



National Aeronautics and Space Administration

PANEL: NASA Human / Systems Integration (HSI)

Presentation: HSI in the Program Life Cycle

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May 5, 2009

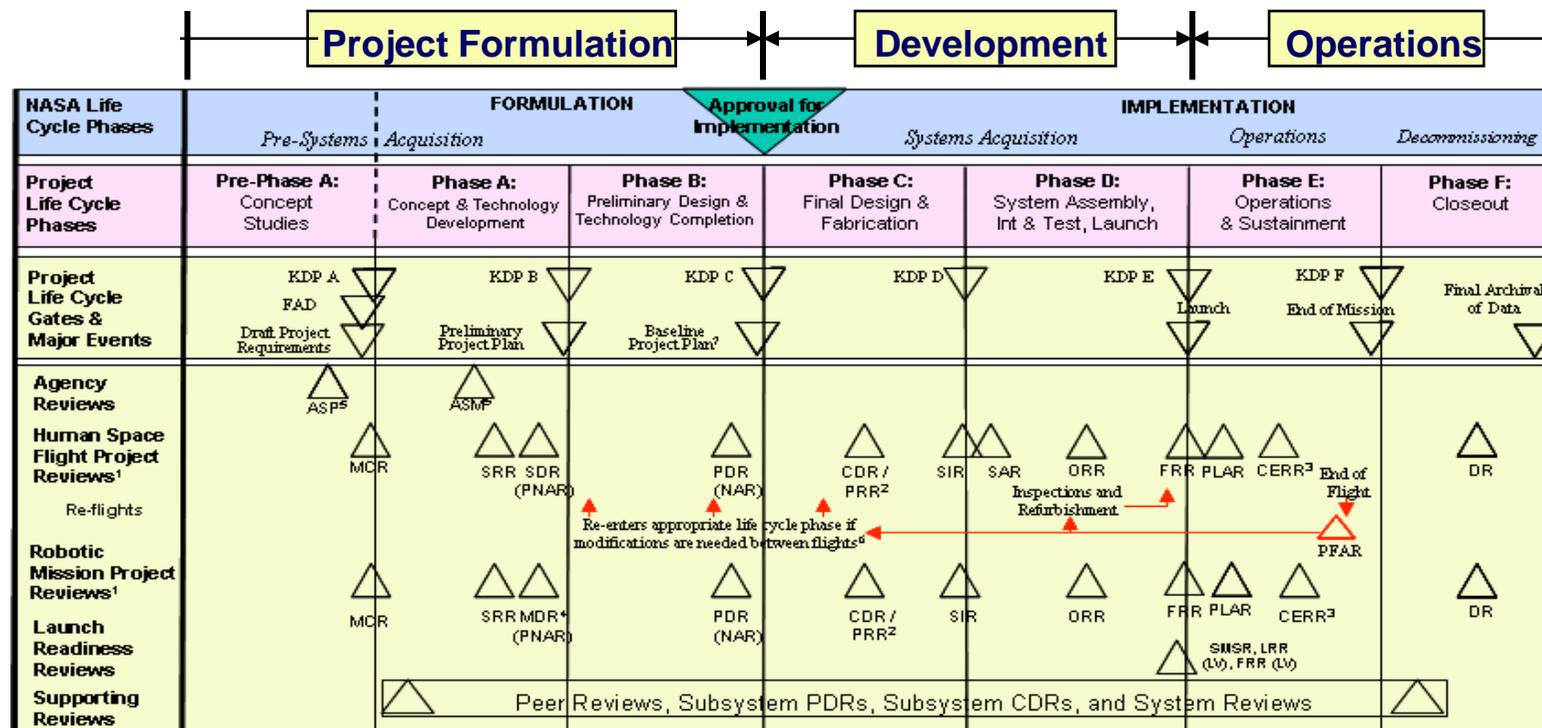
AsMA 2009, Los Angeles, CA



The Systems Engineering Life-Cycle

As with most major government acquisitions, human spaceflight programs follow a **Systems Engineering life-cycle**

- Defined for NASA in the NASA Systems Engineering Handbook



Major phases: **Formulation → Development → Operations**



Integration of Human Concerns

For effective consideration, Human/Systems Integration (HSI) must be thoroughly integrated with the Systems Engineering life-cycle

The Department of Defense (DoD) has developed and mandated HSI inclusion in acquisition processes

NASA has no formal HSI mandate, however...

NASA Space Life Sciences Directorate (SLSD) and Health & Medical Technical Authority processes provide HSI requirements and deliverables to human spaceflight:

- Human Factors assessments & validation of spacecraft systems
- Habitability requirements & design for spacecraft
- Behavioral Health & Performance capabilities & countermeasures
- Space Medicine capabilities for Exploration
- Environmental Monitoring technologies & strategies
- Human Health Countermeasures & technologies

