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MEETING REPORT

Ellen Williams

10/6/2022

Ellen Williams, Chair

J Callahan

10/6/2022

Jason Callahan, Executive Secretary

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Opening Remarks/Introduction of Members

Mr. Jason Callahan, Designated Federal Officer (DFO) for the NASA Advisory Council (NAC) Science Committee (SC), opened the meeting by greeting the participants. This meeting was combined virtual/in-person, with some SC members and NASA personnel present and others participating remotely.

Mr. Callahan reviewed the Federal Advisory Committee Act (FACA) rules for the participants. Under FACA, the meeting was open to the public and minutes were being taken to be posted to the NASA website. All presentations and statements would be part of the public record. Each SC member has been appointed by the NASA Administrator on the basis of his or her subject matter expertise and are considered Special Government Employees (SGEs). As such, they are subject to Federal ethics laws and must recuse themselves in the event of a personal or institutional conflict of interest (COI). Members with questions or concerns about possible COIs should discuss the matter with Mr. Callahan. The contents of the Webex chat would be included in the meeting minutes.

He next introduced Dr. Ellen Williams, Chair of the SC. Dr. Williams welcomed the SC members and had them introduce themselves. Dr. Serina Diniega was sitting in for Dr. Amy Mainzer of the Planetary Advisory Committee (PAC); Dr. Diniega will become PAC's chair in October.

Goals of the Meeting

Dr. Williams reviewed the meeting agenda and the charge for each item. The SC was to formulate any needed advice for the NASA Science Mission Directorate (SMD), to be provided at the end of the meeting in an outbrief.

SCaN Commercialization and Impacts to SMD

Mr. Gregory Heckler, Director of Communications for NASA's Space Communications and Navigation (SCaN) program, provided an update on SCaN activities, of which the Tracking Data and Relay Satellite (TDRS) constellation is a keystone. A graphic depicted SCaN's worldwide footprint and navigation infrastructure. Within this are the Near Space Network (NSN) and Deep Space Network (DSN), along with commercial stations supporting NSN. The NSN ground stations are jointly owned by NASA and private entities.

In 2020, SCaN began implementing a shift to greater commercialization, though the discussion had been going for a number of years. For Low Earth Orbit (LEO) missions, the program is trying to transition to become entirely commercial within the next decade; Mr. Heckler pointed out that this does not include the Moon. This effort builds on the success of the Human Exploration and Operations Mission Directorate (HEOMD) in commercializing the International Space Station (ISS). It also takes into consideration the growing market for commercial navigation capabilities. Private funding will also instill confidence in the user community, possibly broadening the tolerance for risk.

Dr. Vincent Cerf asked about mixed mode environment complications. Dr. Heckler said that industry, the Department of Defense (DoD), and others are starting to drive this path, though the DSN is much different from the other capabilities. Dr. Cerf said he was interested to know who controls which assets and how the control is communicated to various components. It is not clear if the separate assets have been transferred or if control is contracted. Dr. Heckler said that there have been conversations about standards and contracts, but there is a per-pass commercial model that maintains efficiency. The need is

for more automation and access. Dr. Charles Woodward added that it would be helpful to hear about internal and commercial requirements in context of moving from 5G to 6G.

Mr. Heckler reviewed elements of the global space economy that have played into the national space policy, noting the potential for NASA to become one of many buyers. The vision is to extend the range of commercial capabilities to space users, and SCA_N is studying whether the existing space communications systems can provide commercial capabilities. Internal goals are to demonstrate and operationalize commercial space-based relay services by 2030, and to expand commercial low Earth orbit (LEO) direct-to-Earth (DTE) services, building on commercial partnerships and integrating new providers. NASA is asking the Glenn Research Center (GRC) to identify an operational end state for the transition, with Goddard Space Flight Center (GSFC) in a supporting role.

Mr. Callahan said that SMD satellites are sending back overwhelming amounts of data compared to what are sent out. He asked about how to account for that when there is no control over the bandwidth. Mr. Heckler said that where there is demand, commercial offerors will build out capacity to meet the market. The question is the extent to which the government should fund new capabilities. SCA_N will always have the flexibility to do the best for the Agency, but the focus is on commercial first. Industry vendors are already supplying other parts of the government. The idea is to have a catalogue of vendors and pursue task orders for individual missions. Dr. Linda Godwin asked about the elements of the agreements. Mr. Heckler said that NASA will have to balance costs, barriers to entry, cost modeling, and other functions.

Dr. Cerf said that the service sounds like a basic point-to-point link, but there are also multidirectional communications and relays. Mr. Heckler said that SCA_N is still focused on point-to-point and will see how the market evolves. Mixed into this are ground capabilities, cloud storage, access, and costs, all of which offer opportunities. Space-to-space optical communications capabilities and architectures are starting to emerge. He described the construction of the team executing the SCA_N goals, noting that the move to commercial is not a single event, but rather an ongoing process.

DTE service is an established commercial market with multiple activities. SCA_N is sorting missions into three tiers for transitioning. A draft solicitation just went out for additional LEO DTE services. Contracts will be adjusted, including incentives and more direct work between NASA and subcontractors. SCA_N is doing additional capability studies. These will be done annually to ensure that services, architectures, and capabilities meet SMD needs. Dr. Noël Bakhtian observed that since NASA is not the only customer, it is important to know the extent to which it makes up the market for these companies. Mr. Heckler said it was about 5-10 percent for ground stations. NASA has contracted with six commercial satellite communications (SATCOM) providers to demonstrate their end-to-end communications capabilities, using their own spacecraft and showing they can meet all of NASA's needs.

