarily useful, and based on mature technology. The HSI AO should review any HSI goals and constraints in the ICD as well as the key performance parameters (KPPs) to crosswalk them into the draft CDD. This phase serves as the starting point for many of the long-term, large-system, development programs. Consequently, the more HSI can participate in this phase, the greater the impact. A human systems integration plan (HSIP) and the first human systems integration assessment (HSIA) may be prepared; concurrently with documents such as the CDD, SysSpec, SOW, and TEMP. The HSI AO must be prepared for involvement in each of these activities and this guidebook is structured to help manage the effort. It is also the start of the long process of documenting every HSI recommendation and tracking issues as they develop. Constant communication with the PM office is very important throughout development.

e. Engineering and manufacturing development. MS B approval marks the beginning of this phase. It is at this point that an acquisition program is initiated and a PM is appointed and assumes responsibility for system development. DoDI 5000.02 states that the purpose of the EMD phase is to develop, build, and test a product to verify that all operational and derived requirements have been met, and to support production or deployment decisions (see DoDI 5000.02 for the purpose and phase description of EMD). Entrance into this phase requires a CDD, which states the operational and support-related performance attributes of a system that provides the desired capability required by the warfighter—attributes so significant that they must be verified by testing and evaluation. The CDD provides the operational performance attributes, including supportability necessary for the acquisition community to design the proposed system, including KPPs that will guide the development, demonstration, and testing of the current increment. The AS identifies the specific attributes contributing most significantly to the desired operational capability, in threshold-objective format.

(1) If not prepared in the MSA phase, all the documents mentioned are prepared. However, the EMD phase is the real core of a development program. EMD is where the workload grows rapidly and time pressure on the PM increases dramatically because a schedule will be created that is set in stone and determines a PMs success or failure.

(2) The HSI AO must address all issues and design changes in terms the PM understands; Schedule, Performance, and Cost. If a PM perceives an HSI issue as superfluous it may not be addressed. The HSI AO must show how Schedule, Cost, the Soldier, Safety, SSv, or Performance will be significantly impacted if the HSI issue is not addressed.

(3) The HSI AO participates in WIPT meetings, contractor performance reviews, and formal program decision meetings. The HSI issue tracking database is a method to track issues that need to be mitigated and can be included in an HSIA. Formal test programs are also conducted and the HSI AO may also function as the ATEC HSI lead.

f. Production and deployment. The purpose of this phase is to achieve an operational capability that satisfies mission needs.

(1) *Production and deployment activities.* Operational test and evaluation (OT&E) determines the effectiveness and suitability of the system. The MDA makes the decision to commit DoD to production at MS C. MS C authorizes entry into low-rate initial production (LRIP; a major decision point for Major Defense Acquisition Program and major systems). MS C also authorizes production or procurement for non-major systems that do not require LRIP or for limited deployment in support of operational test (OT) for major automated information systems programs as well as for software-intensive systems with no production components. Entrance into this phase depends on the following criteria: acceptable performance in development, T&E, and operational assessment; mature software capability; no significant manufacturing risks; manufacturing processes under control (if MS C is full-rate production); an approved ICD (if MS C is program initiation); an approved CPD; acceptable interoperability; acceptable operational supportability; compliance with the DoD Strategic Plan; and demonstration that the system is affordable throughout the life cycle, optimally funded, and properly phased for rapid acquisition. The CPD reflects the operational requirements

resulting from SDD and details the performance expected of the production system. If MS C approves LRIP, a subsequent review and decision shall authorize full-rate production.

(2) *Low-rate initial production.* LRIP is intended to result in completion of manufacturing development in order to ensure adequate and efficient manufacturing capability; to produce the minimum quantity necessary to provide production or production-representative articles for IOT&E; to establish an initial production base for the system; and permit an orderly increase in the production rate for the system, sufficient to lead to full-rate production upon successful completion of operational (and live fire, where applicable) testing.

(3) *Full-rate production and deployment.* Continuation into full-rate production results from a successful full-rate production decision review by the MDA (or person designated by the MDA). This effort delivers the fully funded quantity of systems and supporting materiel and services for the program or increment to the users. During this effort, units shall attain initial operational capability (IOC).

(4) *A human systems integration assessment is prepared for Milestone C.* The HSIP issues tracking log supports the HSIA that is key to start production. If an issue is rated critical by the HSI community and could interfere with production, there will be significant pressure placed on HSI AOs to justify their position. If the HSI AO has documented all recommendations and maintained communication with the PM through each step of the way, the process will be far easier. The HSIA may be updated later as production continues, but usually only addresses issues that still exist or have been resolved.

g. Operations and support. The objective of this phase is the execution of a support program that meets operational support performance requirements and sustains the system in the most cost-effective manner over its total life cycle.

(1) System sustainment. Sustainment includes supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel capability, training, habitability, survivability, environment, safety (including explosives safety), occupational health, protection of critical program information, anti-tamper provisions, and information technology (IT), to include NSS, supportability, and interoperability functions.

(2) Effective system sustainment. Effective sustainment of weapon systems begins with the design and development of reliable and maintainable systems through the continuous application of a robust systems engineering methodology. As a part of this process, the PM employs HFE to design systems that require minimal manpower; provide effective training; can be operated and maintained by users; and are suitable (habitable and safe with minimal environmental and occupational HH) and survivable (for both the crew and equipment).

(3) Optimize operational readiness. PMs optimize operational readiness through affordable, integrated, and embedded diagnostics and prognostics; embedded training and testing; serialized item management; automatic identification technology; and iterative technology refreshment.

2–9. Summary

HSI has an active role throughout the life cycle of a system. The scope of the HSI effort will range from providing input to program documentation to conducting hands-on design studies, resulting in a MS C HSIA. The pace of the program participation can range from a few hours of consultation to full-time involvement in every aspect of program execution. Systems acquisition is an ever-changing discipline that requires the HSI AO to stay current with regulations to ensure HSI is included at every step along the way. With the wide variety of acquisition programs and the wide flexibility that PMs have in structuring their programs, it is safe to say that no two development programs will ever be conducted in the same manner. Ultimately, the HSI AO has the unique chance to positively impact a system design and improve operational suitability.

Chapter 3
The Human Systems Integration Plan

3–1. Content and format

The HSIP should be the first step in the process of planning and executing an HSI Program. An effective HSIP helps a PM to reduce risk in the program because the HSIP provides the mechanism to proactively identify and resolve potential issues before they threaten program success. The HSIP format can follow the example referenced in appendix B or be tailored to fit individual program needs. Minimally, the plan should have sections that address the purpose and scope; HSI challenges; events and activities; HSI IPT; HSI issue definition; HSIA; HSI issue tracking database; references; and appendices such as the checklists included in the appendices to the example plan (see app B). The HSIP must identify the key personnel in the HSI Program, track issues and risks, and identify how HSI fits in the PM's overall development efforts and ongoing HSI activities.

a. Challenges and events. The HSI AO's primary duty is to identify the key program issues and then review the program schedule to determine where and when HSI will have the opportunity to influence the design to minimize the

impact of these issues. For all programs, major milestone decisions are key events; however, the emphasis at MS B may be on planning to resolve issues while at MS C, the emphasis is on deciding whether a program can continue or if it should be terminated. Dependent on program challenges, the event schedule may dictate early-on how much time is available to fix problems compared to the level of severity of the challenges. Other events may also be important. For example, contract milestones, internal design reviews, requirement preparation cut-offs, OT initiation, and HSI meeting schedules may also be included. Formal tracking software is rarely required specifically for HSI activities. A table or spreadsheet is usually sufficient but needs to be updated as the program schedule shrinks and expands.

b. Responsibilities. The HSI lead, in conjunction with the PM's guidance, decides what parts are required. At the same time that participants are identified, the responsibilities for various HSI activities are usually defined as well. The Safety representative works the safety domain, Survivability and Lethality Analysis Directorate (SLAD) works the SSv domain, HRED covers the Manpower, Personnel Capabilities, Training, and HFE domains, and the U.S. Army Public Health Center (USAPHC) assesses the HH domain. The HSIP discusses the strategy for supporting the program, including where the HSI effort falls within the PM shop, how the HSI lead will address issues for staffing and funding, how HSI will provide input to the TRADOC requirements documents, how issues will be coordinated within ATEC's planning cycle, and identifies the HSI lead contact for approval of important analyses that should be performed.

c. Members. The HSI AO will determine participant requirements, maintain, and use the section as the basis for HSI weekly teleconferences, periodically issue reviews, and program updates. At the working level, acquisition category (ACAT) III programs may have as few as two or three HSI personnel; a human factors practitioner (who will be the HSI and SSv lead as well), a logistician (training and personnel), and a safety representative. As programs grow in size, complexity, and duration, such as ACAT I programs, more formal membership becomes necessary. The program may have formal channels through the DCS, G–1 (DAPE–HSI) for high-visibility programs. For large programs, DCS, G–3; DCS, G–4; and Army Test and Evaluation Office may also be involved. Key participants in the HSI Program include: (1) representatives from the Training and Doctrine Command capability manager (TCM) office, (2) the PM's project engineer, (3) representatives from each HSI domain, and (4) the ATEC HSI lead. Other representatives with HSI responsibilities should be included such as logisticians, HRED modelers, SLAD munition experts, and contractor HSI leads.

d. Issue tracking database and risk resolution. The issue database portion of the plan is the most important part to the program and will require frequent updates at weekly staff meetings, contractor reviews, or official program decision reviews. Frequently updating the PM prevents any surprises and the PM's design team is more likely to buy-into problem resolution. The issue database also directly feeds the issues discussion sections of the HSIA at MSs, as well as the domain assessments that feed into the HSIA. The database can be a simple spreadsheet or database. If the database will be shared among many people, all members of the HSI Team will have to have the software loaded on their computer. Typically, spreadsheets are sufficient, but if the project office has its own website and suite of management tools, use them; especially if all program personnel are required to have access to the website.

(1) Several methods exist in the HSI community to categorize issue severity. The current HSIA uses critical issues, major issues, and concerns for the top-level assessment. The human factors community uses the same method, however; Safety, HH, and SSv use a tabular approach with Probability of Occurrence and Severity. Confirm with ARL HRED or the HSI website for the latest guidance but usually the HSI AO reviews issues with the Safety, HH, and SSv lead and comes to an agreement on the HSIA issue terminology.

(2) Part of the HSIP includes the identification and tracking of risks. An example of risk identification from MIL–STD–882E is shown in table 4–2. An issue cites the problem with the design, program execution, or funding. A risk states what the impact will be to the program if nothing is done to resolve the issue or what mitigation of risk can be achieved with partial or total solutions.

e. A key point to remember. Contractors and PMs may accept a risk at any level and close any further effort associated with the risk due to cost, schedule, or technical problems. However, as the Soldier's representative, HSI never closes a risk until there is solid proof that the issue can and will be resolved or has been resolved.

3–2. Other considerations

Other elements may be included in the HSIP as appropriate (for example, the TAD; manpower estimate (ME), or program-unique documentation required). Not all HSIPs include all the documents stated above.

3–3. Summary

The HSIP provides the source document for how HSI will be implemented on a program. The HSIP specifies all Government HSI support to the PM and states how the contractor's HSI Program will be supported. The HSIP provides a tracking mechanism for important issues as they develop, are reported at milestones, and subsequently resolved. The

HSIP can serve as documentation for the HSI WIPT and for identifying all the key personnel involved in the HSI Program. Consequently, the HSIP should be prepared as soon as a program is initiated. It is the single most important document for the HSI AO.

Chapter 4
Preparation of the Human Systems Integration Assessment

Section I

Process

4–1. Content and format

The HSIA is used to document potential or known issues that could impede or prevent the Soldier's ability to operate, maintain, and sustain the system and is an independent review of the HSI status of the system. AR 602–2 requires HSI AOs to resolve HSI issues and concerns prior to MDRs as much as possible (see AR 602–2 for HSIA information).

a. The draft HSIA is written by an HSI AO that is assigned by the ARL HRED. Once completed, the HSIA is sent to the Office of the DCS, G–1, Director for HSI. The HSIA is prepared at major milestones in a program, including on rare occasions for MS A, but typically for MS B and C. The HSIA is often updated prior to full production decisions or PIs beyond MS C. The Army Systems Acquisition Review Council (ASARC) and the overarching integrated product team (OIPT) are bodies of representatives from top-level management within Department of Army, who review the data available at each milestone, and recommend continuation, modification, or termination of the program. Consequently, the ASARC is focused on critical and major issues, especially "show stoppers." That is, problems that jeopardize fielding of the system and warrant a rating of Red meaning stop the program.

b. The HSIA also identifies minor concerns to inform the PM of problems that could impact Soldier performance as well as acceptance of the system when it is fielded. Minor concerns will not prevent a system from being fielded unless there are so many issues that when taken together, they create an unusable system. The HSI AO, however, has an obligation to inform the PM of all problems; PMs can't fix problems that are not brought to their attention.

c. The HSI AO must be aware that many personnel in PM offices still are not familiar with requirements for an HSIA, so the AO will need to educate and/or arrange training for the PM regarding the requirement and benefits for both the HSIA. It would be a good idea to keep some of the citations from AR 602–2 and DA Pam 70–3 close-by while talking to members of the PM's staff.

d. The first step in the HSIA process is to advise a PM that an HSIA is required and necessary. While DoDI 5000.02 does not specifically require an HSIA or any of the domain assessments, it does state that the PM will plan for and implement HSI beginning early in the acquisition process and throughout the product life cycle (see DoDI 5000.02, enclosure 7 for an explanation of HSI policy and procedure).

e. Also, there are requirements in DoDI 5000.02 for safety and HH risk identification and acceptance; and for preparation of the Programmatic Environmental, Safety, and Occupational Evaluation (PESHE); but not for an independent safety assessment (ISA) or HHA (see DoDI 5000.02 for information on risks and system security within and across individual systems and programs).

f. HSI risks and risk mitigation should be addressed in the PM's risk management program.

g. The DoD Product Support Manager (PSM) Guidebook includes HSI in the list of key documents for entry and exit from EMD phase as well as the production and deployment phase. The PSM does not specifically list an HSIA by name.

h. MATDEV is required to task and fund the domain agencies (see DA Pam 70–3 for MATDEV requirements). For an HSI reference and a list of required oversight documents for the ASARC IPT, see DA Pam 70–3. Additionally, AR 70–1 specifically requires that the DCS, G–1 exercise primary staff responsibility for HSIA and domain assessments.

i. Further justification for an HSIA comes from AR 602–2 (see AR 602–2 for justification for an HSIA).

j. Specific requirements are also placed for (see AR 602–2 for an explanation of specific requirements):

(1) Chief Information Officer, G–6 to resolve HSI issues in conjunction with DCS, G–1.

(2) CG, AMC to—

(a) Prepare draft HSIAs on all systems; ACAT I, II, and III and provide to DCS, G–1 (DAPE–HSI).

(b) Conduct HFEAs.

(c) Conduct MPT assessments.

(d) Conduct Soldier survivability assessments (SSvAs).

(e) Ensure subordinate commands request HHAs from USAPHC and develop and provide the safety assessments for all systems.

(3) Communications-Electronics Command to conduct safety assessments on automated information systems.

(4) U.S. Army Medical Command to prepare the HHA.

(5) Army Safety Office or a designated AMC Safety Office to conduct ISAs for all ACAT systems.

(6) PM and ATEC to provide the SER in time for inclusion in the HSIA.

k. In addition, see AR 602–2 for the organizations responsible for the various domain assessments as well as the draft and final HSIA.

4–2. Human systems integration assessment process

a. The HSIA is the summary document that rolls up the issues and concerns identified in the assessments from the seven domains of HSI. The MPT and HFE domains are combined into a single assessment. Therefore, there are four domain assessments that contribute to the overall HSIA:

(1) MPT and HFEA.

(2) SSvA.

(3) ISA.

(4) HHA.

b. Two or three of the domain assessments (manpower, personnel, and training assessment (MPTA); HFEA; and SSvA) may also be combined into a single document. The ISA and HHA are prepared independently.

c. For every HSIA, regardless of MS, the issue tracking database of the HSIP is a source of information for issues.

(1) Ideally, the HSI AO uses the issues tracking database of the HSIP to download the issues for each domain that were identified during the course of the program, prepare the draft assessment, and then add any new issues identified during formal T&E. However, the HSIA must reflect what is in the domain assessments, so the HSIA cannot be prepared until all domain assessments are completed.

(2) At later milestones, such as MS C or post-fielding updates, a good source of data is the prior HSIA from an earlier MS. The next best sources are reports from developmental (especially the logistics demonstration (LD)) and OT (such as the limited user test or the IOT&E). These reports should contain the most recent data available with the actual hardware, software, and training package as they were used by representative Soldiers.

(3) If HSI personnel have not been continuously involved in the acquisition program, HSI AOs may need to rely on their own review of the system and supporting information from program documentation, SMEs, and test reports.

d. Issues are categorized in accordance with AR 602–2 and should be consistent with definitions in the HSIP (see AR 602–2, section II for an explanation of issue definitions).

e. Figure 4–1 shows the overall process for an HSIA.

(1) The PM should request the HSIA 180 days in advance of the MS; however, it is usually necessary for the HSI AO to remind the PM of the requirement to conduct the assessment. At the same time, the PM must request the domain assessments as well; letters should be addressed to the agencies responsible for each assessment (see table 4–1). The request provides the rationale for conducting the assessments and helps obtain buy-in from the PM. The most up-to-date information for points of contact within each agency is published in the HSI newsletter.

