

**IMPORTANT NOTICE:** The previous PAC Charter expired on June 12, 2021, but PSD was not informed of this until after the June 14 PAC meeting. The meeting, therefore, was not an official PAC meeting, and the minutes and findings from it are unofficial.

The following minutes address the discussion that arose from the public meeting held on June 14, 2021.

NASA ADVISORY COUNCIL  
PLANETARY SCIENCE ADVISORY COMMITTEE

June 14, 2021

Virtual Meeting  
Washington, DC

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Amy Mainzer, Chair

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Stephen Rinehart, Executive Secretary

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***Tom and Jerry, Inc.***

June 14, 2021

### Opening and Announcements, Introductions

Executive Secretary of the Planetary Science Advisory Committee (PAC), Dr. Stephen Rinehart, welcomed members of the committee, noting that the PAC will increase in size in October of this year to 13 members. Dr. Rinehart acknowledged the presence of PAC Chair, Dr. Amy Mainzer, and then took a roll call. All members except Britney Schmidt were in attendance.

### PSD Status Report

Dr. Lori Glaze, Director of the Planetary Science Division (PSD), presented an update on the division, beginning with the President's Budget Request (PBR) that was released on 28 May. The PBR proposes a total of \$7.9B for the Science Mission Directorate (SMD), with \$3.2B for PSD. The PBR is the first step in the Fiscal Year 2022 (FY22) budget process and has now been passed to the Appropriations Committee in Congress. The detailed budget numbers are available in the presentation package. Dr. Glaze highlighted the major changes between FY21 and the FY22 PBR: Mars Sample Return (MSR) has been established as a new program, and is being funded at the level recommended by both the Standing Review Board (SRB) for the Agency's Mission Concept Review as well as an Independent Review Board (IRB). In the meantime, PSD has been seeking a better understanding of the funding challenges associated with the MSR, with good support from the NASA Administrator. The FY22 PBR also contains support for the Near Earth Object (NEO) Surveyor mission to launch as early as 2026; Volatiles Investigating Polar Exploration Rover (VIPER) and Lunar Trailblazer (both of which are entering development phase); a Dragonfly Launch Readiness Date (LRD) of June 2027; the Dual Asteroid Redirection Test (DART) secondary launch window in February 2022; increases to Research and Analysis (R&A); funding to support new laboratory facilities and expanding access to a diverse group of researchers; a decrease to Discovery Future; COVID impacts to Psyche and the Europa Clipper (which are being accommodated within Headquarters reserves thus far); and the New Frontiers 5 (NF-5) Announcement of Opportunity (AO) delayed to no later than (NLT) 2024.

What remains the same: continued support for Mars 2020; the Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer (OSIRIS-REx); Europa Clipper; and Psyche; as well as instruments on ExoMars 2022 (European Space Agency; ESA), JUICE (ESA), and (Martian Moons eXploration (MMX) (Japanese Space Agency; JAXA); a Europa Clipper launch in 2024 on a commercial vehicle; and NASA contributions to the international Mars Ice Mapper (MIM) mission. Dr. Glaze briefly displayed pie chart renditions of the PSD budget breakdown, representing the distribution of appropriated funding under the current Operating Plan.

The PSD planetary fleet now includes six new missions: MSR, MMX, NEO Surveyor, and three new missions to Venus. Two of these latter missions are in the Discovery program: Venus Emissivity, Radio Science, InSAR, Topography, & Spectroscopy (VERITAS), a Venus orbiter, will carry a synthetic aperture radar (SAR) instrument, operating in X-band, that will provide imaging and a global topography data set, which are expected to yield revolutionary results. VERITAS will also carry an emissivity mapper in the near-infrared (NIR), and an instrument to measure gravity. The second Discovery is DAVINCI, a probe designed to further the understanding of the origins and evolution of Venus's atmosphere, and to probe tesserae on the Venusian surface. EnVision is an ESA Medium-Class mission, a Venus orbiter carrying a SAR that operates in S-band, designed to carry out fine-scale imaging to observe surface change. Dr. Glaze reported that she is also talking with SMD Associate Administrator Dr. Thomas Zurbuchen and ESA, in an effort to broaden international participation in these missions.

Operating mission highlights include the latest activities of the Mars Rover Perseverance, which has just passed the 100-sol milestone on Mars, breaking records on distances achieved by previous rovers on Mars. The rover is moving quickly to explore targets for future sample caching, and is now being supported by the Ingenuity helicopter, which has transitioned to an operational demonstration phase.

OSIRIS-REx left Bennu in May to begin its return trip back to Earth in 2023. The Europa Clipper mission is progressing well toward its 2024 launch date; NEO Surveyor passed its Key Decision Point-B (KDP-B) target to complete Phase B in 2023; and Lucy is due to ship to Cape Canaveral for launch later this year. DART, Psyche/Janus, and VIPER are all progressing well.

The New Frontiers (NF)-5 AO has been delayed to no later than the Fall of 2024; it had been originally scheduled for Fall 2022. A variety of factors led to the delay, including the fact that several missions were to be at peak development in 2022; a situation that was further impacted by COVID, and also led to the delay of the Dragonfly mission to 2027. The updated schedule allows selection of the fifth NF mission such that it avoids the strain of having two New Frontiers missions in development simultaneously. In addition, the ongoing Decadal Survey has announced that it will retain the list of mission themes for NF-5 that was provided by NASA in its Second Community Announcement on November 5, 2020.

Dr. Glaze provided thoughts on the delay of the Dragonfly launch to 2027, which she described as an internal decision and no reflection on the mission team. The decision was wholly undertaken by Headquarters, given that there had been unanticipated cost growth in the New Frontiers program. She noted that the profile in the current PBR includes funding for the launch vehicle and other funds being held at Headquarters as reserve. It is also important to note that cost caps now reflect real year dollars, and not 2015 dollars. PSD is working to adjust and to develop Lessons Learned from this situation.

PSD continues to promote diversity and equity in science: the FY 22 PBR supports key themes of this effort, and NASA is looking to expand participation proactively. The SMD Inclusion Diversity Equity and Accessibility (IDEA) Working Group activities continue apace, with a Leadership Council headed by Doris Daou and Tresa Mitchell. In addition to the effort at the SMD level, the individual discipline divisions have their own groups pursuing similar goals. Currently these groups are working to determine how can NASA do better at making its programs more accessible; professionals in the diversity/equity field are working with all these groups. Current PSD IDEA activities include the second Principal Investigator (PI Launchpad) (now in progress, virtually); Dual Anonymous Peer Review (DAPR) in some ROSES programs; training review panelists; and the establishment of the Here to Observe (H<sub>2</sub>O) Pilot Program that is meant to spark and maintain an interest for underrepresented students considering STEM careers, with a focus on undergraduates in cultivating and sustaining partnerships, establishing meaningful mentorship relationships, and encouraging peer cohort-building at the institutional level. Confirmed partners in the Pilot Program are Howard University, the University of Puerto Rico, and Virginia State University (VSU).

### ***PSD Response to PAC Findings***

- 1- *Perseverance kudos*: NASA appreciates the acknowledgment.
- 2- *COVID Mitigation efforts*: SMD will consider whether further funding will be needed, and also will support the efforts of professional societies should the opportunities arise.
- 3- *Astrobiology infusion into mission teams and decisions*: NASA thanks the PAC for the finding, and has brought on Astrobiology expert Dr. Lindsay Hays as Deputy Program Scientist for MSR.
- 4- *MSR cost and impact on programmatic balance*: MSR is committed to controlling cost growth; meaningful steps are being taken to understand cost profiles early on in the development phase.
- 5- *(5a)- Science involvement in Mars Missions, MIM*: NASA recognizes there is concern in the community, and it takes the finding seriously, and is looking for more ways to engage the community, including international. NASA has already decided on a modest science enhancement to be considered for MIM.  
*(5b)- Science involvement in MSR*: the MSR Science Planning Group Phase 2 (MSPG2) has been working over the last year and is rolling out its recommendations, one of which is to establish a Campaign Science Group to manage the science of MSR. In addition, Dr. Mini Wadhwa, a sample analysis and curation expert, has been named as the Lead Scientist for the MSR Program.

- 6- *Support for NEO Surveyor*: NASA thanks the PAC for finding. NEO Surveyor has passed KDP-B.
- 7- *PAC Commendation for IDEA efforts in PSD*: NASA agrees to provide regular updates to the PAC, and to gather input from the larger community to guide the way forward.
- 8- *R&A*: NASA agrees that the R&A budget needs to increase, and is working this through the annual budget request process; thus far the effort has proven successful, as reflected in the FY22 PBR. Incentivizing reviewers is an excellent recommendation. Regarding the two-step proposal process, however, NASA has found that the two-step proposal process with full review of Step-1 proposals has been generally ineffective. NASA is exploring the use of a six-month reminder for getting publications to PubSpace.

Dr. Mainzer commented that PSD has had great news on many fronts, and applauded Dr. Wadhwa’s appointment to the MSR Program. She added that it was good to see Venus finally getting some attention, and asked about the complementarity between VERITAS and EnVision. Dr. Glaze said that VERITAS would be uniquely able to collect important global topography data (including X-band data), while EnVision carries an S-band SAR, which is focused on finer scale topography, and the detection of changes since the Magellan mission. EnVision carries a spectrometer that extends beyond IR, possibly into the ultraviolet, as well as a sub-sounding radar to see below the surface. Dr. Glaze felt there was good complementarity between the missions, and that together they will transform the science. Dr. Serina Diniega asked some general questions about the FY22 PBR. Dr. Glaze reported that she was pleased that there was outyear funding for extended missions, which have been included in the budget outlook, and that she would be providing guidelines for these.

