Human System Integration

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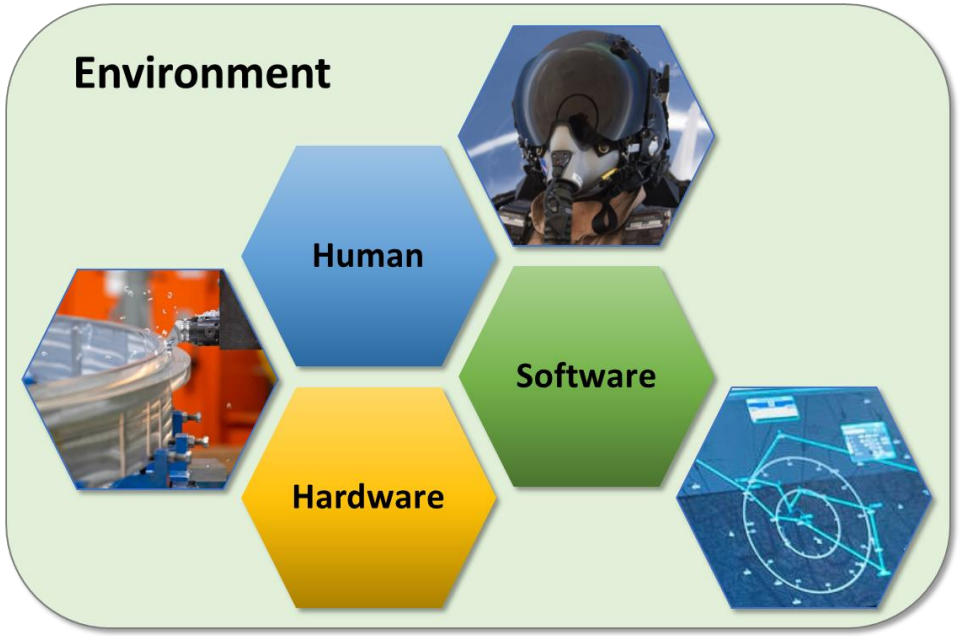
Characteristics of Spaceflight Mission

- Human Endeavors to meet Human Goals
- Complex Systems
- Extreme Environments
- Mission Lengths: hours to decades

- **Humans provide the adaptive capacity to shore up that system, dealing with everything from everyday routine disturbances to unanticipated and potentially catastrophic crises.**

Human System Integration

- “A required interdisciplinary integration of the human as an element of a system to ensure that the human and software/hardware components cooperate, coordinate, and communicate effectively to successfully perform a specific function or mission.”
- HSI is based on scientific research on human capabilities and how humans live, work and interact with systems.
- HSI processes and tools are applied across the entire life cycle of a mission.

