



HUMAN HEALTH AND PERFORMANCE

Exploring Space | Enhancing Life

Human Systems Integration

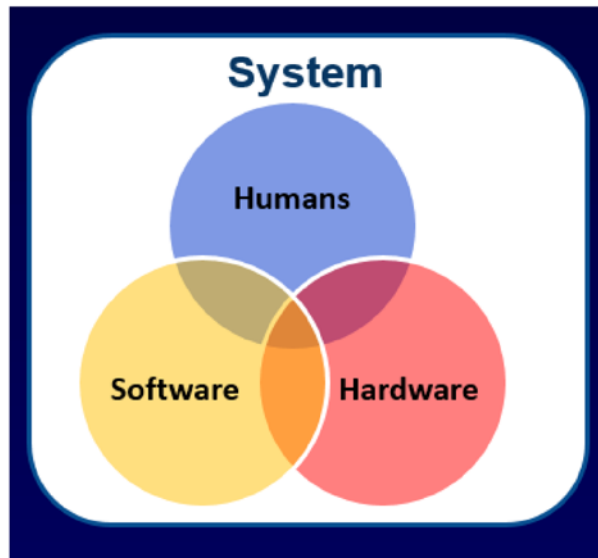
Understanding the Physiological Response of Humans to Extreme Environments

There is no such thing as an “unmanned” system. A system is comprised of the human, the hardware, and the software. Human Systems Integration is a system engineering discipline that applies knowledge of human capabilities and limitations throughout the design, implementation, and operation of hardware and software. It is an interdisciplinary and comprehensive management and technical process that focuses on the integration of human capabilities and limitations into the system acquisition and development processes to enhance human system design, reduce life cycle ownership cost, and optimize total system performance.

World Renowned Skills and Unique Capabilities

The Johnson Space Center, a world leader in human spaceflight, possesses unique knowledge, skills, and capabilities that can be applied to solving human health and performance challenges here on earth—particularly those related to operating in extreme and harsh environments.

NASA’s human systems integration expertise has been shaped by over 50 years of spaceflight design, testing, and operations in the uniquely complex, challenging, and highly constrained spacecraft environment. This process knowledge was codified in NASA’s Human Systems Integration Practitioners’ Guide, as well as NASA systems engineering policies, procedures, and handbooks with the objective of making each subsequent system more successful in its integration of the human with the hardware and software.



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Human System Integration Processes & Plans

Provide a human-centered approach to the whole lifecycle working for the benefit of system performance and the bottom line. The process requires a Human System Integration (HSI) Plan. This plan addresses all domains of the Human Systems Integration Process by addressing:

- Roles and responsibilities for integration across domains;
- Roles and responsibilities for coordinating integrated domain inputs with the program team and stakeholders;
- HSI goals and deliverable for each phase of the lifecycle;
- Entry and exit criteria with defined metrics for each phase, review, and milestone;
- Planned methods, tools, requirements, processes and standards for conducting HSI;
- Strategies for identifying and resolving HSI risks; and
- Alignment strategy with the systems engineering management plan.

HSI Domains:

Human Factors Engineering

This domain focuses on human capabilities and limitations as they are impacted by system design. JSC maintains a cadre of experts to help in this domain area for the HSI Plan/Process with expertise in task analysis, human workload/usability/situation analysis, anthropometry, biomechanics, habitation design, human in the loop testing evaluation, human error analysis, and human factors engineering analysis.

Operations Resources

This domain focuses on resources required for operations planning and execution. It includes human effectiveness for flight and ground crews which can drive systems design and development and trades on function allocation, automation, and autonomy. JSC's community has a wealth of knowledge in this domain that can aid optimization.

Maintainability and Supportability

This domain focuses on design to simplify maintenance and optimize resources including human resources, consumables, and spares.

Habitability and Environment

Considers external and internal environments to the morale, safety, health and performance of the user population.

Safety

Factors ensure execution of mission activities with minimal risk to personnel, including ground personnel.

Training

This domain emphasizes the design of training with simplified resources that are required to provide personnel the requisite knowledge, skills, and abilities to properly operate, maintain, and support the system.



For the benefit of all

For more information:
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