#### Research and Analysis Update

Dr. Rinehart presented an update on the status of PSD R&A. Results for two ROSES20 programs—Exoplanets Research and Habitable Worlds—will be out soon. The average time to notification is improving, however PDART was delayed significantly due to COVID; MDAP and DART-PSP had delays due to the finalization of funding levels. Dr. Rinehart expected the remaining ROSES20 programs to have decision letters out within the next month or so. At the next meeting, he expected to have some observations and data from the first PSD DAPR program (Habitable Worlds). Dr. Rinehart said that reviewers had been generally pleased with the DAPR approach, and that the vast majority had offered very positive comments about it. In ROSES21, PSD will do a No-Budget experiment with DDAP; the budgets will come after reviews on scientific merit and relevance. This approach is expected to reduce effort for PIs and their organizations. Dr. Rinehart offered some reminders on the next ROSES call: DAPR will be used for all the Data Analysis Programs (DAPs), and PSD will be moving to stricter enforcement of compliance rules (e.g., rules on duplicate proposals). No Due Date (NoDD) programs are now open, but it is too early for comment as yet as to their progress. In other updates, NASA will be rolling out a new portal in June for uploading papers, which is designed to be easier than the PubSpace process. Announcements will be sent out to PIs when the new portal is ready  
[[<https://sti.nasa.gov/research-access/>]]

Regarding the FY21 budget, Dr. Rinehart said that he and Dr. Glaze had discussed the importance of maximum transparency. As there are many details to the budget, he cautioned against any individual presenting NASA’s budgetary slides out of context, because presenting the data out of context can be misleading and could be misused for specific agendas. He commented further on previously presented budget breakdown charts, noting that while the FY22 PBR includes \$11M additional funding for R&A, much of this funding will go toward establishing a facilities program, and to paying off all the outyear “mortgages.” Mostly, this \$11M will remove the “brittleness” from the budget, and will not necessarily translate to more selections. If this sort of addition occurs every year, however, the PSD R&A program can start thinking about improved selection rates.

Dr. Rinehart addressed the R&A finding from March's PAC meeting more specifically. Speaking to the finding on importance of reviewers, he completely agreed with the recommendation on incentivization. However, individual reviewer recognition may fly in the face of the need for anonymity in DAPR programs. Regarding paying reviewers for their time, the main question is how this might be done in a more equitable way. Allowing grants to cover review time is not forbidden by NASA's grants policy, thus that particular issue is an institutional policy question that is outside NASA's remit. If a reviewer charges reviewing time to a NASA grant, however, that reviewer is not allowed to take an honorarium. [Note that internal follow-up discussions revealed that this is a somewhat more complicated issue than thought, and the topic will be revisited at the next PAC meeting]. In regard to the Step-1/Step-2 options, this method has been tried in other divisions without much success (except in Earth Science, which has a very different methodology). Writing a reviewed Step-1 isn't much less work than writing a full proposal; and reviewing a Step-1 is also not much easier than reviewing a full proposal. Dr. Rinehart welcomed any other suggestions, and added that the whole enterprise rests on reviewers. Reviewers help NASA to make good and wise decisions.

With regard to the PAC finding on maintaining yearly calls, Dr. Rinehart said that he agreed with the finding in principle, but after a numerical analysis of the input and output effort, he concluded that an annual call can result in a net cost to the community. According to his calculations, using some relatively conservative assumptions, input effort is only equal to output effort when the selection rate is roughly 9%. For selection rates below that, the effort going into the writing, reviewing, and management of proposals exceeds the amount of money going to the community.

In other news, NASA has just renewed a number of Internal Scientist Funding Model (ISFM) work packages; the total budget from PSD is \$20.6M, with an internal cap set at \$20.8M. Dr. Rinehart explained that the apparent increase in the PSD budget comes from moving directed work from SERA to ISFM, which constitutes a net zero move. PSD is also contributing to the NASA Center for Optical Constants which is an ISFM operated out of the Astrophysics Division.

NASA is still considering the question of how to assess High-Risk/High-Impact (HRHI) proposals. In 2018, SMD asked reviewers about the risk and impact of proposals they reviewed, based on the working hypothesis that panels unconsciously downgraded proposals with high-risk aspects. The resulting data showed that the hypothesis was false; if anything, high-risk proposals were overrepresented in selections. These "Blue Ribbon" panel assessments on high-risk proposals will continue for a few more years.

### ***Question for the PAC***

#### ***How can we make proposal reviews better— what is the real question?***

Dr. Rinehart presented the question to the PAC, asking members to evaluate the desires and needs of the community so that R&A can make trades and improvements. However, he noted that desires and needs can conflict: grading proposals as fast as possible can conflict with the need to keeping the workload reasonable. Desires and needs can also be synergistic: justification of the grade and constructive criticism tracks with feedback (grades, and defensible comments, i.e., avoidance of wobble words). He recommended that PAC members refer to the Hidden Brain podcast, and to the book Noise (Kahneman, Sibony, and Sunstein), given that some of the insights provided in these media can be helpful in assessing the issues. For instance, noise can cause disagreement with oneself (from data on angiogram reviewers, who were found to disagree with their own historical assessments). Can the No Budget experiment and the use of NoDD approaches help PIs? Overall, the question for the PAC is: How can we make life easier for reviewers?

Dr. Mainzer referred to Dr. Barbara Cohen's suggestion to revise the handbook to include what type of reviewing time can be allocated; i.e., what is allowed by NASA and what is subject to institutional

policies (honorarium point). Dr. Rinehart agreed that this could be done, and further commented that institutions should include review support as an integral part of their overhead budgets.

Dr. Glaze noted that when Dr. Zurbuchen presented the results of the 2018 HRHI study to the Space Studies Board (SSB), there was concern that checking the HRHI box would impact proposal reception. Dr. Rinehart said that the HRHI discussion, when held by reviewers, is a post-facto discussion; there is no penalty in the initial discussion, and ticking the HRHI box does not affect the proposal score.

#### Mars Exploration Program/Mars Sample Return

Dr. Michael Meyer presented an update on the Mars Exploration Program (MEP). The Perseverance rover completed its first 100 sols on the surface on 1 June. More than 75,000 images have been taken to date. The Ingenuity helicopter is now performing some reconnaissance, and the mission is marking other firsts, such as extracting oxygen from the atmosphere. Mr. Joseph Parrish is the new MEP Program Manager, following Dr. Fuk Li's retirement. The power generation unit for the Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSIGHT) probe continues to decay due to dust and aphelion; a recent saltation experiment to clean the solar panels went well and boosted power slightly. Continuing missions at Mars include Mars Odyssey, Mars Reconnaissance Orbiter (MRO), Mars Science Laboratory (MSL Curiosity), Mars Atmosphere and Volatile Evolution (MAVEN), and ExoMars/Trace Gas Orbiter (ESA). The Mars Exploration Program Analysis Group (MEPAG) will hold a virtual meeting on 21 June. The NASA/ESA MSR Science Planning Group 2 (MSRPG2) has been meeting regularly since June 2020. Overall, MEP is very happy with the newest budget, PBR FY22, which supports a robust Mars Exploration Program, including existing and future international partnerships, and planning for the receiving and curation of returned samples.

Dr. Meyer displayed images of noctilucent clouds on Mars, found at altitudes higher than 60 km; the clouds are thought to be composed of CO<sub>2</sub> ice. Perseverance has started its "Green Zone" science campaign, and will be examining the crater floor, the "Seitah" unit, and a potential sample of opportunity (in this case, a real delta remnant). These are all possible sampling sites. Exploring the crater floor will take about 400 sols, and include raised ridges, about 2 meters across, that have provoked some enticing science questions as to whether they are worth exploring. Another recent science result concerns perennially conflicting data on the presence of methane on Mars, and whether it is being produced by a biological process. Recent data suggests that there may be a micro-seepage of methane contained in a collapsed boundary layer on the Mars surface that builds during the night and dissipates during the day.

The Terms of Reference for MSR SPG-2 were signed in April 2020; this group will provide inputs for an MSR Science Management Plan; identify technical issues; develop high-level requirements for the Sample Fetch Rover (SRF); and list key decision points for the mission timeline. MSPG2 first major results include recognizing the need for an overarching MSR Campaign Science Program, and a proposed implementation approach; and establishment of which sample-related activities must be conducted in the containment, either because they are time-sensitive, sterilization-sensitive, or are needed for initial sample characterization. The report will be out in July of this year.

Mr. Jeff Gramling, Mars Sample Return (MSR) Program Director, reported on the progress of the program, first reviewing elements of the MSR Architecture, which delineates elements contributed by ESA and NASA. MSR is now in phase A, having been initiated in December 2020, following two major reviews by an IRB and SRB. The program has been staffing up, and has benefited from receiving staff transitioning from M2020. A formal partnership with ESA has been established. The ESA Earth Return Orbiter Program Design Review (PDR) was completed on 15 April, and the ESA Sample Fetch Rover System Readiness Review (SRR) took place on 29 April. The Capture, Containment, and Return System (CCRS), which is being developed at Goddard, concluded its SRR in April as well. The program is focusing on developing and refining the architecture, working with the Offices of the Chief Engineer



(OCE) and Safety and Mission Assurance (OSMA) to ensure alignment with Class A mission requirements, working on the mission timeline according to IRB/SRB recommendations, and is continuing to consider the use of one vs. two sample retrieval landers. The program is also considering some heritage designs, and is looking at mass budgets for the Sample Retriever Lander (SRL). An Agency Delta Acquisition Strategy Meeting was held in May to address MSR's program complexity, and as a result, MSR is going to system-type contracts for the Mars Ascent Vehicle (MAV), SRL Cruise Stage, and the Earth Entry Vehicle (EEV). Progress has also been made on strategic procurements, particularly for long-lead parts. Recent additions to the staff include Richard Cook, MSR Program Manager; Joe Gasbarre, Deputy Program Director for Technical; Dewayne Washington, Headquarters Communications Lead; Mini Wadhwa, Program Scientist; Guy Beutelschies, SRL Project Manager; Dave Littman, CCRS Project Manager; Larisa Parks, Program Business Manager; and Randy Blue, Program Mission Assurance Manager.

Mr. Gramling addressed several MSR Campaign components covered by the most recent budget request, in particular SRL, ERO, and CCRS. The MSR program is pleased that the FY22 PBR has provided coverage for these components, as had been hoped for. Addressing concerns about cost control, Mr. Gramling noted that the partnership with ESA will help to reduce NASA costs, and establishing a Deputy Director business position at Headquarters will ensure rigorous cost and schedule management. In addition, the program has identified a descope, a draft requirement for a dedicated Atmospheric Sample in the Orbiting Sample container (OS), which is being studied in Phase A. In addition to the appointment of Dr. Wadhwa as Program Scientist, Dr. Gerhard Kminek of ESA also will be providing science input, and three other prominent scientists have joined the MSR's Standing Review Board.

In summary, Perseverance is progressing toward initiation of sampling science operations, while the MSR program moves forward in phase A, refining the architecture, demonstrating viability on technology and engineering developments, refining cost and schedule estimates with institutional commitments, and continuing the refinement of mission design and planning.

