Applying Human Systems Integration in Air Force Acquisition:
From Requirements Development through Disposal

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Overview

1. **Quick Background**
2. **Trade-Off Tool**
3. **a. Key Tips on Implementing HSI**
   b. Examples of Applying HSI
4. **Conclusion**

Air Force 711 HPW/HP

**Air Force 711th Human Performance Wing/
Human Performance Integration Directorate
(711 HPW/HP)**

**…strives to ensure
products and technologies are
designed, developed, or adapted
with human capabilities
and limitations in mind.**

AF Human Systems Integration Domains

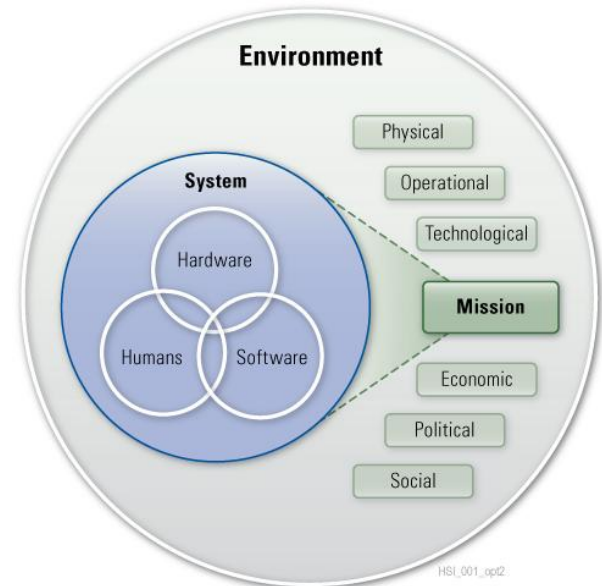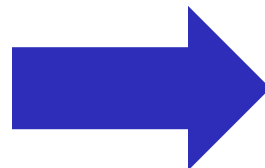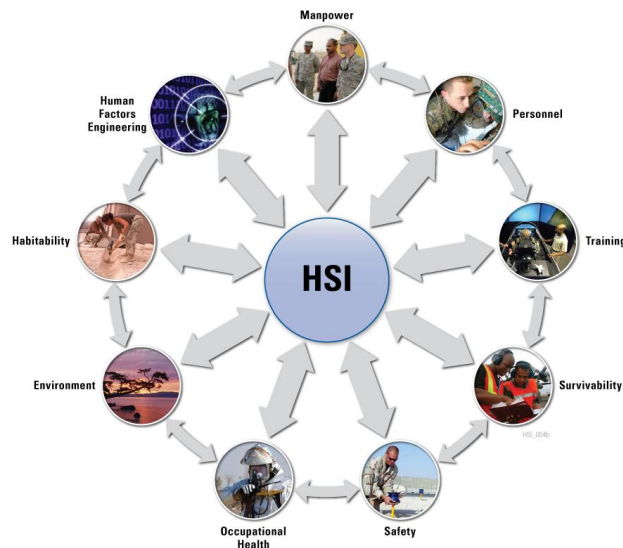## AF Human Systems Integration (HSI) Domains:

- **Manpower**
- **Environment**
- **Personnel**
- **Training**
- **Human Factors Engineering**
- **Safety**
- **Occupational Health**
- **Habitability**
- **Survivability**

The intent is to **create a deliberate means for accounting for the Human** as part of the system solution in **an integrated fashion**.

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AF Human Systems Integration Tradeoffs

- **Focus on the interdependencies and tradeoffs among the HSI domains**

- **HSI must also be considered with cost, schedule, and performance tradeoffs**

- **HSI impacts the human performance, therefore the overall system performance**

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Domain Trade-off Tool

Key Tips on Implementing HSI

- ➢ **Perform prototype/baseline system assessments**

- ➢ **Develop an HSI strategy and plan**

- ➢ **Insert appropriate wording in acquisition documents and requirements**

- ➢ **Participate in technical reviews**

- ➢ **Manage and mitigate HSI risks**

- ➢ **Understand and participate in tradeoffs**

*Order of activities is program dependent

Key Tips on Implementing HSI

➢**Perform prototype/baseline system assessments**

- **Assess system for implications on all domains, human-related risks, and overall human performance**