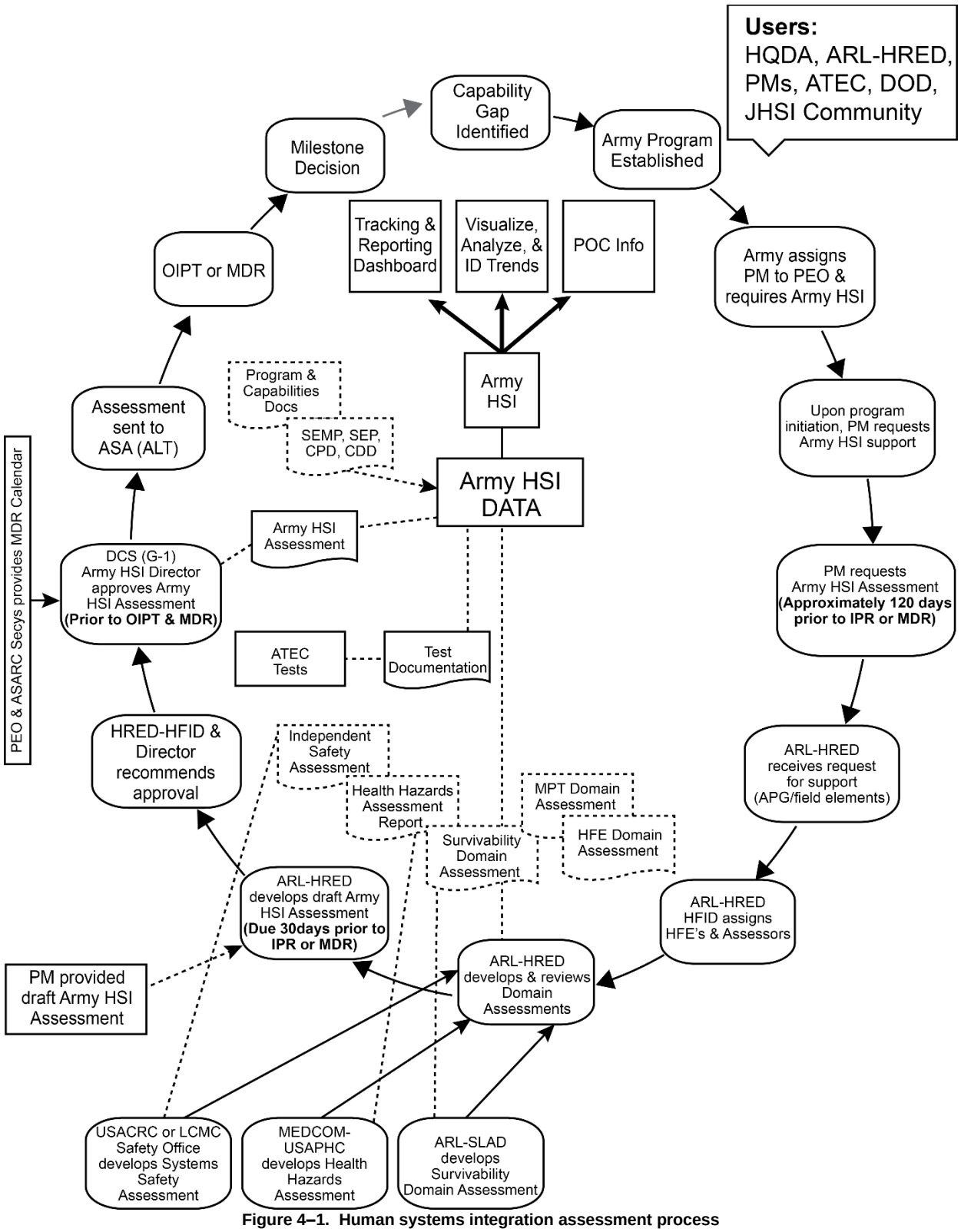

Figure 4–1. Human systems integration assessment process

Table 4–1
Human systems integration and human systems integration domain assessment agencies by acquisition category

Assessment	ACAT ID, IC, and II	ACAT IA (IAM, IAC)	ACAT III
Manpower, personnel, training	ARL HRED	ARL HRED	ARL HRED
HH	USAPHC	USAPHC	USAPHC
HFE	ARL HRED	ARL HRED	ARL HRED
SSv	ARL SLAD (lead); ARL HRED (assist)	ARL SLAD (lead); ARL HRED (assist)	ARL HRED or ARL SLAD (lead)
SS	Army Safety Office or designated AMC Safety Office	Army Communications-Electronics Command	AMC Safety Office
Draft DCS, G–1 HSI assessment (domain integration)	ARL HRED	ARL HRED	ARL HRED
DCS, G–1 HSI final assessment (domain integration)	DCS, G–1 (DAPE–HSI)	DCS, G–1 (DAPE–HSI)	DCS, G–1 (DAPE–HSI)

(2) After the requests have been sent out, the agencies prepare the domain assessments using data sources such as the HSIP, previous HSIAs, program documentation, and ATEC test data (if available). The completed domain assessments are collected by ARL HRED and simultaneously sent to the PM, the TCM, and the CAPDEV. ARL HRED's Director reviews the assessments; which can take up to two weeks, and assigns a summary rating of Red, Amber, or Green (see AR 602–2 for the HSIA definition terms).

f. ARL HRED prepares the draft HSIA and staffs it with the domains as well as with the PM, TCM, and CAPDEV. The draft HSIA is then sent to the DCS, G–1 (DAPE–HSI). To ensure the latest version is being used, contact the DAPE–HSI.

g. At this stage, the assessment is in draft version and is not official. The DAPE–HSI generally requests two weeks to review the draft and prepare any revisions. The DAPE–HSI then finalizes the HSIA and the Director for HSI approves and signs it. The final HSIA is then forwarded through the ASARC Secretary for the ASARC members, to the IT OIPT, or to the MDA, as appropriate.

h. It is important to note that while ARL HRED prepares the draft HSIA, the final belongs to the Director for HSI who may make changes to ratings. The sooner a draft can be sent to the DCS, G–1, the more time there is available to work out any necessary changes.

i. The HSIA presents the DCS, G-1's formal position on HSI risks. It is for this reason that the DCS, G–1 and ARL HRED work closely with the PM and CAPDEV, functional proponent, and TCM. Parties will then have an opportunity to correct or address any previously identified HSI risks, and to provide input to the assessment process. Critical, major, and minor risks, as reflected in the assessment, should be identified at the time the assessment is prepared.

j. Since ARL HRED may spend up to two weeks preparing the draft HSIA, the DAPE–HSI may take two weeks to finalize the HSIA. The OIPT requires time to review the assessment; therefore, the HSI AO ideally needs to have the domain assessments at least one and one half to two months prior to the decision date. In practice, this rarely happens. Although AR 602–2 states that the request for the HSIA should be received at least 120 days prior to the MS, however, a safer time frame is 180 days. Unfortunately, test data is seldom available until shortly before the MS and domain assessments are rarely available far in advance, thus leaving the HSI AO often staffing the assessment right up to the date of the MS.

Section II

Human Systems Integration Domain Assessments

4–3. Manpower, personnel, and training assessment

a. AR 602–2 requires the CG, AMC, to conduct an MPTA through ARL HRED. The domain assessment template identifies MPT risks associated with a system and the MPTA, one of the HSI domain reports, addresses the direct

human cost—in terms of number, type, and skills of Soldiers required—to operate and maintain the system (see ARL–TN–0715 for additional information on the MPTA). The areas of concern covered by the MPTA are:

(1) *Manpower.* The number of Soldiers required to operate and maintain the system. Since the Army has a fixed number of Soldiers, any additional Manpower required to field a system must be offset by a reduction of the number of Soldiers somewhere else in the force.

(2) *Personnel.* The type of Soldier required to operate and maintain the system. This includes MOS, any additional skill identifier (ASI) required, rank, physical requirements, and ASVAB scores.

(3) *Training.* The appropriateness and completeness of the training provided to support the system. This assessment should consider if the training materials are appropriate for the skill and knowledge level of the Soldiers being trained, if the time allocated for initial training is adequate, and if the critical knowledge, skills, and abilities to operate and maintain the system can be retained by the appropriate Soldiers with the available sustainment training. This assessment should be different from and complementary to the formal evaluation of the training package performed by the TRADOC (see AR 602–2 for MPTA definitions and requirements).

b. One of the first steps in the assessment should be the collection of documents that will provide the basic requirements and known MPT implications of the systems. These documents are generally requested through the PM by the evaluator (see ARL–TN–0715 for guidance on the MPTA). ARL–TN–0715 further identifies twelve key documents as essential to an MPTA and the types of information they can provide for the MPTA. While some of these documents are routinely prepared for acquisition programs (for example, CDD and STRAP), some are not and may not be available.

(1) ICD.
(2) AoA.
(3) Supportability strategy.
(4) ME report (required for ACAT I systems only).
(5) STRAP.
(6) Basis of issue plan/basis of issue plan feeder data.
(7) CDD.
(8) TAD.
(9) Materiel fielding plan.
(10) HSIP (or equivalent).
(11) TEMP.
(12) OMS/MP.

c. As the MS or fielding decision approaches, the issues and concerns should be documented as shown in the domain assessment template (see ARL–TN–0715 for an explanation of MPTA responsibilities). ARL HRED is responsible for the final color coding of the assessment.

4–4. Human factors engineering assessment

a. ARL–TN–0715 indicates that HFEA assesses systems design from the HFE perspectives as the system approaches the end of a system acquisition phase (see AR 602–2 for guidance for a HFEA).

b. AR 602–2 requires that the CG, AMC prepare an HFEA through ARL HRED (see AR 602–2 for an explanation of requirements for the CG). ARL HRED responsibilities for the HFEA for all ACAT category systems is stated in AR 602–2 (see AR 602–2 for an explanation of ARL HRED responsibilities).

c. The HFEA format has been streamlined in recent years and is shown in the domain assessment template. The HFEA consists of an executive summary, a short background description of the system, a list of the data sources used, a list of the issues, and the conclusion and recommendations. The HFEA uses the "critical issue/major issue/minor issue" definitions as well as the same "Red, Yellow, and Green" color coding of the HSIA.

d. Principal sources of data for the HFEA are the capability requirement document, the SysSpec, contract deliverables, design analyses, the HSIP issue database, previous HFEAs, formal developmental and OTs, and hands-on experience from interaction with Soldiers using the actual equipment.

e. When the draft HFEA is prepared, copies are forwarded to the PM for review and comment. As with the other domain assessments, the goal is to identify resolutions for issues prior to the MS, so open discussions with the PM are generally desirable; especially when a system could be rated Red. ARL HRED is responsible for the final color coding of the assessment.

4–5. Soldier survivability assessment

a. ARL–TN–0715 indicates that SSvA assesses the system design characteristics in regard to SSv. Also, AR 602–2 requires ARL SLAD to conduct a SSvA with ARL HRED for selected non-ACAT I and II systems (see AR 602–2 for an explanation of SSvAs on ACAT I and II systems).

b. The six components of a SSvA:

(1) Reduction of fratricide.

(2) Reduction of detectability of the Soldier.

(3) Reduction of probability of being attacked.

(4) Minimization of damage incurred.

(5) Minimization of injury incurred (issues that may not be covered in an HHA).

(6) Reduction of physical and mental fatigue (see ARL–SR–0322 for information on the six components of a SSvA).

c. SSv addresses issues involving enemy and friendly combat weapons-induced injuries and the inherent hazards to the human under threat/combat conditions, which is a primary difference between SSv and other HSI/MANPRINT domains (see ARL–SR–0322 for information on a SSv). Consequently, some SSv technical issues may overlap other areas of HSI but when combat weapons-induced injuries are involved, SSv often becomes the overriding concern.

d. The parameter assessment list (PAL) is the primary tool for conducting an SSvA. The PAL addresses each of the six components through a comprehensive checklist. The six components are parsed into their sub-components and then rolled back up to obtain a summary rating. The PAL provides a common starting point but maintains a flexible structure and content for an SSvA of a system (for example assessors may add or delete issues to tailor the PAL to a specific system and its technical characteristics). The PAL guides assessors with a systematic format to address most issues. It is based on a list of issues that describe a developmental system's impact on SSv and contains 200 SSv issues related to the Soldier and his/her equipment during combat (ARL–SR–0322).

e. The current PAL is available in electronic format from ARL SLAD. The PAL should be a dynamic document; it should be continually updated as a program progresses.

f. ARL SLAD is normally the lead agency for ACAT I and II programs while ARL HRED is usually the lead for ACAT III programs. The U.S. Army Medical Research and Materiel Command (MRMC) also participate in preparing sections of the PAL. An SSvA follows a series of steps as outlined in ARL–SR–0322:

(1) Select potential issues from the PAL.

(2) Select actual issues to pursue.

(3) Resolve as many issues during each acquisition phase as you can.

(4) Add new issues as appropriate.

(5) Review issues periodically during each acquisition phase.

(6) Meet with points of contact of interested organization to review issue status for completeness and assign severity rating to each issue.

(7) Prepare report for support of MS B or C.

(8) Forward report for review by PM, and then upward through HRED to the DCS, G–1 HSI Directorate.

g. As the MS or fielding decision approaches, the issues and concerns should be documented as shown in the domain assessment template. When a separate SSvA is prepared, the format of the report follows the format of the PAL. If the SSvA is combined with the HFEA, the format is simplified to follow the HFEA format.

4–6. Independent safety assessment

a. PMs are required to prepare a PESHE, identify environment, safety, and occupational health (ESOH) risks, and to update the PESHE over the system life cycle (MIL–STD–882E). Risk identification and management are required by DoDI 5000.02 but do not specifically call out an ISA (see DoDI 5000.02 for addition information on ESOH risk management).

b. AR 602–2 requires CG, AMC through Communications-Electronics Command, to conduct safety assessments on automated information systems. Additionally, commanders of headquarters and subordinate commands are required to develop and provide the safety assessments for all systems in support of MDRs (see AR 602–2 for further guidance on commander requirements).

c. AR 602–2 explains the requirements of the Commander, MRMC in preparing an ISA for AMC medical system acquisitions.

d. Reference future changes to the AR 602–2 for further guidance on major program safety assessments.

e. The format for categorizing safety issues follows the traditional risk assessment matrix from MIL–STD–882E (tables 4–2 to 4–4) and differs from the HSIA's "critical, major, minor" approach. Consequently, the HSI AO usually

contacts the safety representative and comes to an agreement as to which safety categories correspond with critical, major, and minor. See table 4–2 for the risk assessment matrix.

Table 4–2
Risk assessment matrix from MIL–STD–882E

Probability/Severity	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probably (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

f. See table 4–3 for severity categories.

Table 4–3
Severity categories from MIL–STD–882E

Description	Severity category	Mishap result criteria
Catastrophic	1	Could result in one or more of the following: death, permanent total disability, irreversible significant environmental impact, or monetary loss equal to or exceeding $10M.
Critical	2	Could result in or more of the following: permanent partial disability, injuries, or occupational illness that may result in hospitalization of at least three personnel, reversible significant environmental impact, or monetary loss equal to or exceeding $1M but less than $10M.
Marginal	3	Could result in one or more of the following: injury or occupational illness resulting in one or more lost work day(s), reversible moderate, environmental impact, or monetary loss equal to or exceeding $100K but less than $1M.
Negligible	4	Could result in one or more of the following: injury or occupational illness not resulting in a lost work day, minimal environmental impact, or monetary loss less than $100K.

g. See table 4–4 for probability levels.

Table 4–4
Probability levels from MIL–STD–882E

Description	Level	Specific individual item	Fleet or inventory
Frequent	A	Likely to occur often in the life of an item.	Continuously experienced.
Probable	B	Will occur several times in the life of an item.	Will occur frequently.
Occasional	C	Likely to occur sometime in the life of an item.	Unlikely, but can reasonably be expected to occur.
Remote	D	Unlikely, but possible to occur in the life of an item.	Unlikely, but can reasonably be expected to occur.
Improbable	E	So unlikely, it can be assumed occurrence may not be experienced in the life of an item.	Unlikely to occur, but possible.

Table 4–4
Probability levels from MIL–STD–882E—Continued

Description	Level	Specific individual item	Fleet or inventory
Eliminated	F	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.

4–7. Health hazard assessment

The Army's HHA Program focuses on potential HHs resulting from training, combat, maintenance, and disposal throughout a system's life cycle. It is designed to identify and eliminate or control HHs associated with the life cycle management of new or improved material and weapon systems (see DA Pam 70–3 for information on the HHA Program). Consequently, the term HHA, as used in this pamphlet and many ARs, refers to the overall program effort. Whereas in this chapter, we are referring to the document that is prepared at milestones by USAPHC.

a. AR 70–1 indicates that The Surgeon General/CG provides technical advice and assistance on medical matters and HHs during systems acquisitions. In addition, PMs must plan and execute the requirements for HHAs in accordance with AR 40–5, AR 40–10, AR 40–60, and AR 385–10.

b. AR 40–10 is the primary basis for a HHA Program throughout the acquisition life cycle. AR 40–10 states that the health hazard assessment report (HHAR) provides MATDEVs and CAPDEVs with an estimate of the health risk associated with normal use of materiel items. The HHA does not focus on safety concerns (that is mishaps/failures/slips/falls), but rather long-term or chronic health issues that may occur from normal use of the system.

c. AR 40–10 states that—

(1) HHs are included in the HSIA.

(2) High-level hazards must be presented to the ASARC.

(3) HHs and the lack of data to assess potential HHs, as identified in the HHAR, are integrated into the HSIA.

(4) Unresolved issues or differences related to risk presented by individual hazards are discussed between the HSI AO and the HHA PM prior to HSIA release.

(5) The HH section of the HSIA is staffed with the HHA PM prior to being published.

d. AR 40–10 further places requirements on the CG, AMC, to incorporate the HHAR into the HSIA. Other paragraphs require that USAPHC prepare the HHAR; that PEOs and PMs ensure that HHAs are obtained; and that HHA status is briefed at pre-ASARC and ASARC reviews. AR 40–10 requires preparation of HHA reports starting with the initial HHAR in technology development phase with updates at every major program MS; even beyond MS C.

e. Reference AR 602–2 that discusses commanders of headquarters and subordinate commands requirements to request an HHA from USAPHC (see AR 602–2 which explains USAPHC requirements in conducting HHAs and to providing the assessment to ARL HRED and specifies that the HHA report will be input to the HSIA).

f. For more detail on how the HHA process works and the steps on how to request a HHA, see DA Pam 70–3.

g. The format for the categorizing HH issues also follows the traditional risk assessment matrix from MIL–STD–882E (see tables 4–2 to 4–4) and, consequently, also differs from the HSIA's "critical, major, and minor" approach. The HSI AO usually contacts the HH representative and comes to an agreement as to which health categories correspond with critical, major, and minor.

4–8. Summary

The HSIA is the most important document prepared by the HSI AO for an acquisition system and the most important function of the HSIA is to present a thorough discussion of outstanding issues at each milestone. The HSIA identifies issues that may negatively impact the program sufficiently to significantly reduce Soldier-system performance. Although major and minor issues don't literally raise the "red flag" that critical issues do, major issues should be resolved prior to fielding so that Soldiers do not have to create workarounds, perform unnecessary procedure steps, endure longer processes for task completion, or cause errors that could lead to system malfunction or Soldier injury.

Chapter 5
Human Systems Integration in Test and Evaluation

5–1. Test and evaluation

a. T&E refers to testing conducted directly in support of a development program where the data will be used to decide the continuation of that program. AR 73–1, among others, specifically requires inclusion of HSI. HSI's

authority to participate in T&E is reinforced by AR 602–2. In addition, ARL HRED and ATEC's U.S. Army Evaluation Center (AEC) have a joint memorandum of agreement which gives ARL HRED the primary right for providing HSI support to all AEC evaluations. Consequently, there is ample regulatory basis for justifying HSI in T&E.

b. The T&E Program includes development testing and evaluation (DT&E), operational test and evaluation (OT&E), and live fire testing and evaluation (LFT&E). DT&E is where HSI has a chance to observe the system in use in a relatively controlled environment and OT is where the system is used by Soldiers under representative conditions of actual combat; HSI has a role in both and can also play a role in LFT&E to identify and resolve SSv concerns.

c. AR 70–1 states that the TEMP is the basic planning document for T&E. DoDI 5000.02, specifically requires that the TEMP address HSI. It is required that HSI be included in the TEMP (see DA Pam 70–3 for specific requirements and TEMP formatting). Since HSI only appears in DA Pam 73–1 that covers developmental testing (DT), the HSI AO will have to coordinate with test planners and project office personnel to get HSI included in all areas of the document.

d. The TEMP is created by the PM in coordination with all participants and identifies and integrates all T&E requirements with the program's AS and is due prior to MS B. T&E shall be structured to provide essential information to decision-makers, assess attainment of technical performance parameters, and determine whether systems are operationally effective and suitable, survivable, and safe for intended use.

e. The terms operationally effective, suitable, and survivable appear frequently in T&E. Program decisions hinge on the PM's ability to show that the system meets these criteria. HSI is often placed under the suitability section of the TEMP, test plans, and test reports; but Soldier performance can often dictate whether a system is operationally effective as well.

f. There are two primary measures that are used throughout the T&E process to evaluate effectiveness, suitability, and survivability. Measures of effectiveness (MOEs) refer to the extent overall system capabilities support a military mission and measures of performance (MOPs) refer to the extent the system accomplishes a specific technical or performance function. These measures provide the basis for evaluating requirements such as KPPs and key system attributes (KSAs) in the CDD or CPD. HSI generally does not have a role in development of KPPs and KSAs from the T&E perspective; however, HSI does develop evaluation strategies and test plans to test against KPPs and KSAs. Regulations also refer to measures of suitability but these are seldom spelled out separately from MOPs in Army testing. The Army uses MOEs and performance to evaluate technical and operational effectiveness, suitability, and survivability.

g. ATEC primarily develops the evaluation dendrite that breaks-down the KPPs, KSAs, and COICs, into testable MOEs and corresponding MOPs and data elements which include interview and survey requirements. HSI ensures that technical and operational MOEs and MOPs are written to address any sub-system and system-of-systems functions involving the user, and are based on human capabilities and limitations. HSI can influence COIC development through the T&E WIPT which is the primary "governing body" for COICs. COICs generally must be vetted with the user community (that is TCM, CAPDEV, or both), so coordination between HSI representatives, PM/developer, and TRADOC school sites can help ensure HSI is addressed in testing.

h. AcqNotes also defines MOEs, MOPs, and other evaluation considerations such as Operational Suitability as:

(1) *Measures of effectiveness.* MOEs are designed to correspond to the accomplishment of mission objectives and achievement of desired results. They quantify the results to be obtained by a system and may be expressed as probabilities that the system will perform as required. The CBA defines the MOEs and articulates them in the ICD and CDD. MOEs may be further decomposed into MOPs. Characteristics of MOEs:

(a) Relates to performance.
(b) Simple to state.
(c) Testable.
(d) Complete.
(e) States any time dependency.
(f) States any environmental conditions.
(g) Can be measured quantitatively (if required, may be measured statistically or as a probability).
(h) Easy to measure.