#### SMD Information Policy

Dr. Steve Crawford, SMD Data Officer, presented details of SMD's new Information Policy, a policy which grew out of the Strategy for Data and Computing for Groundbreaking Science 2019–24. The strategy's principal tenet proposes to develop and implement a consistent open data and software policy for SMD, based on core values:

- Maximize the openness of useful scientific information produced by NASA SMD funding
- Preserve the scientific information produced by NASA SMD funding
- Support the community in accessing the information that they want
- Minimize the burden in complying with the policy

The Information Policy will include sections on applicability, general, missions, research, and definitions of common terms to be used across SMD. The policy is currently in its final approval stage. The policy will apply to information that includes publications (excluding lab notebooks, preliminary analyses, etc.), data, and software. An information policy will ensure that information produced by NASA SMD funding is shared openly and widely to maximize the benefit and reach of the information; enable the consolidation of a wide range of applicable laws, guidance, and policies; provide clear and transparent policy for NASA's program officers, scientists, and communities; and help to support open science.

Current policies include the following:

- SMD-funded publications shall be made publicly accessible.

- SMD-funded data shall be made publicly available without fee or restriction of use.
- SMD-funded software should be released as open-source software.
- All SMD-funded activities shall have data management plans describing the management and release of data to facilitate the implementation of these information policies The DMP should include a description of the software to be used and how it will be managed.

Research-specific highlights to the policy:

- Research data shall become publicly available no later than the publication of the peer-reviewed article that describes it.
- Information needed to validate the scientific conclusions of peer-reviewed publications that resulted from SMD funding shall be made publicly available at time of publication. This includes the data underlying figures, maps, and tables.
- In order to achieve reproducibility, research software developed using SMD funding and used in support of a scientific, peer-reviewed publication should be released as open source software no later than the publication date.

NASA is also considering new guidance and additional policies, based on recent as well as proposed laws, recommendations, policies and Federal Guidance related to Open Science. Proposed additions to the Information Policy include making SMD data FAIR (Findable, Accessible, Interoperable, Reusable). Many of the recommendations are already aligned with the principles of the Information Policy (fair use, open source software, creation of a common, shared taxonomy). The initial draft of the new Information Policy was prepared in November 2020, and NASA hopes to be in the application phase by 2022. Dr. Crawford noted that the development of the policy is only an early step in an overall process that will take place over the next five years.

Next steps include the creation of a new PubSpace environment the STI Repository, and a new External Portal, the latter of which is being created for NASA-funded external users. Another aspect of the new Policy is extended support for Planetary and Heliophysics Science. SMD is currently engaging with NASA Astrophysics Data Systems (ADS) to expand holdings in PSD and the Heliophysics Division (HPD), which will provide greater indexability of data holdings.

The Information Policy will be released soon, accompanied by an Request For Information (RFI) requesting answers to the following:

- How will the proposed changes to the existing information policy impact the research activities of your communities?
- What support, services, training, funding, or further guidance is needed to support the successful implementation of the existing or proposed information policy?

Dr. Mainzer commented that NASA-funded research that delivers software carries a tacit assumption for technical support, and asked if that issue was part of the policy conversation. Dr. Crawford said that SMD was looking at different tiers of requirements; for widely applicable tools, the software may include an assumption for such support. For single-use cases, however, no expectation of support would be conferred upon the researcher. Expectations will vary according to tier. In addition, the SMD Information Policy will not supersede other Federal laws; International Traffic in Arms Regulation (ITAR), for instance, will be exempt from this policy.

## Discussion

Dr. Diniega asked a general question about MIM. Dr. Meyer said that more information on MIM would be forthcoming at the MEPAG meeting on 21 June. Another question concerned the Campaign Science Group (CSG). Dr. Meyer noted that CSG was proposed by the MSPG-2, and does not exist yet. Currently, the MSPG-2 is waiting for the respective agencies to adopt it. CSG will be a joint NASA/ESA Group, which will probably see some appointments, such as Dr. Meyer, Dr. Kminek, and curation experts. Dr. Jennifer Glass expressed support for the No-Budget Review experiment in R&A. Dr. Diniega asked about MSR KDP-C decisions; Mr. Gramling said that NPR 7120.5 had been recently revised, and MSR will be the first to work with the Office of the Chief Financial Officer (OCFO) to carry out an early JCL, to enable MSR to be able to reach more rigor/confidence at KDP-C. Dr. Glaze added that the early JCL is looking to get a better sense of the budget before KDP-C, and will help in planning and identifying issues as well, improving the program's ability to plan and manage.

#### Planetary Defense Coordination Office

Mr. Lindley Johnson provided an update on the Planetary Defense Coordination Office (PDCO), reviewing the segments of the program. Since the last meeting of the PAC, there has been a meeting of the International Asteroid Warning Network (IAWN), which now has at least 32 signatories. There was also a campaign in March for observing Apophis, the asteroid that will make a very close approach to Earth in April 2029. The campaign marked the latest close flyby of Apophis, in advance of its future approach, and provided a last opportunity to observe the body in some detail. The 7<sup>th</sup> International Planetary Defense Conference was held, along with an Impact Emergency Response Exercise. Most of these exercises have been based on warning times of several years; this time, the conference focused on a short warning (six months prior to impact) exercise. The exercise presupposed that within a few weeks of an event, an impact probability could be defined as 100%, anticipating an equivalent to a 40 megaton event. Such an impact would create an area of complete devastation within a 25-km radius, with the total area affected estimated to be 140 km<sup>2</sup>.

The Near-Earth Asteroids Catalog, at the time of the PAC's last meeting, had just broken 25,000; the count now stands at 26,000. A total of 2959 Near-Earth asteroids were discovered in 2020, and PDCO is on track to get similar numbers in 2021 (1349 so far in 2021). In the 140m-plus category, 551 were discovered in 2020, with 181 detected so far in 2021. The biggest news is that the NEO Surveillance Mission has been approved for KDP-B, and is fully funded for launch by 2026, if the FY22 budget is enacted by Congress according to the most recent PBR. Planetary radar planning activities are under way following the collapse of Arecibo. There have been two workshops this year: the Keck Institute Space Studies Workshop on Next Generation Planetary Radar, which expects to issue a draft report by mid-summer of this year. The other workshop is still in session: the National Science Foundation Arecibo Observatory Options Workshop, running through the month of June.

As previously noted, DART has slipped to its second launch window due to delays in delivery of solar arrays and the DRACO camera, which in turn were largely due to COVID impacts. However, the mission is implementing a re-planned schedule, and is on track to finish integration and test activities in late July, pack-and-ship review in September, arriving at the Vandenberg Air Force Base launch site in October. The launch window opens in late November and extends through February 2022. There is a much less desirable opportunity to launch in 2024, but Mr. Johnson felt there was a high probability the mission will make the 2022 date.

#### General discussion

Dr. Mainzer remarked on Dr. Rinehart's calculations re: input versus output on research proposals. Assumed that writing a proposal takes one calendar month (20 days of work), and that a reviewer takes two weeks for a review panel, Dr. Mainzer agreed that the estimate was a reasonable starting point. She added that there is a certain degree of prediction involved, and asked how R&A estimated how many proposals a program will receive. Dr. Rinehart said he relied on historical data for the most part, but if it's

a new program, it's largely guesswork. The harder problem is how to decide to go from an annual to biannual cycle, e.g., to balance out programs. Dr. Conor Nixon asked if there were any move to rebalance the program every year to keep selection rates constant across programs. Dr. Rinehart said he didn't feel it was useful to move money away from a program that is hurting; it doesn't solve the overall problem, because every program has relatively low selection rates. With regard to the Planetary Science and Technology from Analog Research (PSTAR) program, he agreed with colleague, Dr. Mary Voytek, that it should go back to an annual call, but that would really require additional funding; alternatively, PSD could reevaluate the call and attempt to focus an annual call more narrowly. One solution may be to alternate lunar and astrobiology each year.

Dr. Mainzer asked if anything could be done in future years to make R&A grow. Dr. Rinehart said that R&A outyear budgets are flat, besides the bump-up in 2022. Asked why this is the case, Dr. Glaze commented that due to a change in the administration, the whole budgetary process has shifted and has been squeezed. There is a lot of emphasis on FY22 right now because Congress must act on it. However, NASA is now getting ready for 2023 planning, so there is an opportunity to try to do better in that budget exercise. Dr. Glaze felt it would be prudent to refrain from predicting outcomes for the outyears.

#### Planetary Data Ecosystem Independent Review

Dr. Melissa McGrath briefed the PAC on a review of the Planetary Data Ecosystem (PDE), a term that was coined for the purpose of this review. The PDE Independent Review Board's (IRB) charter was to define the full environment of the PDE, to identify missing or overly redundant elements, and to provide findings and prioritized recommendations. The final report was submitted in April of this year, and presented to the PSD director in the same month. The final report, as well as meeting recordings and minutes, are available at [<https://science.nasa.gov/researchers/science-data>].

The PDE IRB charter provided a working definition of the ecosystem, which included many PDE Knowledge Elements. The broad scope of the review meant a large, diverse team of 50 members, comprised of data scientists, citizen scientists, and many other experts. There were *ex officio* NASA staff for each subcommittee. Meetings were held from October 2020 through March 2021. Full IRB meetings were open to the public and advertised through community organizations such as the Lunar and Planetary Institute (LPI) and the American Geophysical Union (AGU). The final report had 67 findings and 65 recommendations. The IRB's core values and guiding principles included: "First, do no harm"; the FAIR doctrine; advocacy of open science practices; encouragement of a collaborative environment; effectiveness; and practicality. The IRB repeatedly returned to the principles of data preservation, data discoverability, and data usability as intertwined tenets that are critical to successful data stewardship. Dr. McGrath addressed the highest priority recommendations in three major categories: develop the ecosystem findings, address data preservation needs, and address barriers to use and development.

#### *Develop the Ecosystem findings*

- PDE is a good idea and should be formalized
- PDE is not equal to PDS

#### *Recommendations in priority order:*

- Establish a sustained, community-led coordinating organization for the PDE that mirrors the other Planetary Assessment or Analysis Groups, reports to the Planetary Science Advisory Committee, and meets regularly.
- Refine the full scope of the Planetary Data Ecosystem and build community consensus around it. The responsibilities, accountabilities, governance, and service levels for elements of the Ecosystem that are funded by NASA Planetary Science Division should be clearly defined.

- The prioritized goals and scope of PDS need to be carefully and explicitly defined and clearly articulated to the community. The differing responsibilities and expectations of the data preservation mission versus distribution of usable data need to be clarified. PDS should not be given unfunded mandates.

