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Decadal Survey, R&A Chapter Group
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Definition of R&A

NASA's definition of "Research and Analysis"; what does NASA see as the role of R&A; and what are the goals of a successful R&A program or, alternatively, what does a successful R&A program look like?

The R&A program is critical for PSD:

- Missions provide the critical data needed to answer NASA's Science Questions
- Both missions and R&A provide analysis of these data, and R&A can provide additional context for mission science.
- R&A provides the context needed to plan future missions and tie into national priorities (e.g. Artemis)
- **NASA turns to the Community to help answer Science Questions -- to fulfil NASA's Mission**

R&A also helps provide continuity of expertise between missions

Definition of R&A: Programs (1/2)

There is a community perception that within NASA there isn't a standard definition of what programs are considered R&A, which makes it difficult to assess whether prior DS recommendations are being met; is this an accurate perception? If so, why isn't there a clear definition? If not, please provide a list of programs that are considered R&A by the PSD.

The perception is correct: there is no standard definition. Why? Because reasonable people can have different opinions about what counts.
The problem is not **what** the definition is, but that it is **stable**, and that comparisons made over time use a common definition. We are currently working to develop a clear definition and to adjust internal financial accounting to accurately map onto that definition.

We did two analyses of the historical R&A funding, using different assumptions about "what is R&A?". Both show that PSD has (in aggregate) exceeded recommendations of the last Decadal.

PSD Research Programs

Green boxes are programs funded by mission lines

Red "X" indicates "not considered PSD Science research".

Research Programs

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Meagan Thompson, PE

PESTO
Carolyn Mercer (GRC), Lead

Data / Sample Analysis Programs

CDAP
Henry Throop, PO
Lucas Paganini, Spt

MDAP
Mitch Schulte, PO
Adrian Brown, DPO
Lucas Paganini, Spt
Bobby Fogel, Spt

LDAP
Shoshana Weider, PO
Sarah Noble, Spt

DDAP
Tom Wagner, PO
Doris Daou, Spt

NFDAP
Henry Throop, PO
Melissa Morris, DPO
Jeff Grossman, Spt

LARS
Jeff Grossman, PO
Melissa Morris, Spt

ANGSA
Jeff Grossman, PO

Core Research Programs

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Megan Ansdell, SPS
Riris, Weider, Walker Spt.

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SSO
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Doris Daou, DPO

YORPD
Kelly Fast, PO

PPR
Becky McCauley Rench, PO

ECA / ECF
Melissa Morris, PO
Megan Ansdell, Spt
Shoshana Weider, Spt

FINESST
Lindsay Hays, PO
Amanda Nahm, DPO

PDART
David Smith, PO
Delia Santiago-Materese, DPO
Becky McCauley Rench, Spt
Sarah Noble, Spt

XRP
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Astrobiology Research Program
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HW
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Lindsay Hays, PO
D. Santiago-Materese, Spt
Davis Smith, Spt
Mitch Schulte, Spt
Geoff Wheat, Spt

