Human Systems Integration (HSI)

HSI Standardization and Impacts on Operational Architectures

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Outline

- **Breakout Session Agenda**
- **Introduction of panelists**
  - Dr. Marc Dinerstein
    Space Mission Integration Office
  - Mr. Brian Louie
    GPS Ground, Space and Missile Systems Center
  - Mr. Roger Dispoto
    SBIRS High, Det 11, Space and Missile Systems Center
  - Mr. Steve Scholz
    CERES, Space and Missile Systems Center
  - Mr. Tom Riebe
    TASC Corporation
- **Background**

Agenda

- **Discussion and brainstorming of issues/solutions**
  - What are the mandates for HSI standardization and Operational Architecture development activities?
  - What are the operational benefits/impacts/challenges USAF (and other) space system operations?
  - How can Commercial Off The Shelf (COTS) products help meet HSI standardization and operational architecture development needs?
  - How do the COTS products compare - which seem to work best (or won't work) in military space system operations?
- **Summary**

Introduction of Panelists

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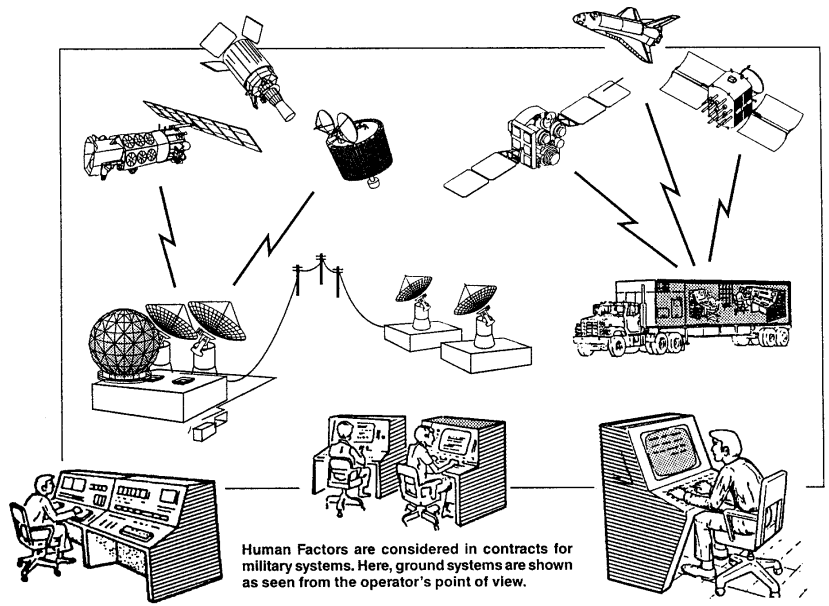
Background