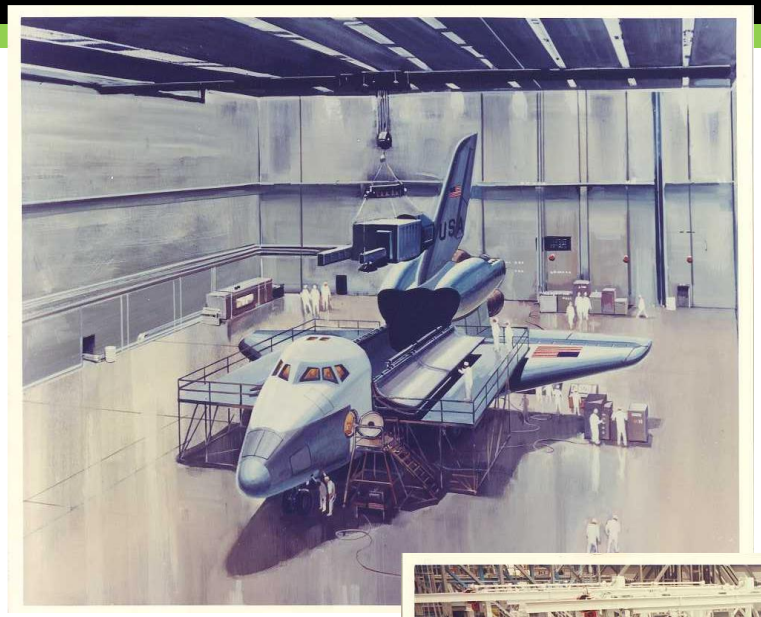


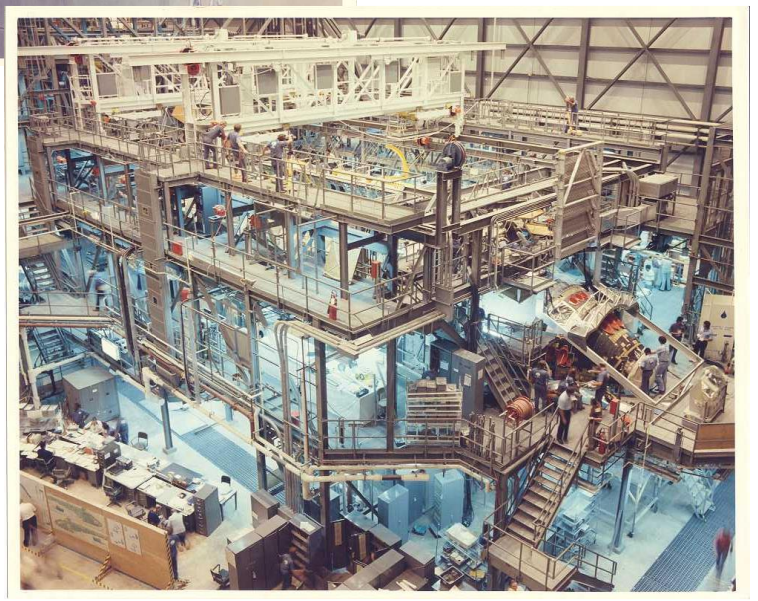
Human System Integration

- Humans are key to every mission
- Everything in a mission has the potential to influence the human or be influenced by the human
- HSI considers all human roles across the mission life-cycle
- Designs and operations need to be compatible with human capabilities
- To be successful, mission must take advantage of the unique ability of humans to be flexible, creative, adaptable, resilient, and to solve problems.