*Address Data Preservation Needs*

- Many critical data preservation needs are not being met. [The final report gives numerous examples.]
- A carefully crafted strategy is needed to establish priorities.
- Several data preservation needs are so urgent they should be addressed before an overall strategy is completed.

*Recommendations in priority order:*

- Establish an archive for planetary radar data either within the PDS Small Bodies Node or separately. Time is of the essence to prevent irretrievable data loss.
- Establish a requirement for the preservation of mission-supported laboratory analyses of returned sample material. Require data preservation with appropriate metadata in an approved archive or repository for data produced by laboratory analysis of returned samples supported by ROSES Data Analysis Programs.
- Establish a carefully crafted strategy to identify and prioritize the data preservation needs of the planetary science community that are not currently being addressed.
- Consider ways of archiving outside of the PDS that are amenable to creating FAIR and standards-based archives of these growing data sets.

*Address barriers to use and development*

- Many Planetary Data Ecosystem elements are designed for an expert group of users but should serve a broader user base.
- Many planetary data sets are difficult to use without extensive effort to convert them into formats compatible with modern scientific computing software, and to reduce low-level data to physical quantities of interest.
- ML/AI/AA and ARD should be utilized more effectively.
- As open as possible, as closed as necessary. Policy consistency and interoperability is desirable, at least across Planetary Science, preferably across SMD.

*Recommendations in priority order:*

- Include early funding for mission data acquisition, processing, and archiving of data and foundational data products so that they are planned well in advance of data acquisition.
- Training and outreach
  - Develop outreach to user communities within the Planetary Data Ecosystem, assess user needs, and develop focused educational and documentation materials that meet highest-priority needs.
  - Provide regular, accessible, and effective training programs for researchers, data producers, mission specialists, and others who need to archive with the PDS.
  - Address data preparation from the perspective of reusability and interoperability, such as the Earth Science Data Systems Working Group (ESDSWG) Data Product Development Guide (DPDG) for Data Producers.
  - Expand opportunities for intermediate to advanced technical training in topics related to accessing, using, and processing planetary data.

- Support the delivery of higher-level and analysis-ready data products in well-documented and broadly used protocols and formats.
- Broaden support across the Ecosystem for a wider variety of data and information formats, such as engineering data; data models; sound and imaging data; and physical collections attached to planetary missions.
- Expand intra- and inter-agency efforts to ensure that best practices, lessons learned, and appropriate technologies are shared and implemented across Planetary Data Ecosystem elements.
- The Planetary Data Ecosystem should regularly assess the Findability, Accessibility, Interoperability, and Reusability (FAIR) of data across each PDE element for machine-actionable access to data.

To define a pathway toward an ideal state, the IRB used a Small Body Science case study to illustrate key issues of the final report, in the belief that addressing the challenges in this particular case study would be useful for measuring progress. The case study for Small Body Science illustrated some unique challenges that are difficult to address in the current state of the PDE, such as serendipitous acquisition of useful data, and time evolution studies that may involve the need for accessing older, outmoded media, such as magnetic tapes.

#### *Implementation of Recommendations*

Dr. Rebecca McCauley-Rench covered aspects of the implementation of PDE IRB recommendations, and described the actions being taken in response to the recommendations.

#### *Develop the Ecosystem Findings*

The PSD working group is identifying an appropriate path to bring together a community-led group as identified by the PDE IRB. The first step will be for the community-led group to assist with further development of the PDE concept. PSD will also develop a webpage on [science.nasa.gov](http://science.nasa.gov) dedicated to providing a centralized location for content about planetary data, including the current definition of the Ecosystem, its elements, and information on how PSD is addressing the PDE IRB recommendations.

#### *Address Data Preservation Needs*

PSD currently supports radar data analysis, publication, and archiving of Arecibo data at the PDS SBN. PSD has initiated meetings between the SBN and the Arecibo, JPL, and Goldstone radar groups to coordinate formats and processes among their substantial radar data archiving efforts. In addition, PSD is actively working on the preservation of mission-supported laboratory analyses of returned sample material for the OSIRIS-Rex mission. PSD will use this specific effort to identify and possibly address the broader needs of PSD laboratory sample data curation.

#### *Address Barriers to Data Use and Development*

The PSD working group met on 9 June to discuss next steps in this area.

A specific response from NASA addressing *all* recommendations is to include current status, anticipated timeline to address (if applicable), and potential future plans. NASA received the final report of the PDE IRB in late April, and PSD leadership and WG met to discuss the implementation plan. A PDS Discipline Node Programmatic Review is to be held in July; the website will be made available in September of this year. Regular updates on addressing the recommendations will be made available on the new PSD data website, and reports on progress will be provided to the internal SMD Strategic Data Management Working Group. Regular status updates will be given to the PAC via the PSD Director or R&A Lead, with specific details when milestones are achieved.

Dr. Justin Hagerty commended the efforts, saying they were hugely appreciated. He said he was curious if there had been a division or directorate-level discussion, since it appears there are cross-directorate and cross-division synergies. Dr. McCauley-Rench said that these conversations are already taking place, but that there is not enough concrete detail to report as yet. Dr. Crawford's Working Group is aware of the PDE IRB. Dr. Rinehart added that the PDE IRB is being held up as a positive model by other divisions. Dr. Mainzer asked if efforts to improve the searchability of PDS for various bodies were a part of the PDE IRB's purview. Dr. McCauley-Rench said that yes, the IRB was very aware of the discoverability issues that need to be solved, and had some plans and paths to get there. Dr. Rich Zurek asked if an estimate of overall cost had been made, and funding identified. Dr. McCauley-Rench reported that NASA had received cost estimates from the PDS nodes, but funding sources are yet to be identified; the plan is to use the funding already in place to advance progress. Dr. Diniega asked how the community might improve its work with the PDE through JMars or Planet Tracker. Dr. McCauley-Rench said that the goal is to build stronger connections between all these elements, and thought that the dialogue had already opened up in those areas following the IRB findings. Dr. McGrath said the IRB had received a presentation on JMars and had considered some of its elements in detail; the IRB also recommended archiving data in places beyond PDS. Getting those connections made is a high priority for making progress. Dr. Mainzer asked if there were a natural conclusion to the whole process. Dr. McCauley-Rench said that a timeline is still being developed, as PSD tries to understand what success will look like. The IRB was just a first step in the right direction; there should be a better understanding of next steps later this calendar year.

#### General discussion

Dr. Mainzer opened the discussion on initial findings. Dr. Hagerty wondered how the PAC would feel about encouraging a cross-divisional, cross-directorate PDE, to spread the burden of funding the effort. Dr. Crawford noted that there have been cross-divisional calls on software—also related to data management and computing—for which a small amount of support is available. Dr. Mainzer commented that it certainly would be beneficial to make data more widely available across disciplines, for use by researchers as they see fit. Dr. Hagerty offered to draft a finding.

Dr. Diniega suggested a finding about FY22 PBR that addresses the balance of funds for ongoing missions, new missions, and missions in development. Dr. Mainzer said she appreciated the PBR's strong support for Planetary, and was interested in what the community could do to further bolster this support, with an eye to the future. Dr. Rinehart said that NASA cannot support advocacy, and suggested that PAC members consult with professional societies on how to advocate for planetary science, and increased R&A funding. He noted that the overall budget for PSD went up 18%, but the R&A portion went up only 5%. Dr. Mainzer suggested a finding on a robust request for R&A in 2023. Drs. Mainzer and Diniega set about drafting on the matter. Dr. Rinehart, when asked how to justify more money for PSD R&A, said that the community had long been requesting a facilities program, and furthermore, R&A is in debt, and thus that is how he planned to allocate the funding he anticipated in FY22. He expected that he would be able to retire almost all the R&A debt with this PBR, and that this budget would afford an opportunity for a fantastic facilities program. On a separate subject, Dr. Rinehart said he was now having a conversation about reviewer support and proposal guidelines, and indirect vs. direct funding. Dr. Rinehart didn't feel there needed to be a finding on this portion of the issue.

Dr. Diniega commented that there is need for more information about MSR, particularly MIM, and about how the science community is to be involved. She also wanted to understand how are these missions being defined so that the science is optimized, as well as the nature of PSD vs. SMD contributions. Dr. Joe Westlake added that the community wanted to know how science was being defined so that science objectives would be achievable (budget realities, scope). Dr. Mainzer said that as she understood it, MSR is defined as a US-led mission, with contributions from other space agencies in terms of instruments, vehicles; is this still true? Dr. Diniega offered to write the finding.

Dr. Mainzer expressed concern about the new SMD Information Policy and its possible unintended consequences on individual researchers. Dr. Rinehart encouraged everyone to read the Policy closely when it is released for public comment, adding that most of the Policy covers requirements that already exist. He was not sure what a finding would do at this point. Dr. Mainzer said that she was concerned about “requirements creep,” and that reviewing the first draft of the Policy would be important in this respect.

Dr. Diniega commented on Dr. Rinehart’s calculations on the net cost to community, and their influence on deciding how to schedule proposal calls. She felt that formalizing these calculations would help with predictability. Dr. Rinehart did not support formalizing algorithms for deciding whether a call will go biannual; he simply wanted to be able to tell the community as early as possible when there will be a call, and did not want to inform the community while such a decision is still tentative. Dr. Mainzer said the PAC would like to further discuss the significance of confirming where the break-even point occurs.

### Demographic Data

Dr. Louis Barbier presented a demographic analysis of the Planetary Science R&A program; the analysis does not include competed missions, student programs, or Cooperative Agreements. The data is voluntary and is collected through NSPIRES, and includes PIs and co-Is. Data were collected beginning in 2016, and back-casted to 2014. By definition, the entirety of 2020 data has been gathered, and the analysis should be completed by the end of Summer. Data was compiled in compliance with EEOC/OMB guidelines. This is an ongoing analysis with no endpoint defined at present. Dr. Barbier noted that there had been a significant number of individuals who did not want to disclose demographic information about themselves (preferred not to answer; PNA).

The aim of the demographic analysis was to understand who is participating in Planetary Science R&A programs, and whether NASA is treating them fairly. The Earth Science Division (ESD) was excluded from this analysis. Overall, HPD had 11,859 participants in R&A, APD had 11,198, and PSD had 31,172. Gender participation from 2014–20 shows that PSD had the largest percentage of self-reported females (23%) (for PSD, this number was for PIs only). For males, the average proposal success rate was 20%, for females 23%, and for PNA 20%. Success rate by gender 2014–20, no significant trends were seen, but over the last two years, there seems to have been a slight decrease for all three categories, but it is not known if this is significant.