ICAR / NAI
Mary Voytek, PO

PSTAR
Sarah Noble, PO
Catherine Walker, DPO
Henry Throop, Spt.
Lindsay Hays, Spt

Participating Scientist Programs

Akatsuki
Adriana Ocampo, PO

InSight
Bobby Fogel, PO

Mars 2020
Mitch Schulte, PO

OSIRIS-REx
Jeff Grossman, PO
Melissa Morris, Spt

KPLO
Shoshana Weider, PO

BepiColombo
Shoshana Weider, PO

Hayabusa-2
Jeff Grossman, PO

Juno
Lucas Paganini, PO

DART
Tom Statler, PO
Melissa Morris, Spt

MMX
Tom Statler, PO

Other Research Activities

HEC (X)
David Smith, PO

SSERVI
Sarah Noble, PO

PME
Aaron Burton, PO
Jeff Grossman, DPO

Planetary Facilities
TBD, **PO**
Jeff Grossman, Spt

PMCS
Doris Daou, PO

Citizen Science
Mike Kelley, PO

ISFM
Stephen Rinehart
David J. Smith, PO
Jeff Grossman, DPO
Mary Voytek, DPO

Technology Funded through ROSES

COLDTech (X)
Ryan Stephan, PE

HOTTech (X)
Viet Nguyen, PE

DALI
Ryan Stephan, PE
Adrian Brown, Spt
TBD, Spt
Add. spt from ESSIO

MatISSE
Carolyn Mercer, PO
TBD, DPO
Lucas Paganini, Spt
Ryan Stephan, Spt

PICASSO
Catherine Walker, PO
TBD, DPO
Lindsay Hays, Spt
Ryan Stephan, Spt

SESAME (X)
Ryan Stephan PE

Astrodynamics (X)
Ryan Stephan, PE

AISR: ARROW (X)
Carolyn Mercer, PE

ANGSA	Apollo Next Generation Sample Analysis Program
ARROW	Autonomous Robotics Research for Ocean Worlds
CDAP	Cassini Data Analysis Program
COLDTech	Concepts for Ocean Worlds Life Discovery Technology
DALI	Development and Advancement of Lunar Instrumentation
DDAP	Discovery Data Analysis Program
ECA	Early Career Award
ECF	Early Career Fellowship
EW	Emerging Worlds
ExoBio	Exobiology
FINESST	Future Investigators in NASA Earth and Space Science and Technology
HEC	High-End Computing

HOTTech	High Operating Temperature Technology
HW	Habitable Worlds
ICAR	Interdisciplinary Consortia for Astrobiology Research
ICEE	Instrument Concepts for Europa Exploration
KPLO	Korean Pathfinder Lunar Orbiter
LARS	Laboratory Analysis of Returned Samples
LDAP	Lunar Data Analysis Program
MatISSE	Maturation of Instruments for Solar System Exploration
MDAP	Mars Data Analysis Program
NAI	NASA Astrobiology Institute
NFDAP	New Frontiers Data Analysis
NPLP	NASA Provided Lunar Payloads
PDART	Planetary Data Archiving, Restoration, and Tools
PICASSO	Planetary Instrument Concepts for the Advancement of Solar System Observations

PME	Planetary Major Equipment
PPR	Planetary Protection Research
PSTAR	Planetary Science and Technology through Analog Research
RPIF	Regional Planetary Image Facility
SESAME	Scientific Exploration Subsurface Access Mechanism for Europa
SSERVI	Solar System Exploration Research Virtual Institute
SSO	Solar System Observations
SSW	Solar System Workings
XRP	Exoplanet Research Program
PSDS3	Planetary Science Deep Space SmallSat Study

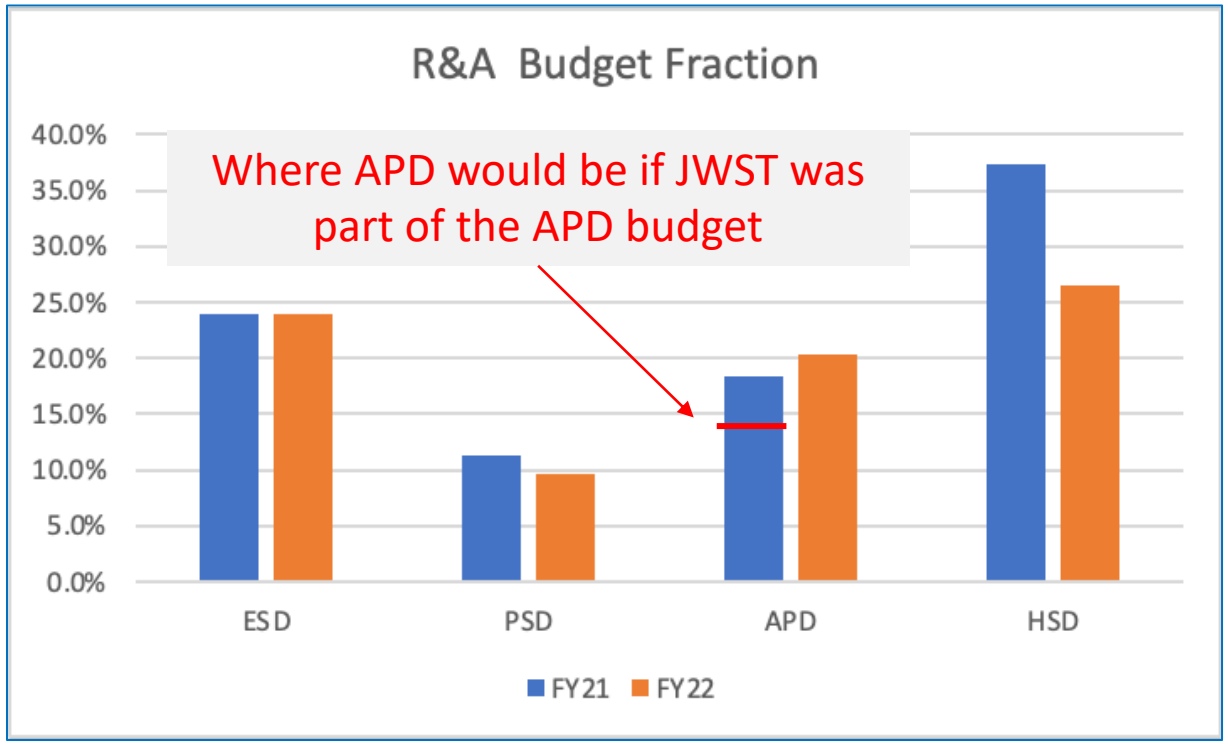
The “Right Size” for R&A?