Example: Work as Imagined vs. Work as Done

Initial Shuttle concept

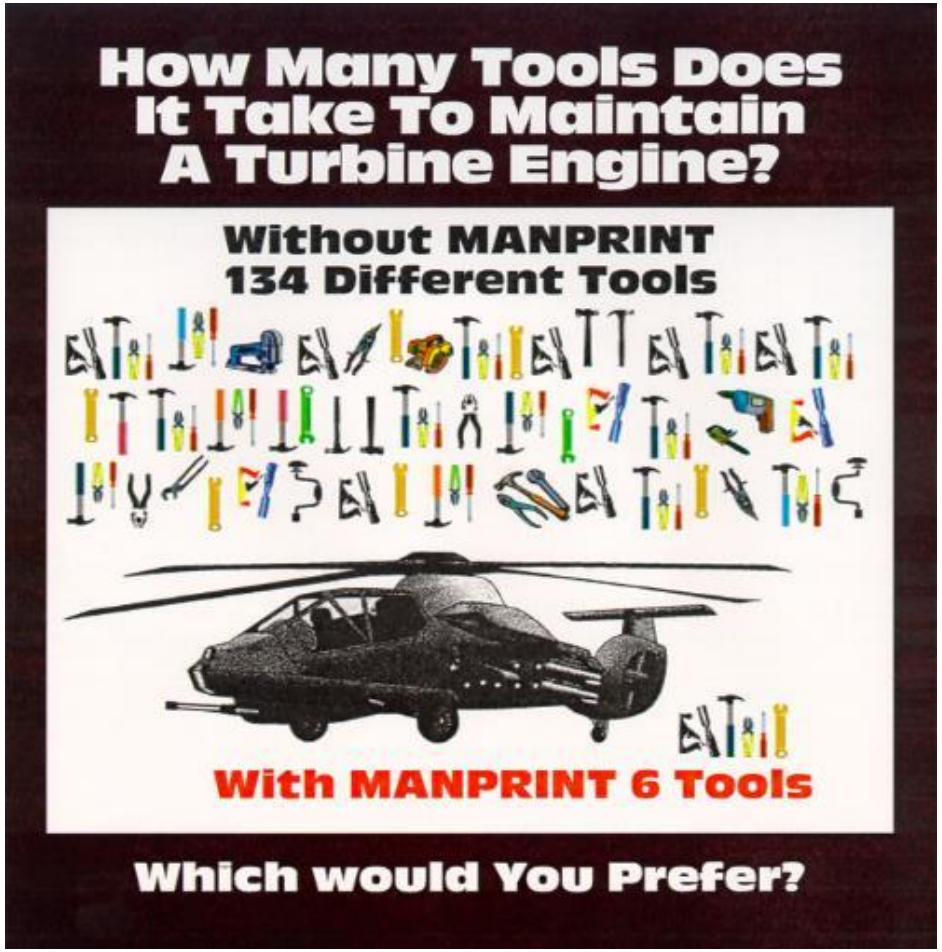




Actual between flight processing

Example: Prioritizing Maintainability and Logistics

- DoD Contractual requirement
  - No change in maintenance skills
  - Fewer maintainers