Dr. Woodward noted that there are many new missions in formulation with target launches for 2030-35. He asked how these missions should think about these environments. Mr. Heckler replied that the SCA_N Communications Services Project (CSP) developing a stakeholder team to help inform choices. Missions can also choose services and capabilities independent of SCA_N. Dr. Wood observed that some missions will have significant data volume needs.

Mr. Heckler said that SCA_N chose to be more aggressive on DTE capabilities because the market is more mature and can drive the process forward. Space relay is less mature, and those demonstrations have been largely internal to NASA. Dr. Cerf said that the commercial effort might establish ground stations that the missions use for DTE communications, possibly with relay satellites involved as part of a more complex architecture such as a constellation. This raises issues of who manages what. Mr. Heckler said that there are already relays occurring, and while there may be some unique data volume needs in SMD, investigators are already going outside NASA. CSP initially sought to identify three companies for the

SATCOM demonstrations but ended up with six. These companies span the range of size and offer diverse capabilities to offer a mix of services. The demonstrations will help SCA_N learn more about technical feasibility, services, and operational models in order to establish a path forward.

Dr. Cerf said that the discussion had focused on communications, and he was concerned about navigation. Mr. Heckler said that ground stations will not have an issue in that area, but commercial SATCOM is a unique need, so SCA_N has sought to have those capabilities demonstrated. It is important to provide NASA users with appropriately robust receivers. There are also trade-offs to be made regarding NASA security requirements. The specific capabilities to be demonstrated include launch support, launch and early operation phase, terrestrial support, low-data-rate routine missions, high-data-rate routine missions, and contingency operations. Dr. Cerf pointed out that the slide misstated the data delivery rate, which should be 9.2 GB, not Gb. He cautioned that when the Advanced Research Projects Agency Network (ARPANET) was being created, developers asked universities for their data requirements, which turned out to be unrealistic and unhelpful. SCA_N should learn from this and be wary of inaccurate answers to queries about data needs. Mr. Heckler agreed.

In terms of the long-term architecture evolution, NSN will serve as scheduler and the source of interfaces, monitoring all providers to ensure that requirements are met. NASA is reviewing whether NSN can also establish a cloud infrastructure. GSFC and NSN will need to do that to meet their DTE utilization goals and to act as the go-between for TDRS services. An analysis of alternatives will help determine if this is the best model for 2030. A decision point will occur in the mid-2020s. Dr. Cerf said it will be an interesting transition to get the endpoints communicating with each other. Mr. Heckler said that the question is how to be recognized by the network before getting into traffic. The demonstration will cover this. Dr. Woodward asked about management of schedule time for downlink versus buying service for capabilities. Missions will push to have the maximum data rate return on demand. Mr. Heckler said that this will be discussed, but SCA_N does not provide on-demand links at present, and missions will have to schedule passes through NSN. That may evolve in the next decade as prioritization schemes are addressed. SCA_N has agreements with missions and will audit against those. The program is not changing the cost model at this point but will likely become more aggressive in the audit.

Mr. Marc Weiser said he suspects that there will be changes that take more SMD work to commercial partners, much like is happening with Commercial Lunar Payload Services (CLPS). The Agency is better off adapting with multiple partners so long as it can maintain flexibility and assume requirements of more bandwidth. Dr. Cerf said that at some point, NASA will need to address connectivity and total capacity, with less focus on the inside work. It is important to see the way forward to be compatible with commercial operations while avoiding unnecessary changes to the architecture. Mr. Heckler agreed but wondered if missions would be willing to take these operational risks and not have an operator on call. That is a philosophy change. Dr. Cerf noted that 6G will be a major transformation. Dr. Diniega asked about the plan for when something goes wrong. Mr. Heckler said that it is SCA_N's job to ensure its agreements have teeth and accountability, as well as on-call emergency response service. NSN will be the interface. Regarding neutrality to avoid playing favorites, this will involve contracts, the business case, and dollars paid.

TDRS currently has 10 satellites. Those will go into storage eventually, but there will be TDRS satellites operating through the late 2030s. However, given NASA timelines, this retirement means that new commitments will have to end soon. Much of this comes from HEOMD. SCA_N plans a flyout that incorporates retirement and avoids gaps. It is important to NASA to avoid vendor lock-in. The investment is in Ka band because that is where most of the market is. Spectrum is important. Current radio frequency regulations do not support using commercial frequency allocations for space-to-space use. The current regulatory environment is a bit tangled. Another challenge in the commercial transition is security. NASA is collaborating with the Department of Homeland Security (DHS) and the U.S. Space Force (USSF) on

developing implementable security standards that adhere to National Institute of Standards and Technology (NIST) system categorizations.

Missions using DTE should benefit from the commercial sector's increased capacity and a potential wider selection of ground stations. While this transition might be perceived as carrying risk, it has potential for transformative opportunities. NASA will evaluate the demonstrations to see how they align with user needs. The transition follows the National Space Policy and Office of Management and Budget (OMB) direction. SCan will maintain its commitment to mission users, including those of legacy missions.

Dr. Bakhtian asked about other organizations that might be doing this kind of work. Mr. Heckler replied that the very limited activity that has occurred was of insufficient fidelity and quality for NASA to offer it to end users.

