Jet Propulsion Laboratory
California Institute of Technology

SSB Review of NASA's Planetary Science Division's R&A Programs

Observations and Recommendations by JPL

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Outline.

Overview of Planetary Research and R&A at JPL

Impacts of PSD Restructuring of R&A Programs

Special Topic: Researcher Morale

Recommendations

JPL's Planetary Research.

Overview

JPL is NASA's leading center for planetary exploration.
Our science roles span the majority of planetary research.

- Broad participation in R&A programs.
- Leadership in competed and strategic planetary missions.
    - Project Scientists for JPL managed missions
    - Mission formulation, design, development and operations
    - Science support in all aspects of planetary missions.

JPL's scientific research and mission implementation are focused on supporting NASA's science goals and Decadal Survey priorities.

Our research is organized around NASA's science themes

- Hiring and development of planetary scientists at JPL is targeted to advance NASA programs and extend research into new areas, e.g. ocean worlds.
- JPL scientists assist NASA in architecting planetary programs, e.g. Mars exploration**.**

JPL's R&A Planetary Research.

JPL scientists hold soft-money positions and depend on NASA competitive selections to support their research.

- Planetary scientists depend on PSD R&A funds for research salaries, equipment and facilities.
    - JPL has 73 funded R&A tasks (as defined in restructured program) distributed among nearly all programs.

      EXO EW HW SSO LARS SSW PDART CDAP MDAP LDAP MSL PS MATISSE PICASSO PSTAR PPR
    - The largest number of research tasks at JPL is in Solar System Workings.
- JPL scientists participate in planetary missions as NASA selected PIs, Co-Is and Participating Scientists.
- JPL scientists may receive partial salary support by assisting in missions and program activities.
    - Science support roles in JPL projects and programs.
        - Project Scientists
        - Investigation Scientists
        - Program office support, e.g. program formulation and development.

Impacts at JPL of Restructured PSD R&A Program.

Restructuring's impact is felt most in the following areas

Solar System Workings program (focused disciplines swept into a single, large multidisciplinary program).
Astrobiology
Laboratory research

Transition to new program structure remains a concern for proposers to Solar System Workings.

SSW is a large, cumbersome, ill-understood catch-all program consisting of disparate science disciplines.
Evidence of challenges in SSW is greatest in proposal review process and outcome.
- Diversity of disciplines challenges even the most experienced researchers who must tailor their proposals to appeal to the diverse audience of SSW reviewers.

Impacts at JPL of Restructured PSD R&A Program.

Transition to new program structure remains a concern for reviewers of proposals to Solar System Workings.

- SSW presents challenges to peer reviewers.
    - Absence of clear guidelines for reviewers increases challenge to proposers and reviewers alike.
    - Assembling competent review panels is difficult
        - Prospective reviewers are asked to commit significant amounts of time to evaluate large numbers of proposals.
        - Time commitments severely limits the pool of willing experienced reviewers.
        - Reviewers with adequate breadth of knowledge required to evaluate SSW proposals are rare (and too busy participate).
        - Conflict of interest policies restrict pool of reviewers
- Constraints drive review panels toward early career, less experienced peers who have yet to accrete administrative duties in their home institutions.

Astrobiology R&A programs have benefitted from restructuring.

Programs related to habitability and the search for life beyond Earth are perceived by the JPL community to have received increased emphasis and funding, compared with the pre-restructured R&A program.

Impacts at JPL of Restructured PSD R&A Program.

There a persuasive impression that laboratory research has been negatively impacted by restructuring.

Negative impacts are felt in R&A programs that require significant infrastructure and support personnel.

- Factors negatively impacting laboratory research:
    - Disruption due to intermittent funding in support of laboratories (even for a single year) can result in the loss of critical capabilities.
    - Following restructuring, laboratory research has been distributed among multiple R&A programs, some of which are not science friendly (PDART). The result is diminished continuity of purpose and funding.
    - The role of NASA Discipline Scientists has shifted away from visionary program leadership. R&A program leadership that adheres too strictly to the results of peer review can lead to the dominance of short-term objectives, and an absence of program balance.
- Current challenges in supporting laboratory cosmochemistry is illustrative of these problems.

Impacts at JPL of Restructured PSD R&A Program.

Researcher Morale.

There is anecdotal evidence, drawn primarily from researcher comments, that morale is low among early career scientists seeking support from PSD R&A programs.

- Although it is difficult to attribute low morale to the R&A restructuring, contributing factors include
    - Proposal selection rates are low.
        - For example, there is a perception that selection rates in cosmochemistry and geochemistry were stable and much higher prior to restructuring.
    - There is little guidance available from NASA program managers. Experienced researchers are themselves confused and disheartened.

Impacts at JPL of Restructured PSD R&A Program.

Researcher Morale.

