NASA-STD-3000
Man-System Integration Standards ("MSIS") Updates

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NASA / JSC / Habitability & Human Factors
David J. Fitts
JSC Mail Code: SF3
ph: 281-483-6647

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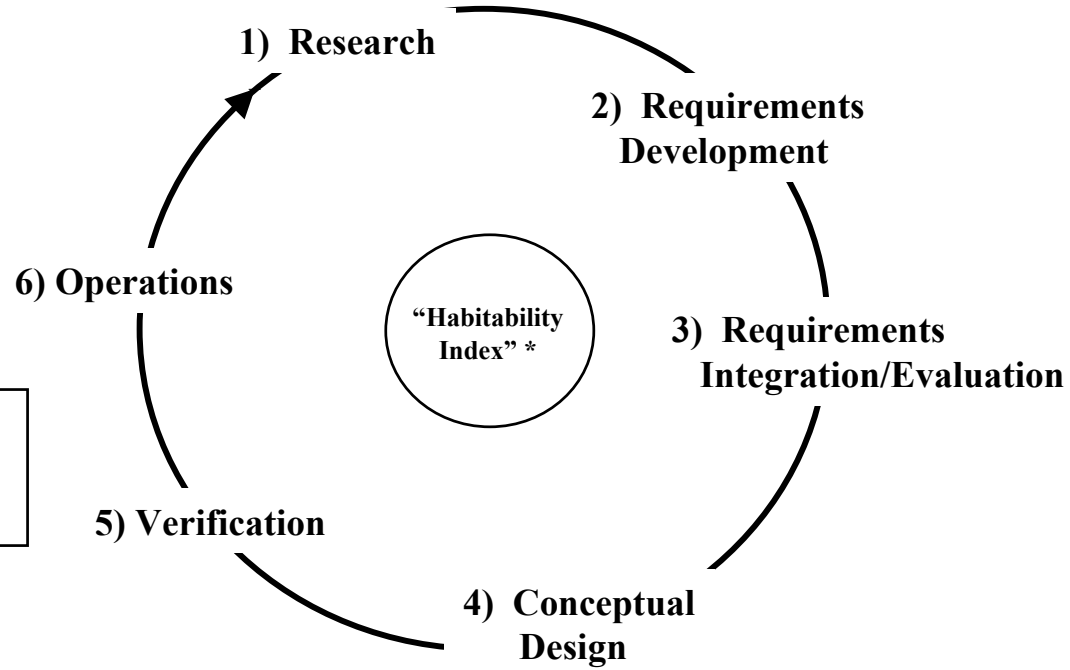
The SF3/Habitability and Human Factors (H&HF) Branch is…

- The JSC focal-point organization for H&HF since the 1960's
- The originator of NASA-STD-3000 / "Man-System Integration Standard" (MSIS)
- The provider of JSC Institutional support for H&HF to Programs—Shuttle & ISS…



H&HF maintains the noted six core capabilities supporting phases in the life-cycle of a program or project

* At the core of H&HF's mission is a drive to objectively quantify, characterize and thereby improve those qualities of an environment that affect human health, safety and performance

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The MSIS ("Man-System Integration Standard" or NASA-STD-3000) is…

- An implementation standard for spacecraft man-machine interface design
  - The document is currently written as a set of standards on hardware design
    - Involvement with the ISS Program indicates the MSIS requirements needs considerable re-wording
- A repository for what we know about space habitability & human factors
  - The document is currently structured with lessons learned ("Design Considerations")

The MSIS needs to…

- Address all phases of space flight—e.g., Operations
  - Not just hardware design
- Be a living document
  - Accepting new information as it develops, particularly "lessons learned"
  - Online, accessible and current

SF3/H&HF is implementing a plan to update the MSIS & place it online

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International Space Station (ISS) Program & Human Factors

- ISS is the 1st major NASA project to manage H&HF--or "Flight Crew Integration" (FCI) in the ISS Program--as a system equal with others such as Life Support or Structures
  - The SF3/H&HF Branch provides funded supported to FCI through task agreement
- H&HF/FCI Program requirements are captured in SSP 50005 / "FCI Standard", which was derived from SF3's MSIS in 1994
- The H&HF/FCI discipline is managed by the Flight Crew Support & Integration (FCS&I) Integrated Product Team (IPT) which also manages delivery of flight crew equipment
  - SF3/H&HF has continually supported the ISS FCI function
  - A part of FCI's function in ISS' operational era involves monitoring how effectively FCI requirements implementation improved habitability and crew interface functions on Station
- There are currently and will be many more "lessons learned" on how the MSIS (SSP 50005) interacted with the ISS Program during its life cycle
  - These will be folded in to the MSIS update
  - Processes will be developed to ensure the MSIS will continually accept new information as new technologies develop and new data is gathered on human long-duration space flight

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MSIS update plan…

Additional Content:

- New topic areas and standards derived from core knowledge base
  - Capture new data from spaceflight—NASA/Mir, ISS…possibly International Partner experience
  - Capture new data from space human factors engineering (SHFE) research developments
  - Example new topic areas: Psychological Factors, Robotics, Maintenance,…others
  - Areas needing major modifications: Human/Computer Interaction, Labeling, EVA, etc.
- Rationale, history and verification data for each requirement
  - Also hyperlink requirements to supporting evidence and/or research if possible
- Information on integrating SHFE into a project or program
  - I.e., include information on processes; Show how SHFE can build better products, ops, etc.
- Indications of the maturity of data in each topic area
  - I.e., indicate which areas beg for further H&HF research

Format provisions:

- Electronic publication (only)
  - Ease of making updates; Considerable use of hyperlinking to correlate and add data
- Variety of output formats and/or additional tools to support different user communities

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Input Data

- Research Data
- Flight Experience
  Skylab, Mir, etc.
- Analog Environments
- Other disciplines

SHFE Interpretation & Analysis

"Pool of Data"
(Comparable to the current MSIS?)

"Shaped Tools"

- For H/W developers
  - "What's the bottom line?"
  - Include verification data
- For concept designers
  - "You need to think about these things…"
  - graphic
- For HE specialists
  - "Here's why we think this is so…"
  - Include more "real world" cross-references
- For H&HR researchers
  - What we know; what we don't
  - Aligned with the critical questions

- **The updated MSIS will be both a requirements and a lessons learned document**
  - **However, when accessing the document, users generally need one or the other**
- **A single "all things to all people" MSIS may be too cumbersome so "shaped tools" are being investigated to supply different users the information they most need**
  - **Therefore, the "look and feel" of online products may differ considerably from the current MSIS**

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MSIS update status…

- A project proposal for the initial FY03 MSIS update has been approved for funding
  - Proposal addresses the next three years but does not fund any needed MSIS topic research
- SF3 is pursuing a variety of funding options for ongoing MSIS activity
  - Ongoing maintenance will extend beyond the initial project proposal