JWST First Images Presentation

The SC joined scientists and watch parties worldwide in viewing the first images released from the James Webb Space Telescope (JWST). The five images were:

- The first deep field image;
- A graph of the atmospheric composition of Exoplanet WASP-96 b;
- The Southern Ring Nebula;
- A cluster of five galaxies known as Stephan's Quintet; and,
- The "Cosmic Cliffs" in Carina.

The full NASA TV broadcast is available at: <https://www.youtube.com/watch?v=nmMRMIE3MGw>

Public Comments

The meeting was opened to the public for comments and questions. In the WebEx chat, Robert T asked: "Will JWST be able to detect effects of coronal mass ejections (CME) from sun on other planets to understand how one would effect Earth?" Dr. Michael Liemohn explained that JWST is an infrared (IR) telescope and CMEs can be hard to detect, so unless there is something that can be visible with a quick redirect, a CME in space might be hard to catch. He did not think NASA had caught CMEs from other stars, but there might have been some via planetary missions.

Robert T also asked if there are any instruments being used to automatically point JWST, so that, for example, another sensor that detects something would cue JWST to take an image. Dr. Liemohn was dubious about near-real-time observations being possible, but the JWST mission planning operations team would know more. This could be a future option, but he had no inside information.

SMD Update

Dr. Michael New, SMD Deputy Associate Administrator for Research, provided the SMD update. He reviewed the JWST image list, noting that thousands of people were involved in making the mission happen. NASA looks forward to amazing outcomes.

The Artemis mission to the Moon is progressing, having just completed its testing campaign. NASA is now working to prepare the Space Launch System (SLS) and Orion for the launch. The Agency is also moving ahead with the Mars Sample Return (MSR) effort. NASA and the European Space Agency (ESA) have formed the Mars Sample Return Science Group to maximize science potential and serve as a resource for project teams and ground projects.

The Earth Surface Mineral Dust Source Investigation (EMIT) was planned to launch later in the week to ISS via SpaceX. This instrument will measure the mineral composition of sources of dust from Earth's

deserts, enabling the mapping of these sources. NASA will soon have to set priorities for ISS payloads, as the current plan is for NASA to end ISS ownership in 2030. Commercial takeover has been discussed, but if no entity takes over, NASA will de-orbit the station. A graphic depicted the 2022 SMD mission timeline by destination. NASA will launch CLPS later in the year.

The Lucy mission, a spacecraft exploring asteroids, has a panel that failed to latch completely. Efforts to address that are ongoing. Three missions in development are experiencing difficulties. The Psyche asteroid mission will miss its planned launch window for 2022, with the next window not available until 2023 or 2024. Psyche's problems largely stem from late delivery of guidance, navigation, and control software. While some of the delay could be the result of Covid-19, NASA has stood up a team to evaluate the issues. A mission of the Heliophysics Division (HPD), the Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS), is experiencing difficulties due to delays and severe work inefficiencies resulting from Covid. It continues to move forward, however. Dr. Liemohn thought it was manifested to launch with another HPD Explorer. Dr. New said that SMD has been working through some challenges with hosted payloads. The third mission of concern is Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of SmallSats (TROPICS), an Earth Venture mission out of the Earth Science Division (ESD). This was meant to be a constellation of six CubeSats. However, the first two CubeSats were lost or destroyed upon launch. While the mission could operate with the remaining four CubeSats, the Federal Aviation Administration (FAA) and the commercial partner, Astra, have put their launch on hold in order to investigate the failure. Dr. New believed there was a precursor mission, but he did not think it was still operating.

Dr. Woodward asked about the status of the Nancy Grace Roman Space Telescope (Roman). Dr. New replied that it is probably combined yellow and green. NASA is still looking to take Psyche forward and will launch it if possible. Aside from these three missions, everything else seems to be moving along reasonably well. Dr. Cerf asked about the mechanics of MSR identification and retrieval. Dr. New said that some samples will be cached on the Mars surface and others will be on Perseverance. Dr. Diniega pointed out that Psyche had a rideshare with the Janus mission. Dr. New said that SMD is still evaluating that, and Janus has some challenges with its thrusters.

SMD funding of High-Risk/High-Impact (HR/HI) research is of interest to the science community. NASA tries to fund research across the spectrum of impact and risk. It is important for the science community to know that failure is okay sometimes as long as there are lessons derived from it. SMD defines HR research as having little if any precedent or going counter to prevailing scientific thought. It is important to distinguish between risk in research, which is largely intellectual, and implementation risk, which deals with the likely success of research. SMD defines HI research as having substantial and measurable effects on current thinking, methods, or practice. The tendency is to pair HR with HI. NASA does not want to have a special program for HR/HI research, preferring to have reviewers and program officers tag it in proposals. However, there is a Research Catalyst Fund that operates outside the regular grants program.

The common perception is that NASA is risk-averse and therefore misses out on transformative ideas, but the data indicate otherwise. In the Research Opportunities for Space and Earth Science (ROSES) 2020 reviews, 3 percent of the proposals were determined to be HR/HI, but HR/HI proposals received 5 percent of the funding. Viewed another way, the selection rate for HR/HI proposals is 33 percent, well over the selection rate of 19.6 percent for non-HR/HI proposals. The Catalyst Fund will expand that, and SMD believes it could receive more HR/HI proposals. There were questions about the characteristics of PIs who submit such proposals. Dr. New explained that SMD has not yet had an opportunity to analyze this, but he agreed with Mr. Weiser that senior scientists might have more confidence in this area. Dr. Bakhtian pointed out that the Department of Energy (DOE) has separate funding for these efforts.