The online *"Young Scientists for Planetary Exploration"* Facebook page is one source of early career perspectives. Example contributions:

"I'm also noticing another issue with SSW: the wider variety of possible reviewers. When I was submitting mostly to OPR I had a better understanding of the knowledge base of my potential reviewers. With SSW, there's more of a possibility of getting put into a very different sub panel. I need to do a better job in the future making sure I'm addressing a wider variety of readers (very difficult in 15 pages)."

"My titan photochemical modeling proposal and my Pluto atmosphere experimental proposal had the same primary reviewer. (How I know that is an issue for another day) That's a...rare combination of expertise for one person to span."

"Some comments I have received on SSW reviews leave me wondering as to the background of my reviewers and how different it is from what I am proposing.. Often things that are widely considered general knowledge are questioned within the review, which I find problematic and very discouraging as well."

"Mine may have suffered from a similar problem. The reviewers expected the work to do things that we weren't planning to do. Could be a lack of reviewer expertise."

"I reviewed a proposal for SSW that was so far out of my field it was hilarious. And it was a very late request. I did it anyway, making it clear that I had no idea what I was talking about, and focusing on the positives I saw in the work (which I thought sounded really cool!)."

Impacts at JPL of Restructured PSD R&A Program.

Researcher Morale.

A common complaint among experienced researchers at JPL is a reluctance by PSD leadership to guide the R&A programs. Too often, researchers are told by Discipline Scientists that the peer review process is now the sole arbiter in proposal ranking and selections.

- Scientists desire the re-introduction of Discipline Scientists who are empowered to apply their personal vision to programs.
- When seeking instructions on program relevance and prioritization, peer review panels are referred by Discipline Scientists to the text in the ROSES calls.
- Absent guidance PSD leadership, R&A programs can fail to achieve balance.

Recommendations for Restructured PSD R&A Program.

It is imperative that we improve the quality of peer review by addressing the excessively constraining *conflict of interest* policies.

Adopt the approach used in the 2016 PSD extended mission Senior Review process.

- Identify and declare conflicts of interest among reviewers.
- Permit all panelists to participate in fact-finding and Q&A.
- Exclude conflicted parties from panel discussions and decision making.

Broaden the pool of expert peer reviewers for PSD R&A proposals

Require R&A awardees to participate in peers review process.

- Require participation in reviews at least once during life of their award, if requested.
- Assemble highly diverse review panels that include a range of experience and institutions.

Recommendations for Restructured PSD R&A Program.

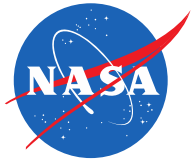
Empower PSD Discipline Scientists to shape their R&A programs.

Scientists desire the return of Discipline Scientists who are empowered to apply programmatic vision in their efforts to manage their programs.

- Outcomes from peer review panels should dominate, but not be taken as direction to Discipline Scientists who are working to achieve NASA objectives and Decadal Surveyor priorities.
- Discipline Scientists should guide program content for excellence, innovation, balance, and continuity.
- Urge Discipline Scientists to communicate their programmatic visions to the review reviewers.

Tackle the extremely challenging Solar Systems Workings program.

Partition SSW and/or assign research topics into other similar R&A programs.
Accept a larger number of programs in favor of better and more relevant research.
Organize improved peer review panel by adopting practical conflict of interest policies.



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Two questions

1. Are the PSD R&A program elements appropriately linked to, and do they encompass the range and scope of activities needed to support the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

2. Are the PSD R&A program elements appropriately structured to develop the broad base of knowledge and broad range of activities needed both to **enable new spaceflight missions** and to **interpret and maximize the scientific return** from existing missions?

    Cross-cutting themes (DS) – ROSES program - # of proposals
    Building New Worlds – EW – 136 proposals in ROSES 15
    Planetary habitats – HW – 63 ….
    Workings of Solar System – SSW – 316 ….

    Are MATISSE, PICASSO, [COLDTECH] responsive to 2014 NASA Science Plan?

Question 2: Are the PSD R&A program elements appropriately structured to develop the broad base of knowledge and broad range of activities needed both to **enable new spaceflight missions** and to **interpret and maximize the scientific return** from existing missions?

EXO	Exobiology
XRP	Exoplanet Research Program
EW	Emerging Worlds
HW	Habitable Worlds
SSO	Solar System Observations
LARS	Laboratory Analysis of Returned Samples
SSW	Solar System Workings
PDART	Planetary Data Archiving, Restoration, and Tools
CDAP	Cassini Data Analysis Program
MDAP	Mars Data Analysis Program
LDAP	Lunar Data Analysis Program
MSL PS	MSL Project Scientist
MATISSE	Maturation of Instruments for Solar System Exploration
PICASSO	Planetary Instrument Concepts for the Advancement of Solar System Obs.
PSTAR	Planetary Science and Technology Through Analog Research
PPR	Planetary Protection Research
COLDTECH	Concepts for Ocean worlds Life Detection Technology
DDA	Discovery Data Analysis