Human Research Program Science Management: Overview of Research and Development Activities

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Human Research Program Goals

- Research necessary to understand and reduce spaceflight human health and performance risks in support of exploration
- Enable development of human spaceflight medical and human performance standards
- Develop and validate technologies that serve to reduce medical risks associated with human spaceflight

What does HRP do?

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What are the human research and technology development areas and activities that are important to NASA?

Elements and Projects within HRP

Technology development activities	*Applied research & development activities*	*Core service activities*

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Elements and Projects within HRP

- Exploration Medical Capability

Technology development activities

Applied research & development activities

Core service activities

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- Exploration Medical Capability
- Space Human Factors & Habitability

Technology development activities

Applied research & development activities

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- Space Human Factors & Habitability

Technology development activities

- Radiation

Applied research & development activities

Core service activities

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Technology development activities

- Radiation
- Behavioral Health & Performance

Applied research & development activities

Core service activities

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Technology development activities

- Radiation
- Behavioral Health & Performance
- Human Health & Countermeasures

Applied research & development activities

Core service activities

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Applied research & development activities

- ISS Medical Project

Core service activities

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Elements and Projects within HRP

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  - ✓ Advanced Environmental Health

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Technology development activities

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- Human Health & Countermeasures
  - ✓ EVA Physiology Systems & Performance

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Technology development activities

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- Human Health & Countermeasures
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Applied research & development activities

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Core service activities

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  - ✓Flight Analogs

Applied research & development activities

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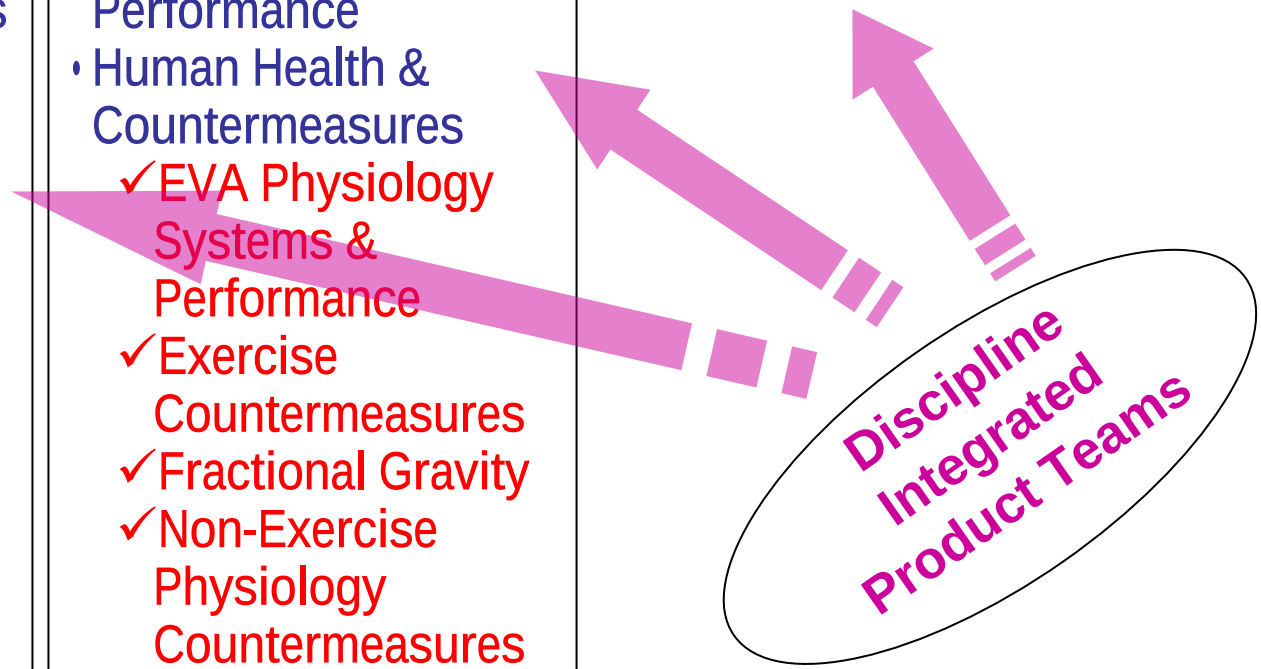
Core service activities



How does HRP do it?