Dr. Sara Tucker said that any analysis of who offers these proposals should include sector and institution type. Her experience is that review panels do not seem to be well-versed in what HR/HI actually is; it seems very subjective. Dr. New said that SMD trains program officers, who should train the panelists. He is loathe to provide scripts. Panels do seem to discuss impact more comfortably than risk. The Catalyst Fund should help. Dr. Cerf advised looking at the success of the HR/HI awards that are given. Dr. New agreed, but it is too early to have those data. Dr. Tucker asked about the ratio of technology versus science proposals. Dr. New did not recall many technology proposals falling into the HR/HI award bins. SMD's definition of intellectual risk may be more appropriate for research than development. Dr. Liemohn said this indicated that failure may be due to implementation. It will take some time for the community to understand that.

Mr. Weiser asked if SC might help flesh out any ideas in this area. Dr. New replied that, in the course of conducting listening tours, NASA is hearing that both front- and back-end research support are lacking at many institutions. It might help if NASA could enable more research support organizations with funding or partnership agreements, or something else. He did not think this would be a role for a Federally Funded Research and Development Center (FFRDC), but public corporations might be a model. He has plans to talk to nonprofits to learn more about their scope, but he first needs to identify appropriate groups and find time to engage. An example of a HR/HI project is the Ingenuity helicopter on Mars. This was proposed as a technology demonstration that was tagged as HR/HI, and it has been so successful that NASA might take it further. It presented a serious intellectual risk, though it helped that Ingenuity was not expensive or heavy and did not supplant another instrument on Perseverance.

A current area of HR/HI research is Unidentified Aerial Phenomena (UAP), more commonly referred to as Unidentified Flying Objects (UFOs). This is an area of concern to multiple Federal agencies, most prominently DOD and FAA. DOD culled many UAP reports, primarily from pilots, to derive more than 400 that warrant follow-up from NASA's scientific perspective. UAPs can pose a threat to safety of flight, and there are national security and intelligence concerns as well. Some appear to demonstrate advanced technology. However, most of these reports are of limited quality, being primarily anecdotal with little data. Dr. New showed eight questions in the Statement of Task for the effort to determine the best way to do scientific analyses. A team will address these questions over a period of several months. SMD and NASA's Aeronautics Research Mission Directorate (ARMD) will appoint team members from across a range of disciplines, avoiding both hard-core believers and hard-core skeptics. The message to the public is that there are still unexplained events, and our job as scientists is to find explanations. NASA is not asking the team to explain what the UAPs are, just identify what the Agency can do to address the questions. The team will also determine if the data exist or if there is a need for funding to obtain it. If this is done scientifically, it will constitute basic HR research. DOD has closed its original team and stood up a new classified group on this topic. NASA has some idea of what that group is doing, but the Agency is not interested in the national security implications. NASA cares about whether UAPs are natural phenomena and if they pose a threat. DOD may weigh in on the Agency's work, however. The effort is driven by interest from multiple diverse stakeholders within the government. The original study sorted the set of over 400 UAPs, mostly seen by pilots, into four categories.

Next was a discussion of proposal rates within SMD, with some focus on the impacts of Covid on proposal submission and on the rate of proposals by PIs identified as female. There was no discernible change in the rate of proposal submission by female PIs during the height of the pandemic, which had been of some concern. However, overall proposal numbers have decreased. Some of this may reflect the PSD switch to No Due Date (NoDD) proposals. This is an ongoing experiment that has yet to run its course for analysis. In addition, HPD is letting some programs have multiple review dates per year, and other impacts could be from programs that are offered on cycles other than annual. Identification of the demographics of research proposal teams runs into issues with OMB, but SMD has used the information

it has to determine that there does not seem to be a gender effect at this time. While the correct reference population for comparison is unknown, that is being worked on.

Dr. New described the PI Launchpad, a relatively new series of annual workshops to help researchers learn what is involved in making a mission idea into a viable proposal. The materials are available on the NASA website. SMD is also working on the Bridge Program, an initiative to increase engagement and partnering between Minority-Serving Institutions (MSIs), other PhD-granting universities, and NASA centers. The goal is to transition science and engineering students into graduate schools and eventual employment at NASA.

Division Advisory Committee (DAC) Chair Report

The chairs of the SMD division advisory committees gave their reports.

Planetary Science Advisory Committee

Dr. Diniega reported on the recent PAC meeting and gave a link to PAC's finalized findings. There was a lot of discussion of Inclusion, Diversity, Equity, and Accessibility (IDEA) within PSD and the planetary community. In addition, the planetary science and astrobiology Decadal Survey (DS) was recently released by the National Academies of Sciences, Engineering, and Medicine (NASEM). Science highlights included the InSight mission to map seismic activity on Mars. Dr. Diniega had a slide on Psyche, which Dr. New had discussed, and Janus. If the launch is postponed, as seems likely, the next launch periods would delay arrival of Psyche at the asteroid until 2029 or 2030. Meanwhile, there has been good progress on Europa Clipper.

The DS exceeds 700 pages and, as it was just released in April, many at NASA and in the community are still digesting its contents. PSD hopes to provide a response at a townhall in August, and PAC will react to that at a future meeting. A Senior Review (SR) looked at eight PSD missions in extended operations, all of which were recommended for extension. Dr. Diniega noted that two of these missions have new Pis as a result of succession-planning efforts. In addition, the plan for New Horizons is to view Neptune and Uranus for 2 years, then move to HPD to operate as part of the Heliophysics System Observatory (HSO).