(2) *Baseline.* The acquisition program baseline should reflect broadly defined, operational-level MOEs or MOPs to describe needed capabilities:

(a) Measure of performance. The measure of a system's performance expressed as speed, payload, range, time-on-station, frequency, or other distinctly quantifiable performance features. Several MOPs may be related to the achievement of an MOE.

(b) Operational suitability. The degree to which a system can be placed and sustained satisfactorily in field use with consideration being given to availability, compatibility, transportability, interoperability, reliability, wartime

usage rates, maintainability, safety, human factors, habitability, manpower, logistics supportability, natural environmental effects and impacts, documentation, and training requirements.

5–2. Human systems integration in test and evaluation

a. T&E addresses crew survivability issues in live fire testing and requires that critical operational effectiveness and suitability parameters and constraints must be cross-walked with the AoA, including MPT. There is an example of a safety question as a critical operational issue and an example of the need for representative test personnel during OT. AcqNotes, however, provides a TEMP that includes human factors and safety as critical technical parameters (CTPs); but not HSI per se. In all cases, the HSI AO will have to be proactive to get HSI input into the TEMP since there is no mandatory paragraph in the outline (see DoDI 5000.02 for guidance on T&E).

b. DA Pam 73–1, AR 73–1, and AR 602–2 provide ample basis for HSI in T&E and are the primary documents for justifying HSI in the T&E process.

c. DA Pam 73–1 indicates (see DA Pam 73–1 for additional guidance on HSI in the T&E process):

(1) HSI will have membership on T&E WIPTs (which write the TEMP).

(2) HSI is part of the suitability assessment.

(3) HSI issues should be addressed during DT.

(4) HSI will be a factor in all T&E planning.

(5) HSI should have representation on Developmental Test Readiness Review WGs and the review should include the status of HSI.

(6) HSI planning for OT must begin prior to the test date.

(7) HSI should be represented on the Data Authentication Group.

(8) The systems evaluator should develop an effective strategy to produce valid, reliable, quantitative, and qualitative data early and iteratively.

d. AR 73–1 states—

(1) G–1 will ensure HSI is addressed in T&E.

(2) ARL provides the HSI resources for support.

(3) ATEC will coordinate with DCS, G–1 in preparation of HSI reports.

(4) Test programs and system evaluations will provide HSI data.

(5) HSI will be a member of T&E WIPTs.

e. Specific requirements are outlined for HSI in the T&E process (see AR 602–2 for an explanation of requirements).

5–3. Human systems integration action officer role in test and evaluation

a. The term HSI AO refers to a responsibility rather than an official duty title. This AO may come from any of the acquisition disciplines or domains. The HSI AO's goal, whenever possible, is to work with TRADOC during development of MOEs and MOPs in the ICD and CDD. Some examples of MOEs and MOPs with HSI characteristics are:

(1) MOE: ability to formulate plans.

(a) MOP: percentage of trained staff who are required to and can formulate plans.

(b) MOP: time required for trained staff to create plans.

(2) MOE: ability to distribute plans.

(a) MOP: percentage of trained staff who can send or receive plans.

(b) MOP: time required for trained staff to send plans.

(3) MOE: ability to create a common operating picture.

(a) MOP: Number of errors by trained staff using the common operating picture.

(b) MOP: time required for a trained Soldier to create/maintain/update common operating picture.

(c) MOP: Percent of information presented that Soldiers rate as useful.

b. The next priority is to ensure that HSI is included in the T&E WIPT and provide input to the TEMP. As detailed test planning occurs, the AO identifies data requirements to address HSI issues. Then the AO engages in the actual testing as much as possible, analyzes the results, and provides a summary of results and recommendations in the ATEC report.

5–4. Interacting with U.S. Army Test and Evaluation Command

a. The AST has roles, responsibilities, and products (see table 5–1). The HSI AO supports ATEC within the context of the AST, led by an AST Chair. AST's primary objective is to develop and coordinate the integrated T&E Program. The AST is divided into three groups: Core Members, Core Support (as needed), and Surge/Specialized Technical Support (as needed). HSI AOs are part of the Core Support Team, usually providing direct support to the Integrated

Logistics Support Evaluation Directorate (ILSED) evaluator. HSI products are integrated and staffed within ILSED before being coordinated within the AST for final integration in the overall test agency report.

b. The AST Chair is principally responsible for integrating, authoring, and staffing for approval the final test agency report and serves as the lead voice for the AST and ATEC. Other duties of the AST Chair include, but are not limited to, coordinate AST funding requirements with the PM; provide the AST position to the early strategy review (ESR)/T&E concept in-process review (CIPR); and assist with and oversee the plan, process, and status of instrumentation certification and accreditation of models. AST Members are responsible for, but not limited to, the following: support and assist the AST in developing ATEC requirements for the system T&E; represent their parent organizations or disciplines on the AST by coordinating and staffing issues and actions within their chain of command; and fully participate and report on instrumentation certification and verification, validation, and accreditation of models. AST products include, but are not limited to, conducting the ESR, the CIPR, the system planning report review, the technical field tests, the engineering development test, and the software qualification test; as well as developing chapters 1 through 3 of the SEP, developing the data source matrix (DSM); and drafting part IV and V of the TEMP.

Table 5–1
Army Test and Evaluation Command Systems Team roles, responsibilities, and products

Core members
AST Chair Lead Evaluator
Evaluation Analyst Test Manager
Operational Test Command Test Officer
OT Operations Research Systems Analysts
Core support (as needed)
Ballistics Survivability, Live Fire or Lethality Analyst Logistics Analyst
Applicable DT and OT Center/Directorates Reliability Availability Maintainability Analyst
Army HSI SME/Analyst
Surge/specialized technical support (as needed)
Safety Engineer
Technical Editor Instrumentation SME
Non-Ballistic Survivability Analyst Resource Management
Modeling and Simulation Software Analyst
Information Assurance Analyst Threat Analyst and Coordinator
Statistician/Design of Experiment Analyst Support Contractor
Network Analyst Data Modeler Interoperability SME

c. AR 73–1 and DA Pam 73–1 provide additional details regarding AST T&E activities, responsibilities, and products (see DA Pam 73–1). A partial summary of T&E activities by product and results is provided in appendix D of this pamphlet.

(1) The AST begins evaluation planning by studying program documents (such as the ICD, CDD, CPD, OMS/MP, acquisition decision memorandum, product support plan, and test support plans (system support package (SSP)), new equipment training packages, and so forth). The HSI AO should request to review these documents as soon as the AST is formed, and participate in AST meetings. The ILSED evaluator retains primary responsibility for scoping the HSI level of effort and securing funding for HSI support with the AST Chair.

(2) ATEC evaluation planning is governed by the mission-based test and evaluation (MBT&E) methodology (see fig 5–1). The MBT&E methodology is a structured approach, framework, and procedure to assess system characteristics and functions on task performance and mission effectiveness. It enables testers and evaluators to better understand how system technical performance impacts desired capabilities by linking capabilities to attributes; aids in the development of evaluation measures that assess the impacts of capabilities and attributes to mission effectiveness; and links evaluation measures to all available data sources. The ATEC MBT&E framework is provided below.

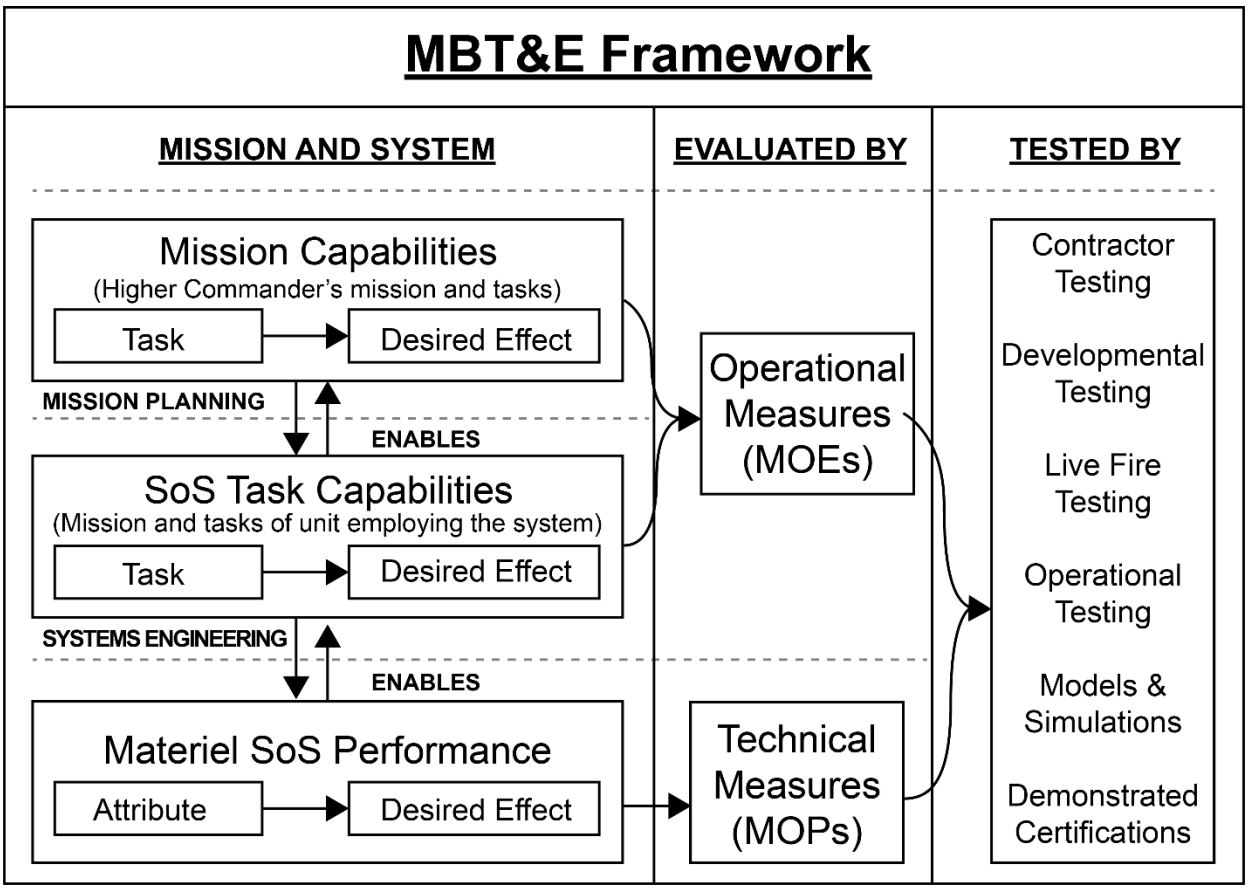

Figure 5–1. Mission-based capability assessment

d. IPT membership and meetings consists of several elements that are essential to the development and execution of the T&E process.

(1) T&E WIPT. In addition to internal AST meetings, HSI AOs can expect to participate in the T&E WIPT. This is a forum in which the users (TCM), developers (PEO, PM), testers, and evaluators work together to refine requirements and work the tradeoffs over the scope and resources allocated to evaluate program events. T&E WIPTs are chaired by the MATDEV (PEO, PM, or other) and include Core and Primary members representing developmental and OT, threat, logistics, and training. The HSI AOs supporting ATEC are invited to participate, if needed, given program type and complexity and usually at the discretion of the ILSED evaluator. T&E WIPT products include, but are not limited to, producing the TEMP. The T&E WIPT assists in developing CTPs, T&E strategy, and critical operational issue and criteria (COIC) for testing (see DA Pam 73–1 for more details regarding T&E WIPT responsibilities and products). Figure 5–2 provides an overview of T&E WIPT membership.

Core and Other Members of the T&E WIPT

Core Members:
- System Proponent
- Combat Developer
- System Evaluator

Other Primary Members:
- Developmental Tester
- Operational Tester
- Threat Integrator
- Logistician
- Training Developer/Trainer

OSE (For Oversight Programs):
- DOT&E
- USD (AT&L)

HQDA Offices:
- DCS, G-1 (PER)
- DCS, G-2 (INT)
- DCS, G-8 (PRO)
- ASA(ALT) - 3 Offices
- CIO/G-6
- T&E Executive/TEO
- DCS, G-3 (OPS)

Others Required For:
- Analysis
- Survivability
- Lethality
- Interoperability
- NBC
- RAM
- Safety
- Health Hazard
- HSI
- Transportability Info
- Technology
- E3

As Needed:
- Test Range Rep
- System Contractor
- M&S

Figure 5–2. Core and other members of the test and evaluation working-level integrated product team

(2) Product support management integrated process team (PSMIPT). Formerly the supportability integrated product team (SIPT), the PSMIPT is developed by the PSM within the PM. This is often the PM's logistician within the integrated logistics readiness management division. The PSM leads the development, implementation, and top-level integration and management of all sources of support to meet Warfighter sustainment and readiness requirements.

e. Product support encompasses a range of disciplines including, but not limited to, logistics, requirements, operational mission planning, financial, contracts, legal, and integrated product support elements functional SMEs. To this end, the HSI AO supporting the PM, ATEC, or both, usually participates in this IPT. Additional information about the PSMIPT is available in the PSM Guidebook.

f. HSIs are in the reporting process. HSI data and findings are integrated into ATEC reports via the ILSED evaluator as part of the suitability evaluation. HSI SMEs are expected to analyze and provide written summaries of survey results, test incident reports, and other data from DT and OT. Findings are usually provided with respect to HSI domains, but must also be linked to AST developed DSMs for linking test results to MOEs and MOPs. It is customary that HSI Analysts supporting ATEC will be asked for an initial and final HSI domain rating and may be expected to provide input to the overall integrated logistics support rating, depending on program scope and DSM.

g. HSIs are in LDs. The LD(s) are used to evaluate the adequacy of the PM SSP and ensure that the gaining unit has the logistical capability to achieve IOC. The PM will perform an LD as part of DT outlined in AR 73–1 to evaluate the adequacy of maintenance planning for the system (such as, maintenance concept, task allocation, troubleshooting procedures, and repair procedures); training and training devices; and HFE aspects and HSI related to operator and maintainer tasks. Additionally, the PM is to ensure that HSI requirements are included in logistics support strategies, concepts, and plans, and documented in the life cycle sustainment plan (see AR 700–127). As a member of the AST, the HSI SME attending the LD with their ILSED evaluator is responsible for conducting a Human Systems Integration Assessment Conference (HAC). The HAC is convened to identify, discuss, and correct HSI issues identified in the LD prior to OT. Representatives of the AST, TCM, and PM normally attend and provide input into the HAC findings

from LD and provide a final rating against system readiness for test as Green, Amber, or Red. Results from the HAC are provided to the PM for inclusion into the final LD report.

5–5. Summary

HSI plays an important role in all aspects of the formal T&E process; a process that can stretch out over many years. Regulations provide justification for HSI involvement but do not always provide a complete basis for participation. Starting with testable requirements in the TRADOC Requirements Documents, the HSI AO must ensure that the TEMP includes sections for collection of HSI data. Then, HSI AOs support ATEC in all phases of the planning process and finally, the actual conduct of DT and OT. As a member of the test team, HSI participates in the subsequent processes for data analysis and reporting. The data from these tests, as available, forms a valuable component of the HSIA.

Chapter 6
Human Systems Integration in the Contracting Process

Section I

Process

6–1. General

For most DoD development programs, a contractor is hired and does the majority of the actual detailed design work. The contractor may also conduct much of the DT. Consequently, it is essential for the HSI AO to be involved in all aspects of the PMs contracting process. The purpose of this chapter is to help understand the details associated with HSI in the contracting process, and to provide some examples of verbiage for the various segments.

6–2. Overview

a. Role of human systems integration. When dealing with PMs, it will be very important to emphasize the importance and necessity for including and supporting a cooperative yet independent HSI Program. The PM should include HSI throughout the contract process. The contracting process is an integral part of systems engineering and acquisition for all development programs; consequently, it is essential for HSI to be included in the contracting process. HSI considerations should be clearly defined and given proper weight in solicitations and proposal evaluation guidelines provided to the Government evaluation team. The record of contractors in HSI should be an element of bid selection and contract performance criteria.

b. Contracting process.

(1) The contracting process usually starts with preparation of the request for information (RFI) and RFP and then proceeds to source selection. Once a contractor is selected, the HSI AO participates in the contract start-of-work meeting and then monitors the contractor's HSI Program. The HSI section of the SOW in the RFP and subsequent contract ranges from a few simple statements of contractor requirements for small or fast track programs, to a large comprehensive section involving multiple DIDs, citations of Government Standards, and detailed test requirements for major acquisitions.

(2) The PM and the TCM crosswalk the requirements in the CDD and CPD to the SysSpec and RFP. This process includes applying threshold and objective values to CDD and CPD requirements and identifying which specification requirements are KPPs. The contractor's efforts associated with key HSI requirements and KPPs are the primary focus during the source selection and contract monitoring phases.

(3) In contracting, there is a SysSpec which details the minimum requirements that define what the system should meet. The SysSpec should reflect what was requested by TRADOC but is written to address one capability or functionality at a time. Since HSI is a multi-disciplinary process, the total system performance is the ultimate test of compliance with TRADOC's intent. The CDD or CPD define what the PM is supposed to deliver to the Army while the SysSpec defines what the contractor must deliver to the PM. ATEC tests to the TRADOC document, not the SysSpec, but will monitor DT to determine if the system meets the SysSpec as part of the overall validation and verification process. The PMs and contractor's verification processes ensure that the contractor has met the requirements in the SysSpec, while validation is performed by the Government to determine if the system provides a capability that the Army needs.

(4) Consequently, the SOW informs the contractor what must be done to meet contractual obligations overall, while the SysSpec is the primary focus of detailed performance requirement design. The SOW can have a statement such as: "The contractor shall conduct an HSI Program throughout development and fielding" while the System Spec

could state “The System shall provide a visual warning, in accordance with MIL–STD–1472G, on the cockpit control panel within 0.3 seconds of detection of the threat.” These are two very different types of statements. The SysSpec contains specific, measurable performance or design requirements while the SOW describes planning, reporting, testing, and analysis requirements (see DA Pam 70–3 for an explanation of the SOW). The SOW may also mandate a military standard for compliance (such as MIL–STD–1472G) but the SysSpec defines which portions apply and verification defines how it will be measured. It is very seldom that an entire standard will be cited for compliance; it is generally incumbent on the Government HSI AO to tailor the standard to include only the essential requirements that need to be demonstrated or tested.

(5) Verification states how the contractors show that they met the requirement. For example, will they test three people who are representative of the anthropometric size range and consider the requirement met if all three participants perform the procedure correctly on the first trial? The HSI AO, in conjunction with the PM and contractor, helps define the verification requirements. Broad verification requirements are initially found in section four of the performance specification. In this section, verification is sorted into four categories consisting of inspection, demonstration, testing, and modeling and simulation. Sometimes, two verification methods may be used in a SysSpec depending on the juncture in the program schedule. In the case of accommodation (anthropometric size) early in the program at preliminary design review, modeling will be used to assess accommodation, whereas in EMD, the SysSpec may be assessed by demonstration.

(6) As with all contracts, the HSI AO is not authorized to direct the contractor to make changes. The HSI AO can strongly question the contractor’s course of action and ask detailed questions. However, only the contracting officer can direct changes since changes usually require additional funding. The contracting officer, in turn, will not direct changes without the approval of the PM. The HSI AO must work through the PMs process for implementing contractor design changes. In all Government contracting, the word “shall” means the contractor must meet the requirement while the words “must,” “will,” or “should” are less binding.