In the category of Race/National Origin (RNO) over all divisions, 66% were White; 21% were PNA; and 1.3% were Other; 4.5% Spanish/Latinx, and 0.4% were Black/African-American. For PSD PIs only, the success rates over all years compiled were 19% Asian, 19% PNA 19%, 22%White, and 15% Other. The category “Other” category in this latter case encompasses Alaska native, Black or African-American, American Indian, Hispanic, and multi-racial.

For PI and co-I data (Planetary only), success rates hover around the 20% rate, with no significant trends seen. In the category of RNO and gender combined, there were no real significant differences: success rates were between 19% and 23%. There was a very small dip in the participation of Hispanic males, in one instance. Declared disability success by division yielded the same result, with no real differences, although those with reported disabilities had a slightly lower success rate over the past two years. Relevant Civilian Labor Force (RCLF) data on race and ethnicity for members of Planetary Science community has been completed, while RCLF data on HPD and ESD are still being collected.

### Cross-AG IDEA Working Group

Dr. Moses Milazzo presented an update on the activities of the Cross-AG Inclusion, Diversity Equity and Accessibility (IDEA) Working Group (WG). The IDEA WG was formed in August 2019, as the result of



discussion at an Outer Planets Assessment Group (OPAG) meeting. Its first meeting was held in October 2019, and since that time the IDEA WG has created an organized structure to develop and disseminate resources, findings, and recommendations associated IDEA to the larger AG ecosystem and to the Planetary Science community. The WG now has more than 50 members. Its Steering Committee includes two representatives from each AG, and from the Division for Planetary Sciences (DPS), Professional Culture and Climate Subcommittee (PCCS), and a special representative with a sociology background. Since its inception, the Group has led discussions and development of 27 white papers for the Decadal Survey, with 242 total co-authors, as well as given presentations to various meetings, AGs, and professional conferences.

In ongoing work, many members are developing their own white papers for publications. Some members are working on developing Codes of Conduct for Missions and Teams, gender equity issues, pay equity for community service, cultural concerns, and many other topics. In new work for 2021, Dr. Milazzo noted that the IDEA WG has been asked by several AGs to help to create standard procedures, best practices, and checks and balances on selection and hiring; updates on this activity will be given at next IDEA WG meeting on 28 June. The Working Group is considering establishing a website with institutional sponsorship, and performing a Workplace Climate Survey, also with sponsorship. Dr. Milazzo invited PAC members to give feedback, request discussions as needed, and to contact Maggie McAdam or himself.

In response to a question, Dr. Milazzo said that the IDEA WG did not yet have specific connections with the SMD IDEA groups, as it wants to leave flexibility to members of the WG. There is a lot of cross-pollination, but no formal relationship. Dr. Diniega asked if there were any shared connections between community-based groups and the NASA-wide IDEA work. Doris Daou said that the timelines of related Working Groups were not congruent, and that the major goal of the SMD IDEA WG was to start working within SMD, and then within NASA. There are also NASA Program Officers that are part of the science community; communication is key, and members of the SMD subgroups will certainly be interacting with the PSD AGs. Dr. Diniega commented that there is a lot of good data in the demographic survey, and she hoped that data would be shared between these IDEA groups. Doris Daou agreed, and observed that SMD subgroups have a lot of leverage. Dr. Rinehart cautioned PAC members that NASA is prohibited from doing things such as broad surveys, which the community, by contrast, is not prohibited from doing. He added that change starts at home; NASA should lead the way in getting its own house in order, and not reach out to “fix people.” Dr. Mainzer asked if NASA would be able to leverage these community-based studies in order to take appropriate action in the IDEA realm. A meeting participant pointed out that SMD has two subgroups—the mission subgroups and R&A subgroups—and that these subgroups should be talking with the community IDEA groups. Dr. Meagan Thompson noted that the demographic survey required much earnest work, particularly in determining how to ask questions about gender and non-binary status. The survey ended up following NSF guidelines, for the most part. Dr. Barbier commented that he was going to work hard within the new administration members to improve the questions. Dr. Milazzo commented that there are members in the community that have experience in these areas, and with OMB, Census, etc., on how to deal with gender-related pronouns. Dr. Rinehart agreed to compile the necessary references to help guide future efforts in gathering demographic data.

Dr. Mainzer asked how the community could enhance efforts in mitigating the inequities that appeared in the demographic survey. Dr. Milazzo expected that the use of DAPR and NoDD proposal approaches will help; but bravery will be required to push back on centuries of bias. Science must be treated as a human endeavor, and scientists must admit that they carry bias. Dr. Mainzer commented that it would be interesting to see if/how the Decadal Survey IDEA white papers make it into practice at NASA.

Discussion with AG chairs/Open forum

The Chairs of the various AGs engaged in a “lightning round,” presenting the top concerns from their most recent proceedings.

#### *Mercury Exploration Assessment Group (MExAG)*

Dr. Steve Hauck presented findings:

- MExAG notes its disappointment that the delay in NF-5 extends the NF cadence by two years.
- MExAG also notes that NASA’s announcement of the NF-5 delay explicitly permits consideration of new discoveries since Vision and Voyages through the on-going Decadal Survey process—an approach that addresses MExAG’s prior concern that NF-5 was unable to consider new discoveries and new destinations.

Dr. Hauck briefly noted that MExAG has created two types of subcommittees: Working Groups for strategic issues and Task Groups for short-term, focused work. In addition, MExAG made a presentation to the Decadal Survey Mercury/Moon Panel on Mercury Technology Needs, and continues to develop a Goals Document. The MExAG 2022 Annual Meeting planning will begin this summer.

#### *Venus Exploration Analysis Group (VEXAG)*

Dr. Darby Dyar reported that VEXAG is quite pleased with the recent Discovery selections, and the prospect of a total of three new Venus missions. VEXAG is requesting PAC advocacy for long-duration power systems for both hot and cold surfaces; and for fundamental research as opposed to target-specific, hypothesis subjects. She presented some examples of fundamental research not getting funded, noting that such proposals typically don’t get selected because they are not asking fundamental questions about a target body. Some possible solutions:

- Create a new program element dedicated to Planetary Fundamental Research.
- Add language to the SSW solicitation to include funding of fundamental research that does not focus on testing a hypothesis based on a specific target of study.
- Loosen restrictions on the percentage of a proposal (in other programs) that can be laboratory-based (e.g., from 10% to 25%).

#### *Lunar Exploration Analysis Group (LEAG)*

Dr. Amy Fagan reported top LEAG findings:

- South Pole-Aitken basin Sample Return (SPA-SR) and LGN should remain high-priority missions.
- The Lunar Reconnaissance Orbiter (LRO) is still highly valuable, and LEAG encourages it to be maintained.
- Equity, Diversity, Inclusion are still important.

The LEAG is requesting more information regarding strategic plans for Exploration Science Strategy and Integration Office (ESSIO) and entities contained within ESSIO, and some clarification in particular about the evolution of the Commercial Lunar Payload Services (CLPS) program. LEAG is also requesting more updates on Artemis timelines, landing site team selections, and science team selections, as well as clarification as to why some flight programs must use Cooperative Agreement Notices (CANs), and why others are not required to use them.

#### *Mars Exploration Analysis Group (MEPAG)*

Dr. Aileen Yingst reported that one individual is rotating off, and one new member is coming on, to the MEPAG. MEPAG now has two IDEA representatives, highlighting MEPAG’s explicit intention to work with the SMD IDEA Working Group. In addition, MEPAG offers huzzahs for the tremendous amount of exploration activity ongoing at Mars.

Active findings for MEPAG:

- The MEPAG is excited that MSR is going forward, and that lines of communications between MSR and MEP have been established, and encourages NASA to address the important MASWG report requested by the mid-term Decadal review.
- MEPAG continues to follow the development of MIM.
- MEPAG is excited about the first stages of discussions regarding humans to Mars but is concerned regarding the lack of input the Mars community has had in the initial formation of science objectives for human exploration of Mars. MEPAG requests that science objectives be considered for the Humans to Mars effort.

The MEPAG's next virtual meeting will take place later in June.

#### *Small Bodies Analysis Group (SBAG)*

Dr. Bonnie Burrati requested that two SBAG findings be elevated to the PAC: SBAG requests that NASA support additional asteroid radar observations at other facilities to meet a portion of NASA's Science and Planetary Defense goals, in light of the loss of Arecibo. SBAG further recommends that NASA continue to consult with the National Science Foundation (NSF) on Arecibo recovery. The second finding is to encourage NASA to use its resources to identify the key science goals that can be obtained during the Apophis flyby in 2029; the SBAG community concludes that the next steps in preparation for this event are focusing activity into a formal Science Definition Team or similar entity, as well as investigating how existing spacecraft and ground-based assets could enhance the science return from this event.

#### *Outer Planets Assessment Group (OPAG)*

Dr. Linda Spilker reported that OPAG requests PAC advocacy to prevent further Dragonfly launch delays, and to obtain more transparency on the decisions that lead to launch delays. OPAG also requests PAC advocacy to encourage the building of Radioisotope Thermoelectric Generators (RTGs); and to be kept apprised of the progress of the second next-generation unit that is currently being built (reported to be ready for fueling in 2026). OPAG also supports NASA in its work with the Department of Energy (DoE) to ensure that the plutonium production is going on as planned, as RTGs will be needed for future Ice Giant missions.

OPAG's next meeting will take place in late August/early September.

#### *Mapping and Planetary Spatial Infrastructure Team (MAPSIT)*

Dr. Brad Thomson presented findings:

- MAPSIT encourages the creation of a Planetary Spatial Data Infrastructure (PSDI) for the Moon, particularly in light of numerous lunar efforts being brought forth by NASA, the commercial sector, and other space agencies. MAPSIT further notes that the creation of a lunar PSDI is a non-trivial effort and will require funding resources.
- MAPSIT is encouraged by the IRB Planetary Data Ecosystem report results on data and usability.
- MAPSIT has moved forward on creating the Lunar Critical Data Products Specific Action Team (LCDP-SAT), to help determine what mission-derived cartographics will be needed to derive such products as hazard maps for the Moon, including slope maps, rock abundance maps, etc.