Development and Maintenance of Priorities

- Needs/goals
- Risk assessment
- Prioritization
- Standards, deliverables

HRP Responsibilities

Gather requirements from customer programs (e.g., Shuttle, ISS & Constellation) and stakeholders

- What is crewmember expected to do?
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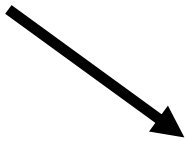

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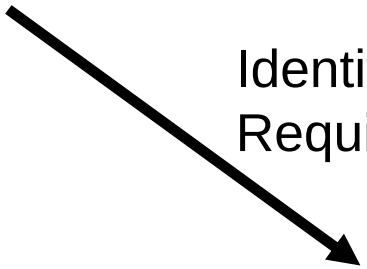

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Develop Space Flight Health **Standards** for Human Performance

HRP Responsibilities

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Plan, acquire & execute necessary research & technology activities

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Develop Space Flight Health **Standards** for Human Performance

Plan, acquire & execute necessary research & technology development

Provide **Deliverables** to Customers

- Operational experience
- Knowledge (reduced uncertainty, design recommendations)
- Countermeasure protocols
- Technology for crew health, safety and efficiency
- Progress Reports
- Lessons Learned

Backup

Acquisition and Evaluation of Research and Technology Proposals

Per Human Research Program
Science Management Plan

(HRP-47053)

Feb. 8, 2007

Acquisition of Research & Technology Proposals

"It is HRP's policy to utilize full and open competition for research and technology investigations through periodic research solicitations issues by both NASA nd NSBRI and to maintain a balance between selected intramural and extramural investigations."

- Solicited proposals
  - Annual joint NASA/NSBRI research announcements as part of HRP's ongoing approved research program
    - Radiation-specific (~January)
    - Non-radiation topics (~May)
- Unsolicited proposals
  - Innovative, unique
  - Prepared without NASA involvement
  - Sufficiently detailed to permit evaluation
- Project-directed study proposals
  - Competitive (*via* Request for Proposals) or non-competitive
  - Intramural and extramural investigators, teamed if possible
  - In space flight or on Earth (field centers, universities, institutions)
  - Constrained by time, focus or operational limitations

Evaluation of Research & Technology Proposals

- Solicited proposals
  - Peer review as specified in Announcement
  - Selection based on merit, relevance, feasibility cost, other factors
- Unsolicited proposals
  - Triaged by Program Scientist to relevant Element
  - Element Scientist and Project Scientist(s) review proposal, determine relevance and value to Project area(s)
  - Element Scientist recommends merit review by appropriate Project NAP Panel to Program Scientist
- Project Directed Study proposals
  - Generated by Project, supported by Element Scientist
  - Forwarded to Program Scientist for NAR review
  - Reviewed by Project NAR Panel (or *ad hoc* NAR panel)
  - Any space flight requirements reviewed by ISSMP for feasibility
  - Element, Project Scientists include successful, relevant propsals in funded program

Conclusion

- In work

Annual Reviews

- Discipline Science Review
- Project Science Review
- Element Science Review
- Program Science Review
- Annual Research and Technology Forum

Annual Discipline Science Review

- Evidence base of space research
- Clinical and operational data and knowledge
- Exploration-related adverse outcomes to HHP
- Gaps, uncertainties and recommendations

Annual Project Science Review

- Project Non-Advocate Review Panel (or *ad hoc* NAR Panel)
  - To exist for duration of Project
  - Coordinated, managed by Program Scientist to avoid real or perceived conflict of interest
  - Primarily extramural discipline specialists, engineers, managers for fixed, staggered terms
  - Review, comment on all appropriate scientific, technical aspects
  - Identify strengths, weaknesses, recommendations
- Project Science Management Review
  - Element Scientist to focus on each Project's activities, responses to Project NAR Panel advice, responses to latest Discipline Proposed Research Profile

