

HSI in DHS Acquisition Policy: Management Directive 102

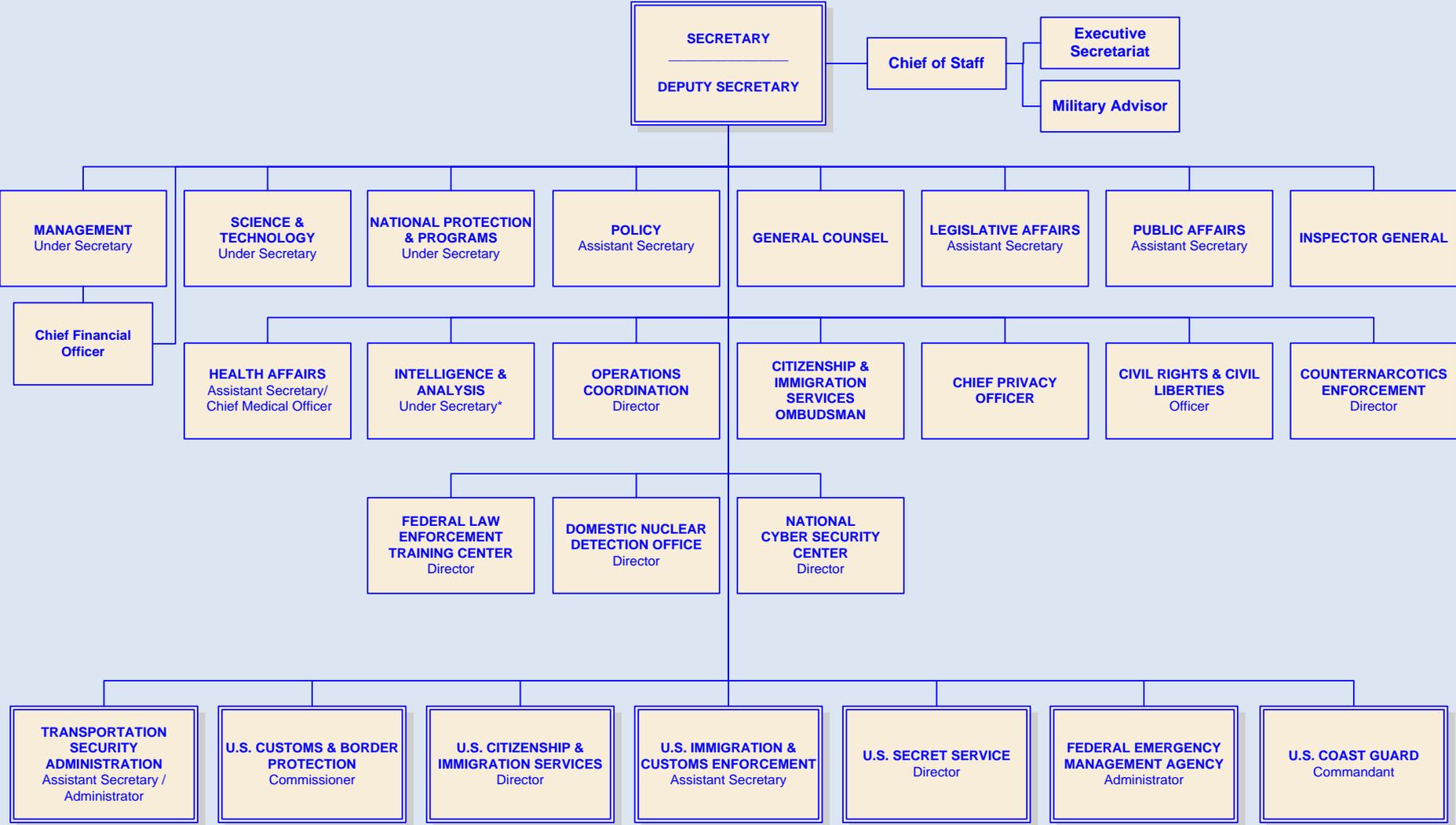
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