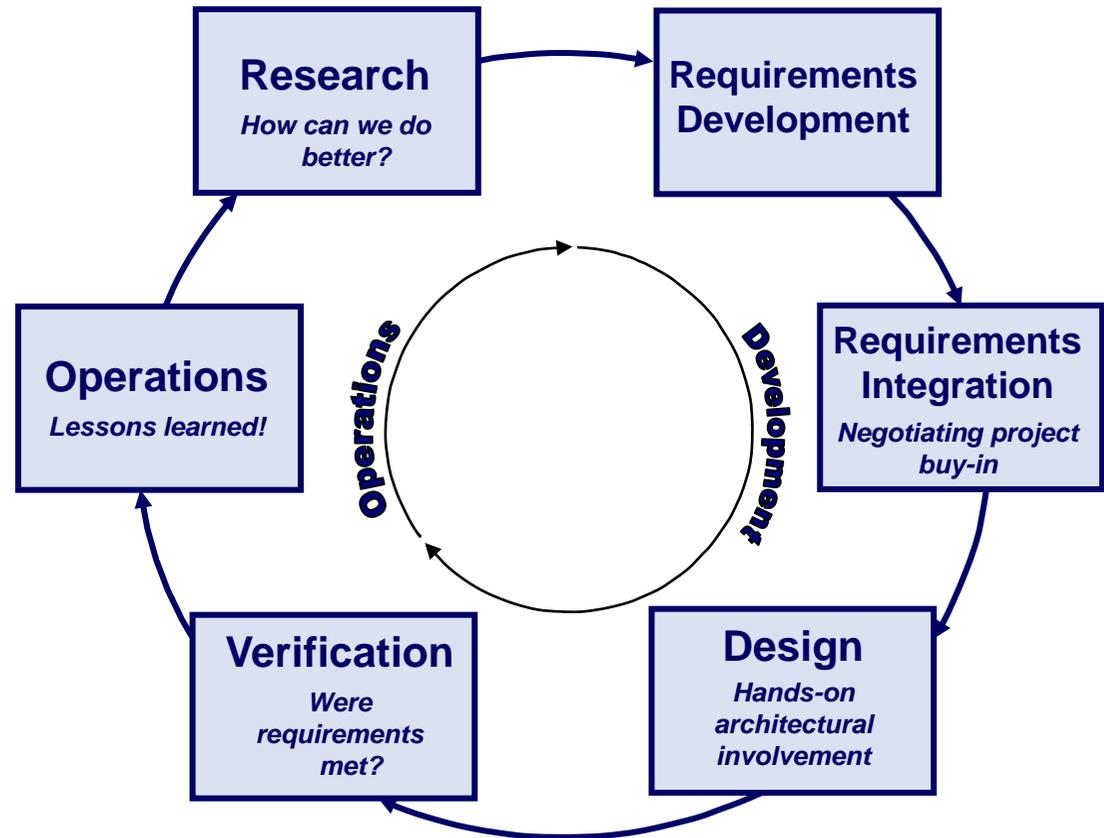
Six Capability Model for Integrating Human Concerns



SLSD Human Factors personnel have promoted Six Capabilities essential to including HSI into the Systems Engineering life-cycle:

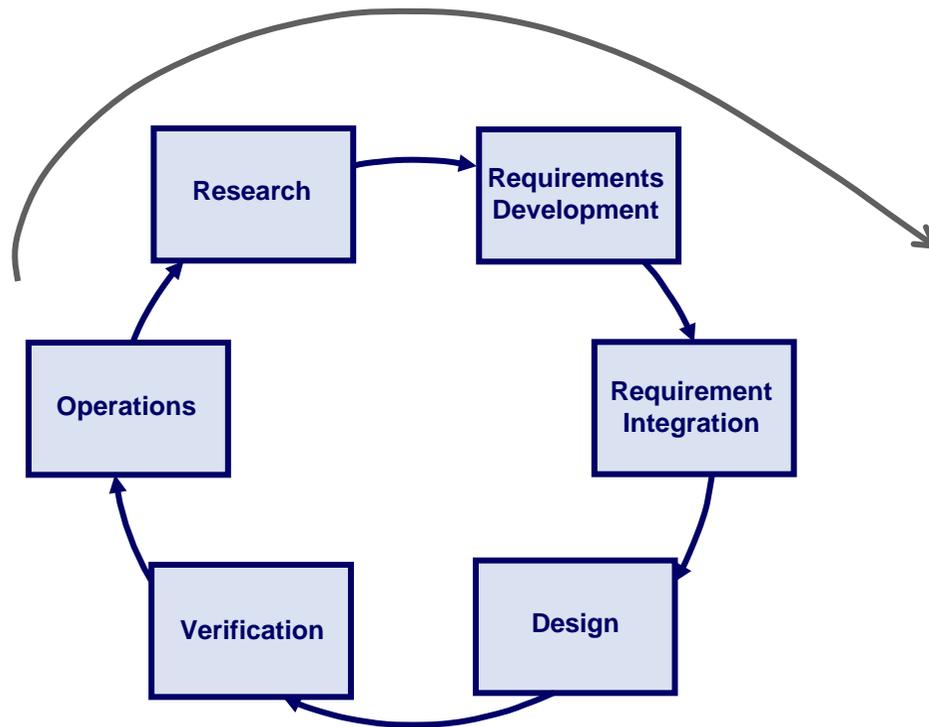
Required for success:

- 1) Capability competency in each HSI provider's discipline
- 2) Program Managers' buy-in that each discipline may engage in their processes



Relation: Six Capabilities / SE Process

The Capabilities' sequence tracks the Systems Engineering (SE) life-cycle



<u>Capability</u>	<u>SE Phase</u>
Requirements Reqt's Integration Design	Project Formulation
Reqt's Integration Verification Design	Development Cycle
Operations	Operations

The Research capability assesses the success of HSI's inclusion throughout the cycle and closes the loop with knowledge to write better Requirements for the future



Today's NASA HSI Panel

This Panel addresses SLSD inclusion of HSI in human spaceflight using the Six Capabilities model as an organizing tool

<u>Presenter</u>	<u>Discipline</u>	<u>Capability</u>
Debbie Berdich	Systems Engineering	Requirements, Requirements Integration, Verification
David Fitts	Habitability	Design
Jennifer Fogarty	Space Medicine	Operations
Lauren Leveton	Behavioral Health & Performance	Research

Judith Robinson will close by continuing discussion of SLSD's risk-based management of HSI cross-discipline concerns