6–3. Tools

The primary tools available are the contract solicitation, the source selection evaluation, the contract SOW, the contract data items, the SysSpec, military standards, and communication/collaboration with a contractor counterpart.

6–4. Human systems integration in contract solicitation

a. RFI is an information request, not an actual contract mechanism. The HSI goal with the RFI is to find out whether the potential offerors have any background or experience in conducting HSI. The RFI may include language that encourages them to demonstrate their expertise such as: Provide examples of how HSI has influenced the design of existing and developmental products the offeror has produced in the past. Identify what HSI tools and processes have been used.

b. RFP development tends to be a very dynamic process with frequent changes in emphasis by the PM. The HSI AO should assist the PM by participating in RFP development from start to finish. The HSI AO must be ready to adapt to changing program goals and revise all relevant sections on short notice (see AR 602–2 for HSIs RFP process).

c. FAR specifies the Uniform Contract Format. Section C is where the actual SOW exists but Sections L and M are also important regarding HSI (see AR 602–2 for HSI requirements). Section L may provide additional guidance on the overall structure of the technical and management response section while Section M lists relative weightings of HSI compared to other programmatic aspects (such as Technical and Management).

d. RFP development is a team effort. The human factors lead often performs the role of HSI lead as well, and provides the human factors input. Ideally, all domains would fall under a section heading labeled HSI but in practice, seldom are. The HSI section should reflect the integration of the domains since the details of each domain’s input are generally addressed separately. Typically, the safety representative will prepare the Safety and HH section, the SSv representative will prepare the SSv section, and the HFE will prepare the Training section. Manpower and Personnel issues generally fall under the Supportability or Logistics sections of the contract. If a domain is not adequately addressed elsewhere, the HSI lead should include that domain in the HSI section.

e. At a minimum, the HSI lead should request that DD Form 1423 data items be included for the development of an HSIP and report. The plan should include what, where, when, and how the contractor is going to accomplish the HSI requirements. The plan and the report provide the system PM feedback as to how the contractor is implementing the HSI requirements while the system is being developed. The DD Form 1423 process ensures that all involved in the system development know and understand their responsibilities. Most importantly it supports the requirement that the PM must have a comprehensive plan for HSI in place.

f. Examples of Section C input follow. These statements are generally in addition to, not in place of, statements in each of the domain sections. If there are separate sections for all domains, the Safety section may state “The contractor

shall provide an SS program plan that establishes and documents the contractor's SS program and organization" or the human factors section may state: "The contractor shall prepare a human factors engineering plan." However, there is still a need for an HSIP. For example, if the PAL has not specifically been mentioned as the means for performing a SSv evaluation, then that language should be inserted into the HSI section It is preferable to have these statements in their own section but if the need arises, include them in the HSI section. An example HSI section follows:

(1) Throughout the contract period, the contractor shall conduct an HSI Program through an HSI WG. The contractor shall lead the HSI WG, providing HSI integration system status, HSI event findings, issue database updates, as well as program and design recommendations.

(2) The contractor shall prepare an HSIP in accordance with DI HFAC 81743A. DD Form 1423 will be used to identify potential data requirements in a solicitation, and deliverable data requirements in a contract. The plan shall be delivered in accordance with DD Form 1423 item A0XX. The A0XX refers to the line item number on DD Form 1423; so A0030 might be the reference number for the HSIP and contractors often refer to DIDs by their A00XX…number. If the PM does not allow the use of a DID, a more generic statement may be used such as: "HSI Management Plan. The contractor shall prepare, deliver, and update an HSIP." The HSI AO has to specify when it is due and any updates: "within 90 days of contract award and shall provide two updates; one at preliminary design review and a second at critical design review."

(3) The contractor shall prepare an HSI report in accordance with DI HFAC 81833. The report shall be delivered in accordance with DD Form 1423 item A0XX and shall include the results of all HSI analyses, demonstrations, tests, and program reviews. Note: multiple iterations are normally requested of the report (for example, every 6–12 months for a major system). This information can be included in an overall contract status report, but HSI will be relegated to a small section at the end. Therefore, a separate report is usually better because the HSI AO has direct control when the information is included in a separate document.

(4) The contractor shall perform and deliver an analysis of the HSI Program and include the analysis in the HSI report. The analysis shall assess the status of the system's HSI Program and contain adequate data to support the contractor's assertions that the system meets the HSI requirements for the milestone decision and design reviews.

(5) The contractor shall lead the HSI WG which will provide HSI integration system status, event findings, issue updates, recommendations, and design data to the contractor's lead engineer.

(6) The contractor shall develop and maintain a single database in contractor format for all unclassified HSI issues and a separate database for classified issues. HSI database shall be available on the program website to all HSI WG members. All critical and major issues (as defined in AR 602–2) shall be raised to the Government within 60 days and a resourced mitigation plan in place within 120 days after notification to the Government.

(7) The contractor shall identify applicable sections of MIL–STD–1472G and MIL–STD–1474 and include them in the SysSpec.

(8) The contractor shall prepare a list of HSI events (User Juries, Demonstrations, or Tests) and include in the DI HFAC 81743A. Data from these events shall be reported in DI HFAC 81833.

(9) The contractor shall conduct tests of Soldier workload with the system using surrogate or actual control interfaces and shall report the results in DI HFAC 81833. The contractor shall allow Government access to observe the tests as well as for the Government to administer data collection instruments.

(10) The contractor shall use JACK human figure models prepared by ARL HRED as the standard models in all 3-dimensional analyses of crew workstations, which are based upon the U.S. Army Soldier Boundary Mankin Set as documented in the Government Furnished Equipment list (Exhibit XXX of this RFP) configured in the approved list of individual equipment (Exhibit YYY of this RFP; Note: the exhibits referred to in this example must be included in the RFP and will vary depending on the MOS of the Soldiers involved). This statement is included because it provides Government configuration control over the human figure model the contractors can use and provides a common framework for evaluation of the crew workspace areas. The approved list of individual equipment can include hundreds of items and should be approved by TRADOC prior to release of the RFP. Additional coordination is required if there are other areas of HSI to control and similar statements should be created.

(11) The contractor shall use the Improved Performance Research Integration Tool (IMPRINT) model as the basis for all estimates of Soldier performance task times.

(12) Section L (Instructions to Offerors) example input. The contractor shall demonstrate:

(a) How the HSI Program will be implemented.

(b) The Offeror's HSI organization and approach to HSI domain integration.

(c) The approach to identifying HSI risks in system development and engineering.

(d) Plans for ensuring HSI participation in system design efforts.

(e) How they will address training.

(f) How they will integrate HSI into the contractor's T&E program.

(g) The approach to coordinating and integrating HSI with supportability activities.
(h) How they will include the target audience in user-centered design activities.

Section II

Contracting

6–5. Source selection

Source selection planning and implementation is further explained in AR 602–2 (see AR 602–2 for additional information on source selection planning and implementation).

a. Participation in the source selection process helps ensure that HSI is addressed by the potential contractors. The process can be long, may require sequestration, and may also require frequent revisions to write-ups; but overall, participation in source selection is an essential component of the HSI Program. Frequently, selection board members are not allowed to state that they are on a source selection board; for fear that someone will attempt to influence members. The process is defined by the PM contracts specialist and normally requires that every participant sign a non-disclosure agreement to certify that there are no personal connections with any of the offerors through stocks, bonds, or family relations.

b. The actual work involves reading the proposal and documenting where the proposal fails to meet what was requested, and scoring the shortcomings in accordance with the PMs guidance. Boards can meet for a few hours, a few weeks or a few months, depending on the cost and complexity of the program. The Board needs to know if the technical proposal is complete, feasible, and consistent across the whole proposal, whether the cost proposed is sufficient if the management team understands the task at hand, if the schedule of work makes sense, and whether the personnel performing the work are qualified.

c. RFPs may have varying procedures for evaluating proposals. However, evaluation of each proposal will be conducted per the criteria in sections L and M. The FAR requires a fair and objective evaluation process.

d. Typically, the proposal will be evaluated for technical merit, management capability, cost, and past performance.

(1) *Technical merit.* A majority of the evaluation occurs in this section. Criteria will be awarded as deficient, uncertain, meets, or strengths.

(2) *Management capability.* This section details whether the offeror has management and organizational resources, including facilities, to execute the SOW.

(3) *Cost.* The cost of a contract is the sum of direct and indirect costs allocable to the contract, incurred or to be incurred, plus any allocable cost of money.

(4) *Past performance.* It is important and relevant that the contracting officials consider a contractor's past performance as an indicator that the offeror will successfully perform a contract to be awarded.

e. If the AO required use of a model such as ORCA or JACK, the contractor needs to demonstrate that they have sufficient computer power to run the software, that they own the software or can obtain it, that they have a trained person to use the software or the program schedule includes training someone, and that they have a mechanism for transferring Computer Aided Design files in the proper format into the model. The proposal may also need to show how the contractor will share those files with the Government.

f. The contractor cannot run tests with the system's actual or surrogate control panels if they have no lab with mock-up capabilities, so a review of their plans for use of simulation facilities for HSI purposes should be performed. If tests are required, offerors will also need statistical analysis software, and verify that they have it in place.

(1) The contractor is not required to have the specific personnel identified in the proposal under contract; but must show that they can provide personnel with proper background. Once the contract is awarded, the contracting officer's technical representative should monitor the prime contract effort to ensure they are performing to standards.

(2) The cost must be reasonable and realistic. If there is no labor or insufficient labor called out for HSI in the basis of estimate for the Work Breakdown Structure, bring this shortcoming to the immediate attention of the source selection board. The evaluation must assess whether the offeror has the correct labor hours and labor mix to execute scope.

(3) HSI delineated in the RFP will set the stage for the quality of HSI throughout program execution. If the contractor does not understand HSI and does not provide adequate costing for HSI in their proposal, the Government will be challenged with HSI issues the entire period of performance. Three areas in a contractor's proposal are typically evaluated by the HSI AO on the Source Selection Evaluation Board (SSEB) for HSI include the below.

(a) HSI funding allocations in the contractor's proposed cost.
(b) Integration of HSI into the overall integrated master schedule.
(c) Workspace analysis using computer aided design model files and human figure modeling to evaluate key specifications that will differentiate between competing designs.

(4) HSI funding (basis of estimate) should be assessed for the entire period of the contract. HSI should be heavily funded from start-of-work meeting to critical design review (CDR). Funding should start tapering off after CDR because most of the design work should be accomplished. However, there should be reserve funding for unforeseen HSI issues that may appear after EMD.

(5) When reviewing an RFP for HSI funding, there should be allocations in the following major categories.

(a) Manhours for meeting prep, meetings (HSI meetings and major milestone reviews); design; analysis; user juries; HSI support to other IPTs (that is hull, auxiliary, logistics, and separate vehicle variants, and so forth); HSI Program management (issue trackers, user juries); and contract deliverables.

(b) Cost of simulators, mockups, prototypes design, and building.

(c) Soldier User Juries and other specific verification events such as test site data collection, use of facilities, temporary duty cost, and HSI support to LD.

(6) Two key areas in integrated master schedule evaluation of HSI are:

(a) Ensuring scheduled HSI events are appropriate for the timeframe allowed. There should be strong HSI preceding CDR and adequate post-CDR activity should continue to properly manage the HSI Program. This includes assessments, analysis, and resolution of any new HSI challenges that occur past CDR. Soldier User Juries should occur with enough lead time to provide insight into design reviews and contract deliverables. HSI activity should take place throughout LD and T&E.

(b) Key HSI analysis should be performed prior to major design reviews to influence the design throughout the program schedule.

(7) Finally, as part of the RFP evaluation, the contractor may have submitted a computer aided design model. The HSI AO in conjunction with the SSEB modeler, should evaluate the proposed design in accordance with the parameters called out in section L of the Technical Factor in the Integrated Design sub-paragraph.

6–6. Ensuring human systems integration requirements in the contract statement of work

The proposal states what the contactor plans to do; the signed contract states what the contractor shall do. If the work is not stated in the signed contract, the contractor either will not do the work or will increase cost to do it. The contract SOW on rare occasions will be identical to the RFP SOW. Most of the time the SOW is modified based upon contract negotiations. As with the RFP, include specific statements as contractor requirements, especially in those areas where the proposal was not sufficient. HSI requirements for the SOW can be similar or identical to those in the RFP, depending on the contract negotiations.

a. General Human Systems Integration Program requirements. "The contractor shall conduct an HSI Program throughout the contract and prepare an HSIP in accordance with DI HFAC 81743A.*"*

b. Domain-specific requirements. "The contractor shall design to accommodate the central 90 percent of the population."

c. Contractor's plans for accomplishing the Human Systems Integration Program. "The contractor shall include the Government HSI AO in the engineering change approval process.*"*

d. Human systems integration in program reviews. "The contractor shall include HSI as a topic, with current issues, at every major program design review and program decision review."

e. Descriptions of required human systems integration data and reports. "All HSI analyses and data shall be submitted as part of the HSI report DI HFAC 81833."

f. Human systems integration in program reviews. "The contractor shall include HSI as a topic at every major program design review and program decision review."

g. Descriptions of required human systems integration data and reports. "All HSI analyses and data shall be submitted as part of the HSI report DI HFAC 81833."

6–7. Contractor deliverables—data item descriptions

a. See AR 602–2 for an explanation of contract deliverables. There are two HSI DIDs in the Military Procurement System; DI HFAC 81743A HSIP and DI HFAC 81833 HSI report. In accordance with MIL–STD–963, DIDs are officially sanctioned documents that are used in contracting. This means they are recognized as valid, necessary, and useful documents in dealing with contractors. In theory, they contain everything needed to request for a successful HSI Program. However, DIDs are generic and therefore the product received is only as good as the person preparing the product. It is still a good idea to submit detailed requirements whenever possible (as in the examples above) and use the DIDs as the place where the data is presented. An alternative is to tailor the DID to include specific verbiage applicable for this specific program (see table B–6). Generally, this requires that a separate DID be created that is specific to the program underway, but the effort is worth it.

b. The HSI AO always wants approval authority over acceptance of the HSI DD Forms 1423 and DIDs to exert control over the plan and report content. As an HSI AO, the more flexibility there is to structure the contract deliverables, the better the product will be.

c. DIDs are included on DD Form 1423 (table B–7 provides an example). The DD Form 1423 defines how often a document must be prepared and at what intervals, states whether a draft is required, and states how long the Government requires for review prior to approval.

Section III

System Specifications, Standards, and Communications

6–8. System specification

a. The specifications for how the system is to operate for the user in the operational environment, how the human influences performance parameters and in the quality assurance paragraphs, how those requirements will be verified are further outlined in AR 602–2 (see AR 602–2 for specifications on HSI objectives and thresholds identified in the CDD).

b. The HSI AO should provide input to the SysSpec, defined in MIL–STD–961E as: "A type of program-unique specification that describes the requirements and verification of the requirements for a combination of elements that must function together to produce the capabilities required to fulfill a mission need, including hardware, equipment, software, or any combination thereof." The SysSpec is the primary focus of all design and contract testing. HSI must be included in Section 3, which states the requirement, and in Section 4, which states how the requirement will be verified. Verification is defined in MIL–STD–961E as: "Confirmation through the provision of objective evidence that specified requirements have been fulfilled. Objective evidence may be obtained through observation, measurement, test, or other means." The Verification Section, therefore, is just as important as the requirement section. Test is usually preferable but for cost reasons, HSI requirements are often verified through observation of another test or limited to a demonstration with a few Soldie7rs or with contractor technicians.

c. MIL–STD–961E provides guidance for elements and topics to be considered when developing a specification. However, it is not all inclusive and every item listed does not need to be included. Whenever possible, establish a separate section for HSI with the domains beneath it. The HSI AO's job is to ensure the domains are all included, with specifications entered as appropriate in sections. For example:

(1) Para 3.2.1: Total System Performance Characteristics.
(2) Para 3.2.2: Physical Characteristics.
(3) Para 3.3.6: Safety.
(4) Para 3.3.7: Human Factors Engineering Program.
(5) Para 3.3.8: Soldier Survivability.
(6) Para 3.3.9: Health Hazards.
(7) Para 3.6: Manpower, Personnel, and Training.

6–9. Military standards

Typically, each domain expert will be familiar with the standards they incorporate. The HSI AOs primary job is to ensure that there are no conflicts among the requirements being placed across domains and provide a common basis for interaction with the contractor. The Government HSI AO should participate in tailoring the standards down to the minimum essential requirements in the SysSpec.

6–10. Communication and collaboration with the contractor counterpart

Attend the contract kick-off meeting and ensure HSI is on the agenda. Face-to-face meetings at the beginning of a contract help set expectations on both sides and also help the Government and industry representatives to get to know each other. Periodically, meet with the contractor's counterpart face-to-face as well as on teleconferences and HSI WIPT meetings. A report must provide information as discussed directly with counterpart. A report is a legal necessity and should include what was mutually agreed upon.

6–11. Summary

The contracting process is a critical component of any acquisition program in that it directly affects what is delivered. Therefore, HSI should be included in all phases of the contracting process. Since a large portion of an HSI AOs time will be associated with collaborating with and assuring contractor's performance, it is essential to be proactive in defining the SOW and SysSpec input. Finally, when the contractor enables a successful HSI Program, problems that

arise tend to be simpler to resolve and HSIAs less prone to critical or major issues. A well designed HSI contracting process enables the correct execution of systems development and associated delivery to the Soldier.

Chapter 7
Human View

Section I

Process

7–1. Overview

The human viewpoint was developed by a panel of system engineering and HSI practitioners in 2007. The goal was to develop an integrated set of models, similar to existing architecture viewpoints, that included and organized human data as part of the architecture description (RTO–TR–HFM–155). HSI practitioners have long argued that without a viewpoint that focuses on the human component of the system, there is no basis in the architecture for analysis of human issues that may impact multiple aspects of the system (for example, performance analyses that consider the human impact to system performance, cost-benefit analyses that consider the impact of MPT on total costs, and requirement analyses that include the human specifications to adequately operate and maintain the system). With a viewpoint that captures human considerations, these factors can be assessed and addressed early in the acquisition process, along with their technical counterparts. The consideration of human issues early in the acquisition phase can enhance overall systems performance by ensuring efficient and effective use of human resources within the system, ultimately reducing overall system costs. Utilizing the human viewpoint supports HSI's goals of optimizing total system performance, reducing life cycle costs, and minimizing risk of Soldier loss or injury by ensuring a systematic consideration of the impact of the materiel design on Soldiers throughout the acquisition process.

7–2. Building a human viewpoint

a. Human viewpoint models. The human viewpoint contains seven models that include different aspects of the human element, such as roles, tasks, constraints, training, and metrics (see table 7–1). It also includes a human dynamics component to capture information pertinent to the behavior of the human system under design (see RTO–TR–HFM–155 for an explanation of human viewpoint models).

Table 7–1
Human viewpoint models

Product	Name	Description
HV–A	Concept	A conceptual, high-level representation of the human component of the enterprise architecture framework.
HV–B	Constraints	Sets of characteristics that are used to adjust the expected roles and tasks based on the capabilities and limitations of the human in the system.
HV–C	Tasks	Descriptions of the human-specific activities in the system.
HV–D	Roles	Descriptions of the roles that have been defined for the humans interacting with the system.
HV–E	Human Network	The human to human communication patterns that occur as a result of ad hoc or deliberate team formation, especially teams distributed across space and time.
HV–F	Training	A detailed accounting of how training requirements, strategy, and implementation will impact the human.
HV–G	Metrics	A repository for human-related values, priorities, and performance criteria, and maps human factors metrics to any other Human View elements.
HV–H	Human Dynamics	Dynamic aspects of human system components defined in other views.

b. Relationship. The relationship between the data captured in each Human View product is shown in figure 7–1. These relationships can be used to develop a simulation model to evaluate the impact of the human on the system performance. IMPRINT is a human performance modeling tool developed by ARL to help system developers predict the impact of operator attributes on system performance. In order to use IMPRINT as the model for the Human View Dynamics, a mapping was created between the Human View products and the IMPRINT model as shown in table 7–2 (Handley & Broznak, 2011). This mapping indicates how the information captured in the Human View static products can be applied as input data to the IMPRINT model.