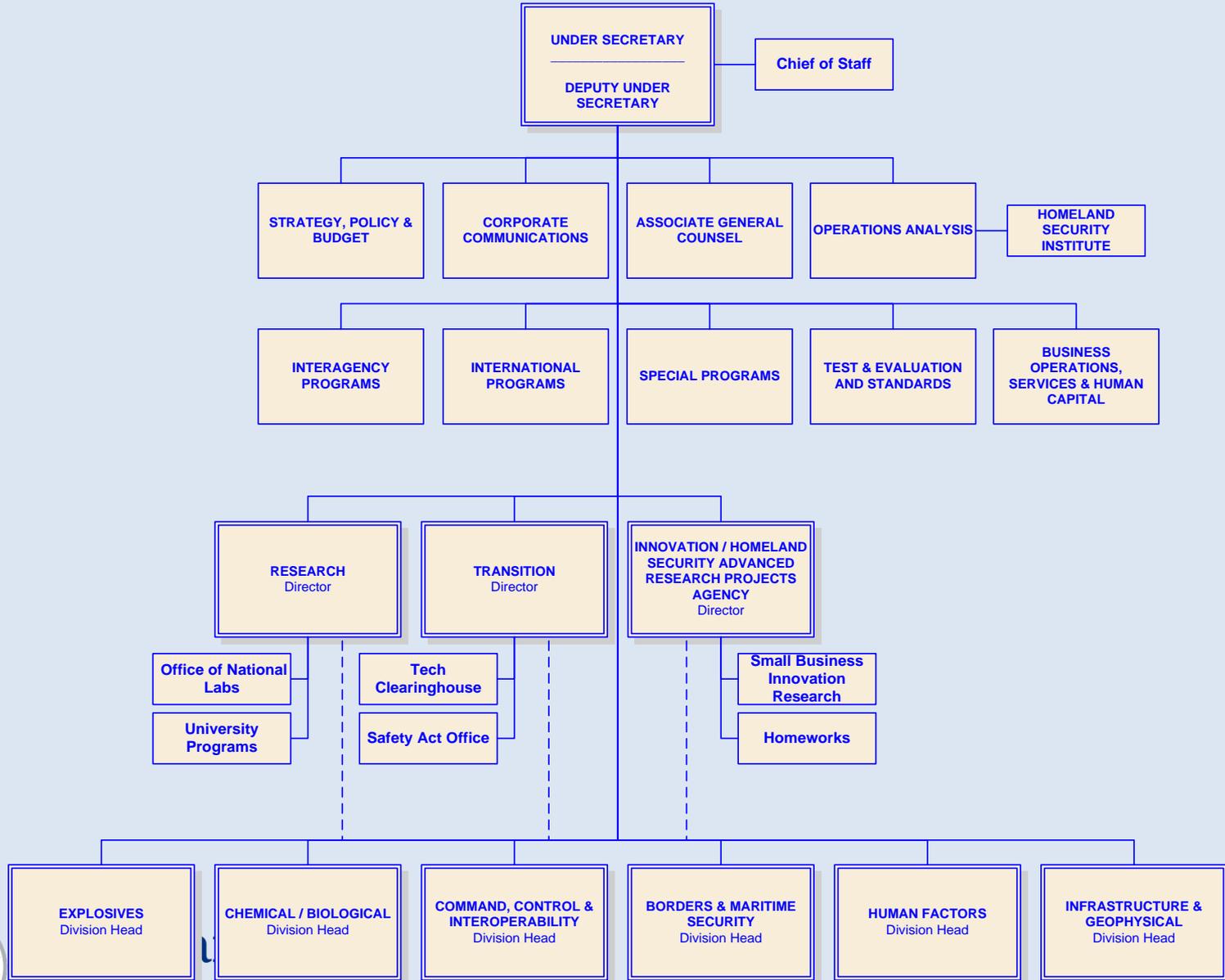
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U.S. DEPARTMENT OF HOMELAND SECURITY