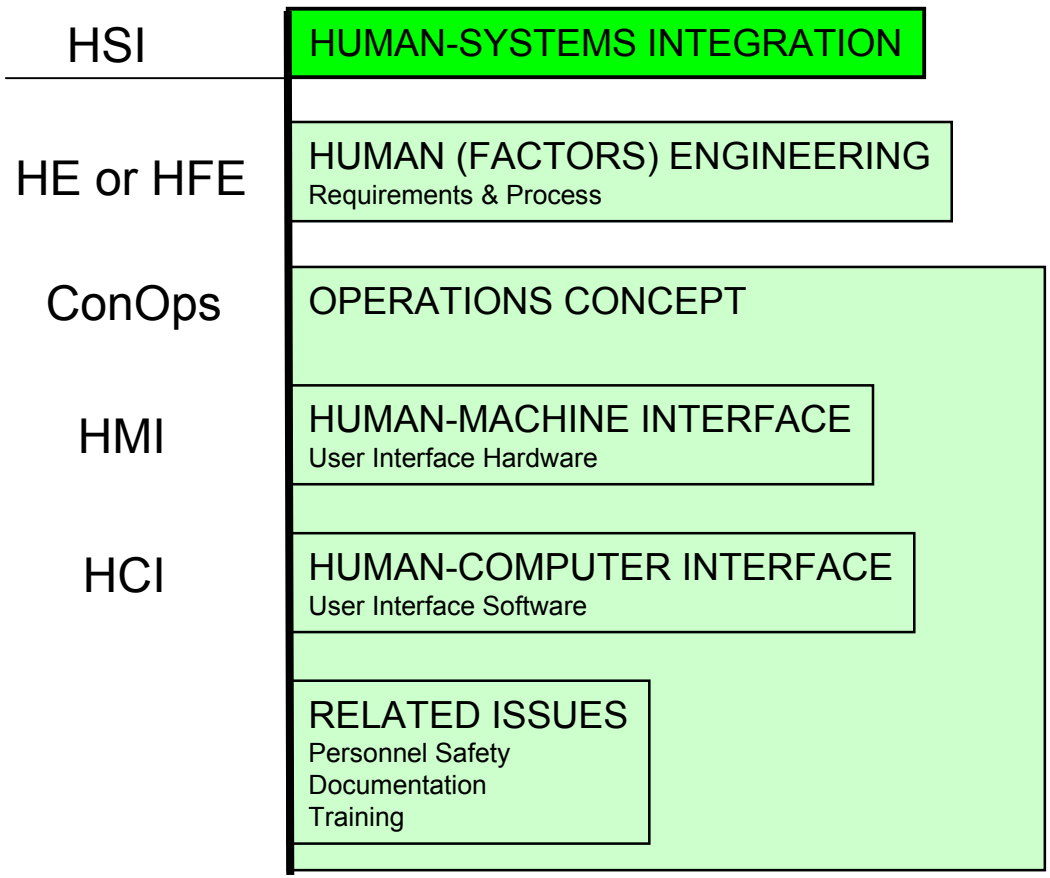
- **The Roles of People in Space Systems**
  - Space Segment
    - Satellite (humans not included)
  - Launch Segment
    - Vehicle Test and Integration
    - Launch control and range safety
    - Telemetry data processing
  - Ground Segment
    - Satellite Command & Control
    - Mission Data Processing
    - Computer Support
    - Communications Support
  - User Segment (selected examples only)
    - Tactical Data Processors
    - GPS Receivers



Human Factors are considered in contracts for military systems. Here, ground systems are shown as seen from the operator's point of view.

Background

Human Systems Integration Components



Background

Human Systems Integration Goals and Objectives

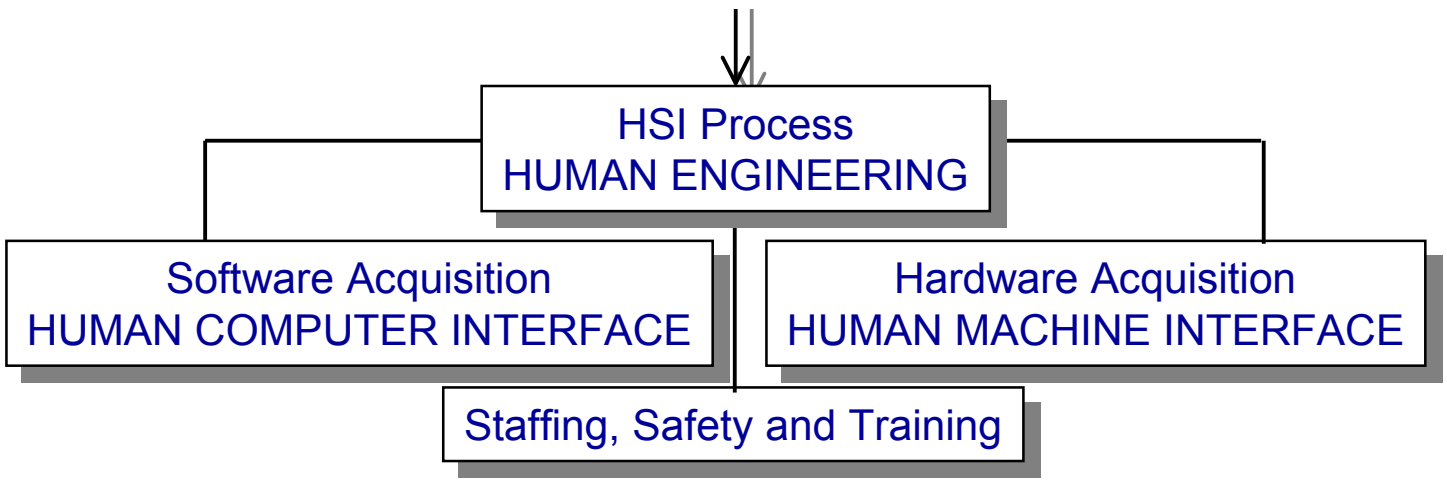
- **Designing Human - System Interface for Compatibility with Human Capabilities**
  - Easy to Learn
  - Easy to Use
  - Easy to Maintain
  - Safe
  - Error Resistant
  - Cost Effective
- **Operations and Maintenance**
  - Fewer personnel
  - Fewer human errors
  - Greater mission flexibility
  - Reduced training time and complexity
- **Acquisition and Development**
  - Reduced O&M costs
  - Reduced hardware/software development