The planetary community is still adjusting to the new NoDD R&A program, which is being rolled out and tested. PSD has received a fraction of the expected proposal volume, but the trend seems to be going in the right direction. At the same time, the Division continues expansion of Dual Anonymous (Dual Anon) peer reviews. The Planetary Data Ecosystem (PDE) addresses data access and modeling. PSD has hired a PDE Chief Scientist to coordinate this effort. The anticipated result will be better science by wider range of Pis. This effort will also support data training.

Dr. Diniega closed her presentation by reviewing the PAC meeting findings. She noted the State of the Profession chapter in the DS and PAC's recommendation that NASA have a Code of Conduct (CoC) template for all NASA-supported activities. IDEACon, a NASA-supported conference, should be useful in advancing and coordinating IDEA efforts. The Here to Observe (H2O) program pairs students from MSIs with specific missions and has resulted in outcomes that were meaningful for both students and mentors. Finally, PAC spoke of the partnership with the National Science Foundation (NSF) and the need to replace the Arecibo observatory.

Dr. Tucker said that it might be useful to share the CoC and she would like to hear more about it. Dr. Diniega said a white paper about this had been sent to the decadal survey panel. It is not enough to have a statement, there must also be enforcement. The expectations need to mesh at a higher level. PAC wants community involvement. Dr. Tucker observed that that could be pushed out to any NASA-funded conferences. Dr. Diniega said that the Lunar and Planetary Institute (LPI) runs a lot of the PSD workshops and it is getting pushed there more. Only a few mission teams have a CoC at the moment.

Astrophysics Advisory Committee

Dr. Woodward had no formal slides, as the Astrophysics Advisory Committee (APAC) was to meet the next week, at which time they would discuss Athena issues and reformulation. APAC had a special meeting for the Astrophysics Division's (APD's) SR in June (https://science.nasa.gov/science-red/s3fs-public/atoms/files/2022_Senior_Review_Subcommittee_Report.pdf), and the Committee endorsed the SR findings. One thing that came out of this was a recommendation to APD to create clear Prioritized Mission Objectives (PMOs) for developing IDEA criteria for missions. APAC also recommended prioritizing Guest Observer (GO) funding in the mission over-guides, as inflation affects GO funding.

Heliophysics Advisory Committee

Dr. Liemohn began the presentation for the Heliophysics Advisory Committee (HPAC) with a science highlight on the solar cycle, proving the Gleissberg cycle. HPAC met in May and wanted SC input on two of the meeting's findings and recommendations. The first addressed open data and open software. At issue is actual implementation of the new HPD open data/open software policy, especially at smaller scales. HPAC recommended increased dissemination of the HPD policy and implementation plan, and solicitation of community feedback. HPAC wants an update that will allow the Committee to have informed discussion of the impact the new requirements will have on ROSES programs.

Dr. Liemohn also brought forward to SC the HPAC findings and recommendation on IDEA actions within HPD. The Committee commended HPD for the work it has been doing, then suggested that suborbital and other lower-cost platforms be used to attract members of historically under-represented or excluded populations. It is necessary to bridge the gap in professional development between low-cost and larger-scale missions, and to support those in the early and mid-career stages. The recommendations included: identify means to incorporate IDEA into all HPD activities on a systematic basis; obtain input from those in the heliophysics community who have felt left out; regular updates to HPAC; and consideration of community concerns expressed in a letter from CEDAR and GEMS. Dr. Liemohn explained that these are two self-organizing community groups that wrote an open letter to HPAC. It was not received in time for discussion at the May meeting, but the Committee wants HPD to address it.

Finally, while there has been a lot of discussion about big data management, HPAC is also concerned about small data management, particularly in context of open data and software requirements, templates, and training that SMD might be developing. The Committee wondered if the SC should address these concerns. Similarly, HPAC thought the SC might comment on SMD-wide IDEA efforts, especially in regard to ROSES. It is not yet clear the extent to which HPD and SMD should use ROSES to push IDEA into the research community.

Dr. Woodward said that APAC shares the IDEA concerns. Dr. Cerf said that, regarding small data, NASA should have an enabling framework for those who need a piece of code. He wondered if this merits cooperation with NSF, which has previously addressed the issue. Dr. Woodward said that APAC had a presentation on modernization within APD for the poorly supported code. There was concern about Artificial Intelligence (AI) codes getting out into the wild. Any advisory group on this topic should have both science and security representation.

Earth Science Advisory Committee

Dr. Tucker explained that the Earth Science Advisory Committee (ESAC) has been newly reappointed and will meet soon. ESD also has the Applied Science Advisory Committee (ASAC), and there will be coordination between the chairs. She asked SC to discuss the data downlink landscape, describing how a PI with a cubesat has struggled to communicate with those in a position to help. PI workshops should educate on the data downlinks and prioritizations. Cubesats are not Agency priorities, and NASA could

be hurting research by taking that approach. Dr. Liemohn said that HPD has many SmallSats and CubSats, mostly in constellations, and will require a great deal of ground interaction with them.