* Under Secretary for Intelligence & Analysis title created by Public Law 110-53, Aug. 3rd, 2007

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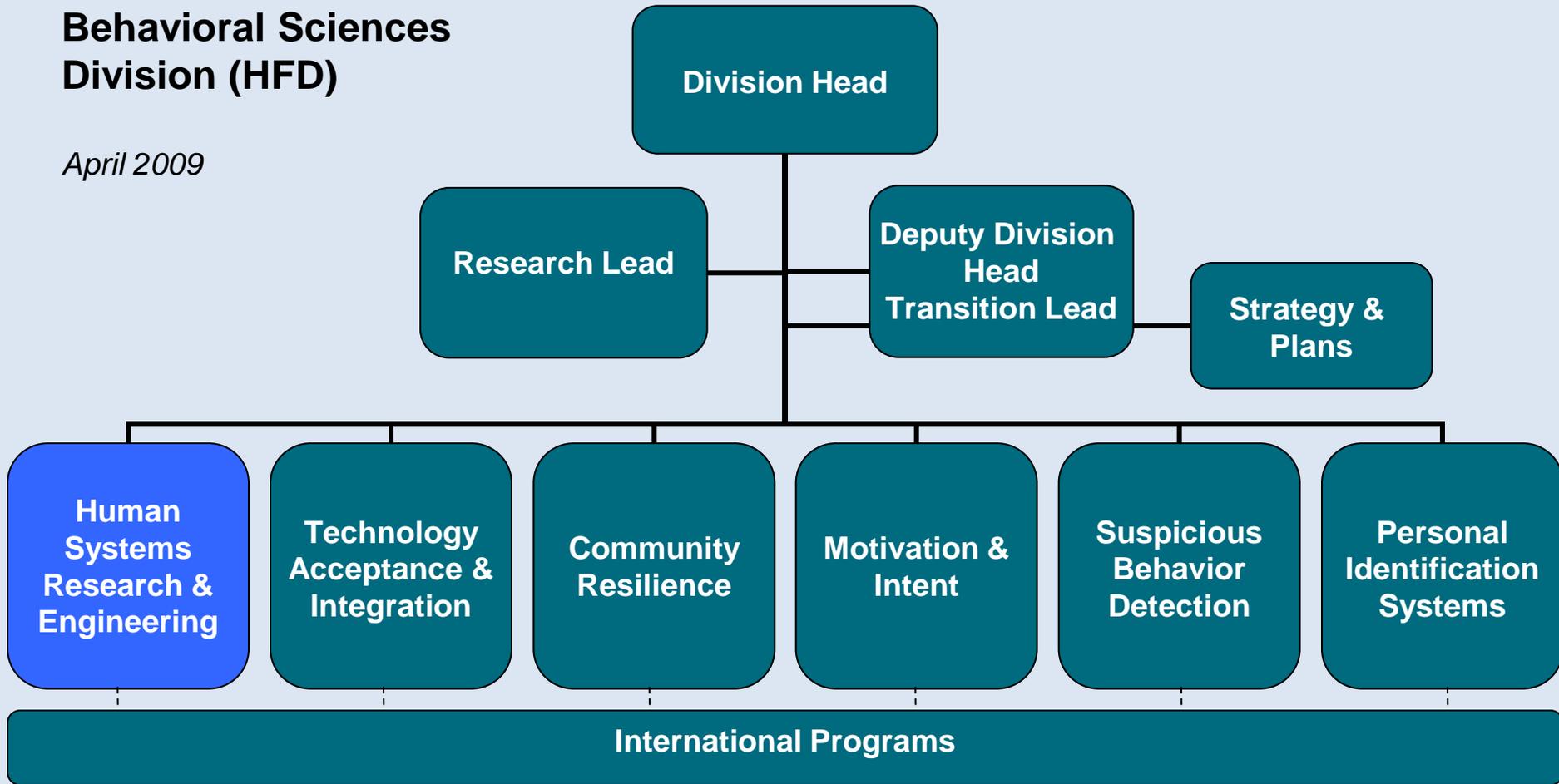


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**DHS S&T
Human Factors/
Behavioral Sciences
Division (HFD)**

Last modified: 6 April 2009

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Human Factors/Behavioral Sciences Division