Background

Department of Defense HSI Requirement

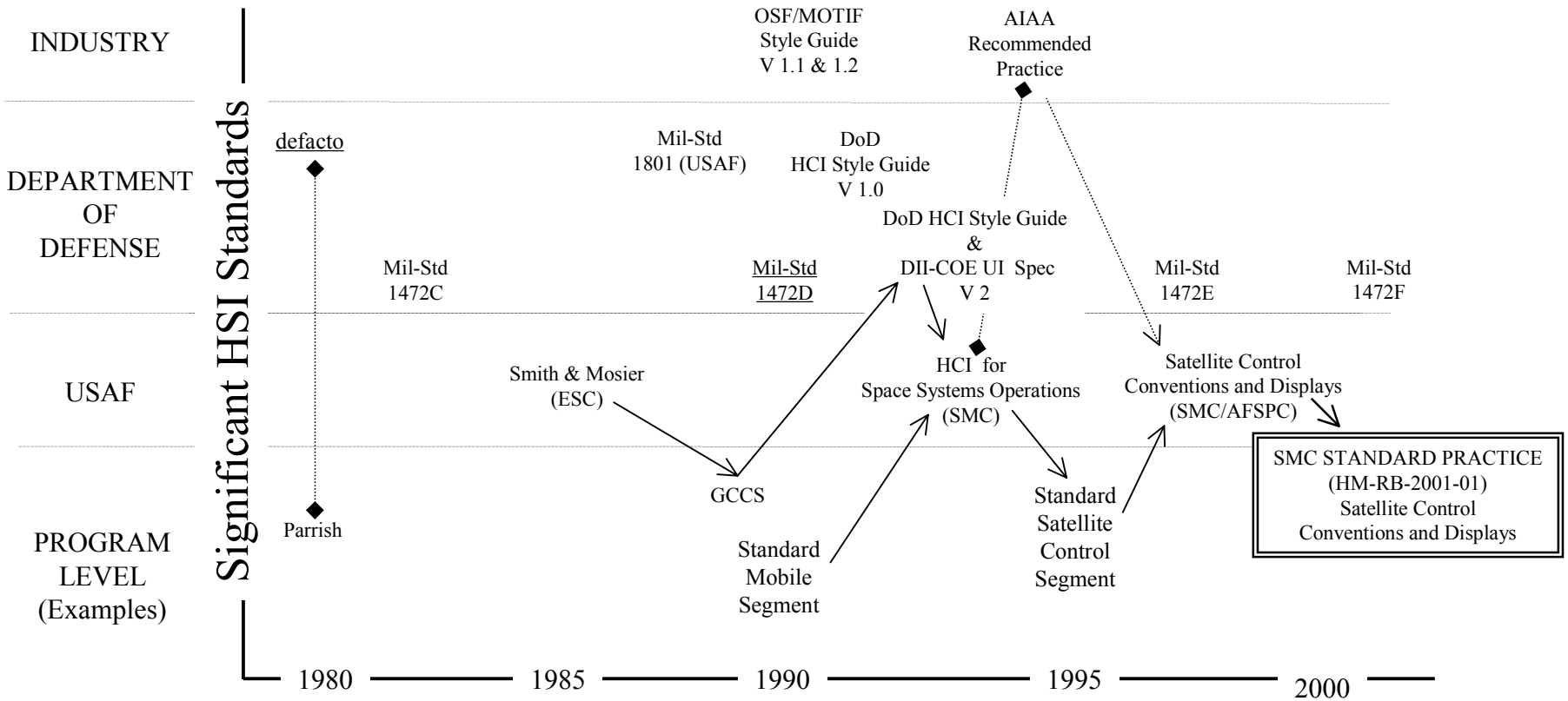
Mandatory DoD Acquisition Procedures DOD 5000.2-R