What does the answer to the first question suggest about what NASA would consider to be the “right size” of the R&A-supported science community in quantitative and qualitative terms?

This seems like a great question for the Decadal…

PSD has the lowest percentage of overall budget going to R&A (of the Divisions of SMD, not counting BPSD)

Percentages here are taken from the FY22 PBR, and they have potentially large error bars! (they’re probably all on the high side)

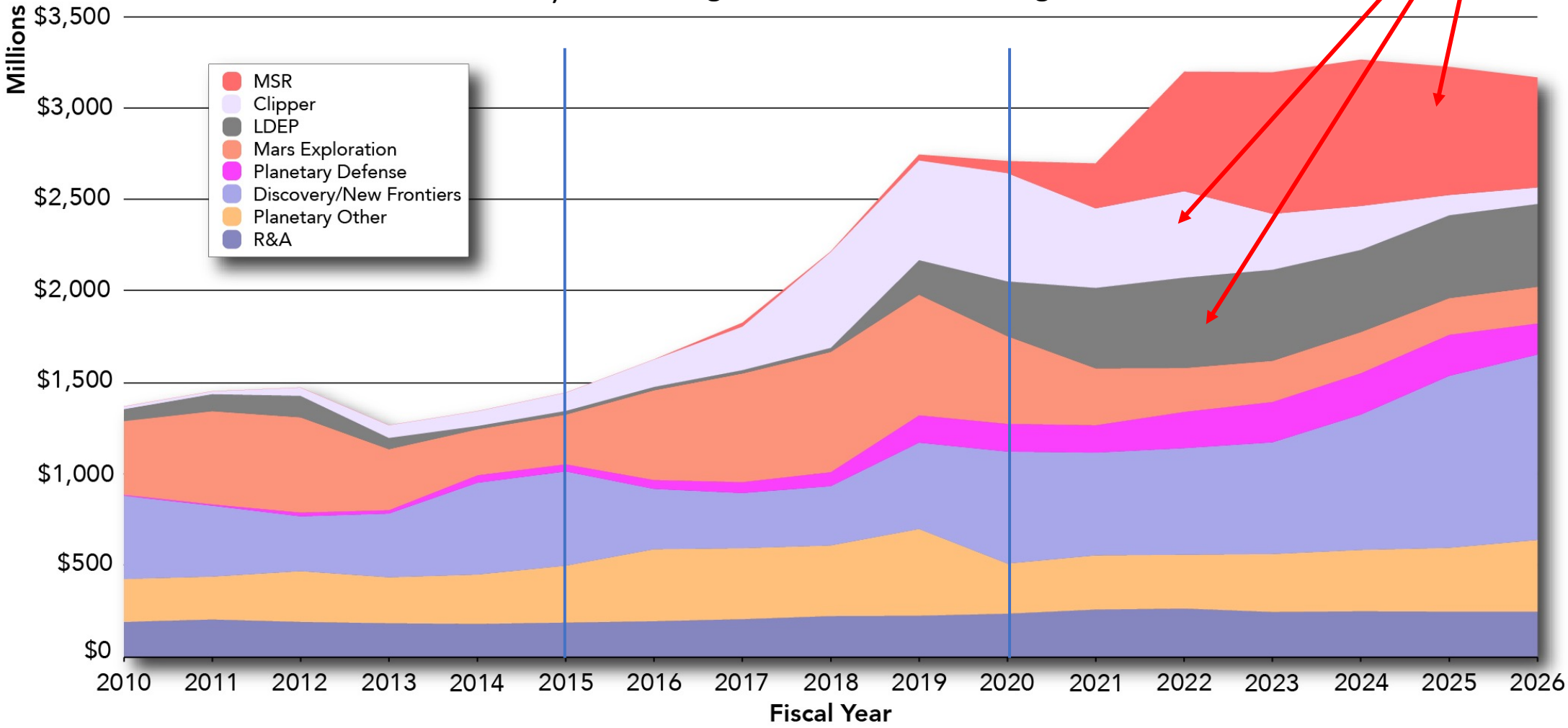


Context

In 2015, R&A was 13% of the total PSD budget (this does not count research in mission lines)

In 2020, R&A was 9% of the total PSD budget; the decrease comes from the growth of the total budget

The growth, though, is here: Additional funds from Congress for flagships and the moon.