- **Government and contractor document review (CONOPS, requirements, Data Item Descriptions)**

- **Hands-on system tour or review**

- **Implement recommendations/changes at appropriate level and phase of development**

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Prototype/Baseline System Assessments Example

ACAT Level: I

Post Milestone B System Modification

- **Hands-on – spoke with operators and maintainers**

- **Reviewed previous lessons learned**

- **Reviewed current documentation**

- **Assessed where the "gaps" and concerns potentially could potentially exist**

ACAT Level: III

Post Milestone B new design

- **Hands-on system assessment – reviewed design and spoke with potential users**

- **Reviewed contractor and government documentation**

- **Identified risks and tradeoff opportunities**

- **Developed network map to show potential effects of decisions**

Key Tips on Implementing HSI

➢**Develop an HSI strategy and plan**

1. **Identify overall HSI objectives**
2. **Identify activities and efforts to meet objectives**
3. **Develop an HSI WG – players and stakeholders**
4. **Develop a plan to manage and mitigate HSI risks**
5. **Plan to participate in technical/design/program reviews**
6. **Plan to participate in high level discussions of program tradeoffs**
7. **Draft an HSI Plan**

Key Tips on Implementing HSI

➢ **Develop an HSI plan**

HSI Plan:
- **A tool to track and document progress, risks, WG member responsibilities, and program tradeoff decisions**
- **HSI Plan approval**

HSI Plan

HSI Plan Example

- **ACAT Level: I and III**
- **Pre-Milestone B to System Modification status**
- **Pre-MS B**
  - **High level activities**
  - **Major program risk drivers**
  - **Influence design**
- **System Modification**
  - **Detailed activities**
  - **Document baseline design and activities that were performed**
  - **Risk areas**
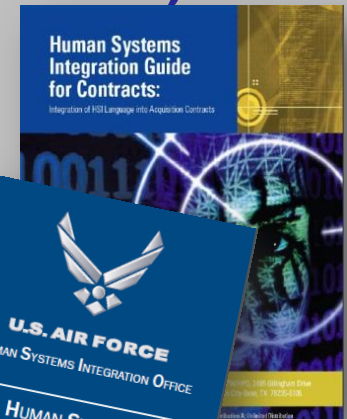 - **Coordination with all domain POCs**

Key Tips on Implementing HSI

➢**Insert appropriate wording in acquisition documents and requirements, including…**

-**Systems Engineering Plan (SEP)**
-**Request for Proposal (RFP)**
   -**System Performance Specification (SPS)**
   -**Statement of Objectives (SOO)**
   -**Statement of Work (SOW)**
   -**Contract Data Requirements Language (CDRL)s**
-**Life Cycle Sustainment Plan (LCSP)**
-**Test Plans**
-**Capability Documents (ICD, CDD,CPD)**

Helpful References:

United States Air Force Human Systems Integration in the System Requirements Document Guidebook   July 2011

SURVIAC   HSI

Human Systems Integration Guide for Contracts: Integration of HSI Language into Acquisition Contracts

U.S. AIR FORCE
HUMAN SYSTEMS INTEGRATION OFFICE

HUMAN SYSTEMS INTEGRATION REQUIREMENTS POCKET GUIDE

SEPTEMBER 2009

Documents and Requirements Example

JCIDS Level Capability Documents: ICD, CDD, CPD

Review for inclusion of HSI

- **Insert HSI language**
  - **Determine requirements for human performance and each HSI domain**
- **Recommendations are then often vetted at AFROC/JROC level**

Participate in document development

- **Develop human-related KPPs, KSAs, or OSAs**
- **Create MOEs and MOPs**
  - **Associated with each attribute or performance parameter**
- **Review entire document for HSI language and implications**
- **Participate in the High Performance Team**