#### *Extraterrestrial Materials Analysis Group (ExMAG)*

Dr. Barbara Cohen presented findings from the Spring 2021 meeting of ExMAG:

- ExMAG concurs with LEAG that the scientific goals of a South Pole-Aitken Basin sample return mission are unlikely to be addressed at the planned Artemis landing locations at the lunar south pole. ExMAG recommends that NF-5 proposals for such a mission should not be dependent upon Artemis program planning. (finding endorsed by LEAG)
- ExMAG finds that terrestrial sample collection activities, important to the community, should be resumed as soon as possible

- ExMAG fears that politics will hinder the availability of Chang'e 5 lunar samples, and asks NASA for clarity on scenarios for a bilateral exchange of samples. At present, Chinese researchers cannot request Apollo samples, for instance.
- ExMAG endorses the Midterm Review finding and recommends that the curation costs for sample return missions be considered outside the PI cost cap in the NF-5 call.

Note: The Exoplanet Analysis Group (ExoPAG) did not report.

Dr. Glaze briefly responded to the OPAG finding on Dragonfly's launch delay, noting that the PBR for FY22 does have the profile to support the launch in 2027, and that furthermore, NASA has decided to launch Dragonfly on a launch vehicle that will get the mission to Titan three years earlier than previously planned. The faster arrival also means that the Multi-mission RTG (MMRTG) will be in better shape upon arrival. Regarding Chang'e 5 samples, NASA is painfully aware of the challenges associated with China, and there are still some political issues that may hinder a satisfactory solution. NASA is addressing the problem through the Office of International and Interagency Relations (OIIR). The matter is on the Agency's radar, and Dr. Glaze said she was supportive of the idea, as is SMD AA, Dr. Zurbuchen. The matter won't necessarily need a legislative solution; there is room to request having leeway to talk to Chinese scientists on specific subjects. Dr. Glaze recommended elevating Chang'e 5 to the attention of the Science Committee.

#### Discussion

Dr. Mainzer introduced two findings for consideration: fundamental research that is non-target specific; and restrictions on international travel for NASA employees. She noted that NASA Chief Scientist Dr. Jim Green had taken on the travel issue, and is trying to increase the number of contractors that can go to international conferences. She understood that he made some progress, but also understood that Dr. Green felt the issue would need a legislative solution. Dr. Glaze suggested bringing the subject of international travel back to the attention of the Science Committee. Dr. Rinehart recommended, apropos of the finding, that everyone remember the convenience of virtual meetings.

Dr. Mainzer commended Dr. Barbier on his excellent presentation on demographics, and asked the PAC if any findings should be issued in response. Dr. Diniega said that it was encouraging to see that there were not many differences in success rates, but discouraging that there are still groups that are severely underrepresented. Dr. Mainzer thought the IDEA groups should report regularly to the PAC, in an effort to understand how representation can be improved. Dr. Lynn Carter recommended more mentoring at the undergraduate level, and more Early Career mentoring and outreach. Dr. Diniega noted that the H<sub>2</sub>O program is a concerted effort to reach underrepresented racial minorities, and similar programs could be instituted to improve participation in R&A. PAC declared a finding on the issue.

#### *Returning to Rinehart Question for the PAC*

Dr. Mainzer said she liked the idea of alternating between topic areas, and the idea of triage (as being explored for NoDD) being an option for other programs. Dr. Rinehart said that he would rather have raw, unfiltered comments from panels; releasing the raw notes as feedback could reduce reviewing time. Release of raw notes could also save time by minimizing discussions about proposals that are obviously not going to be funded. He suggested one possibility: that panels hire technical writers to write up draft reviews, which could save 1–2 days per panel, and improve the writing quality as well (although that may not be possible). Referencing his prior mention of Kahneman et al.'s Noise, he reiterated that some of the book's observations can provide some help with improving the review process. All human decisions are flawed, and reviewers need to start from this precept. Dr. Carter agreed that shortening the review process was a desirable end. Dr. Thomson asked how DAPR was going. Dr. Rinehart said that each of the four SMD divisions did DAPR in 2020. Thus far, results have been fantastic; there is no

significant shift in selections, but he was seeing that DAPR is having a positive effect. He offered to give a briefing on DAPR at the PAC's October meeting, but also suggested that it may be well-timed for a presentation from Michael New on DAPR from the SMD perspective. He did caution that DAPR does not save time, and that members need to recognize that there are pros and cons associated with any new approach. The PAC did not issue a finding on DAPR, because it is in progress.

Dr. Diniega expressed appreciation for closed captioning (CC) having been made available for the Webex meeting, and asked if it was something NASA will enact for more of their public meetings. Dr. Shoshana Weider said that closed captioning is indeed available for other meetings. Dr. Glaze commented that its use has seemed *ad hoc* in implementation, and generally needed to be requested. Dr. Diniega set about drafting a finding on making CC a standard part of public meetings.

Dr. Glass suggested that PAC offer a congratulatory finding on Venus, and the involvement of external folks, and establishing a Participating Scientist Program (PSP) with ESA's EnVision mission, e.g. Dr. Glaze welcomed a finding on PSPs.

A PAC member suggested elevating the LEAG finding on NF-5 and the South Pole-Aitken Basin mission. A member suggested reserving the finding until after the release of the new Decadal Survey in March 2022.

The PAC deferred a finding on ESSIO until the October meeting.

The PAC considered adopting the VEXAG finding on fundamental research. Dr. Rinehart said that he didn't think it was true that ROSES does not fund fundamental research. Both Dr. Glaze and Dr. Rinehart noted that the issue had not come up in the Gaps RFI.

The PAC also considered the SBAG finding on determining science goals that can be derived from the appearance of Apophis, and the standing up of an SDT. After further discussion, it was not clear this would be a finding.

Dr. Glaze suggested the PAC issue a finding or recommendation on Pu production and plans for further RTG development. The PAC decided to defer a finding until it had received an update.

The PAC determined that more information would be needed on a proposed ExMAG finding on samples.

Dr. Rinehart wrapped up the proceedings and announced the dates for the next PAC meeting: October 18–19, 2021. Dr. Rinehart adjourned the meeting at 6:03pm.

Appendix A  
Attendees

Planetary Science Advisory Committee Members

Amy Mainzer, University of Arizona, **Chair**  
Lynn Carter, University of Arizona  
Serina Diniega, Jet Propulsion Laboratory  
Justin Filiberto, Lunar and Planetary Institute  
Jennifer Glass, Georgia Institute of Technology  
Justin Hagerty, United States Geological Survey  
Dana Hurley, Johns Hopkins Applied Physics Laboratory  
Conor Nixon, NASA Goddard Space Flight Center  
*Britney Schmidt, Georgia Institute of Technology (absent)*  
Joseph Westlake, Johns Hopkins University Applied Physics Laboratory  
Stephen Rinehart, NASA Headquarters, **Executive Secretary**

Attendees

John Adams  
Megan Ansdell  
Jim Armor  
Louis Barbier  
Julia Bauer  
David Beaty  
Linda Billings  
Francesco Bordi  
Mia Brown  
Jan Bruegmann  
Paul Byrne  
Jason Callahan  
Brandi Carrier  
Nancy Chanover  
Stephen Clark  
Barbara Cohen  
Steven Crawford  
Doris Daou  
Christopher Dateo  
Lisa Danielson  
Leonard David  
Richard Davis

Elaine Denning  
Tammy Dickinson  
Jessie Dotson  
Shannon Ewan  
Walt Faulconer  
Robert Fogel  
Mark Fonda  
Jeff Foust  
David Gaba  
Carl Gelderloos  
Amitabha Ghosh  
Lori Glaze  
Jeffrey Gramling  
Jeffrey Grossman  
Lewis Groswald  
Tim Haltigin  
Steven Hauck  
Lindsay Hays  
Jeffery Hollingsworth  
Zhengwei Hu  
Van Kane  
Linda Karanian  
Walter Kiefer  
Melissa Kirven-Brooks  
Irene Klotz  
Gerhard Kminek  
Bill Knopf  
Kelsie Krafton  
Alana Johnson  
Bob Johnson  
Lindley Johnson  
Christy Layton  
James Lochner  
Robert Tomes  
Rebecca McCauley-Rench  
Carolyn Mercer  
Michael Meyer  
David Millman  
Thomas Morgan  
Melissa Morris

Suman Muppidi  
Amanda Nahm  
Michael New  
Curt Niebur  
Sarah Noble  
Adriana Ocampo  
Lucas Paganini  
Ramon de Paula  
Louise Prockter  
Julie Rathbun  
Oscar Resto  
Ursula Rick  
Andrea Riley  
Edgard Rivera-Valentín  
John Rummel  
Richard Ryan  
Joan Salute  
Delia Santiago-Materese  
David Schulte  
Phil Scott  
Jake Short  
David Smith  
David H. Smith  
Michael Smith  
Krista Soderlund  
Hale Stolberg  
Julie Stopar  
Henry Throop  
B. Trieu  
Bradley J. Thomson  
Meagan Thompson  
Thomas W. Thompson  
George Tahu  
Ashwin Vasavada  
Paul Voosen  
Mary Voytek  
Mini Wadhwa  
Dewayne Washington  
Shoshana Weider  
John Whitehead



R. Aileen Yingst  
Nicolle Zellner  
Joan Zimmermann  
Rich Zurek

Appendix B  
Committee Membership

Amy K. Mainzer, **Chair**  
University of Arizona

Lynn Marie Carter  
University of Arizona

Serina Diniega  
Jet Propulsion Laboratory

Justin Filiberto  
Lunar and Planetary Institute

Jennifer Glass  
Georgia Institute of Technology

Justin Hagerty  
United States Geological Survey

Dana Hurley  
Johns Hopkins Applied Physics Laboratory

Conor Nixon  
NASA Goddard Space Flight Center

Britney Schmidt  
Georgia Institute of Technology

Joseph Westlake  
Johns Hopkins University Applied Physics Laboratory

Stephen A. Rinehart  
Executive Secretary, NASA Headquarters

Appendix C  
Agenda

**Planetary Advisory Committee (PAC) June 14, 2021 Meeting**  
**VIRTUAL MEETING**  
**Agenda**

**Meeting Information**

Meeting link:

<https://nasaenterprise.webex.com/nasaenterprise/j.php?MTID=mco6gdodce973dbdb5fde4e4d54d18eab>

**Meeting number:** 199 292 7638      **Password:** PAC\_June2021

For audio, when you join the WebEx event, you may use your computer or provide your phone number to receive a call back. Otherwise, call the U.S. toll conference number: 1-415-527-5035 and enter the access code 199 292 7638.