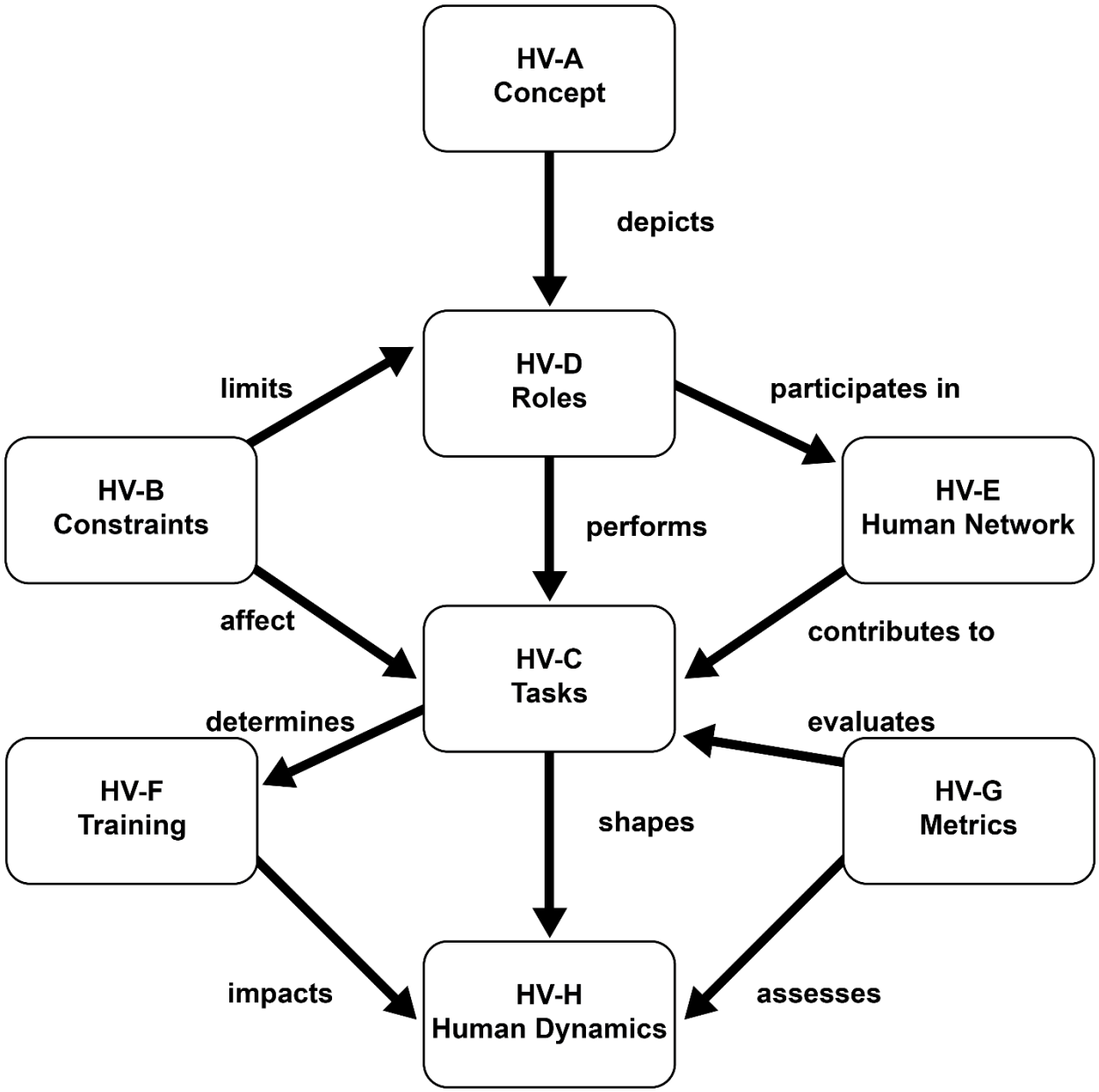

Figure 7–1. Human view relationships

Table 7–2
Mapping of human view products to improved performance research integration tool data

Information captured in human view		Data required by IMPRINT model
HV–A Concept	A high-level representation of the human component of the system	Hypothesis to be tested by the model
HV–B Human Factors Constraints	Operator capabilities and limitations under various conditions	Selection of the moderator settings of personnel and stressors
HV–C Tasks	Task decomposition and interdependencies; systems available for task completion	Generation of the network diagram composed of tasks and subtasks; assignment of system interfaces to tasks
HV–D Roles	List of roles and assigned task responsibilities	Creation of operator list; assignment of operators to tasks
HV–E Human Network	Role groupings or teams formed; interaction types between roles and teams	Identification of team functions and operator teams
HV–F Training	Training required to obtain necessary knowledge, skills, and abilities to perform assigned tasks	Selection of the moderator setting of training
HV–G Metrics	Performance parameters and standards	Identification of mission-level time and accuracy criterion and selection of task-level time and accuracy standards

c. Stages to develop the human viewpoint. The human viewpoint models can be compiled by going through a series of steps, broken into stages (Handley & Kandemir, 2013). The first stage is initiated by the concept of operations for the overall system concept. From this use cases (HV–A) are developed that describe the interaction of humans with the operational environment and system components. The second stage develops the human roles (HV–D) and tasks (HV–C), often in tandem. Tasks describe the human activities, usually by more fully decomposing higher-level functions. Roles represent job functions or task groupings. The mapping between the two is a key product of the development as it drives manning and training requirements. The first two stages are shown in figure 7–2.

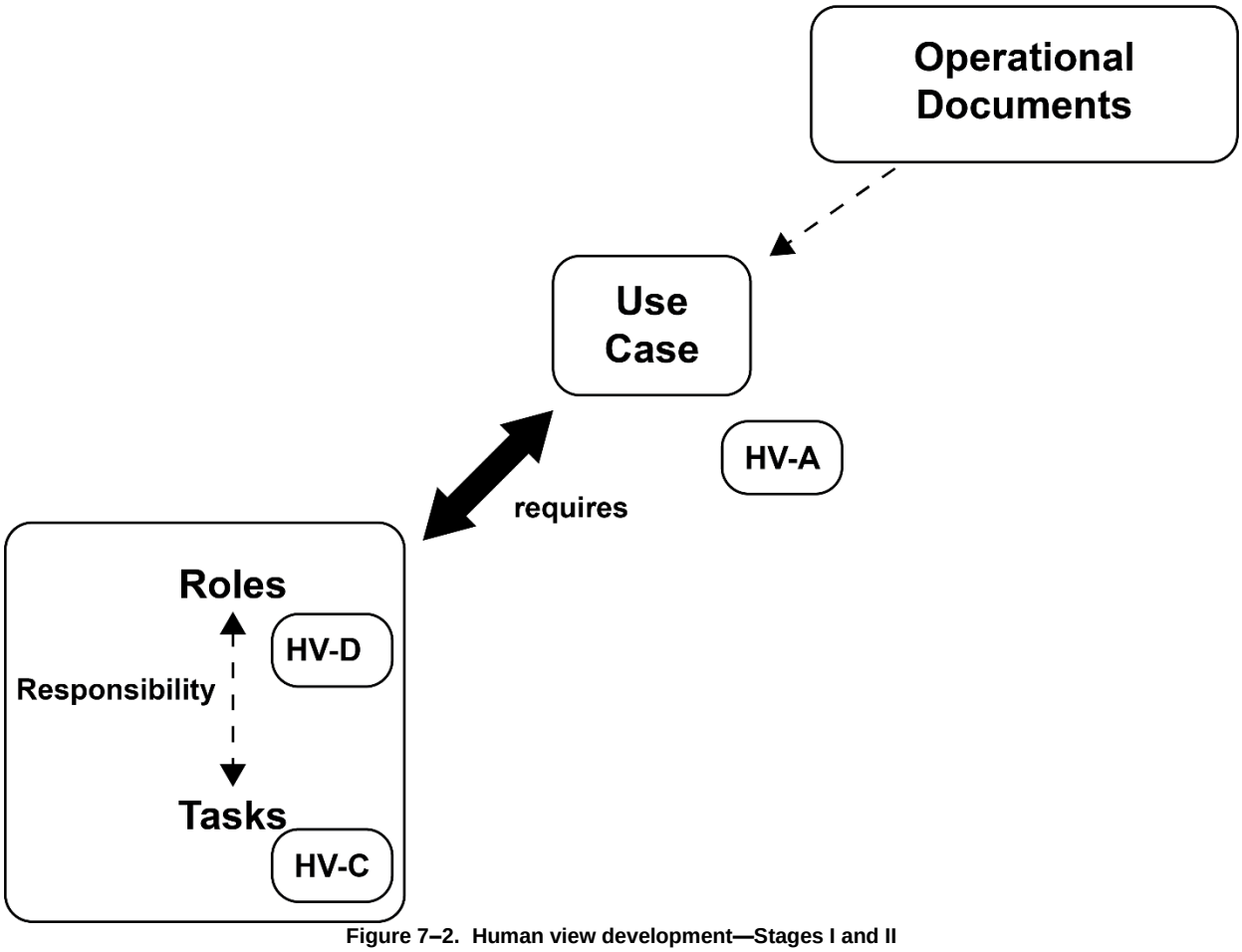

Figure 7–2. Human view development—Stages I and II

d. Third stage. The third stage focuses on human interactions and develops a human network, usually represented as a work process (HV–E) which describes the interactions of the roles completing tasks to support the use case. This is another key product of the human viewpoint as it describes human activity over time, which is a driver of workload (and overload) for the individual roles. At this stage, role locations can also be included, which is important for designing distributed teams. Metrics (HV–G) representing human performance criteria are also determined. SMEs are often consulted at this stage to ensure that the human interactions with the system are accurately represented. This stage is shown in figure 7–3.

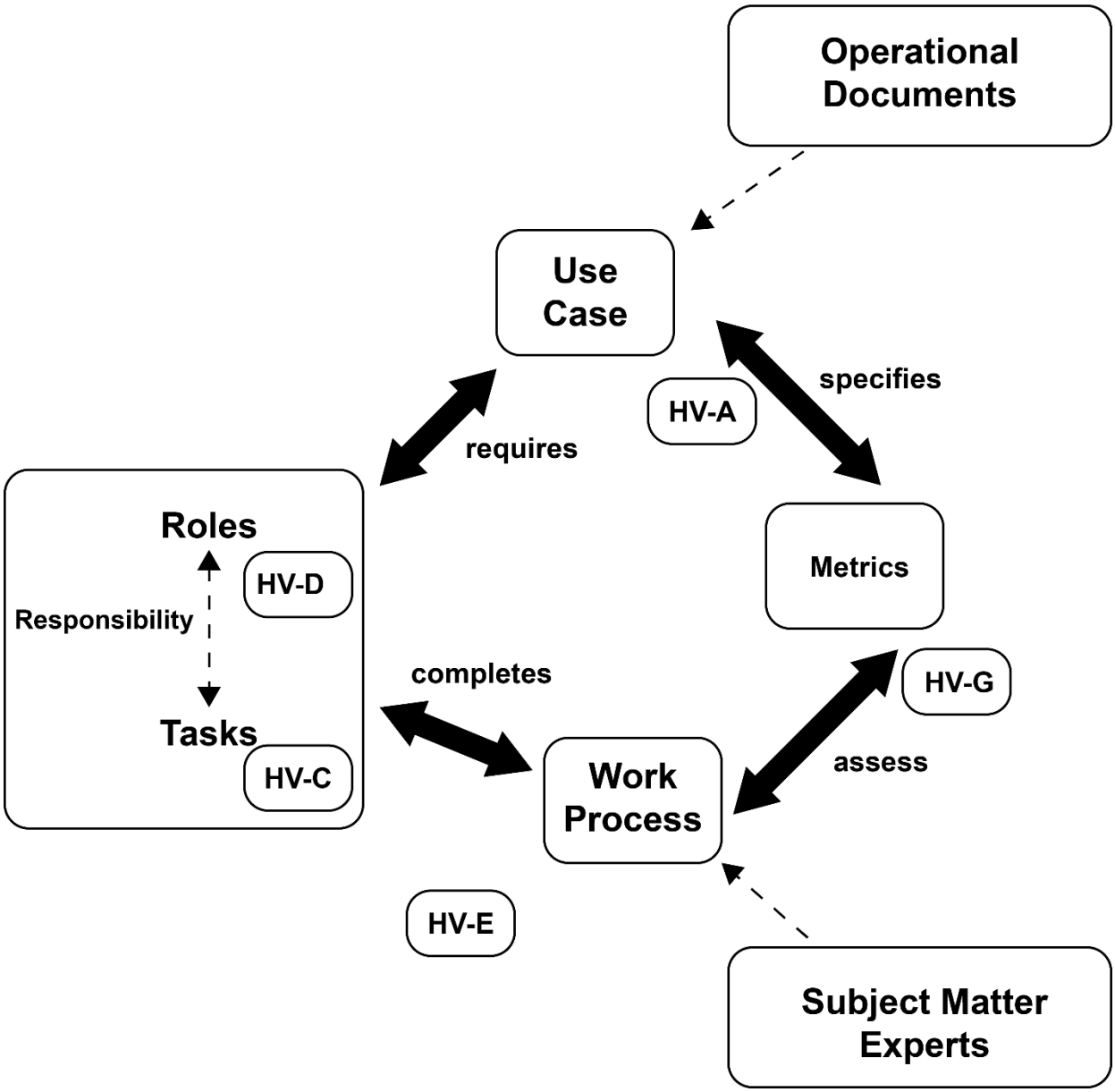

Figure 7–3. Human view development—Stage III

e. Fourth stage. In the fourth stage, manning assignments (HV–BI) are completed by mapping personnel to roles based on current qualifications. Additional training (HV–F) requirements are determined based on anticipated knowledge, skills, and ability requirements. Other human factors constraints (HV–BII) are captured that may impact the human system, such as work cycle and availability. After the completion of the individual products, the human dynamics (HV–H) can be used to pull together the information captured in all the products to evaluate the total human system behavior. Figure 7–4 shows the completed human view development process.

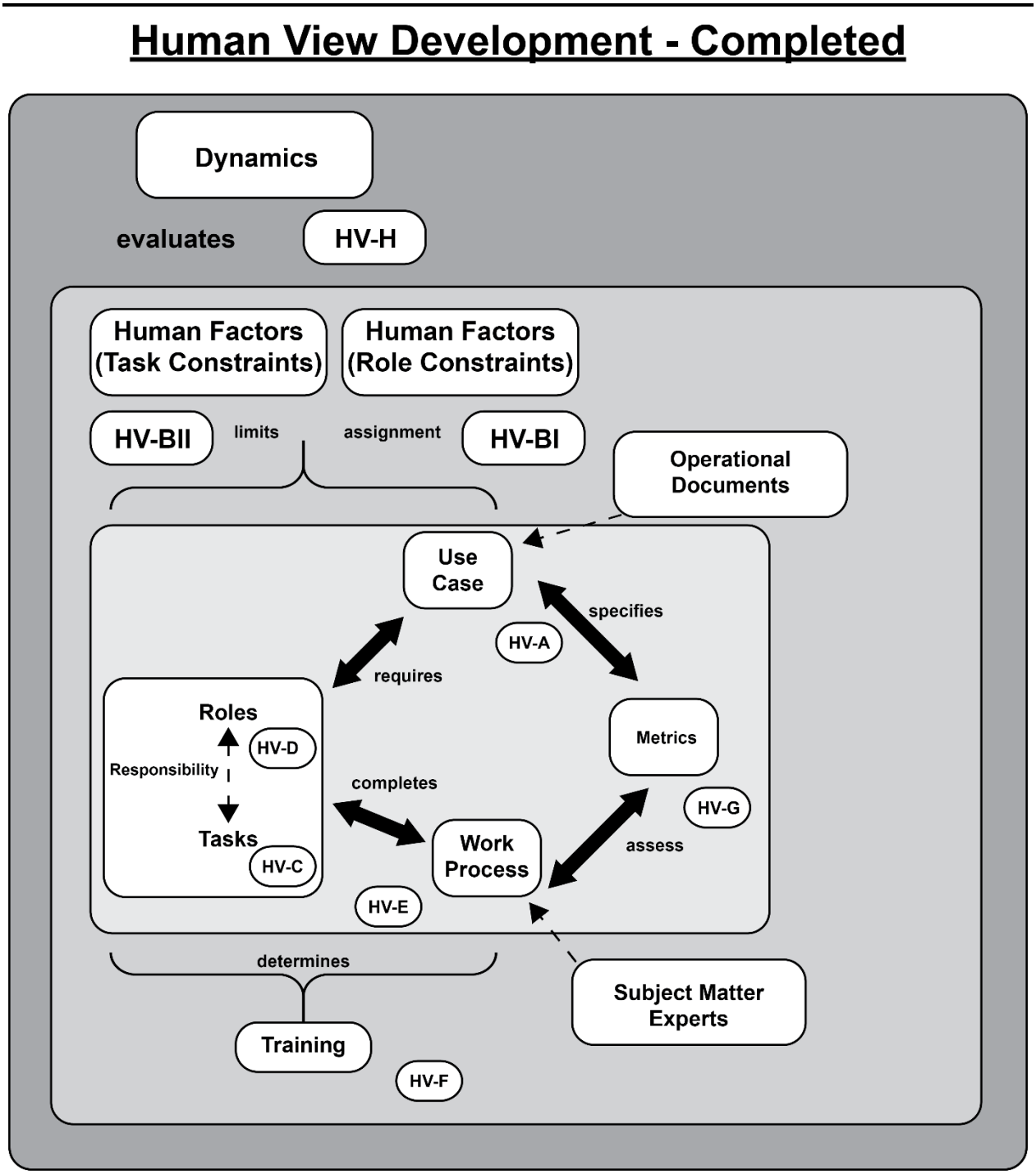

Figure 7–4. Human view development—Completed

f. All personnel. The human viewpoint models should capture information about all personnel who interact with the system in any capacity. The operators, maintainers, and support personnel possess specific knowledge, skills, and abilities that must be accounted for in the system design, along with their physical characteristics and constraints, just as the technology elements of the system have inherent capabilities and constraints.

Section II

Applying the Human Viewpoint

7–3. Applying the human viewpoint in acquisition

a. The human viewpoint models can provide information to the JCIDS analysis starting in the pre-MS A stage. At this stage, capability gaps, capability needs, and approaches to provide these capabilities are defined. By including the human data in the architecture, it also presents an opportunity to address MPT needs required by the conceptual system. Table 7–3 shows the individual models that support the pre-acquisition JCIDS process.

Table 7–3
Support of human view products for Joint Capabilities Integration and Development System

JCIDS step	Goal	Supporting human viewpoint models
Functional area analysis	Tasks to be accomplished	HV–A provides an overview of objectives HV–C provides insights into tasks that are required to achieve military objectives HV–G provides performance standards and metrics for system tasks
Functional needs analysis	List of capability gaps	HV–B1 may identify manpower gaps that cannot be supported by current personnel HV–D identifies the needed roles to support tasks HV–E identifies information exchange requirements between roles– may also identify implications of distributed (reach back teams)
Functional solution analysis	Potential integrated DOTMLPF approaches to capability gaps	HV–B1 provides the ability to conduct strategic manpower tradeoffs and comparisons between potential options HV–B2 identifies the impact on personnel issues on career progressions (as well as costs) HV–F identifies the impact on training programs (and costs)
Post independent analysis	ICD	Complete set of initial human view product documents

b. The human viewpoint supports HSI's goals of optimizing total system performance, reducing life cycle costs, and minimizing risk of Soldier loss or injury by ensuring a systematic consideration of the impact of the materiel design on Soldiers throughout the acquisition process. Figure 7–5 shows the application of HSI both pre- and post-MS A. The human viewpoint models capture the different HSI perspectives, which applied during the system acquisition process can result in risk reduction and fewer changes in the mature system. The HSI issue processing cycle supports personnel planning for the deployed system by analyzing the work allocation, personnel demand, and required training. It also allows early assessment and mitigation alternatives for survivability aspects (that is, force protection, safety, and HHs).