Annual Element Science Review

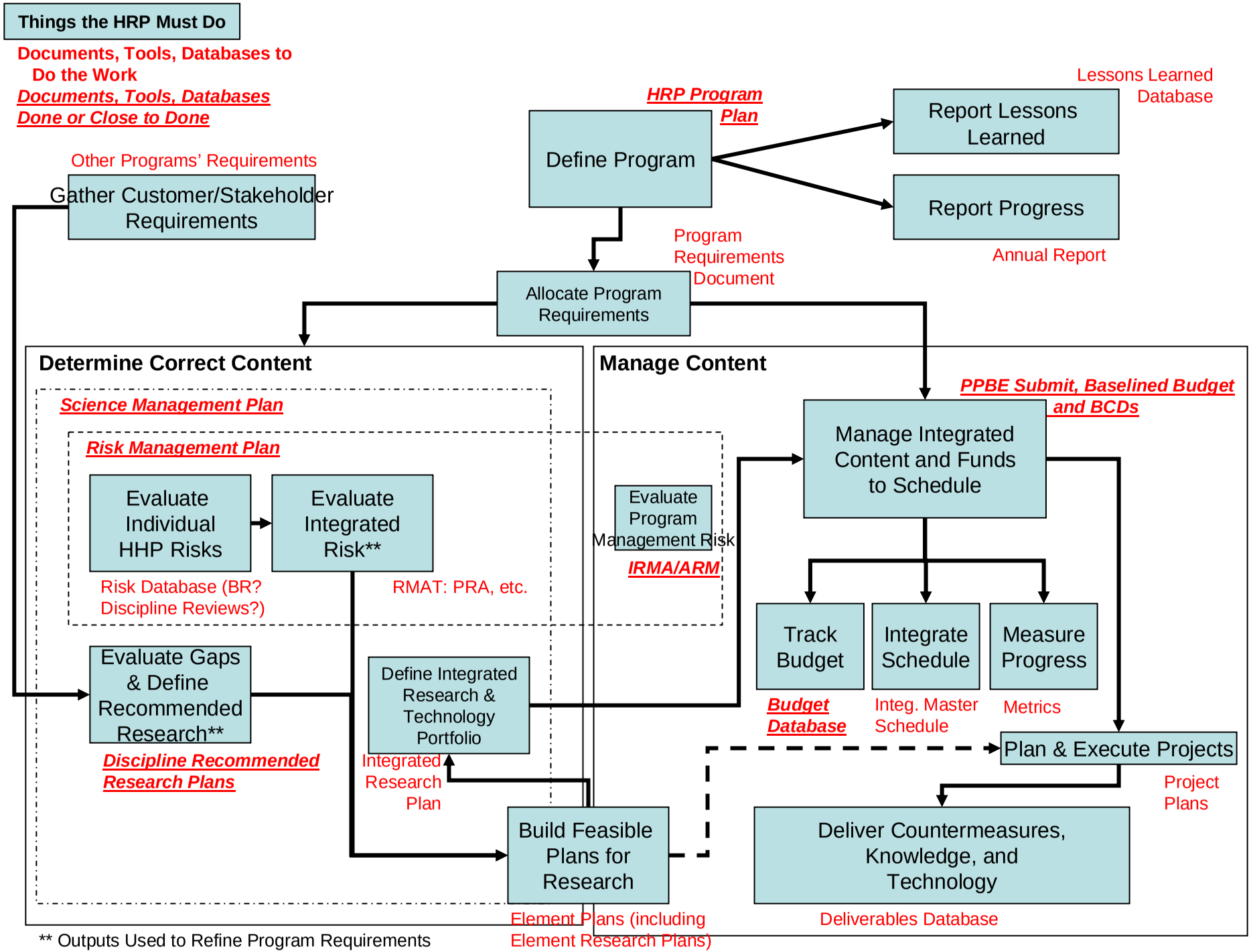
- Program Scientist to review all scientific activities of each Project within each Element
- Focus on Project integration into cohesive, synergistic set of mutually beneficial activities

Annual Program Science Review

- Program Scientist, with Element, Project Scientists, to provide overview of entire HRP scientific program to Program Manager
- Focus on strengths of current program, traceability of activities to Program Requirements Document, and gaps to be addressed
  - Assesses need to continue, modify, expand or terminate scientific studies, investigations based on results, evidence and program needs
- Coordinated with NASA annual budget cycle
- Criteria
  - Documentation of new scientific evidence further mitigating known risks or identifying new ones
  - Advancement of TRLs or CRLs
  - Delivery of tangible products that are accepted by HRP's customers

Annual Research and Technology Forum

- “2007 HRP Investigators Workshop”
- Bring together investigators, managers to communicate results to HRP stakeholders (space medicine, astronauts, NASA management, the public) and customers (Exploration Systems Mission Directorate, Space Operations Mission Directorate, Chief Health and Medical Officer)


Things the HRP Must Do
Documents, Tools, Databases to Do the Work
Documents, Tools, Databases Done or Close to Done
HRP Program Plan
Lessons Learned Database
Other Programs' Requirements
Gather Customer/Stakeholder Requirements
Define Program
Report Lessons Learned
Report Progress
Annual Report
Program Requirements Document
Allocate Program Requirements
Determine Correct Content
Manage Content
Science Management Plan
Risk Management Plan
PPBE Submit, Baselined Budget and BCDs
Evaluate Individual HHP Risks
Evaluate Integrated Risk**
Risk Database (BR? Discipline Reviews?)
RMAT: PRA, etc.
Evaluate Program Management Risk
IRMA/ARM
Manage Integrated Content and Funds to Schedule
Track Budget
Integrate Schedule
Measure Progress
Budget Database
Integ. Master Schedule
Metrics
Evaluate Gaps & Define Recommended Research**
Discipline Recommended Research Plans
Define Integrated Research & Technology Portfolio
Integrated Research Plan
Plan & Execute Projects
Project Plans
Build Feasible Plans for Research
Deliver Countermeasures, Knowledge, and Technology
Element Plans (including Element Research Plans)
Deliverables Database
** Outputs Used to Refine Program Requirements