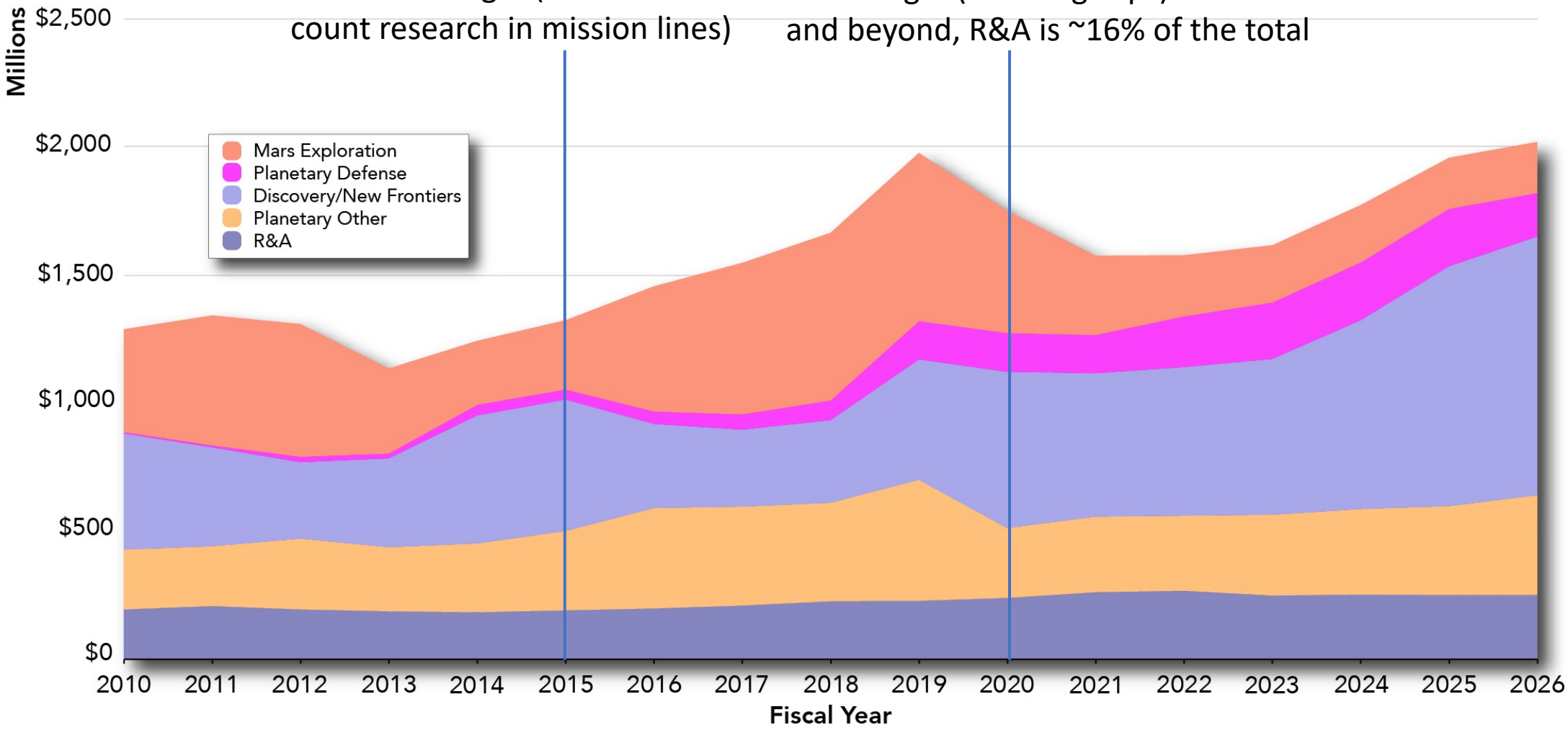


Context, part 2

Take out flagships and the moon, and the answer is different

In 2015, R&A was 14.3% of the total PSD budget (this does not count research in mission lines)

In 2020, R&A was 13.6% of the total PSD budget (sans flagships): in 2021 and beyond, R&A is ~16% of the total



Demographics

What demographic information is presently collected and tracked for NASA R&A submissions? Is there information you would like to collect but are not able to due to NASA policy or federal law?