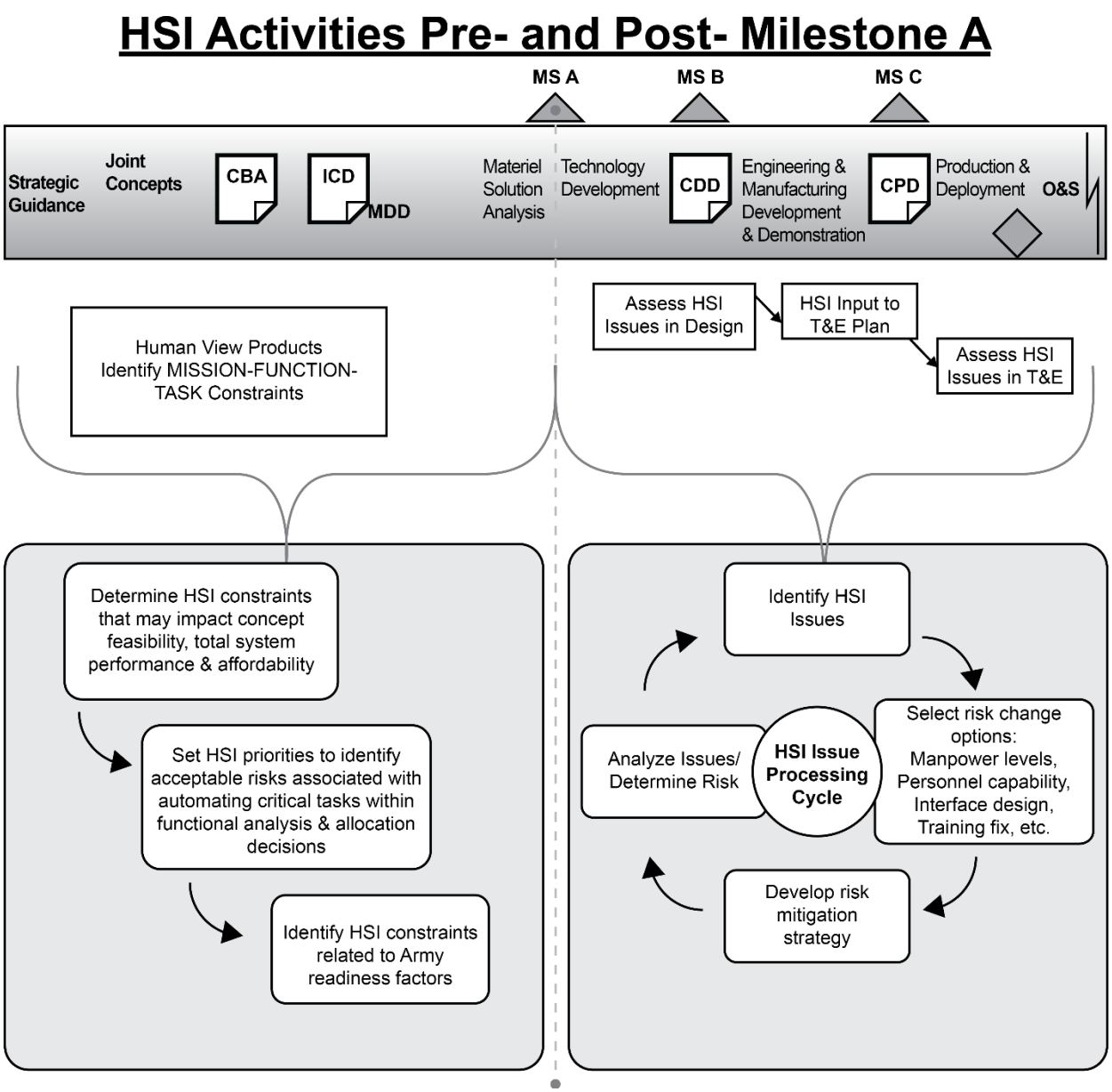

Figure 7–5. Human systems integration activities pre-and post-milestone A

c. The human viewpoint provides a way to include HSI into the mainstream acquisition and system engineering process by promoting early and often consideration of human roles. It provides early coordination of task analysis efforts by both system engineering and HSI Teams. Implementing a human perspective can reduce system risk due to technical design problems by communicating information about the needs and constraints of the human component and insure optimal performance and safety.

d. It is not necessary to complete the full set of models to benefit from a human architecting effort. Each individual model captures a "snapshot" of different aspects of the human system and can add value to the architecture description. For example, the HV–C captures the human-level activities of a system. These tasks can be described in terms of a sequence diagram, a temporal ordering of the tasks. This can give an indication of how a given sequence of tasks will perform, and the performance predictions for alternative sequences of tasks can be compared. Analyses with single products can also provide insights in comparing "as-is" and "to-be" architectures. For example, an analysis of the role assignments (HV–D) based on task changes may result in recommendations to reallocate tasks based to other roles

based on workload, skill requirements, or locations. For network based systems, an analysis of the HV–E may result in coordination requirements for distributed team members to define responsibilities and information sharing. Even using a subset of the human viewpoint models provide the opportunity to capture and organize diverse human information to assess design and recommend improvements.

7–4. How the human viewpoint supports and affects human systems integration

The human viewpoint supports HSI's goals of improved integration of humans and systems. Humans play a pivotal role in the performance and operation of most systems, (that is systems must be supported by sufficient manpower, and personnel must be adequately trained to operate the system), therefore the absence of a human perspective in the architecture framework leaves a gap in both the system architecting and acquisition process. The human viewpoint organizes information and provides a comprehensive representation of human capabilities related to expected performance. It provides a basis for decisions by stakeholders by enabling structured linkages from the engineering community to the manpower, personnel, training, and human factors communities. It provides a fully integrated set of products that can be used to inform and influence system design, development, and production process, facilitates human system tradeoff considerations, and it ensures the human component has visibility as part of the system acquisition process.

7–5. Summary

There is a direct relationship to the information captured in the Human View products to the simulation model outcomes. The Human View can show the effect of high workload, poor training, and inadequate communications on system outcomes. The Human View documents the unique implications humans bring to the system design. A universally accepted Human View enables consistency and commonality across service elements and international forces. Ultimately, the goal of the Human View is to show that failing to consider human issues in system design can have an impact on overall performance.

Appendix A

References

Section I

Required Publications

AR 602–2
Human Systems Integration in the System Acquisition Process (Cited on title page.)

DA Pam 70–3
Army Acquisition Procedures (Cited in para 2–2*a*.)

DA Pam 73–1
Test and Evaluation in Support of Systems Acquisition (Cited in para 2–7*e*.)

DoDI 5000.02
Operation of the Adaptive Acquisition Framework (Cited in para 1–1.)

Section II

Related Publications

AR 40–5
Army Public Health Program

AR 40–10
Health Hazard Assessment Program in Support of the Army Acquisition Process

AR 40–60
Army Medical Materiel Acquisition Policy

AR 70–1
Army Acquisition Policy

AR 70–75
Survivability of Army Personnel and Materiel

AR 71–9
Warfighting Capabilities Determination

AR 73–1
Test and Evaluation Policy

AR 385–10
The Army Safety and Occupational Health Program

AR 700–127
Integrated Product Support

ARL–SR–0322
20-Year Status Report on the Human Systems Integration (HSI)/Manpower and Personnel Integration (MANPRINT) Soldier Survivability Domain (Available at https://discover.dtic.mil/.)

ARL–TN–0715
Manpower, Personnel, and Training Assessment (MPTA) Handbook (Available at https://discover.dtic.mil/.)

DA Pam 611–21
Military Occupational Classification and Structure

DI HFAC 81743A
Human Systems Integration Program Plan (Available at https://quicksearch.dla.mil/.)

DI HFAC 81833
Human Systems Integration Report (Available at https://quicksearch.dla.mil/.)

DoDI 7041.04
Estimating and Comparing the Full Costs of Civilian and Active Duty Military Manpower and Contract Support

Handley, H. A. H., & Broznak, D.
Developing, Enhancing and Utilizing Human System Integration Tools–Task 7: Human View Processes and Measures, Role Analyses (see U.S. Army Research Laboratory, Human Research and Engineering Directorate Interim Report (#716760)). June 2011.

Handley, H. A. H. & Kandemir, C.
Human View Considerations of the Intelligence Crew for the Multi-Intelligence Platform Long Endurance (see U.S. Army MANPRINT Final Report (#733021)). December 2013.

JCIDS Manual
Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS) (Available at https://www.dau.edu.)

MIL–STD–882E
System Safety

MIL–STD–961E
Defense and Program-Unique Specifications Format and Content

MIL–STD–963C
Data Item Descriptions (DIDs)

MIL–STD–1472H
Human Engineering

MIL–STD–1474E
Noise Limits

PSM Guidebook
Product Support Manager Guidebook (Available at https://www.dau.edu.)

RTO–TR–HFM–155
Human Systems Integration for Network Centric Warfare (Available at https://apps.dtic.mil.)

Tauson, R. A., Doss, N. W., & Zigler, R.
Methodology for Performing Soldier Survivability Assessments. *HSI Quarterly*, Vol. III, No. 2, Office of the Deputy Chief of Staff for Personnel, Department of the Army. Washington: DC. 1995.

10 USC
Armed Forces

Section III

Prescribed Forms

This section contains no entries.

Section IV

Referenced Forms

Unless otherwise indicated, DA forms are available on the Army Publishing Directorate (APD) website (https://armypubs.army.mil); DD forms are available on the OSD website (https://www.esd.whs.mil/directives/forms/).

DA Form 2028
Recommended Changes to Publications and Blank Forms

DD Form 1423
Contract Data Requirements List

Appendix B

Human Systems Integration Plan Example

B–1. Purpose

The purpose section ties the HSI Program to the regulations—and thus legitimizes the HSI Program—and also provides a quick overview of what the plan covers (see fig B–1). For example:

a. This HSIP describes how the Government will implement HSI on the example weapon system (EWS) in accordance with DoDI 5000.02 and AR 602–2, as well as many other regulations that cite HSI requirements. For example, DA Pam 70–3 specifically states that: *"*The document that describes how the MATDEV will identify, track, and manage the HSI risks and mitigation strategies identified is the HSIP*."*

b. EWS is an ACAT I (substitute the ACAT designation for this program) program entering EMD (identify the phase of the program or MS). This plan identifies the HSI Program objectives, team members, and issues (with associated risks). This plan also serves as the charter for the HSI IPT which is a technically qualified advisory group that supports the product manager, EWS, for effective HSI management and integration of the operation, maintenance, and support of EWS.

Human Systems Integration Plan (HSIP) Example

Example:

Combined Human Systems Integration Plan and HSI IPT Charter

Example Weapon System (EWS)

ACAT *X (enter the ACAT designation)*

(Optional - insert photo)

Day, Month, Year

Note – text in italics denotes instructions to follow while preparing a plan and charter. Delete all italic text for the plan prior to finalization. This example plan refers to PM EWS; but the program may have a Program Manager (PM) or some other designation. Use whichever is appropriate. The term Integrated Product Team (IPT) can be replaced by Working Group on many programs. IPTs tend to be used for more formal critical decision making processes while Working Groups can indicate working-level teams; but on many programs the two are synonymous.

Example intro:

This plan has been developed by the EWS HSI Integrated Product Team (IPT). The HSI IPT includes TRADOC, Product Manager, HSI domain assessor, and industrial communities. The HSI IPT reports to the Logistics *(note –the program may use a different IPT such as the Supportability IPT)* IPT which can forward issues needing resolution to the corresponding EWS technical IPT *(it will be necessary to determine which to report to)*. The purpose of this plan is to ensure that the seven HSI domains (Manpower, Personnel, Training, HFE, System Safety, Health Hazards, and Soldier Survivability) are given systematic attention and consideration in all equipment design, supportability, and program decisions. This document shall serve as a framework for all HSI related decisions and processes.

Approved:	Approved:
[Insert Signature]	[Insert Signature]
[Typed Name]	[Typed Name]
PM, EWS	TCM, EWS

Figure B–1. Human systems integration plan example

B–2. Scope

a. Identify the HSI lead and who the IPT reports to, such as the logistics lead or the supportability IPT. Add this same info to the introductory paragraph on the cover page. Some PMs may try to restrict scope to specific areas of design or exclude domains such as training; the scope section will be the result of how well the PM is on board with the HSI Program.

b. For example: The HSI IPT will report directly to the PM, who is responsible for managing the HSI Program. Organizationally, HSI resides under the SIPT. The HSI IPT will evaluate issues associated with the design, development, training, testing, fielding, and support of EWS.

B–3. Human systems integration challenges

a. Intent is to provide some background on the known problems. The challenges could serve as the basis for initial issues in the tracking database and as areas of focus for contract preparation and specification development. To identify potential issues, read any existing HSIAs for other systems that are similar to this system. Identify any SMEs with previous experience to obtain a better understanding of the nature of the problems with previous systems. In addition, if IMPRINT, JACK, ORCA, or other models exist for previous variants, review them to identify the key tasks and design constraints that drove Soldier performance. If a previous ME exists for any similar system, it should provide an idea of the magnitude of personnel impacts from the new system. A previous TAD, if available from TRADOC, can also provide potential personnel impacts. Same applies for previous safety and HHAs. ATEC test reports from OT are a great source of information for what types of data were collected on predecessor systems and the actual impact of Soldier performance problems.

b. For example: EWS presents many HSI challenges. The active armor system does not have a comparable predecessor so there is little known about how the SSv will be impacted. The high-tech crew station includes a means for controlling unmanned ground vehicles; the first time this capability has been added in a tank. Consequently, this design may require skills over and above what current MOSs provide. The upgraded engine is a COTS system, which has known major HSI problems with component weights as well as problems with access to routine maintenance check points for small personnel. The 120-mm cannon is used on other vehicles, but those vehicles have a considerably bigger chassis and there is a new formulation of gun propellant with different chemical byproducts than previous propellants. Consequently, combined with the new fire control system, the crew may need to use different procedures with this system than with current vehicles. A new training program may be required to provide the Soldiers with the skills necessary to effectively employ the EWS. In addition, EWS does not replace any current system, so the Army will need to add overall manpower or identify billpayer MOSs to keep overall end strength at current levels. No unique data collection techniques are anticipated compared to previous systems.

B–4. Events and activities (examples)

Every program will have a different event timeline but many of these examples will be the same. Examples:

a. MS B—prepare HSIA.
b. SysSpec development—prepare HSI specifications.
c. Source selection—participate in evaluation of candidates.
d. Kick-off meeting with contractor—meet industry counterpart and level-set expectations.
e. Quarterly design reviews—review progress of HSI Program.
f. Preliminary design review—identify potential critical issues.
g. CDR—identify critical and major issues remaining.
h. First prototypes delivered—review final deliverables for compliance with requirements.
i. DT—provide support to the PM; collect data and prepare report.
j. OT—collaborate as PM representative; support as an evaluator for AEC.
k. HSI feeder assessments—request six months prior to MS.
l. MS C–HSIA complete one month prior to MS.

B–5. Human systems integration integrated product team charter

This can be included in the plan or as a separate document depending on the PM's preference. There is no mandatory requirement to have an IPT; it is solely based on the PM's program structure but serves as a place to bring together different groups. The actual day-to-day HSI work per se, is not necessarily part of the IPT; depends on the program.

a. Authorization. Denotes that the PM approves of the existence of the IPT. For example: The PM has management responsibility for providing overall direction and guidance in the development, acquisition, testing, PIs and fielding of EWS. Consequently, the PM EWS authorizes the creation and conduct of an HSI IPT and will provide the information and resources necessary for the HSI IPT to perform its responsibilities.

b. Responsibilities. Spells out exactly what the IPT is entitled to discuss and impact. For example: The HSI IPT will be responsible to PM EWS and the TRADOC Program Office (or TCM—whatever current title the TRADOC office uses) for the following: (then provide the list of responsibilities such as these examples).

(1) Develop requirements for the materiel needs statement, ICD, capabilities development document, capabilities production document, SysSpecs, and letters and memorandums of agreement (Government only).

Note. If the program is already at MS C, there is no need to include all of these requirements documents; just the ones that are still relevant, such as the CPD.

(2) Examine technical information in the HSI domains of manpower, personnel, training, HFE, SS, HH, and SSv for risk mitigation, cost, schedule, and performance requirements.

(3) Interface with all other IPTs in the program to ensure HSI is embedded in system development.

(4) Include HSI requirements in requests for proposals (RFPs; Government only).

(5) Recommend HSI portion of AS and technical approach (Government only).

(6) Develop the SSEB criteria for HSI concerns (Government only).

(7) Serve as technical advisor to the SSEB regarding HSI issues and evaluations of contractor proposal responses to the RFPs (Government only).

(8) Respond to requests from the PM for recommendations on program matters potentially influencing HSI domains. Coordinate with other elements of the PM for problem resolution.

(9) Maintain a tracking system to identify and track issues and concerns throughout the life cycle of the program. Participate in the PMs risk management process.

(10) Provide recommendations for corrective actions to resolve issues and concerns to the PM.

(11) Review, evaluate, and maintain the HSI Charter. Coordinate with all appropriate organizations and agencies in the HSI effort.

(12) Provide assistance to the PM during design and program reviews to ensure that the intentions of the HSI Program are being met.

(13) Monitor, evaluate, and support contractors' HSI issues and concerns.

(14) Collect and evaluate lessons learned pertaining to HSI Program and provide design recommendations.

(15) Conduct HSI studies, evaluations, and assessments of system designs and procedures.

(16) Provide HSI support to the development of T&E criteria, plans, data collection analyses, and reports.

(17) Ensure technical documentation is sufficient for Soldiers to effectively operate, maintain, and support EWS.

c. Administration. Details of the meetings can be provided here; such as how long before a meeting notices will go out, who prepares the minutes and by when, how minutes are distributed to members, what official process there is for entering and closing issues in the database, and any approvals required. Meeting minutes should state how many new issues were identified, how many existing issues were closed, and when and how the PM will be notified. For example:

(1) Normally the meetings will be scheduled one month in advance and notifications will be sent by email by the HSI lead. The main emphasis of the scheduled meetings is to review open action items, introduce new issues for resolution or inclusion into the tracking system, determine status of existing issues, and to develop future courses of action.

(2) The HSI lead, with concurrence from the voting members of the IPT, will designate when issues have been resolved satisfactorily and approve the entry of new issues into the database. Once new issues are entered into the database, the PM will be notified by the HSI lead. Schedules are determined and suspense assigned as required at meetings. Minutes will be prepared by the HSI lead for all meetings within one week after the meeting and specifically address the status of open and closed issues.

d. Membership.

(1) Voting members (in addition to the HSI lead, one or more of these may be voting members; up to the HSI lead to decide).

(a) HSI lead—name, organization, phone number, email.

(b) HFE—name, organization, phone number, email.

(c) MPT—name, organization, phone number, email.

(d) SSv–name, organization, phone number, email.

(e) SS—name, organization, phone number, email.

(f) HH—name, organization, phone number, email.

(g) Any other voting members (PM or TRADOC).

(2) Non-voting members**.** Ad hoc members can be added temporarily as required for modeling, tech base, specification, testing expertise, or any other needed expertise from Government, industry, or academia.