Section 4.3.8 requires comprehensive and management strategies for HSI to assure human performance; reduce the burden that a design may impose on manpower, personnel, and training; and comply with safety and health issues.



Background

Historical solution: Design Standards and Style Guidance



Background

Examples of HSI Program Requirements

Requirement Topic	Space Lift Range	Air Force Satellite Contro Network
Human Engineering Process - Allocation of Functions - Task Analysis - Mission Analysis	IMPACTS Program IAW DOD 5000.2 AFR 800-15 MIL-H-46855	[DOD 5000.2 assumed]
Operations Concept - Staffing - Operational Procedures	AF Skill Level 5 Enlisted Tech orCiv Error Reduction Cognitive, Physical, Sensory, Skill Reduction, PhysicalAccessability, Complexity, Manpower, Training Reduction	AF Skill Level 3 One Operator Per Sat * * Not true in Standard Satellite Control Segment (SSCS) Preliminary Design
Human Machine Interface (User Interface Hardware)	ANSI/HFS-100-1988	
Human-Computer Interface (User Interface Software)	MIL-HDBK-761A	DoD HCI Style Guide BSRAIAA R-023A-1995

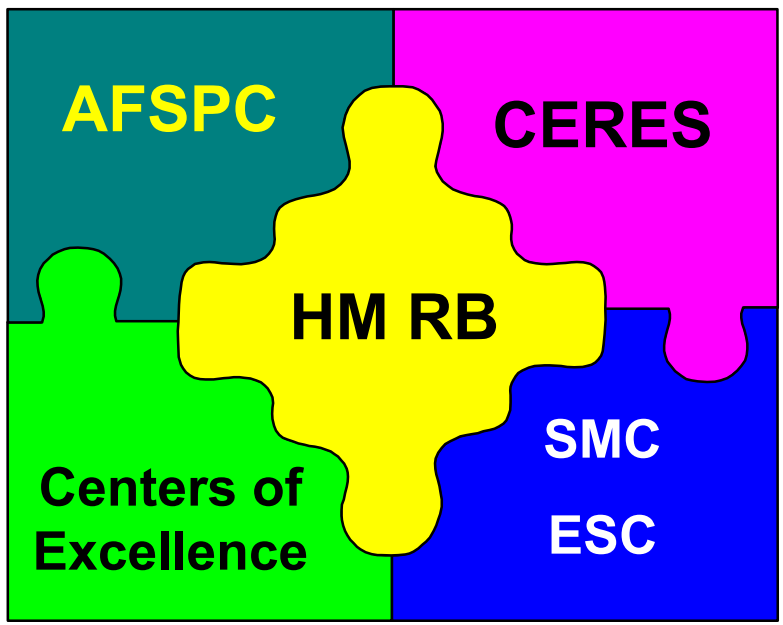
Background

- **HSI in Satellite Operations Domain Requirements**
  - 1993 AFSPC Operational Requirements Document (ORD)
    - 50% reduction in personnel
    - Level 5 military operators
    - Life-cycle cost savings goal
  - 1995 unreleased ORD update draft
    - Removed the life-cycle cost savings goal
- **These issues, alone, are incomplete requirements. Fail to**
  - consider system interoperability needs
  - identify effective operational concept
  - lead contractor toward acceptable standardized solutions