- NASA Office of the Chief Scientist (OCS) started collecting some demographic data in 2016 after a GAO report on women in STEM research recommended that NASA begin collecting standard demographic data (https://www.gao.gov/products/gao-16-14)
- NASA OCS had to adhere to the Paperwork Reduction Act. For ease (and speed), NASA adopted an already-approved demographic survey that was being used by the National Science Foundation. The survey was added to the NSPIRES system and all users were prompted to respond to it upon logging into the system.
- PSD and the PSD R&A program do not collect demographic data!

Demographic Survey (2016-2019)

Demographics Data Collection

WHY THIS INFORMATION IS BEING COLLECTED:
The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify any inequities based on gender, race, ethnicity, or disability. NASA asks that you provide information about your gender, race, ethnicity, and disability status in order to ensure compliance with Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d et seq., Title IX of the Education Amendments of 1972, 20 U.S.C. § 1681 et seq., Section 504 of the Rehabilitation Act of 1973, 29 U.S.C. § 701 et seq., and NASA's implementing regulations at 14 CFR. §§1250, 1251, and 1253.

Submission of the requested information is voluntary and will not affect an organization's eligibility for an award. However, withholding this information will undermine the usefulness of information provided by others. Any individual who would prefer not to submit some or all the information requested should check the box(es) provided.

1. Gender * (choose one):

- ○ Male
- ○ Female
- ◉ I prefer not to report my gender

2. Ethnicity * (choose one):

- ○ Hispanic or Latin
- ○ Not Hispanic or Latin
- ◉ I prefer not to report my ethnicity

3. Race * (select one or more):

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other
- ☑ I prefer not to report my race

4. Do you have any of the following disabilities/serious health conditions? Consider your answers without the use of medication and aids (except eyeglasses) or the help of another person. (Check all boxes that apply to you.) *

- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None
- ☑ I prefer not to reveal my disabilities/health conditions

5. Are you currently serving (or have previously served) as PI, PD, Co-PI, or Co-PD on any federally funded project? *

- ○ Yes
- ◉ No

Demographic Survey (2020-current)

- Added career stage and type questions to basic demographic survey:
  - Highest degree earned (BS, MS, PhD, Other, prefer not to answer)
  - year of highest degree (drop down box)
  - career classification sector (academia, government, for-profit, non-profit, prefer not to answer)
  - Career type (primarily research, primarily teaching, science-related, engineering/technology-related, further training/education, other, prefer not to answer)
- What didn't get approved in the new survey:
  - Change in the assumption of gender binary
  - Antiquated concepts of ethnicity/race
  - Expanded ability classifications (ADA)

Analysis and availability of data

- Conditions of gathering data included:
  - Data would not be used to make funding decisions
  - Data would not be provided in such a way that individual responses could be correlated or connected to the person submitting their data
- The analysis, dissemination of aggregate data, and communication of results is the responsibility of OCS and they have begun doing high level analysis and presenting it to us (e.g. Louis Barbier's presentation to the PAC in June of 2021).
- Demographic data are not provided to the Divisions, but OCS is developing several data products which they will be providing to us in the future. Further questions on demographic trends should be directed to Louis Barbier and Michael New.

Future Crises: Commentary

Given the disruption resulting from COVID-19, and the impact of NASA's re-allocation of substantial R&A funding to early-career researchers in response, what action is NASA taking to develop plans for dealing with similarly disruptive, unexpected but not unforeseeable, events in the future so that there is a lesser negative impact on the community as a whole?

- The decision to provide support for early career researchers was made at the SMD level and was met with near-unanimous praise from the scientific community.
- The overall impact to R&A was <2% of the entire R&A budget
- The reduction in the number of selections was typically 1-2 per program
- The loss of next-generation scientists would have a **permanent** negative on the community
- Question: What level of negative impact would have been acceptable?
- Question: What level of **ongoing** impact would be acceptable in preparation for "unexpected but not unforeseeable events"?

Future Crises: Answer

Given the disruption resulting from COVID-19, and the impact of NASA's re-allocation of substantial R&A funding to early-career researchers in response, what action is NASA taking to develop plans for dealing with similarly disruptive, unexpected but not unforeseeable, events in the future so that there is a lesser negative impact on the community as a whole?