Documents and Requirements Example

ACAT Level: I System Modification

- **HSI Plan**

- **SEP and LCMP**
  - **Sections on HSI and reference to HSI Plan**
  - **SEP can include HSI Plan as an appendix**

- **CONTRACT**
  - **SOO: Section on HSI**
  - **CDRLS: HEDAD-O, HEDAD-M, HEPP, HSIPP**
  - **CDRLs for Specific Testing Reports**
  - **CDRLs for Training, Safety, other domains**
  - **Human-related requirements in SRD**

- **TEST DOCUMENTATION**
  - **Robust testing of human-related requirements**

Develop HSI Strategy and plan

Example of an HSI Plan:

1. **SUMMARY Overview of the HSI strategy; highlights of the plan**

2. **DESCRIPTION The proposed materiel system, acquisition strategy, lead agency, AF and MAJCOM policy, any 'a priori' decisions and assumptions**

3. **HSI STRATEGY**
   A. **For each domain and for HSI overall**
   B. **Data sources**
   C. **Strategy for integrating HSI into Systems Engineering process**
   D. **Roles and responsibilities**

4. **CONCERNS/RISKS/TRADE-OFF DECISIONS AND RECOMMENDATIONS**

APPENDIX: HSI WG CHARTER

Key Tips on Implementing HSI

➢**Participate in Technical Reviews**

Technical/design/program review participation
- **Program Management Reviews**
- **Design Reviews**
- **Risk Meetings**

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Technical/Design/Program Review Example

ACAT Level III

- **Technical Reviews – PDR/CDR**
  - **Provide HSI entrance/exit criteria**
  - **Assess documentation and design for domain and trade-off implications**
- **Design Reviews**
  - **Perform HSI assessment to determine overall effect on system performance considering operators, maintainer, and supporters**
- **Risk Meetings**
  - **Participate in risk working groups to identify high-level HSI-related risks and HSI-related risks stemming from other identified risks**

Key Tips on Implementing HSI

➢ **Manage and mitigate HSI risks**

	1	2	3	4	5
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4	🟩	🟨	🟨	🟥	🟥
3	🟩	🟩	🟨	🟨	🟥
2	🟩	🟩	🟩	🟨	🟨
1	🟩	🟩	🟩	🟩	🟨

•**Include HSI risks in HSI Plan**

•**Elevate high level risk items so they may be managed with other program level risks**

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Manage and Mitigate HSI Risks Example

ACAT Level I and III:

- **Risks are identified through HSI assessments and documentation reviews**

- **Determine the level of HSI risk – program level, component level, operational, maintenance, cost, etc**

- **Track HSI-related risks and develop mitigation strategies**

  - **Planning and monitoring**

  - **Modify/change design**

  - **Modify requirements**

Key Tips on Implementing HSI

➢ **Understand and participate in tradeoffs**

During the Technology Development Phase:
-Trade studies are conducted to assess tradeoffs between technologies

During the Engineering and Manufacturing Development Phase:
-The design and integration details are refined
-Critical Design Review
       -Participate in decision making and trade studies for HSI-related considerations that affect the component level of the system
**-Design tradeoffs are made**

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Tradeoffs Example

ACAT Level III

- **Assess overall program for domain interdependencies (i.e. manning and personnel; MPT; HFE, safety and survivability)**

- **Review design and document any high-drivers for cost, safety, or performance**
  - **Determine if the high-drivers will affect other domains (2nd, 3rd, 4th order effects)**

- **Identify the tradespace for decision-making and what will provide the optimized human performance across all of the domains**