Background

Satellite Control HSI Community

An integrated effort toward common, cost-effective Human-Systems Integration



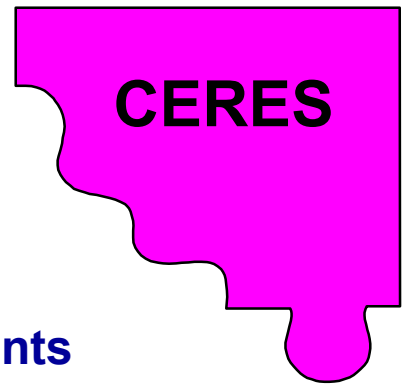
Background

Air Force Space Command

- **Advocate position & priorities**
- **HSI operations concepts**
- **Incorporation into Integrated Program Plan**
- **Validated HSI operational requirements**
- **HMI RB & CERES support**

Background

SMC/TEO Center for Research



- **Support development of operations concepts**
- **Support development of operations requirements**
- **Support development of standards**
- **Review/evaluate COTS products**
- **Support fly-before-you buy**

Background

Market Research, COTS, Acquisition Centers of Excellence

- **Provide potential solutions**
- **Track trends/operational concepts**
- **Nominate products for evaluation**

Background

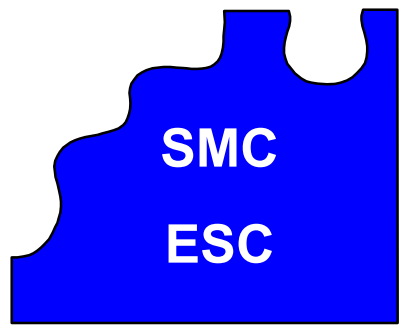
Acquisition Agencies

Centers

- Support databases, working groups, HM RB
- Implement standards
- Formalize standardization documents
- Support mission area expansion of standards
- Implement contracting standards

Programs

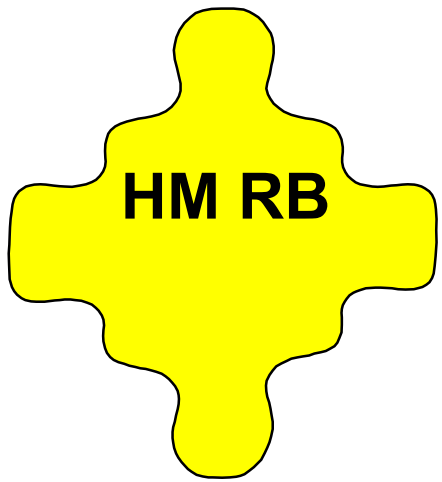
- Support expansion of domain standards
- Coordinate with HM RB and CERES
- Support mission area expansion of standards



Background

"Human Machine Interface" Review Board

- **Coordinate cross center HSI efforts**
- **Oversee conventions and standards process**
- **Industry liaison for common conventions and standards**



- **Develop and update style guides**
- **Oversee HSI waiver process**

Discussion and Brainstorming of Ideas

- What are the mandates for HSI standardization and Operational Architecture development activities?
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Summary

- **Thank you very much for your participation!**

- **Identification of needs, issues, and concerns will raise the awareness that Ground System Architecture includes:**
  - Technical
    AND
  - Operational

- **Breakout session discussion will be:**
  - Summarized
  - Presented to Plenary Session on Friday
  - Published in GSAW Proceedings (CD and website)