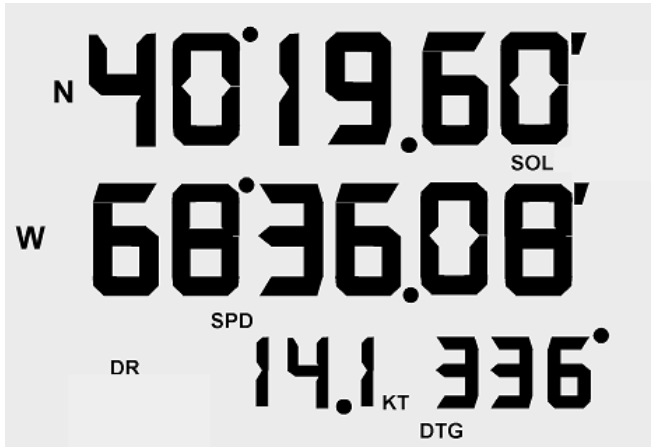


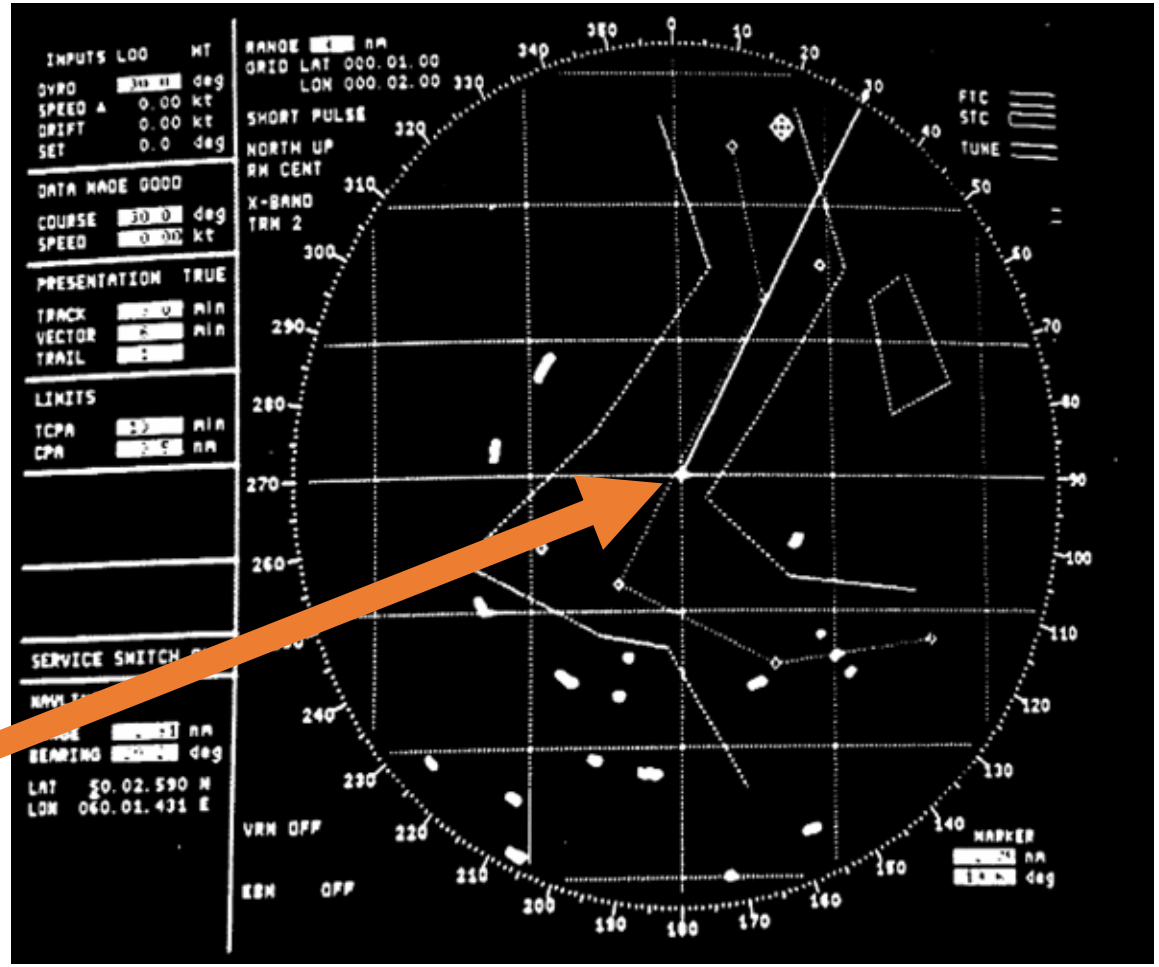
Example: Logistics

If it looks like a hand hold…

Example: Information Display

Grounding of *Royal Majesty*

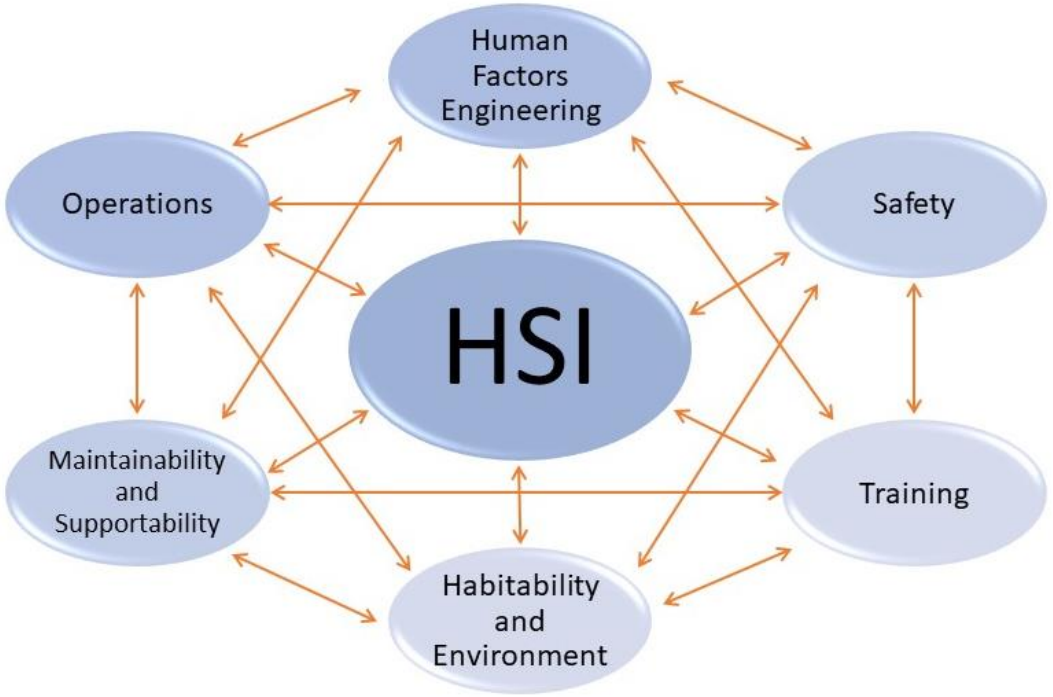




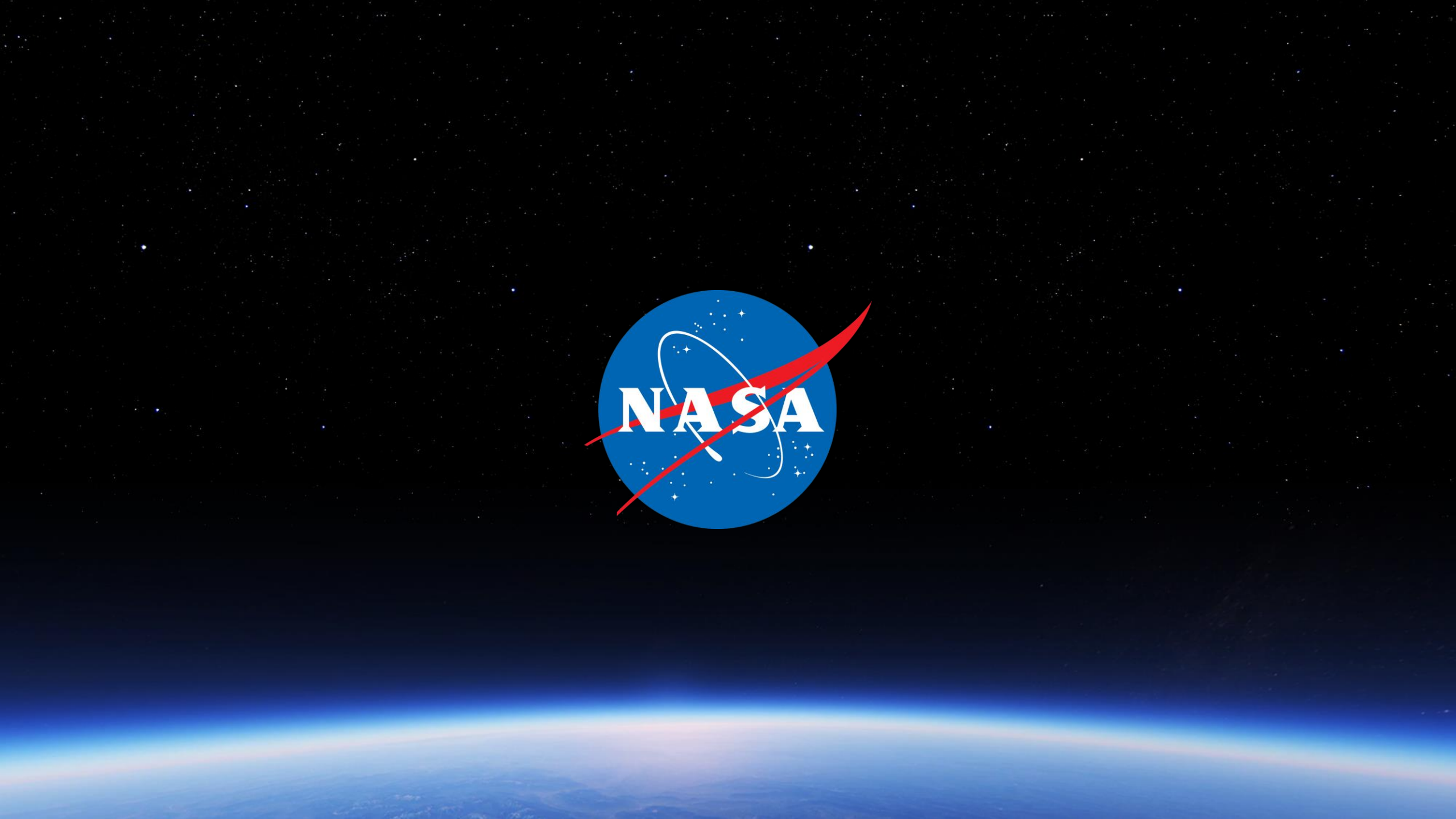
Ship Location Indicator

PB97-916401 NTSB/MAR-97/0l

Human System Integration



- To accomplish these goals we need to understand ourselves, mission operations, vehicles, environments and the interactions among them.
- Built on the knowledge from many scientific disciplines, and engineering and safety domains.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