To the best of my knowledge, there are no specific plans in development to deal with the "unexpected but not unforeseeable"

However, two things may help:

- No Due Date (NoDD) Programs: the key reason for implementing NoDD was to provide flexibility to proposers in cases of natural disasters, personal obligations, etc.
- Reduction of out-year obligations in the R&A budget improves flexibility and provides resilience against unexpected expenses. This flexibility is critical for the program and would give "room to maneuver" in case of crises

ISFMs: Some General Comments

NASA has ~1,000 Civil Servant scientists (~150 funded through R&A).

- Critical component of the NASA workforce for the planning, implementation, and execution of the missions, for providing scientific context for the broad range of NASA activities, etc.
- All CS get paid

ISFMs were approved for implementation in Dec. 2016. Goals:

- Improve efficiency and satisfaction of CS scientist workforce
- Strategic hiring: improved recruitment and retention
- Maintain quality of research
- Maintain balance of internal/external funding

Funding for ISFMs comes from R&A – the same place from which the CS were funded before.

- **There has been no net shift in internal / external funding balance.**

ISFMs: Process

The objectives of ISFM have been explained in broad terms in a variety of venues, but the process itself has not; please describe how money is allocated to centers, how the centers solicit and select proposals, how the proposals are reviewed, how NASA selects proposals, and what reporting is required from PIs for the duration of a project.

The process is still evolving, but this past year:

- The Centers submit ISFM proposals to HQ PSD; these proposals are evaluated by HQ personnel, based on factors including (but not limited to):
  - The science
  - Community service (including enabling broader science)
  - Work plan / budget
- Reporting
  - Annual reports from each ISFM
  - “In-person” year-end-review (probably hybrid going forward)
  - Mid-term external review (Site visits?)

ISFMs: Documentation

Is there any single document that explains how SMD (and by extension PSD) is expected to implement ISFM?

No.

ISFMs: Documentation

ISFM has defined eight specific metrics for success – please provide the current HQ assessment of how well ISFM is meeting each of these metrics, including what is working well, and where are areas for improvement.

	Criteria	Goal	OCS Assessment
1	More research work is directed to the centers rather than competed.	Reduce CS FTE in competed R&A by 25%	Achieved (~114 FTE out of ~350)
2	Fewer R&A proposals are submitted, scientists can focus more time on research activities geared toward NASA goals.	Reduce proposals and time spent writing proposals	Achieved – fewer PI & Co-I proposals on average
3	HQ and science capability leads are involved in strategic hiring decisions	Hiring areas are approved by HQ	SMD's decision
4	Positive feedback (via survey) of HQ program managers and center managers, and scientists.	Improve satisfaction	On track – survey results
5	Scientists are able to participate in more review panels without conflict-of-interest issues.	Improve participation	No change
6	NASA scientists continue to publish research in the peer-reviewed literature	Maintain quality	No drop in publications
7	External review panels continue to rate the quality of NASA science as high, initially on a three-year review cycle.	Maintain quality	favorable external reviews*
8	The balance of research funding support to the external community is maintained.	Maintain balance of external/internal funding	Achieved

Here are the 8 criteria.
None of these are "failing"

- We have not yet seen the improvement in participation in reviews by CS

Community service was **not** a criteria originally, but we think it's one of the highlights of the ISFMs

We're also working with the Centers to look at how ISFMs could be leveraged for Inclusion, Diversity, Equity, and Access (IDEA) objectives.

ISFMs: Documentation

A publicly stated goal is to standardize implementation of ISFM across SMD; how is NASA assessing whether ISFM is being implemented consistently at the Centers and across HQ program officers, and is this goal being met?

This is still in work.

Implementations are not uniform across Divisions; lessons-learned are being shared, and there is some convergence, but complete "standardization" is unlikely (in my opinion).

Within PSD, implementation is reasonably consistent, but there are differences between the Centers based on how the Centers operate, and between ISFMs because of the nature of the objectives.

ISFMs: COVID-19 and Funding

What have been the impacts, if any, of COVID-19 on ISFM funding allocations as compared to, e.g., ROSES programs?

In ROSES-20, cuts were made to new selections to provide funding for COVID augmentations. No existing grants were affected (financially)

ISFMs were treated as existing grants and were not affected (financially).

But: in FY19 and FY20, the overall ISFM budget was cut (by a total of around 15%), and the budget is now expected to be level at this reduced amount.

Backup Slides