Wrap-up Discussion

Dr. Cerf noted Mr. Weiser's comment that JWST was a HR/Hi effort. NASA should emphasize that a lot of people took a lot of risk to make this happen. NASA is not risk-averse and does take justifiable risks. Mr. Weiser said that JWST is both an engineering and a scientific feat. We all gasp when we think of all the possible single-point failures and the fact that all the systems came together. The science that will result is Hi. This was HR engineering as well, but clearly worth it. Dr. Woodward said that this raised the issues of setting boundaries. JWST had troubled phases, but NASA has terminated other missions and instruments. The question is how to define the principle and manage risk. Mr. Weiser said that remains unclear, but any innovation is difficult until you get through it and it becomes second nature. The accomplishment of JWST will allow confidence in the next giant thing. That is NASA's story.

Dr. Williams pointed out that NASA conducts reviews after failure. To identify best practices, it might be useful to review how successful teams pushed through points of difficulty. This could lead to incentives or other rewards. Dr. Cerf added that almost everything NASA does is novel and has a learning curve. Mr. Weiser observed that this is part of the rationale for the move to commercialization because NASA no longer needs to solve some of these problems. Dr. Woodward reminded the Committee that NASA was severely hampered in human exploration due to a series of failures, such as the Challenger disaster. The result was that NASA's risk posture has become a delicate subject, especially when balanced with stakeholder demand. It is important to pick good problems to work on, because that is where the impact lies, especially if the public can be educated to expect some failure. Mr. Weiser said that SMD leadership understands that, and that part of the culture needs to be reemphasized.

Dr. Tucker said that much of Dr. New's HR/Hi discussion was focused on ROSES, and classes of missions carry varying levels of risk. She was concerned that it has become increasingly difficult to tell the difference between Classes C and D in terms of cost. There is a connection between cost and risk, and those things need to be separated somehow, because sometimes there is a false assumption that HR is cheaper. Mr. Weiser said it is not straightforward, and sometimes HR is indeed cheaper. There is no expectation that all of CLPS will work, for example. The results should be fairly significant with Hi. Dr. Woodward said that there is technological development risk leading to stable architectures later, but it requires nimbleness. Mr. Weiser wondered if SC might have a finding or recommendation here for the senior leadership of JWST to make sure that what happened is not lost. The commercial sector tends to have most of the engineering solved. NASA is different. Dr. Woodward noted the need to persevere over long timescales to achieve these goals, and the commercial sector does not have the same tolerance for long timeframes. Therefore, certain things fall to NASA due to viability and the nature of the challenge. There are currently proposals for the next big astrophysics mission, and it will be useful to get a sense of successes and failures to inform the missions of the future. Sample return is another area where costs go up. Roman has had some issues but it is a matter of getting through rough patches. Athena cannot make its design criteria, and the impact on the mission is being examined right now. This is why probes, Explorers, and balloons are useful in bringing in and training talent.

Dr. Williams next mentioned the concerns about SCan. This effort is top-down, and it sounds like a bureaucratic, contract-oriented program. She asked how it will affect small programs, and how it will affect NASA's internal competencies. Dr. Bakhtian was also concerned about possible losses with the retirement of TDRS. Dr. Woodward said that the architectures are set for the LEO environment. But NASA seems completely lost for the next generation; it was very puzzling. Dr. Cerf added that the 1.6 Terabit thing is new to him, and he does not blame NASA for not knowing about it. However, NASA has pursued optical communications and done some testing. He is interested in NASA's ability to formulate something the commercial sector can provide to insert into usage patterns. SCan talks about a ground

station and a link opportunity for communications, which fits into the existing consumption pattern. But what about the ability to buy network access, which will require serious standardization? What will be needed and can the commercial sector supply it? The miracle needed will be making it all work together.

Dr. Tucker said that TROPICS and the Cyclone Global Navigation Satellite System (CYGNSS) are Earth Venture missions that did not go to SCan, and a PI on a cubesat did not have access. She thought NASA might present potential PIs with the various options for data management, access, etc. SCan should be talking to them about what NASA and the commercial sectors each offer. Most PIs do not know this. Dr. Liemohn added that everyone is trying their best at whatever level they can. If the issue is open data, there is a need to manage, distribute, and archive it. There are many standards out there and NASA needs to ensure the data policies address interoperability. Dr. Williams wondered if NASA will allow project teams to do their own downlinks. Mr. Weiser said that some optical communication is between satellites, which is nontrivial and not a readily available competency. Data demand will only grow. Dr. Cerf added that no one has ever asked for less capacity. Dr. Woodward referred to the clutter in space that affects communications as much as anything else. This could drive certain operations to the lunar environment.

Dr. Bakhtian asked if SC should be concerned with ISS end-of-life issues. Dr. Tucker said that the presumed end keeps getting pushed out, but the station is falling apart and requires increasing amounts of funding. Dr. Williams asked if NASA will be able to do science contracts should ISS transition to a commercial entity. She also wondered about how to mitigate the loss of science capacity. Dr. Godwin explained that NASA's long-term plan is to rent capacity from commercial space stations. Currently, the crews spend a lot of their time on maintenance. She wondered about the future of the Russian collaboration. Dr. Woodward noted that NASA is committed to do science from the Gateway environment. He asked about lessons learned from the LEO and Gateway environments in terms of what should not be repeated. Dr. Tucker pointed out that a lot of Earth science benefits from ISS access and the data downlink. She asked if it was likely that universities would pay for space on a commercialized ISS. Dr. Godwin added that it would be hard to run without the Russians. She would hate to let it go. Dr. Woodward asked if SMD knows the relative importance of ISS to its research and if the opportunity costs had been identified. Dr. Cerf referred to ISS as "a midden heap." However, commercial space research facilities are possible. Dr. Tucker asked about NASA and NSF investment in some of these. Mr. Callahan suggested bringing this up the next day during the SC's joint session with the Human Operations and Exploration Committee (HEOC). If more information is necessary, SC can have a presentation at a future meeting. Mr. Weiser asked if SMD will run out of payload bays before ISS runs out of time; Dr. Tucker said that it is already necessary to swap out payloads. Dr. Godwin said the protocol for training is a complexity that will have to be addressed. Dr. Bakhtian asked if there has been discussion of space environmental protection, such as on Mars. Dr. Woodward replied that APAC had an update on that.