B–6. Human systems integration issue definition

HSI issues are defined as critical, major, or minor in accordance with AR 602–2. Standard definitions can be inserted here such as these examples. These definitions will also be used for the HSIA at MSs, so should reflect the definitions used in the assessment to maintain consistency. AR 602–2 definitions follow:

a. Critical. An issue regarding one or more of the HSI domains which warrants immediate attention and/or resolution to preclude serious risk to the program and the Army, regarding one or more of the following areas of risk: high probability for catastrophic injury or death to the crew or other friendly personnel; seriously degraded mission

performance or effectiveness; the requirement for major unprogrammed MPT resources; or jeopardized ability of the MPT community (DCS, G–1, TRADOC, Human Resources Command) to support system fielding with trained available personnel. Critical unresolved issues will be addressed in an HSI assessment and reported to the MDA. Critical issues often result in an overall RED rating to the program (that is, a recommendation that the program not be allowed to proceed to the next phase until the issues are resolved or the risks have been mitigated).

b. Major. An issue regarding one or more of the HSI domains that, at the time of the rating, will not preclude the program from proceeding to the next acquisition phase. Major issues often differ from those deemed as critical in that the degree of severity or the probability for occurrence is lower, or there is adequate time within the program schedule to resolve the issue or mitigate the risk.

c. Minor. Minor issues are potential issues or areas of risk regarding one or more of the HSI domains lacking sufficient supporting data or analyses. Actions to provide data and/or analyses will be accomplished as early as possible to determine the severity of the potential issue or the degree of probability for occurrence. This will facilitate issue resolution or risk mitigation.

B–7. Human systems integration assessment

Six months prior to MS B and MS C, the PM should request HRED to prepare the HSIA. The PM should also request that the domain assessments be prepared in time to feed the HSIA. The MPT and HFEA are generally merged into a single document now, the MPT and HFE assessment. The SSvA is prepared by ARL SLAD for ACAT I and many ACAT II programs, while ARL HRED prepares the SSvA for most ACAT III programs. The PESHE, safety health data sheet, and system safety assessment (SSA) are provided by the life cycle management command or Army Materiel Systems Analysis Agency and Research Development and Engineering Centers safety office for ACAT III systems. For example: HSI and domain assessments will be prepared for each MDR. Preparation of a domain assessment is the responsibility of the agency listed in table B–1.

Table B–1
Domain assessment preparation

Domain report	Responsible agencies
HSIA	ARL HRED (draft) and the HSI Directorate, Army G–1 (final)
MPTA	ARL HRED
HFEA	ARL HRED
SSvA	ARL SLAD
SSA; ISA	AMC life cycle management command or Army Materiel Systems Analysis Agency and Research Development and Engineering Centers safety element supporting the PM U.S. Army Combat Readiness Center as requested by Army Safety Office. ARL HRED FE as necessary
HHA	USAPHC

B–8. Human systems integration issue tracking database

a. (optional to include here; may be kept as a separate document). An initial database can be prepared and included in the HSIP or transferred to an Excel spreadsheet, an Access database, or the PM's approved program management software tools. The PM may want all documentation maintained on their system website if the PM has established one. In that case, anyone wishing to have access to the database would contact the HSI lead and follow whatever procedure the PM has established for granting access to the website. Issues can affect more than one domain, so a lead may need to be identified for tracking resolution. Also, PMs tend to think in terms of risk, not issues, so it is important to include the risk statement for each issue and important to be involved in any risk management IPT. The issue is a description of the problem; the risk statement says what will happen to the program or system design if no action is taken or if only partial solutions are implemented. Be careful not to mix the two. Consequently, the risk needs to use the same Probability/Severity model the risk management program uses.

b. Issue one (major). Potential increase in overall manpower requirements for the Army.

(1) Description. The EWS does not replace any current Army system. Consequently, the Army will have to find billpayer MOSs that will have to lose slots to maintain overall manpower at its current level within the Army.

Preliminary estimates indicate that over 2000 Soldiers will be required to operate EWS. To accommodate the demand, the Army will have to either increase its total manpower levels or reduce the number of Soldiers within other MOSs.

(2) Risk. The Army will not have enough personnel to meet the demand with subsequent shortages that will delay fielding of EWS.

(3) Probability. High.

(4) Severity. Moderate.

(5) Domain. Manpower.

B–9. Attachments A to H: example human systems integration checklists

These example checklists provide an effective way to double-check that all potential problems are identified and can serve as the basis for the initial interaction between the HSI lead and each domain representative. After reading these checklists, it will be easier to understand the system in detail and better explain to the PM or the design team how HSI fits in, where the concerns are, and how to help the PM. These example checklists are not all inclusive; modify to suit as needed.

a. Human systems integration plan attachment A: manpower checklist. The number of military and civilian personnel required or potentially available to operate, maintain, sustain, and provide training for systems. See table B–2.

Table B–2
Manpower checklist

Manpower questions:	Yes	No	N/A
Were manpower constraints identified in the requirement document (ONS, ICD, CDD…)?			
If there is no predecessor system, this system will likely add manpower requirements. Has a strategy been prepared to address the additional Manpower requirements?			
If there is a predecessor, does the new system require more, same, or fewer people than the predecessor system? If more, has a strategy been prepared to address the additional Manpower requirements?			
Have all MOS/ASI/Special Qualification Identifier needed to support the new system been identified?			
Are sufficient authorizations available for each MOS/ASI/special qualification identifier required to operate and maintain the system? That is, ensure that human resource demands of the system do not exceed the available supply. (Compare requirements of system with projected quantities of qualified personnel.)			
Have the numbers of Active Component, Reserve, officer, enlisted, warrant officer, and Civilian ranks been evaluated?			
Will distribution of ranks/grade change?			
Has the impact of this system on force structure during replacement or "phase in" been determined? How long will "phase-in" take?			
If a plus-up is required in authorizations for existing units, have tradeoffs been identified?			
Manpower impacts from operator and maintainer workload:			
Can increased workload be designed out by increasing system performance (for example, built in error-malfunction diagnostics)?			
Is recommended manning of operators-maintainers-repairers sufficient for continuous operations?			
Are shifts required? Is shift length too long for effective performance and thus results in a requirement for more Soldiers?			
Does fatigue or unavailability of personnel due to attrition or medical necessity lead to a requirement for additional manpower?			
Does failure of hardware or software elements, including automated functions, cause additional workload for Soldiers; thereby increasing the requirement for manpower?			

Table B–2
Manpower checklist—Continued

Manpower questions:	Yes	No	N/A
Are there labor-intensive (high-driver) tasks that could lead to a requirement for more system operators or maintainers?			

b. Human systems integration plan attachment B: personnel checklist. The personnel checklist helps determine cognitive and physical capabilities required to be able to train for, operate, maintain, and sustain materiel and information systems. The Army has a finite pool of Soldiers and Civilians (civil service or contractor) available with finite cognitive and psychomotor abilities. Aptitude, therefore, can become the limiting factor in system effectiveness potential. A truly representative sample of the target population must be used during T&E to get a proper measure of system performance so that if aptitude constraints affect system use, they can be identified. See table B–3.

Table B–3
Personnel checklist

Personnel questions:	Yes	No	N/A
Have the knowledge, skills, and abilities required by the new system been identified and documented? Compared against the aptitudes which the target audience possesses?			
Has a TAD (defines the qualifications of the users, operators, maintainers, and support personnel) been prepared?			
Has an assessment been conducted of the required aptitudes which the users must possess to complete all of the necessary training to operate, maintain, or support the system?			
Have MOS descriptions been identified?			
Has an assessment of inventory, force structure and standards of grade authorizations been conducted?			
Personnel background information:			
Is anthropometric data available for the specific MOSs operating and maintaining the system? Or solely for the general Army population?			
Are there physical qualifications identified?			
Have aptitude descriptions (Note: Aptitude is measured by the Armed Forces Vocational Aptitude Battery (ASVAB)) been identified?			
Will the system operators and maintainers require a Physical Profile Serial System?			
Are there physical limitations or standards for system personnel (such as color vision, acuity, or hearing)?			
Does the target audience have new considerations (more civilians, more females, and fewer high school graduates)?			
Are there any aptitude-sensitive critical tasks? Is it likely that personnel in the TAD can perform the critical tasks of the job?			
Skills and knowledge:			
Are skill requirements for system tasks defined?			
Are skill grade authorizations complete?			
Have security requirements been determined and documented for the operator, maintainer, and repairer as well as supporters, users, or leaders?			

Table B–3
Personnel checklist—Continued

Personnel questions:	Yes	No	N/A
Has the reading grade level been determined for the operator, maintainer, and repairer?			
How has the expected mental category distribution been considered in system design?			
MOS/ASI:			
Will the system require a new MOS?			
Will the system require an ASI?			
What is the impact on recruiting and retention for this system generated by a new MOS or ASI?			
Does the proposed system have an impact on the reassignment system (turn-around time) for operators, maintainers, and repairers?			
Has the impact of the proposed system on promotions and career development been determined for the operator, maintainer, and repairer?			

c. Human systems integration plan attachment C: training checklist. The training checklist helps determine the instruction or education, plus on-the-job or unit training required to provide personnel their essential job skills, knowledge, and aptitudes. The system must be designed so that the specified target population can be easily trained to perform to standard. See table B–4.

Table B–4
Training checklist

Training questions:	Yes	No	N/A
Are Individual training requirements identified?			
Are crew/team training requirements identified?			
Have unit collective (for example, platoon, company, and higher echelons) training requirements been identified?			
Have sustainment or refresher training requirements been identified?			
Has the method of training been identified?			
Has the requirement of embedded training been identified?			
Has the requirement for hands-on equipment training been identified?			
Have training aids devices, simulators, and simulations (TADSS), where simulations may be constructive (based on math or computer models), virtual using digital imagery, or live in the field been identified?			
Will the training be conducted at a school?			
Has Unit organization training been identified for sustainment?			
Have on-the-job requirements been identified?			
Will there be home (that is correspondence courses) training identified with this system?			
Has a training center (for example, National Training Center, Fort Irwin, CA) been identified?			
Has specific system training been identified?			

Table B–4
Training checklist—Continued

Training questions:	Yes	No	N/A
Will there be required combat tasks to be included in the training?			
Has the requirement to determine who does the training been satisfied?			
Is there a requirement for Additional instructors to provide the training?			
Will there be special skills to be trained?			
Has the requirement of who is to be trained (active, reserve, civilian); the target audience, been identified?			
Has a determination been made as to when and how long training will be and how it will be distributed?			
Are the training objectives reasonably achievable?			
Are refresher courses needed?			
Examples of training assessment criteria:			
Has the percentage of tasks performed to standard been identified?			
Has the time required to achieve qualification been identified?			
Has the number of practice trials to achieve qualification been identified?			
Has the % tasks not trained to standard been identified?			
Has the % tasks inadequately trained been identified?			
Has the % tasks incorrectly trained been identified?			
Does the training program include sufficient training equipment, reference materials, and TADSS?			
Has a determination been made as to who evaluates acquisition of targeted skills and knowledge?			
Training strategy considerations:			
Is the target audience known and documented?			
Have the system's critical tasks been identified?			
Has the target audience and trainers participated in planning the training strategy?			
If training TADSS are required, have plans been made for their development?			
Does the system require new equipment training teams?			
Has funding been set aside/identified for training effectiveness analysis?			
Has the training strategy’s validity been analyzed and checked?			
Resources, funds, facilities, time, and trainers:			
Has the total implementation of operators, maintainers, repairers, and support personnel been considered in order to resource skill training and practice?			
Have personnel flown through the trainees, transients, holdees, and students account been evaluated?			

Table B–4
Training checklist—Continued

Training questions:	Yes	No	N/A
Has the impact on personnel training or availability to work, and on career progression been considered for officers, warrant officers, enlisted personnel, and civilians?			
Will the system have an impact on Common Task Training requirements?			
How will the required training affect total force readiness, mobilization efficiency, and speed?			

d. Human systems integration plan attachment D: system safety checklist. The design features and operating characteristics of a system that serve to minimize the potential for human or machine errors or failure that cause injurious accidents. SS deals with both the safety of the materiel system, as well as the operators, maintainers, and support personnel. See table B–5.

(1) Maximize operational readiness and mission effectiveness through accident prevention by ensuring that appropriate hazard control measures are designed into the total system (materiel, performance procedures, and training) in a timely manner.

(2) A large lessons learned accident data base is located at U.S. Army Safety Center.

Table B–5
System safety checklist

SS questions:	Yes	No	N/A
Has a safety risk assessment been completed?			
Is the system safe for the Soldier or civilian to operate, maintain, repair, and support?			
Have the following hardware safety risks been considered:			
Risks associated with power sources assessed?			
Risks associated with electrical sources assessed?			
Risks associated with mechanical sources assessed?			
Risks associated with hydraulics/pneumatics assessed?			
Risks associated with chemicals, explosives, or propellants assessed?			
Are safety risks of exposed, moving equipment identified?			
Are RF/MW antenna safety risks identified?			
Are hazardous materials or by-product safety risks identified?			
Are combustion processes identified and safety risks determined?			
Are high temperature devices identified and safety risks determined?			
Have conditions of vehicular movement/flight been identified for possible safety risks?			
Are gun systems identified and their associated safety risks determined?			
Are missile systems identified and their associated safety risks determined?			
Have software safety risks been considered?			
Have design requirement statements have been developed to address or prevent the impact of the following items:			
Catastrophic loss of a materiel system or loss of a Soldier due to failure of a component or due to procedural error or omission?			

Table B–5
System safety checklist—Continued

SS questions:	Yes	No	N/A
Operational loss of a system or disabling Soldier injury due to component failure/malfunction?			
Loss of system effectiveness or Soldier injury due to component malfunction or procedural error or omission?			

e. Human systems integration plan attachment E: human factors engineering checklist. The HFE checklist drives the integration of human characteristics into system definition, design, development, and evaluation to optimize human-machine performance under operational conditions. To ensure operational effectiveness, a comprehensive technical effort must be made to integrate human factors qualitative and quantitative information into system design, testing, and acquisition. Such information includes human characteristics, operator/maintainer capability requirements, Soldier performance data, system interface requirements, biomedical factors, safety factors, training factors, and manning approach. See table B–6.

Table B–6
Human factors engineering checklist

HFE questions:	Yes	No	N/A
Has a user or user's representative been an active participant in concept development, system design, and test planning?			
Have battlefield functions been listed that must be performed to execute the missions?			
Have required capabilities been identified?			
Have organizational frameworks (chains of command) for system design been defined?			
Have job and job task descriptions been identified?			
Has development of preliminary analysis of total system functions for achieving required capabilities been conducted?			
Has a check been conducted for consistency of missions and battlefield functions?			
Has completeness of total system functions, specifications, and battlefield functions been conducted?			
Has the appropriateness of span of control been identified?			
Adequacy of lines of communication been established for both internal and external communication?			
Have issues in formation and maintenance of trust/cohesion within the organization been conducted?			
Have adequacy of provision for supplies (internal and external support) been analyzed?			
Has total system functions to man or machine been allocated to the following:			
Operators?			
Equipment?			
Maintainers?			
Embedded fault detection and diagnostics?			
Has data been obtained from the following:			
Checklists?			
Interviews?			
Questionnaires?			

Table B–6
Human factors engineering checklist—Continued

HFE questions:	Yes	No	N/A
SME observations and ratings?			
Direct performance measures?			
Video (time and motion studies)?			
Number of tasks attempted and completed been identified?			
Has time to perform tasks been measured and documented?			
Has the number or proportion of successfully completed tasks been measured accurately and identified?			
Does the design and procedures meet required Soldier or civilian aptitudes?			
Soldier error sources:			
Is the level of training provided sufficient?			
Does the equipment configuration induce error?			
Do the environmental conditions induce human error?			
Have typical sources of human error been eliminated through design?			
Is feedback provided and appropriate?			
Has task criticality, frequency of task, learning difficulty, and decay rate been established?			
Are "high driver" tasks identified?			
Has information flow analysis been conducted?			
Has task allocation analysis been conducted for the following:			
Soldier?			
Soldier and machine?			
Machine?			
Manual override of specific functions considered?			
Sequence of operational instructions?			
Task-interdependence of crew members?			
In the area of Workload analysis, have the following items been identified:			
Can workload be reduced by increasing system performance (for example, built in error-malfunction diagnostics)?			
Information processing demands?			
Memory requirements been identified?			
Learning and retention requirements identified?			
Sensory discrimination requirements identified?			
Physical workload demands identified?			

Table B–6
Human factors engineering checklist—Continued

HFE questions:	Yes	No	N/A
Task overload been identified?			
Biomedical considerations been identified?			
Strength and endurance considerations been identified?			
How will degraded manning affect performance?			
Is the number of Soldiers planned to perform various critical tasks required by the system sufficient to meet the system performance requirements?			
Psychomotor requirements identified?			
Task environment identified?			
Does the system require major dismantling for access to frequently replaced components to provide ease of maintenance?			
Are built-in self-diagnostics feasible?			
Is the system designed with an appropriate Soldier-computer interface?			
Is the system interface compatible with the capabilities of the target audience?			
Is there repetition of task steps due to poor training or poor design?			
Is there excessive use of on-line help or system documentation?			
Are there frequent requests for assistance?			
Have Ergonomic considerations been implemented?			
Is there Anthropometric data?			
Have solutions been identified to reduce the following stresses?			
Heat stress?			
Psychological stress?			
Continuous operations?			
Fatigue?			
Isolation?			
Crowding?			
Battle stress?			
NBC conditions?			

f. Human systems integration plan attachment F: health hazards checklist. The design features and operating characteristics of a system which create significant risk of bodily injury or death. Prominent sources of HH include acoustic energy, chemical substances, biological substances, temperature extremes, radiation energy, oxygen deficiency, shock (not electrical), trauma, and vibration. See table B–7.

Table B–7
Health hazards checklist

HH questions:	Yes	No	N/A
Acoustic energy: Has the probability of system-induced hearing loss been considered?			
Has steady-state noise been evaluated: Magnitude, frequency, duration, and type?			
Has Impulse Noise been evaluated: Auditory and non-auditory blast overpressure?			
Biological substances:			
Have the potential hazards associated with operation of food service facilities and management of field rations, microbiological quality of water supply, solid and liquid waste disposal, management of sewage disposal, infectious and medical wastes, pest management, graves registration, and field sanitation and personal hygiene practices and devices been evaluated?			
Chemical substances (combustion products and other toxic substances):			
Will there be solid or liquid exposures from various physical states via contact, inhalation, and/or ingestion present?			
Oxygen deficiency:			
Has poor ventilation in vehicle cabs or confined (enclosed) spaces been evaluated?			
Is there hypoxia at high altitudes present?			
Radiation energy:			
Will there be exposure to non-ionizing radiation?			
Will there be exposure to Ionizing radiation?			
Shock and vibration:			
Is there potential for shock (not electrical) (for example, opening forces of a parachute or weapon recoil) present in the system?			

Table B–7
Health hazards checklist—Continued

HH questions:	Yes	No	N/A
Will there be whole-body vibration (for example, from military ground vehicles operating over secondary and cross-country routes)?			
Will there be segmental vibration (for example, localized body area or limb in direct contact with a vibrating source, operating a hand-held tool)?			
Have design requirement statements been developed to address/prevent the impact or consequences of exposure to temperature extremes and humidity?			
Physical trauma:			
Is there a potential for physical trauma (for example, resulting from impact)?			
Is there a potential for musculoskeletal trauma (for example, resulting from heavy lifting or other adverse ergonomic health impact)?			
Have design requirement statements been developed to address/prevent the impact or consequences of exposure to HH during operation, maintenance, or repair from the following:			
The system itself?			
Any associated equipment?			
Is a HHA planned?			
Is qualified support available from Preventive Medicine Service personnel from supporting medical activity collocated with TRADOC activity?			

g. Human systems integration plan attachment G: Soldier survivability checklist. The SSv checklist defines the characteristics of a system. This checklist also lists characteristics that can reduce fratricide, detectability, and probability of being attacked, as well as minimize system damage, Soldier injury, and cognitive and physical fatigue (see table B–8).