**Monday, June 14**

<b>Time (Eastern)</b>	<b>Length (minutes)</b>	<b>Item &amp; Speaker</b>
10.00–10.05	5	<b>Welcome/around the table</b> Stephen Rinehart
10.05–10.50	45	<b>Planetary Science Division (PSD) Update</b> Lori Glaze
10.50–11.20	30	<b>R&amp;A Update</b> Stephen Rinehart
11.20–11.30	10	<b>Additional Q&amp;A / Discussion</b>
11.30–12.00	30	<b>Mars Exploration Program/Mars Sample Return Update</b> Michael Meyer, Jeffrey Gramling
12.00–12.30	30	<b>SMD Information Policy</b> Steve Crawford
12.30–12.40	10	<b>Additional Q&amp;A / Discussion</b>
12.40–13.25	45	<b>BREAK (east coast/mid-west lunch)</b>

13.25–13.45	20	<b>Planetary Defense Update</b> Lindley Johnson/Kelly Fast
13.45–13.55	10	<b>Additional Q&amp;A / Discussion</b>
13.55–14.55	60	<b>Planetary Data Ecosystem Independent Review Board</b> Becky McCauley Rensch, Melissa McGrath
14.55–15.10	15	<b>Additional Q&amp;A / Discussion</b>
15.10–15.55	45	<b>BREAK (west coast lunch)</b>
15.55–16.15	20	<b>NASA Demographics Reporting</b> Louis Barbier
16.15–16.45	30	<b>Cross-AG IDEA Working Group</b> Moses Milazzo, Maggie McAdam
16.45–17.15	30	<b>AG Discussions</b> PAC & AG Chairs
17.15–18.00	45	<b>Discussion time &amp; Findings</b> PAC members
18.00		<b>Adjourn</b>

Appendix D  
Presentations

1. Planetary Science Division Update; *Lori Glaze*
2. PSD Research and Analysis Update; *Stephen Rinehart*
3. Planetary Data Ecosystem Independent Review; *Melissa McGrath, Rebecca McCauley-Rench*
4. Science Mission Directorate Information Policy; *Steven Crawford*
5. Planetary Defense Coordination Office Update; *Lindley Johnson*
6. Demographic Data; *Louis Barbier*
7. Cross-AG IDEA Working Group; *Moses Milazzo*
8. Analysis/Assessment Group Open Forum:
  - MExAG (Mercury); *Steve Hauck*
  - VEXAG (Venus); *Darby Dyar*
  - LEAG (Lunar); *Amy Fagan*
  - MEPAG (Mars); *Aileen Yingst*
  - SBAG (Small Bodies); *Bonnie Burrati*
  - OPAG (Outer Planets); *Linda Spilker*
  - MAPSIT (Planetary Cartography); *Brad Thomson*
  - ExMAG (Extraterrestrial Materials); *Barbara Cohen*

## Appendix E Chat Transcript

from Lori Glaze (Int) to Everyone: 1:15 PM

If you had a question in the chat that didn't get answered this morning, please re-type it.  
Thanks!

from Shoshana Weider (Int) to Everyone: 1:19 PM

To access Closed Captions - open up the Multimedia Viewer panel in Webex

from dana hurley (Ext) to Everyone: 1:38 PM

Is it breaking up? Or is it me?

from Conor Nixon (Int) to Everyone: 1:47 PM

Is there any move to rebalnce funding between R&A programs every year to keep selection rates constant across programs? E.g. to give ExoBio, PSTAR more money from other high selection rate programs.

from dana hurley (Ext) to Everyone: 1:49 PM

Stephen, it would be useful to add a column to the chart for \$s awarded.

from dana hurley (Ext) to Everyone: 1:51 PM

LASER

from Lori Glaze (Int) to Everyone: 1:56 PM

apologies to all, I have to drop off for a couple hours, but will return for the final disussions.

from STEPHEN RINEHART (Int) to Everyone: 1:57 PM

it wasn't LASER... it was somethign beginning with an "M" I think....

from rich zurek (Ext) to Everyone: 2:34 PM

Has there been an estimate of the overall cost of these improvements? Has funding been identified?

from Rebecca McCauley Rench (Int) to Everyone: 2:40 PM

Thank you all for the opportunity to share.

from Jennifer Glass (Ext) to Everyone: 2:47 PM

agree!

from Jennifer Glass (Ext) to Everyone: 2:53 PM

yes good wording

from Julie Rathbun (Ext) to Everyone: 2:53 PM

I'm still confused about how preoscribed NASA's budget is. For example, Stephen mentioned tha thte one year increase was going towards "mortgages" and starting a new facilities program. Was the new program actually mandated in the budget?

from Serina Diniega she/her (Ext) to Everyone: 2:54 PM

argh computer rebooted. sorry, I heard Amy and agree

from Serina Diniega she/her (Ext) to Everyone: 2:54 PM

I'm also thinking about future mission funding vs. continued mission funding, but those are the main aspects

from Julie Rathbun (Ext) to Everyone: 2:55 PM

This might be addressed to the PAC: Is a program the best use of funds? Again, I'm unsure how much a "program" funds actual research vs. just a new office at HQ.

from Dylan Seefeldt (Ext) to Everyone: 2:56 PM

I read private space collaboration was vital to the NASA budget.

from John Whitehead (Ext) to Everyone: 2:56 PM

It would be worth reading between the lines in Jeff Gramling's charts, and asking some pointed questions, for example does the MSR standing review board have expertise for miniature launch vehicles, and why should we believe that this brand-new thing can be ready in 5 years. The Mars ascent vehicle (MAV) remains the least understood piece of MSR (underestimated, taken for granted etc.), with no related prior experience or experts to rely on.

from Dylan Seefeldt (Ext) to Everyone: 3:09 PM

Vandenburg AFB is seeking space related industry building on the surrounding property. They are a Space Force base in need of grassroots expansion.

from Julie Rathbun (Ext) to Everyone: 3:10 PM

Stephen, in your slide demonstrating that there is more cost than benefit in low funding rate programs, did you take into consideration that many (most?) proposals aren't newly written but are likely resubmits?

from STEPHEN RINEHART (Int) to Everyone: 3:11 PM

I assumed that the average time spent writing a proposal was 20 person-days. (work days) In my personal experience, this is way low for new submissions, and probably low for resubmissions.

from STEPHEN RINEHART (Int) to Everyone: 3:16 PM

If you think that estimate is high, please tell me: But make sure you consider the time spent putting together a budget, the time of all the Co-Is and collaborators, etc. You could even think more broadly and think of the time of people submitting proposals, etc. And, technically, you should probably also include the time you spent reading and analyzing the review that you get back. I think my 20 days is probably low even for a rewrite. But I'm willing to believe I'm wrong if someone wants to argue the point.

from Serina Diniega she/her (Ext) to Everyone: 4:00 PM

I missed the very first part of this - is this based on self-reported demographic information?

from Edgard Rivera-Valentín (Ext) to Everyone: 4:00 PM

On the NSPIRES collected demographic data.

from Serina Diniega she/her (Ext) to Everyone: 4:01 PM

thank you

from Moses Milazzo He, Him (Ext) to Everyone: 4:07 PM

It would be nice to open up the possible answers on NSPIRES to enable people who have genders that aren't M/F to answer the question without being an "other."

from Serina Diniega she/her (Ext) to Everyone: 4:07 PM

agree, Moses.

from Paul Byrne (Ext) to Everyone: 4:07 PM

Moses: seconded

from Meagan Thompson (Int) to Everyone: 4:07 PM

Moses, agree and we tried. The survey has to be approved through the OMB to adhere to the paperwork reduction act

from Meagan Thompson (Int) to Everyone: 4:08 PM

and they declined our attempt to change so it's not a gender binary when we last updated. I'm sure we'll try again when we renew



from Moses Milazzo He, Him (Ext) to Everyone: 4:09 PM

Meagan, I understand. The OMB approval for the survey expires in August 2022; can we start the updating of the survey now with inclusion of experts in how to ask these gender-related (as well as the race/culture) questions?

from Serina Diniega she/her (Ext) to Everyone: 4:09 PM

Thank you, Meagan.

from Meagan Thompson (Int) to Everyone: 4:10 PM

that's going to be something that Louis will have to respond to. We definitely tried to update all the questions when we submitted our last renewal, including adding more representative race/ethnicity questions and ability questions

from Meagan Thompson (Int) to Everyone: 4:10 PM

sorry, \*options not questions

from Moses Milazzo He, Him (Ext) to Everyone: 4:11 PM

Thanks, Meagan!

from Edgard Rivera-Valentín (Ext) to Everyone: 4:15 PM

Student respondents in the DPS survey is known. We'd be happy to share the data, but it is also in my white paper.

from Edgard Rivera-Valentín (Ext) to Everyone: 4:18 PM

The data showed here that 23% of submissions are from women; however, the DPS survey has shown that women are currently some 35% of the profession. One could infer that women are PI-ing less proposals in planetary science.

from Amy Mainzer (Ext) to Everyone: 4:19 PM

Interesting point, Ed.

from Jennifer Glass (Ext) to Everyone: 4:22 PM

agree - thanks for that important observation, Ed

from Edgard Rivera-Valentín (Ext) to Everyone: 4:23 PM

Other observation, a 15% selection rate (even including the small number of submissions) for the Other group for race/ethnicity, which was the group for PoC, compared to the 22% overall selection rate for submissions from people who identified as White and 19% for people who said PNA, is also concerning.

from Serina Diniega she/her (Ext) to Everyone: 4:25 PM

Agree, Ed. I thought that really stood out as a sign of an issue.

from Serina Diniega she/her (Ext) to Everyone: 4:26 PM

especially with how broad "Other" was in many cases -- that would correspond to a lot of people and perspectives in the US workforce, even if not presently in the planetary science community.

from Serina Diniega she/her (Ext) to Everyone: 4:36 PM

Thanks. As the DPS survey results are also being compared with the NASA work (which is a good idea), I also recommend reaching out to white paper authors who worked on that survey and very carefully analyzed those survey results. Especially with regards to very careful consideration of how to not lose non-binary folks and very sensitively and carefully consider BiPOC scientists.

from Serina Diniega she/her (Ext) to Everyone: 4:37 PM

\*BIPOC

from Julie Rathbun (Ext) to Everyone: 4:39 PM

Meagan - Is there anyone within the NASA hierarchy who has enough power to push OMB on this?

from Serina Diniega she/her (Ext) to Everyone: 4:40 PM

Thank you, Meagan and all involved with that. Understand the efforts and appreciate them!

from Serina Diniega she/her (Ext) to Everyone: 4:41 PM

and if there's something from PAC or the community to strengthen future efforts, let's identify that :-)

from Meagan Thompson (Int) to Everyone: 4:41 PM

Julie - I'm not sure what could have been done at the time, and I will say that it was during the previous administration when we tried to get the options changed, so it might go better this year

from Edgard Rivera-Valentín (Ext) to Everyone: 4:41 PM

Definitely thank you to Meagan and everyone who has worked on this and thank you for your continued perseverance on this important issue. Much appreciated!