He then said that in APD ROSES calls, IDEA is becoming a standard component at growing levels. Part of the evaluation process is to involve nonscientists who are expert in this area. APAC was advised that GSFC might help missions respond to this new pillar. The intent is to face both outward and inward. It will be interesting to see how other divisions move forward. Dr. Williams pointed out that when things like this are pushed down to individual PIs, it becomes a huge waste of time because everyone is reinventing the wheel. A centralized program would be hugely helpful. Dr. Liemohn agreed but thought it useful for teams to go through the process and check against a template of best practices. Dr. explained that APD is standing up a knowledge base and running PI workshops to provide those resources. Dr. Liemohn suggested that SC recommend that SMD ensure this goes across the divisions. Dr. Woodward agreed that commonality among divisions would be helpful and wondered if SC might receive a briefing on that.

Dr. Diniega explained that this was the top recommendation from IDEACon. It would be better to have this across SMD. Dr. Tucker advised also having an inward focus. While NASA has some diversity at the

top levels, it disappears at lower levels, especially in technology. Centers should set the example and be held to the same standards that they expect of the community. Dr. Woodward said that in the APD Announcements of Opportunity (AOs), there is language about CoCs, forming and maintaining diverse teams, evaluation, etc. He volunteered to take an action to provide more detail on this.

The suggestion was made that SC invite Ms. Jenn Gustetic of NASA's Space Technology Mission Directorate (STMD) for a briefing on the Agency's innovation efforts, ideas on how to drive innovation, and how to get more of those ideas out into the open. Dr. Tucker reiterated her interest in HR/HI data analysis. Mr. Callahan said that while there are limits on what can and cannot be collected, it is possible to determine how much HR/HI comes from the centers as opposed to outside NASA. Dr. Godwin wanted to know more about demographics. Dr. Woodward said that APAC has pushed APD on this. It cannot be changed quickly. Dr. Diniega said that social scientists will need to be brought in to ensure the demographic analyses are done meaningfully. Another preliminary recommendation was that SC advise NASA to raise up the people in the community who worked on JWST, as it is important to create environments in which people can be recognized.

Dr. Woodward thought SC might want to hear about a NASEM report on the NASA proposal system; this was just released. It is important to think about the open science initiatives and the analysis tools that enable use of these data sets. The environment for doing this without obligating researchers to long commitments is not well-understood. Dr. Liemohn observed that there can be onerous requirements. He would like clarification on whether investigators are supposed to document and maintain code for others. Dr. Woodward added that this makes NASA center employees nervous. The TOPS initiative ostensibly leverages the commercial cloud environment for anyone with NASA-funded activities, but it was hard to know what they wanted to do. Dr. Diniega said that PAC heard about this, and it might be a good SC presentation. Mr. Callahan said that that had occurred, but there could be an update. Dr. Woodward wondered if TOPS will increase the barriers to participation for communities lacking sponsored research support at their organizations. These things are interrelated.

Wednesday, July 13, 2022

Re-open Meeting

Mr. Callahan called the meeting to order for the second day. He reminded participants of the FACA regulations discussed on the first day. He then introduced Dr. Williams, who had the SC members re-introduce themselves. Dr. Woodward was unable to participate on this day.

Big Data Management in SMD

Mr. Kevin Murphy discussed NASA's open-source science efforts. Recent activities in this area have built on foundational work from 2019. One of the first steps was to create NASA's own definition of open science: a collaborative culture enabled by technology that empowers sharing of data, information, and knowledge within the science community and the broader public. NASA science data are incredibly attractive to people around the world, so making those data as available as possible is the objective. Open-source science is NASA's method for putting open science into practice. It incorporates community involvement in developing science and best practices, and it calls for openness of data, software, and publications to facilitate inclusion, transparency, and reproducibility.

Mr. Murphy reviewed the core principles. *Transparency* is key to trust. *Access* becomes an issue with tools that enable the formats, size, etc. *Inclusiveness* is also important to build the communities. Finally, *reproducibility* is the scientific gold standard. The SMD Strategy for Data and Computing was published in 2019 after 2 ½ years of development. Mr. Murphy reviewed the primary goals, noting that there are

subgoals. SMD has expanded some of these as work progresses. Development of the Strategy involved workshops, deliberation activities, visits to the centers, etc. Mr. Weiser asked if Goal 2, on evolution, means that there parts of the Strategy that might be no longer appropriate given new technologies, new thinking on data and software, etc. Mr. Murphy replied that the Strategy did not highlight any specific technologies. There should probably have been more attention paid to AI and machine learning (ML), but NASA has been working on that. There may be technologies and approaches the Agency needs to enable faster, but the Strategy offers a lot of flexibility. NASA's Open-Source Science Initiative (OSSI) will implement the Strategy for SMD. OSSI will help align policies among the divisions while supporting open-source software as communities are developing rich collaborative networks. OSSI will also enable cyberinfrastructure.