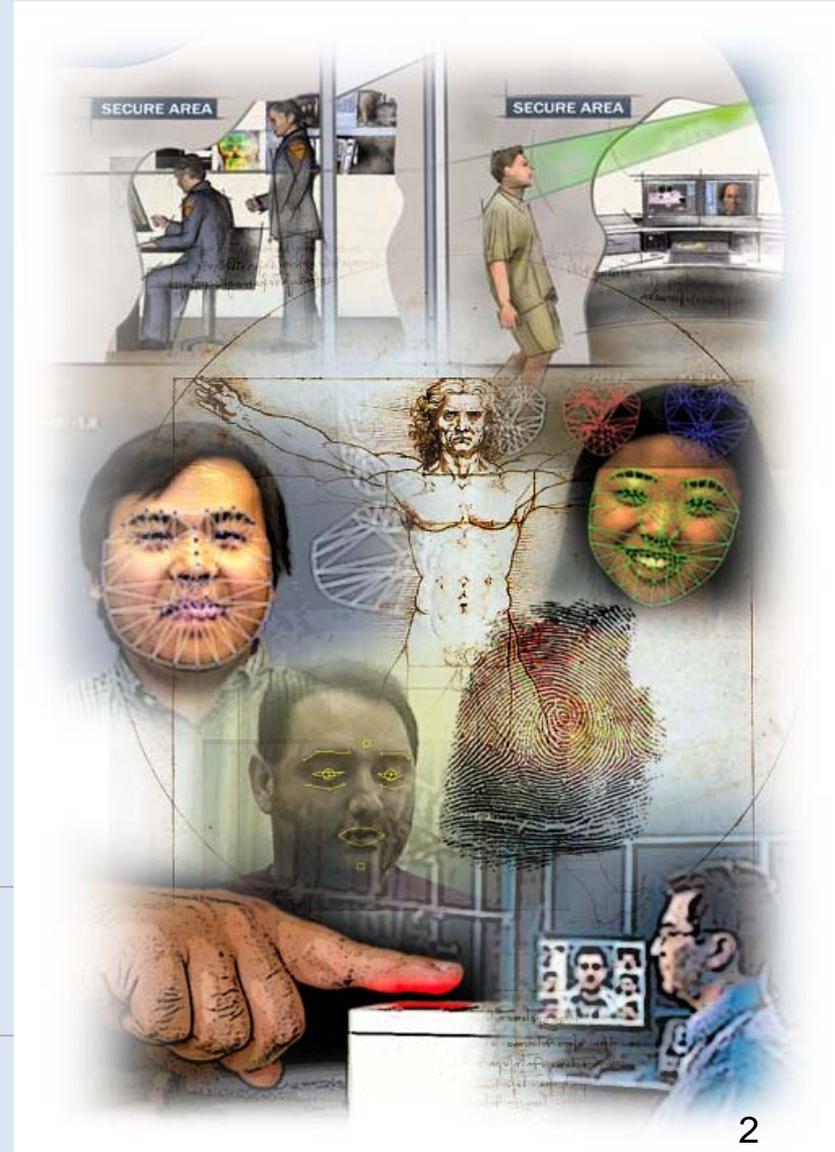
Vision:

A safer, more resilient nation that **incorporates the human dimension** into homeland security analysis, operations and policy development.

Mission:

We will advance national security by developing and applying the social, behavioral, and physical sciences to improve identification and analysis of threats, to enhance societal resilience, and **to integrate human capabilities into the development of technology.**

Customers: TSA, US-VISIT, USCIS, ICE, SCO, USSS, FEMA, OI&A, USCG, State & Local, S&T Divisions



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Human Factors/Behavioral Sciences

Division Goals

1. Enhance the analytical capability of the Department to understand terrorist motivation, intent and behavior.
2. Improve screening by providing a science-based capability to identify *unknown* threats indicated by deceptive and suspicious behavior.
3. Improve screening by providing a science-based capability to identify *known* threats through accurate, timely, and easy-to-use biometric identification and credentialing validation tools.
4. Enhance safety, effectiveness, and usability of technology by systemically incorporating user and public input.
5. Enhance preparedness and mitigate impacts of catastrophic events by delivering capabilities that incorporate social, psychological and economic aspects of community resilience.

Know our enemies, understand ourselves; put the human in the equation.



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DHS Operational Definition of HSI

- Human Systems Integration (HSI)
 - HSI is the discipline of executing human performance requirements, analysis, design and test activities as part of the systems engineering (SE) process.
 - The integration of these activities into the SE process addresses human performance risks and issues to maximize total system performance and reduce life cycle costs.



