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

John Charles, Ph.D.
HRP Deputy Program Scientist
NASA Human Research Program
Investigators’ Workshop
Feb. 12, 2007
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?
What does HRP do?

What are the human research and technology development areas and activities that are important to NASA?
# Elements and Projects within HRP

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**Technology development activities**

**Applied research & development activities**

**Core service activities**
Elements and Projects within HRP
## Elements and Projects within HRP

| • Exploration Medical Capability  
  Technology development activities | Applied research & development activities | Core service activities |
Elements and Projects within HRP

- Exploration Medical Capability
- Space Human Factors & Habitability
  *Technology development activities*

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

Applied research & development activities
Elements and Projects within HRP

- Exploration Medical Capability
- Space Human Factors & Habitability
  Technology development activities
- Radiation
- Behavioral Health & Performance
- Human Health & Countermeasures
  Applied research & development activities

Core service activities
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  - Advanced Environmental Health
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  *Technology development activities*

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  - EVA Physiology Systems & Performance
- ISS Medical Project

Core service activities

Applied research & development activities
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  - Exercise Countermeasures
  - Fractional Gravity
  - Non-Exercise Physiology Countermeasures
  - Flight Analogs

ISS Medical Project
Core service activities

Discipline Integrated Product Teams
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?
- What conditions is crewmember exposed to?
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Identify and evaluate risks associated with Requirements
Develop Space Flight Health Standards for Human Performance

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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 proposals 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

Evidence base of space research
Clinical and operational data and knowledge
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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)