Relationship Map
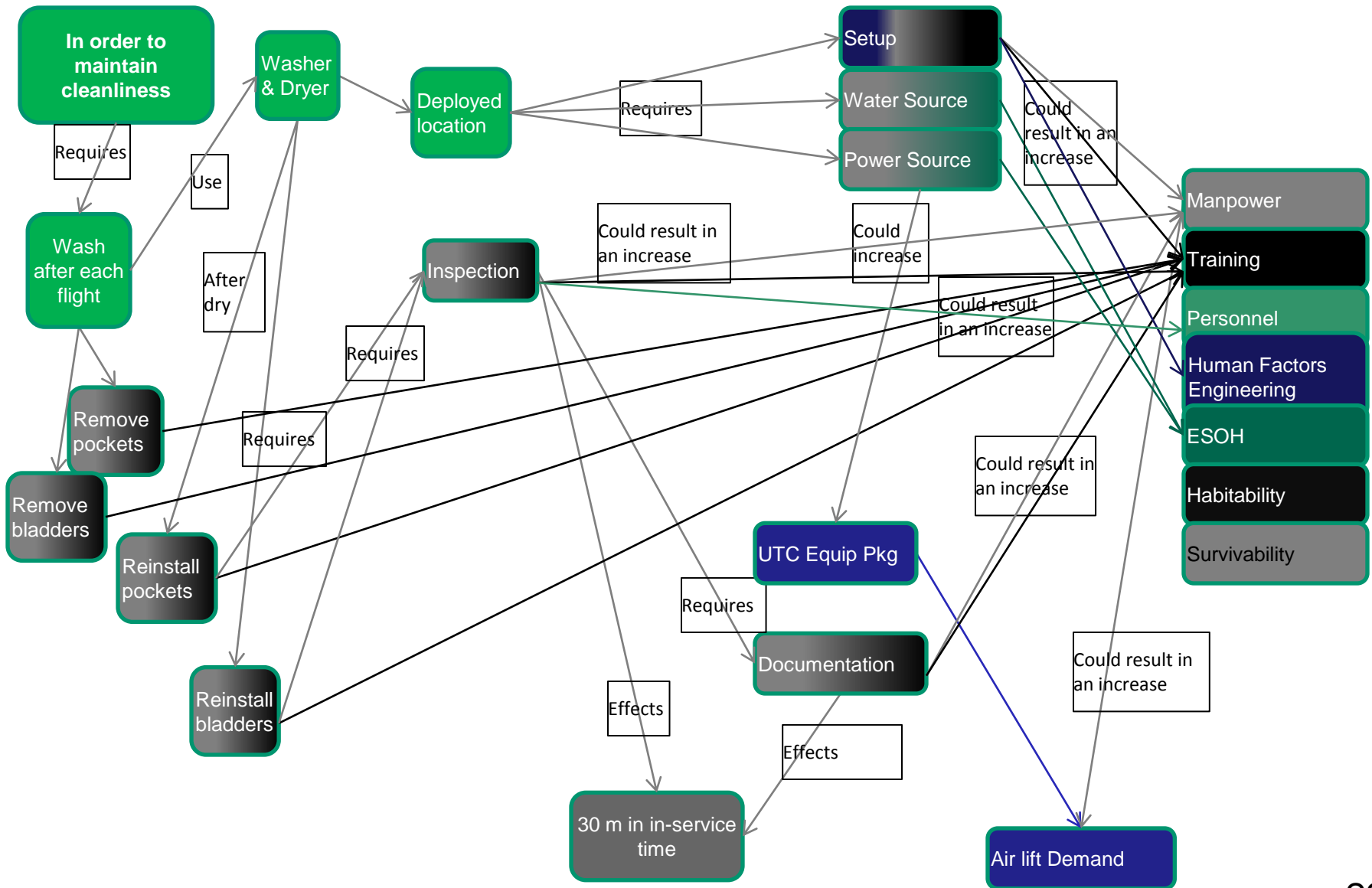
Key Tips on Implementing HSI

➢ **One last tip:**

Implementing HSI…

…requires extensive & pervasive *teamwork*

(PM, SE, HSI Practitioner, Logistics Manager, Functional Domain Owners, Test Manager, Acquisition Team, HPT, IPT)

Conclusion

- **Examples have been presented to demonstrate "hands-on" application of HSI**

- **Through the sharing of new theories and practical application processes/techniques HSI activities can proliferate within the Systems Engineering community**

Conclusion

Program Support

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Questions

Questions?