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DHS Operational Definition of HSI

- **Domains of HSI:**
 - *manpower*
 - *personnel*
 - *training*
 - *human factors engineering*
 - *habitability*
 - *personnel survivability*
 - *safety and health*



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Human Systems Research & Engineering

Strategic Plan Objectives:

- **HSI language into DHS Management Directives/Policies**
- *Develop a standardized process with associated best practices for implementing HSI*
- *Support DHS technology development and system acquisition programs*
- *Establish DHS HSI Community of Practice*
- *Fund research designed to maximize human performance and facilitate the development of usable technologies*
- *Education and Awareness*
- *Internal and External Outreach*



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HSI language into DHS Management Directives/Policies

- Systems Engineering Working Group (SEWG)
 - DHS Management Directive (MD) 102-01 includes DHS Acquisition Instruction / Guidebook 102-01-001
 - Consolidated DHS acquisition management policy
 - September 21, 2010 release of SELC Guide ver. 2.0
 - CY 2010 release of DHS MD 102-01-001 rev. 1



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HSI language into DHS Management Directives/Policies

- HSI language was integrated into technology development and acquisition documents in DHS MD 102:
 - DHS Acquisition Guidebook
 - **Systems Engineering Life Cycle (SELC)**
 - Mission Need Statement (MNS)
 - Capability Development Plan (CDP)
 - Concept of Operations (CONOPS)
 - Analysis of Alternatives (AoA)
 - Operational Requirements Document (ORD)
 - Supportability and Sustainment
 - Acquisition Program Baseline (APB)
 - Test and Evaluation Master Plan (TEMP)



HSI Inputs to Acquisition Instruction Guidebook

102-01-001 Revision 1

- To the extent that human performance is critical for mission success, human systems integration must be addressed in the acquisition process.
- Human performance includes human capability, proficiency, availability, utilization, accommodation, survivability, health and safety;
- HSI involves the integration of the human with other elements of the system, including hardware, software, firmware, webware, courseware, information, procedures, policy and doctrine, documentation, design features, technology, environments, organizations, and other humans.
- Ensure that task analysis scenarios include functions and events that are challenging for human performance;
- Include HSI Plan in the process products at each Stage;
- Include definitions of human performance and HSI in the Glossary.

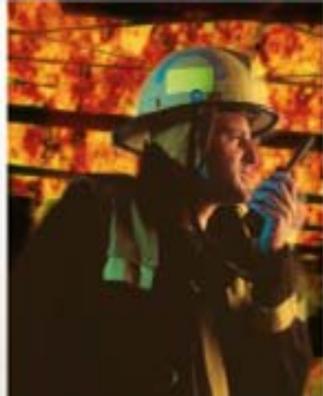


HSI Inputs to Systems Engineering Lifecycle Guide (ver 2.0)

- HSI inputs to each process in the Systems Engineering Life Cycle (SELC);
- HSI inputs to SELC and Acquisition Review Process documents;
- HSI exit criteria for each SELC Stage;
- HSI inputs to each Stage Gate review;
- Description of the HSI Top Down Requirements Analysis (TDRA) process as the foundation of derived human performance requirements, roles of humans, and HSI concepts;
- Description of HSI user-centered design and user-centered T&E;
- Description of the HSI risk analysis and mitigation process;
- Determination of human performance deficiencies in the identification of DHS needs and capability gaps.



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IDENTIFYING END-USER NEEDS, HUMAN PERFORMANCE REQUIREMENTS, AND RISKS TO BETTER SUPPORT SYSTEMS ENGINEERING, INNOVATIVE RESEARCH, TRANSITION, AND ACQUISITION OF TECHNOLOGY WITH THE GOAL OF MAXIMIZING PERFORMANCE IN THE FIELD...

HUMAN SYSTEMS RESEARCH & ENGINEERING

KEEPING THE HUMAN IN THE LOOP



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Back-up



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HSI Inputs to Appendix C, the MNS

- To the extent that human performance is essential for mission success, mission scenarios must be challenging for human performance;
- Human performance issues for DOTMLPF/S/R/G;
- HSI inputs to the mission and need analysis include identified human performance deficiencies in how human performance requirements are addressed in relevant legacy systems or technology representations, and requirements that the mission be challenging for human performance.



HSI Inputs to Appendix D, Capability Development Plan (CDP)

- HSI inputs to the CDP begin with a determination of how users/operators will be engaged, particularly for developing the CONOPs and ORD, and assessing potential alternatives for operational utility.
- Inputs and insights from users and operators will be assisted by an identification of the human performance deficiencies identified in legacy systems or technology representations for end users of the systems or technologies. These deficiencies will have been identified in the MNS.
- Human performance implications for spiral or evolutionary acquisition.
- HSI inputs to systems engineering reviews in the Solution Engineering Stage.