from Julie Rathbun (Ext) to Everyone: 4:41 PM

Meagan - I think Serina got to my point better than my question - how can the PAC (and/or other community efforts) help y'all with this?

from Moses Milazzo He, Him (Ext) to Everyone: 4:42 PM

moses@otherorb.net

from Meagan Thompson (Int) to Everyone: 4:42 PM

ah, okay thank you for that clarification, Julie.

from Julie Rathbun (Ext) to Everyone: 4:44 PM

I'd also point out that there's a huge amount of information (including specific recommendations) in the Decadal white paper and I've been disappointed in the lack of community engagement in reading the EDI papers.

from Julie Rathbun (Ext) to Everyone: 4:45 PM

For example, Stephan asked earlier for ideas in funding reviewers and I know there are recs in at least one decadal white paper.

from Moses Milazzo He, Him (Ext) to Everyone: 4:46 PM

100%, Julie.

from Lori Glaze (Int) to Everyone: 4:55 PM

Amy, can you give me an example of a flight program that uses a CAN?

from Amy Fagan (Ext) to Everyone: 4:55 PM

Lori-

from Amy Fagan (Ext) to Everyone: 4:55 PM

Lori, I have been told that PRISM is?

from Amy Fagan (Ext) to Everyone: 4:56 PM

I must confess that I am less comfortable talking about this item as others since I am just less knowledgeable about this topic.

from Lori Glaze (Int) to Everyone: 4:56 PM

great suggestion Aileen.

from Amy Fagan (Ext) to Everyone: 4:56 PM

But other AG chairs may have some more insight.

from Lori Glaze (Int) to Everyone: 4:57 PM

Thanks Amy. I know of several examples where CANs are used (e.g., SSERVI) but not flight projects. All our PSD flight projects are contracts.

from Lori Glaze (Int) to Everyone: 4:57 PM

the only exceptions were the first two SIMPLEX which were ROSES grants.

from dana hurley (Ext) to Everyone: 5:01 PM

Right, PRISM is offered as a CAN.

from Amy Fagan (Ext) to Everyone: 5:02 PM

@Dana, thank you for the confirmation!

from Lori Glaze (Int) to Everyone: 5:04 PM

Ah, thanks Dana!

from Lori Glaze (Int) to Everyone: 5:05 PM

Amy Mainzer: when you're ready to discuss the proposed findings, I have a few comments in response to the OPAG finding on Dragonfly

from Lori Glaze (Int) to Everyone: 5:09 PM

I have comments on the Chang'E-5 finding as well

from Serina Diniega she/her (Ext) to Everyone: 5:16 PM

we're jinxing it now ;-)

from michael (Ext) to Shoshana Weider (Int) (privately): 5:20 PM

Shod Hana. I'm on but the system has me muted, in case Mars gets question during discussion

from michael (Ext) to Shoshana Weider (Int) (privately): 5:20 PM

Shoshana

from Lori Glaze (Int) to Everyone: 5:21 PM

you bet Linda :)

from JEFFERY HOLLINGSWORTH (Int) to Everyone: 5:21 PM

Thank you, Stephen for echo-ing that ..!!

from Darby Dyar, PSI and Mount Holyoke (Ext) to Everyone: 5:21 PM

I have to sign off now but if anyone wants any more questions, ideas, or suggestions about fundamental research in R&A, please feel free to contact me.

from Amy Fagan (Ext) to Everyone: 5:22 PM

I also have to sign off, please feel free to call me back in if you need to ask any questions (cell: 706-338-6550)

from Brad Thomson he/him (Ext) to Everyone: 5:25 PM

Another source of data would be publications, i.e., what are the demographics of lead-authors publications in journals like JGR-Planets, Icarus, etc.

from Moses Milazzo He, Him (Ext) to Everyone: 5:25 PM

I think it's also important to look beyond what our community looks like now and look at what we want our community to look like in 5, 10, 20 years. NASA has an outsized impact on this and it's important to keep an eye not just on who in the current community are able to submit proposals, but also who is feeling welcomed into the community...

from Serina Diniega she/her (Ext) to Everyone: 5:27 PM

yes, getting some data is refreshing :-)

from Lori Glaze (Int) to Everyone: 5:27 PM

just a note that there is a current on-going National Academies study to try and understand what demographic data we SHOULD be collecting and what are the barriers to keeping NASA from collecting those data.

from Serina Diniega she/her (Ext) to Everyone: 5:28 PM

good point, Lori.

from Steven Hauck Ext (Ext) to Everyone: 5:28 PM

To build on Brad's comment. AGU at least has some publication related demographic information and has presented and published it.

from Lori Glaze (Int) to Everyone: 5:28 PM

In fact, they are having a meeting this Friday.

from Serina Diniega she/her (Ext) to Everyone: 5:28 PM

Lori, is that an open meeting?

from Brad Thomson he/him (Ext) to Everyone: 5:29 PM

@ Steven, yes we have. I'm not sure how widely these demographic data have been disseminated, but speaking as a representative of the JGR editorial board, we'd be happy to share data that have already been collected and collated

from Paul Byrne (Ext) to Everyone: 5:30 PM

Bear in mind that the ongoing Planetary Science and Astrobiology Decadal Survey will talk explicitly about R&A, and will include recommendations based on the white papers the community provided last year.

from dana hurley (Ext) to Everyone: 5:30 PM

@Lori, several of the LEAG findings are related to ESSIO and HEOMD. Are those findings passed around NASA to those other offices?

from Brad Thomson he/him (Ext) to Everyone: 5:32 PM

But does that mean that the bottom 20% doesn't receive the benefit of a full suite of comments from the panel?

from Brad Thomson he/him (Ext) to Everyone: 5:33 PM

Ah, on that point, getting the individual reviews would be helpful. That is NSF

from Brad Thomson he/him (Ext) to Everyone: 5:33 PM

...NSF's practice

from Walter Kiefer (Ext) to Everyone: 5:34 PM

But individual reviewers might have identities revealed if their unfiltered ER reviews are given to the proposer.

from Moses Milazzo He, Him (Ext) to Everyone: 5:34 PM

I agree, Brad; I think triage could easily cause a survivorship bias that creates more problems with IDEA than otherwise. Getting feedback on my proposal is invaluable to writing better proposals.

from Serina Diniega she/her (Ext) to Everyone: 5:40 PM

In thinking about that outside of the box idea - could wrap in also thinking about how to mitigate bias of community members. Having someone outside the community and trained in recognizing e.g, problematic/personal comments could help sort them out for the review ... and potentially if they don't get into the first draft, they might get more filtered out of later

discussion. (avoids responsibility we bear inside the community to do better, but might address more than one issue)

from Lori Glaze (Int) to Everyone: 5:43 PM

@Dana I will certainly pass along ESSIO findings to them! HEOMD is more of a challenge, but aren't they also a co-sponsor of LEAG? I would suggest going through Jake Bleacher - is he still the HEO liaison?

from Meagan Thompson (Int) to Everyone: 5:43 PM

I know that the analysis for DAPR is being undertaken

from Serina Diniega she/her (Ext) to Everyone: 5:44 PM

agree

from dana hurley (Ext) to Everyone: 5:45 PM

Thanks, Lori!

from Lori Glaze (Int) to Everyone: 5:45 PM

@Dana I also suggest that Shoshana make a mental note to make sure we get ESSIO on the agenda for the October meeting when we have more time.

from Shoshana Weider (Int) to Everyone: 5:46 PM

@lori/dana - I will put it on my list!

from Moses Milazzo He, Him (Ext) to Everyone: 5:46 PM

I wanted to say: Paying reviewers a reasonable fee for doing reviews would likely end up making the review process a lot easier. If someone can afford to take time off from their paid work, they're more likely to be fully present for reviews.

from Moses Milazzo He, Him (Ext) to Everyone: 5:47 PM

Paying would also invite more people who are not necessarily available for volunteerism.

from Moses Milazzo He, Him (Ext) to Everyone: 5:48 PM

100%, Serina.

from Binzel (Ext) to Everyone: 5:48 PM

SBAG brought two findings forward to PAC

from STEPHEN RINEHART (Int) to Everyone: 5:49 PM

can you tell me how much we should pay reviewers?

from Moses Milazzo He, Him (Ext) to Everyone: 5:49 PM

I would pay between \$100 - \$150/hour; \$1200/day.

from Brad Thomson he/him (Ext) to Everyone: 5:49 PM

Something that beats jury duty pay

from STEPHEN RINEHART (Int) to Everyone: 5:50 PM

teh current honorarium beats jury duty pay :)

from Serina Diniega she/her (Ext) to Everyone: 5:50 PM

agree it's good to say something about Venus :-)

from Paul Byrne (Ext) to Everyone: 5:51 PM

That would be welcomed by the Venus community, for sure. Especially since that community is going to be growing quite a bit in the coming years.

from Brad Thomson he/him (Ext) to Everyone: 5:51 PM

The current honorarium for an external NASA proposal review is \$0.

from STEPHEN RINEHART (Int) to Everyone: 5:51 PM

ah, that's true.

from Jennifer Glass (Ext) to Everyone: 5:53 PM

fine by me

from Noam Izenberg (Ext) to Everyone: 5:54 PM

The silence is unanimity, I believe

from Brad Thomson he/him (Ext) to Everyone: 5:55 PM

Dana: would that be covered under a SALMON?

from Binzel (Ext) to Everyone: 5:55 PM

SBAG recommended a study team. PAC needs to OK that.

from Brad Thomson he/him (Ext) to Everyone: 5:55 PM

Stand Alone Mission of Opportunity?



from Binzel (Ext) to Everyone: 5:56 PM

Can be science from any platform, Earth or space based.

from Noam Izenberg (Ext) to Everyone: 5:57 PM

To be clear, not targeted fundamental science is far more than a Venus issue. It's multipbody, and multiprocess.

from Binzel (Ext) to Everyone: 5:57 PM

HQ is saying that PAC needs to respond to SBAG.

from Serina Diniega she/her (Ext) to Everyone: 5:58 PM

let's look into it offline. I agree it makes sense to do a study of some sort for this opportunity

from Paul Byrne (Ext) to Everyone: 5:59 PM

@Noam: seconded

from Jennifer Glass (Ext) to Everyone: 6:03 PM

thank you and see you next time!