Table B–8
Soldier survivability checklist

SSv questions:	Yes	No	N/A
Does the system have the ability to minimize or prevent engagement by allied systems to avoid fratricide?			
Does the system have the ability to support correct identification of U.S. or allied systems, which might otherwise be engaged in a fratricidal incident?			
Does the system provide support of crew training and readiness to reduce the probability of a fratricidal event?			
Does the system's weapons design reduce the probability of committing fratricide?			
Does the system's physical signature affect the system's detectability by threat forces?			
Do the system's operational characteristics affect the system's detectability by threat forces?			
Does the system provide the ability to avoid appearing as a high value target?			
Does the system have the ability to actively prevent or deter attack?			
Has the effect of the system's concept of employment on the system's survivability been evaluated?			
Does the system have the ability to minimize the risk to supporting personnel if this system is attacked?			
Does the system have the ability to protect the crew from attacking weapons?			
Does the system provide the ability to protect the crew from hazards relating to on-board equipment (fuel, munitions, and so forth) in the event of an attack?			
Does the system provide the ability to prevent further injury to the Soldier after being attacked?			
Does the system have the ability to support treatment and evacuation of injured Soldiers?			
Have the physical constraints and workload placed on the Soldier by the system been evaluated?			
Have the cognitive constraints and workload placed on the Soldier been evaluated?			
Does the system provide the ability to minimize the effect of environmental stressors on the Soldier?			
Does the system provide the ability to minimize the effect of physical and environmental stressors (for example, noise, vibrations, bouncing, and extreme heat or cold) on the Soldier?			
Does the system have the ability to promote unit/team cohesion?			

h. Human systems integration plan attachment H: human systems integration checklist. The title "HSI" means human systems integration; and the integration portion of the title means HSI is not directly responsible for the work within each of the domains but for the integration of those efforts. Consequently, HSI should reside organizationally above the level of the individual domains. This checklist applies across all seven domains. See table B–9.

Table B–9
Human systems integration checklist

HSI questions:	Yes	No	N/A
Are HSI domains addressed in TRADOC requirements documents?			
Has an HSIP for Government support been prepared?			

Table B–9
Human systems integration checklist—Continued

HSI questions:	Yes	No	N/A
Is HSI part of the process for RFP development?			
Is HSI part of the source selection process?			
Has an HSI issue and risk tracking database been established?			
Have members been identified for an HSI IPT or WG?			
Is HSI included in all T&E plans?			
Are HSI assessments and the domain assessments included on the program schedule?			
Is the Government HSI Program funded by the PM?			

Appendix C

Example Formats for the Human Systems Integration Assessment and the Transmittal Letter from U.S. Army Research Laboratory, Human Research and Engineering Directorate to Deputy Chief of Staff, G–1

Format templates for the MPTAs and combined assessments are frequently updated, but can be obtained through the ARL HRED or the U.S. Army HSI G–1 (https://www.arl.army.mil/).

C–1. Human systems integration assessment

The HSI assessment is prepared under the authority of the DCS, G–1. HSI assessments address unresolved critical HSI issues to the MDA for ASARCs, IT OIPTs, and other acquisition decision reviews. The HSI assessment is a summary document that combines the issues and concerns identified in the assessments from the seven domain assessments: MPT, SS, HFE, SSv, and HHs. The PM will address the issues, their impact on supportability and the life cycle costs, and their planned resolution in the modified integrated program summary. Issues are defined as critical, major, and minor.

a. Critical. System characteristics which, if not remedied, could reasonably be expected to result in death or serious bodily injury, mission abort, loss of the system, inability of the system to perform intended mission, or an unacceptable impact on the manpower, personnel, or training requirements of the system.

b. Major. System characteristics which, if not remedied, could reasonably be expected to result in significant bodily injury, reduced mission performance, extensive system damage, seriously diminished capacity of the system to perform its intended mission, or a significant negative impact on the manpower, personnel, or training requirements of the system.

c. Minor. System characteristics which, if not remedied, could reasonably be expected to result in discomfort to the Soldier; reduced mission effectiveness; system damage; diminished capacity of the system to perform its intended mission; or negative impact on the HSI requirements of the system. Figure C–1 shows an example format for the HSI assessment. Figure C–2 shows an example format for the HSI assessment issues.

Sample HSI Assessment

DAPE-HSI

MEMORANDUM FOR: ASSISTANT SECRETARY OF THE ARMY (ACQUISITION, LOGISTICS AND TECHNOLOGY)

SUBJECT: [Draft] Army Human Systems Integration (HSI) Assessment for the (replace with your System Name and Milestone)

1. Purpose. To report the HSI Assessment rating to inform Army acquisition decisions. Based upon a review of referenced documents, the overall rating for (System) is (color code, all caps in **BOLD**). (If your HSI Assessment is only focused on a specific component or product of a larger system – you should describe the scope of the HSI Assessment. For example — The focus of this assessment is the EWS software of the Vehicle product.) (List the number of critical and major issues identified and reference that these are listed in the table enclosure.) Number (X) critical issues and number (X) major issues were identified in the HSI Assessment and are listed in the enclosed table.

2. Recommendation. It is recommended the (system) program be approved for the transition to Milestone X with the understanding all major issues and risks will be addressed prior to (TD, EMD, LRIP or FRP) phase of the Material Acquisition Cycle.

3. Findings Summary. (This paragraph presents the summary results. The order of listing is by Criticality/Risk level (Critical, Major, Minor). If all domain issues are at the same level, present the results in the following order: Manpower, Personnel, Training, HFE, HH, SS and SSv. Each domain summary starts by referencing the domain assessment followed by the number of critical and major issues identified. For critical and major issues, a bulleted description of the issues can be presented and/or any caveats that impacted the results. If no issues were identified for a given domain, so state and list last.)

4. References:

a. AR 602-2 Army Human Systems Integration (HSI) in the System Acquisition Process. 27 January 2015.

b. MPT and HFE assessment for the (System and Date).

c. Add reference

d. Add reference

5. This HSI Assessment was prepared by the U.S. Army Research Laboratory, Human Research and Engineering Directorate (ARL HRED). The HRED point of contact is (Name), ARL HRED (FE or Branch Team Name) Field Element, DSN XXX-XXX, commercial (XXX) XXX-XXXX, or email (email address, without underline or color). The HQDA, G-1 POC is (list POC name, phone number and email address, without underline or color).

Encl

[NAME]

Director for Human Systems Integration

CF:

Director, U.S. Army Research Laboratory, (RDRL-HRB-D/(NAME))

Director, U.S. Army Research Laboratory, (RDRL-SLB-W/(NAME))

Director, U.S. Army Safety Office, (DACS-SF/(NAME))

Military Deputy, Deputy Under Secretary of the Army, Test and Evaluation, (DUSA-TE/(NAME))

Commander, U.S. Army Training and Doctrine Command, (ATFC-O/NAME))

Commander, U.S. Army Combat Readiness Center, (CSSC-E/NAME))

Commander, U.S. Army Test and Evaluation Command (ATEC), (TEAE-ILC/(NAME))

Commander, U.S. Army Operational Test Command (OTC), (CSTE-OTC-TD/(NAME))

Director, U.S. Army Public Health Center (APHC), (MCHB-PH-HHA/(NAME))

Figure C–1. Sample human systems integration assessment

ID	Issue	HSI Domain	Issue Risk Level
1.	Issue – description	Human Factors Engineering	**Critical**
2.	Issue – description	Human Factors Engineering	**Major**
3.	Issue – description	Human Factors Engineering	**Minor**
4.	Issue – description	System Safety	**Major**
5.	Issue – description	System Safety	**Major**
6.	Issue – description	Soldier Survivability	**Major**

Add any additional notes required for clarification of issues.

Issue Risk Level Key:

Critical *– a system characteristic which, if not remedied, could reasonably be expected to result in death or serious bodily injury, mission abort, loss of the system, inability of the system to perform intended mission, or an unacceptable impact on the manpower, personnel, or training requirements of the system.*

Major *– a system characteristic which, if not remedied, could reasonably be expected to result in significant bodily injury, reduced mission performance, extensive system damage, seriously diminished capacity of the system to perform its intended mission, or a significant negative impact on the manpower, personnel, or training requirements of the system.*

Minor *– a system characteristic which, if not remedied, could reasonably be expected to result in discomfort to the Soldier; reduced mission effectiveness; system damage; diminished capacity of the system to perform its intended mission; or negative impact on the HSI requirements of the system.*

Figure C–2. Sample human systems integration assessment issues for the (system name)

C–2. Letter from U.S. Army Research Laboratory, Human Research and Engineering Directorate to Deputy Chief of Staff, G–1

Figure C–3 is an example format of the transmittal letter from ARL HRED to G–1.

Sample Transmittal Letter from ARL HRED to G-1

RDRL-HR

MEMORANDUM FOR Director, HSI, Army G-1 (DAPE-HSI/(NAME)), Department of the Army, Office of the Deputy Chief of Staff, G-1, 300 Army Pentagon, Washington, DC 23010-0300

SUBJECT: Draft Army Human Systems Integration (HSI) Assessment for (system) Milestone (X) Decision Review

1. Reference: AR 602-2 Army Human Systems Integration (HSI) in the System Acquisition Process. 27 January 2015.

2. Purpose: The enclosed draft HSI Assessment was prepared for (system) to support the (Milestone) Decision.

3. Conclusion: The overall rating for the HSI Assessment is (color code, all caps **in BOLD).** Next, list number of critical issues, major issues or concerns identified in the assessment along with any caveats as appropriate. Example: One (1) critical and 12 major issues were identified in the Assessment. System Safety and Health Hazard issues are not included in the Assessment because the PESHE and Health Hazard Assessment (HHA) were unavailable.

4. Recommendation: Based on the available information, it is recommended that the (system) program be (approved or not approved) for transition to (Milestone). Add any caveats as appropriate. Example: "The HSI Assessment should be updated when the PESHE and HHA become available."

5. Questions regarding this assessment should be directed to (name), ARL HRED (FE Name) Field Element, DSN xxx-xxxx, commercial (xxx)-xxx-xxxx, or email (no color or underline).

Encl

[NAME]
Director, Human Research and
Engineering Directorate

CF:

Director, U.S. Army Research Laboratory, (RDRL-HRM/-[office symbol, name of applicable Branch Chief])

Director, U.S. Army Research Laboratory, (RDRL-HRM-[office symbol, name of applicable Branch Chief])

Figure C–3. Sample transmittal letter from U.S. Army Research Laboratory Human Research and Engineering Directorate to G–1

Appendix D

Examples of Tailoring DI HFAC 81743A

D–1. Example 1

a. DI HFAC 81743A version.

(1) This version does not have detailed information.

(2) Use/relationship. The HSI program plan describes the contractor's HSI Program; elements to support requirements and activities for HSI specified in the contract; and how they will be managed and integrated with other program elements. It does not take the place of related plans such as the SS plan; training plan; PESHE; human engineering program plan; or an HSI section in the systems engineering management plan, unless the procuring agency so directs.

b. Tailored version.

(1) The tailored version adds some detailed information that the HSI AO wants.

(2) Use/relationship. The HSIP describes the contractor's HSI Program, identifies the HSI elements, and how the HSI domains will be managed and integrated with other program elements. It will also contain HSIP annexes that provide product deliverables, as a minimum, as specified below as a result of the implementation of the contractor's HSI Program.

D–2. Example 2

a. DI HFAC 81743A version.

(1) The HSIP shall be tailored to reflect the SOW, SysSpec, and phase of development. The proposed tailoring of the HSIP content shall identify the paragraph, the proposed changes, and a rationale.

(2) Tailoring specified by the procuring agency shall also be included. If no tailoring is proposed beyond that specified by the procuring agency, this shall be stated.

b. Tailored version.

(1) The tailored version reflects the program office emphasis on tailoring with respect to program needs rather than the SOW, as well as tailoring of the requirements and guidelines.

(2) The HSIP may be tailored to reflect the program needs, ACAT, and phase of development. Additionally, the HSIP shall contain proposed tailoring of the requirements and guidelines as applicable to the contract, in addition to any tailoring already accomplished by the procuring activity. Proposed tailoring of the guidelines shall identify specific provisions, by paragraph, as applicable including supporting rationale. If no tailoring is proposed beyond that specified by the procuring activity, this shall be stated.

D–3. Example 3

a. DI HFAC 81743A version. HSI issues and risks. Describe the methods by which the contractor will identify, document, validate, prioritize, coordinate, track, report, and resolve or mitigate HSI issues and risks over the life of the program. Describe the process for trading off HSI issues and risks among HSI domains, and between HSI and other disciplines. Describe the process by which HSI risks will be elevated to formal program-level risk management status.

b. Tailored version.

(1) The tailored version specifies that the contractor must integrate HSI issues and risks identified by the Government with their own.

(2) HSI Issues and Risks. Describe the approach and procedures for identifying, documenting, validating, prioritizing, tracking, reporting, resolving, and mitigation verification of HSI issues and risks over the life of the program. Describe the process for trading off the HSI risk and issues in HSI domains, and between HSI and other disciplines. Explain the contractor procedures for communication and conflict resolution. Present the method and process for integrating HSI issues and risks with those issues and risks tracked by the Government team.

D–4. Example 4

a. DI HFAC 81743A version. HSI in habitability. Describe the methods by which the contractor will analyze and meet habitability requirements, if any. Examples include requirements for the physical environment (for example, adequate personnel work and living space and environment control); for personnel services (for example, medical and mess); and for living conditions (for example, rest/housing, education, recreation, and personal hygiene) that have an impact on human performance contributions to system performance or affect the quality of life.

b. Tailored version. This habitability paragraph is often deleted in its entirety since it is generally not applicable to Army programs; Habitability is not identified in AR 602–2 as part of the HSI Program. If there is a case where habitability should be included, it becomes another item the contractor has to consider like any other.

D–5. Example 5

a. DI HFAC 81743A version. HSI in personnel survivability. For systems with missions that require exposure to natural and combat threats, the methods by which the contractor will analyze and meet the requirements for personnel survivability will be described. Issues to be addressed include protection from detection, fratricide, injury, and NBC effects; the integrity of the crew compartment; life support equipment; and provisions for rapid egress when the system is severely damaged or destroyed.

b. Tailored version. Uses the specific Army terminology of SSv and mandates the use of the PAL, the tool used by ARL SLAD to assess the SSv aspects of a system. For SSv, describe the methods by which the contractor will analyze, design, and validate requirements for SSv using the Army's PAL. Areas to be addressed include reducing fratricide, detectability of the Soldier, probability of being attacked; minimizing damage and injury; reducing physical and mental fatigue.

D–6. Example 6

a. DI HFAC 81743A version. HSI in T&E. Describe HSI participation in T&E and other verification activities as part of the contractor's integrated T&E program. Describe how (for example, methods, metrics, and tools) and when the contractor will verify the design for compliance with HSI requirements. Identify the number and role(s) of HSI personnel who will support T&E. Provide a summary schedule that depicts HSI tests, evaluations, and other verification activities (inspections, analyses, and demonstrations) in support of program milestones.

b. Tailored version. The tailored version adds details for HSI tests and demonstrations as opposed to DI HFAC's verbiage to show how HSI requirements will be verified. For HSI in T&E, describe HSI participation in T&E as an integrated effort within the contractor's total T&E program. Include specific information to show how and when the contractor will test, evaluate, and validate requirements related to HSI. Identify design milestones at which HSI tests are to be performed to assess compatibility among human performance, MPT requirements, and systems design aspects of human and hardware interfaces. Describe test and demonstration objectives and proposed test methods. Identify the number, location, and role of HSI personnel involved in T&E. Provide a summary test schedule that depicts HSI tests, evaluations, and demonstrations in relationship to project milestones such as system design releases, project level design reviews, DT, OT, first article demonstration tests, and commencement of procuring activity testing.

Glossary

Section I

Abbreviations

ACAT
acquisition category

ACTD
advanced concept technology demonstration

AEC
U.S. Army Evaluation Center

AMC
U.S. Army Materiel Command

AO
action officer

AoA
analysis of alternatives

AR
Army regulation

ARCIC
U.S. Army Capabilities Integration Center

ARL
U.S. Army Research Laboratory

AS
acquisition strategy

ASA (ALT)
Assistant Secretary of the Army (Acquisition, Logistics and Technology)

ASARC
Army Systems Acquisition Review Council

ASI
additional skill identifier

AST
U.S. Army Test and Evaluation Command Systems Team

ASVAB
Armed Services Vocational Aptitude Battery

ATD
advanced technology demonstration

ATEC
U.S. Army Test and Evaluation Command

AWE
advanced warfighting experiment

CAPDEV
capability developer

CBA
capability based assessment

CCP
concept capability plan

CDD
capability development document

CDR
critical design review

CG
commanding general

CIDS
Capabilities Integration and Development System

CIPR
concept in-process review

COIC
critical operational issues and criteria

COTS
commercial off-the-shelf

CPD
capability production document

CTP
critical technical parameters

DA
Department of the Army

DA Pam
Department of the Army pamphlet

DCS
Deputy Chief of Staff

DD Form
Department of Defense form

DID
data item description

DoD
Department of Defense

DoDI
Department of Defense instruction

DOTMLPF
doctrine, organization, training, materiel, leadership and education, personnel, and facilities

DOTMLPF–P
doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy

DSM
data source matrix

DT
developmental testing

DT&E
development testing and evaluation

EMD
engineering and manufacturing development

ESOH
environment, safety, and occupational health

ESR
early strategy review

EWS
example weapon system

FAR
Federal Acquisition Regulation

HAC
Human Systems Integration Assessment Conference

HFE
human factors engineering

HFEA
human factors engineering assessment

HH
health hazard

HHA
health hazard assessment

HHAR
health hazard assessment report

HRED
Human Research and Engineering Directorate

HSI
human systems integration

HSIA
human systems integration assessment

HSIP
human systems integration plan

ICD
initial capabilities document

ICDT
integrated capability development team

ILSED
Integrated Logistics Support Evaluation Directorate

IMPRINT
Improved Performance Research Integration Tool

IOC
initial operational capability

IOT&E
initial operational test and evaluation

IPT
integrated product team

ISA
independent safety assessment

IT
information technology

JCIDS
Joint Capabilities Integration and Development System

JROC
Joint Requirements Oversight Council

KPP
key performance parameter

KSA
key system attribute

KSAO
knowledge, skills, abilities, and other characteristics

LD
logistics demonstration

LFT&E
live fire testing and evaluation

LRIP
low-rate initial production

MANPRINT
manpower and personnel integration

MATDEV
materiel developer

MBT&E
mission-based test and evaluation

MDA
milestone decision authority

MDR
milestone decision review

ME
manpower estimate

MIL–STD
military standard

MOE
measure of effectiveness

MOP
measure of performance

MOS
military occupational specialty

MP
mission profile

MPT
manpower, personnel, and training

MPTA
manpower, personnel, and training assessment

MRMC
U.S. Army Medical Research and Materiel Command

MS
milestone

MSA
materiel solution analysis

MSC
major subordinate command

NBC
nuclear, biological, chemical

NDI
nondevelopmental item

NIE
network integration evaluation

NSS
National Security Strategy

OIPT
overarching integrated product team

OMS
operational mode summary

OSD
Office of the Secretary of Defense

OT
operational test

OT&E
operational test and evaluation

P3I
pre-planned product improvement

PAL
parameter assessment list

PEO
program executive office

PESHE
Programmatic Environmental, Safety, and Occupational Evaluation

PI
product improvement

PM
program manager

PSM
product support manager

PSMIPT
product support management integrated process team

RFI
request for information

RFP
request for proposal

S&T
science and technology

SDD
system development and demonstration

SEP
system evaluation plan

SER
system evaluation report

SIPT
supportability integrated product team

SLAD
Survivability and Lethality Analysis Directorate

SME
subject matter expert

SOW
statement of work

SS
system safety

SSA
system safety assessment

SSEB
Source Selection Evaluation Board

SSP
system support package

SSv
Soldier survivability

SSvA
Soldier survivability assessment

STRAP
system training plan

SysSpec
system specification

T&E
test and evaluation

TAD
target audience description

TADSS
training aids devices, simulators, and simulations

TCM
Training and Doctrine Command capability manager

TEMP
Test and Evaluation Master Plan

TRADOC
U.S. Army Training and Doctrine Command

USAPHC
U.S. Army Public Health Center

WG
working group

WIPT
working-level integrated product team

WRAP
Warfighting Rapid Acquisition Program

Section II

Terms

This section contains no entries.