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HSI Inputs to Appendix F, Concept of Operations (CONOPS)

- Requirements for scenario operational conditions that are challenging for human performance;
- To the extent that human performance will be critical for mission success, a mission scenario must be challenging to human performance, including human capability, workload, situation awareness (SA), survivability, and safety. Mission scenarios must be realistic in terms of representative characteristics of the operating systems and operating environments.
- HSI inputs to functional capabilities, including human performance requirements for functions derived from legacy systems, functions performed by selected end users, and functions associated with selected mission scenarios.
- Under Analysis reports, description of HSI Top Down Requirements Analysis (TDRA) which provide the analyzed requirements, allocation concepts, workload estimates, human task models, system metrics, manning models, and personnel management and training concepts necessary for assessing alternative concepts, and developing requirements for improving specific concepts.
- Description of classes of DHS end-users, and mission-essential functions.



HSI Inputs to Appendix G, Analysis of Alternatives (AoA)

- *Assessment of each AoA concept* - does it optimize manpower, enhance human performance, facilitate the interaction between humans and automation, reduce the incidence of human error, reduce costs by reducing manpower and the training burden, eliminate hazards to personnel health, safety and survivability, and enhance quality of life.
- *Operational Effectiveness Analysis* should include the results of the HSI Top Down Requirements Analysis (TDRA) which provides the analyzed requirements, function allocation concepts, workload estimates, human task models, system human performance metrics, manning models, personnel management and training concepts, and human performance risk assessments necessary for assessing alternative concepts, and developing requirements for improving specific concepts.
- *Cost analysis* - include the results of assessments of the implications of HSI for each design concept. This analysis involves determination of life cycle resource requirements for: operational and maintenance manpower; training; personnel non-availability due to accident; expected human error rates; expected time to repair; requirements for supportability; and requirements resulting from expected system downtime.
- *Alternative selection implications* for: (1) sustained human performance, (including human and team capabilities, proficiency, workloads, manpower, training systems, and health and safety), (2) human performance risks, and (3) affordability as a function of manpower requirements, training burden, accident rates, and human error potential.



HSI Inputs to Appendix H, Operational Requirements Document (ORD)

- HSI inputs to the mission area and end-users;
- HSI requirement for challenging scenario operational conditions;
- HSI inputs to the maintenance philosophy, and the strategy for providing human performance in the conduct of maintenance, and in the reduction of the maintenance overhead;
- HSI inputs to operational requirements;
- HSI inputs to supportability and sustainment requirements;
- Requirements for human reliability;
- HSI inputs to requirements for maintainability, including reduction of maintenance;
- HSI inputs to survivability requirements;
- Description of training requirements;
- Description of HSI considerations;
- Description of the HSI Plan.



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HSI Inputs to Appendix J, Supportability and Sustainment

- HSI inputs to supply/support;
 - workload and manpower levels are reduced through labor saving and workload reduction technology,
 - automated inventory control and part-piece stowage and retrieval,
 - expanded use of decision support systems, and task simplification;
- HSI inputs to support equipment design or selection;
 - spares, supporting documentation, tools, and test equipment required for a maintenance activity are located for ease of access from the worksite;
 - facility maintenance is reduced; automated inventory management and control is enhanced;
 - material handling to reduce human involvement, workloads, potential for human error, and time to access supplies are enhanced;
 - personnel record keeping and management functions are reduced;
 - security provisions to reduce human involvement and workload are provided.
- HSI inputs to environmental safety and occupational health;
 - safe environments by eliminating or mitigating the potential for injury, disability or death and minimizing hazardous material usage.
- HSI inputs to information technology resources;
- HSI inputs to independent supportability and sustainment assessment;



HSI Inputs to Appendix K, Acquisition Program Baseline (APB)

- HSI inputs to Key Performance Parameters (KPPs);
 - human performance requirements that are critical to the success of a mission;
 - A KPP can include demonstrated human performance when operating a product in addition to parameters for the product itself
- HSI inputs to APB key events;
 - HSI Plan;
 - User interface design concepts;
 - Training plan.
- HSI inputs to terms and definitions.
 - Human Systems Integration (HSI) is the systems engineering discipline that focuses on the requirements and capabilities of the human as a critical and integral component of the system, and ensures the full integration of the human with other elements of the system, including hardware, software, firmware, webware, courseware, information, procedures, policy and doctrine, documentation, design features, technology, environments, organizations, and other humans.