Underpinning all of this is the Scientific Information Policy (SPD-41), which was published in fall of 2021. SPD-41 brings together existing NASA and Federal guidance on open data, software, and publications. It applies to all SMD-funded activities that produce scientific information. Notably, it applies only to activities that began no earlier than September 2021; it is not retroactive. So, for example, it does not apply to the Hubble Space Telescope (HST), although there are some funds to incentivize compliance in older missions. Missions cannot use the International Traffic in Arms Regulations (ITAR) as a shield for keeping things closed, though security concerns are considered. The operating principle is to be as open as possible and as closed as necessary.

Mr. Murphy reviewed the definition of "scientific information" at NASA as it applies to publications, data, and software. NASA will fund PIs to ensure there is no paywall to access. For example, a PI should not have to be at a major institution to purchase needed publications. Data will need to be digitally stored and electronically accessible. This is about the development of science results, meaning there will be some grey areas, but SMD discusses these issues. The things that are important should be made open. Mr. Murphy then reviewed SPD-41's current requirements for scientific data, mission data, research software, manuscripts, and mission publications. Dr. Bakhtian asked about periods of exclusive access to JWST data for PIs. Mr. Murphy said that this policy looks forward, and JWST started before the policy went into effect. The goal is to be inclusive but that does not completely rule out periods of exclusive access to support inclusive and diverse populations. This is still being discussed.

SMD divisions can add requirements to meet the needs of their specific communities, and ESD has already issued an open-source science policy for its missions in the Earth System Observatory. Many of these requirements have existed all along, but the Division's new policy requires that some information be available in Phase B when the previous requirement was to make it available in Phase E, for example. This will help open up the shorter-lived missions. Similarly, some requirements for openness that had begun in Phase D now begin in pre-Phase A and Phase A concept reviews. ESD is also studying how to implement requirements for open workshops and meetings. The requirements will also apply to competed missions. There are AOs that will include this for Earth Venture missions. While Phase A does not generate data, there are often simulated data sets and science software involved. Dr. Godwin pointed out that some of that is funded by the institutions, which could be a complication. Dr. Cerf cautioned that implementation can be complex, driving up costs over time. Preservation of source code, software quality, and codification are all issues, as is determination of adequacy. The principle is wonderful but the implementation is full of traps.

Mr. Murphy said that NASA has talked to the National Archives, and the Agency is responsible for maintaining these records forever, so the data must be made available as long as they are usable. Dr. Cerf advised thinking about the appetite here. He favors holding onto data, but this effort makes him wary. He does not object, but it becomes a pragmatic issue of the scope of a program that increases over time. Mr. Murphy said that NASA wrestles with this and considers costs as well. Data storage has evolved incredible efficiencies, but labor is the major portion of management costs. Dr. Diniega said that in the

planetary community, scientists do not have training in this area, which results in a lot of extra work. NASA's guidance would help with the transition.

Mr. Murphy next discussed SMD Core Data and Computing Services (CDCS), which provides the infrastructure to support open science. There are capabilities within NASA that excel in this area. The idea is to identify what works well and is sharable in order to scale such things out. Research data and software archives are not necessarily in-house, but NASA does evaluate and purchase services that meet Agency requirements. Hybrid/cloud scientific computing environments can help establish baseline capabilities, ensure cybersecurity, etc. Most of the divisions are investigating cloud capabilities. Hiring experts is difficult, and using what NASA already has is important so that the divisions can focus on mission development and management. CDCS will look at publicly available collaboration tools. The Astrophysics Data System (ADS) extracts data from open publications for scientific information and knowledge management. SMD is also developing a catalogue of all NASA science information, which is a requirement. Finally, SMD will do training on open-source science. Mr. Murphy provided a timeline for the transition to CDCS. Divisions will continue to support their existing data and computing activities, while his office will look at prototype efforts. There will soon be a study of how to best use GSFC and Ames Research Center (ARC) contracts and infrastructure. Funding for this will not be available until Fiscal Year 2024 (FY24), so there will be a lot of planning, and the timeline may have to be pushed out. NASA already has a lot of the basic capabilities, so this is a matter of scaling them out.

Mr. Weiser asked about what SPD-41 rules will apply to commercial partnerships. Mr. Murphy said that he would have to check the scope. He did not believe that SPD-41 applies to commercial partnerships or diversity initiatives, but it does apply to international agreements and to grants, as well as NASA-funded missions. The division directors agree it should be on the table with international agreements. However, commercial partners must stay competitive in the market, creating different issues. One size does not fit all here. NASA is working closely with other government entities on data purchases. Dr. Cerf said that multi-cloud environments and frameworks have a natural fit to the long-term problem, but researchers need access to facilities that will fulfill SPD-41. He asked about NASA interactions with NSF on this. Mr. Murphy explained that NASA has talked to multiple organizations on this. The National Institutes of Health (NIH) and other government science organizations have comparable requirements. A question is resiliency in the community when it comes to making some of these shifts.

Transform to Open Science (TOPS) is a 5-year SMD initiative, officially beginning in 2023, that will help the community adopt open science practices. Mr. Murphy presented a timeline of activities. NASA is working with national organizations, particularly the American Geophysical Union (AGU), to have their meetings concentrate on open science. Along with AGU, NASA is actively and openly creating the curricula. The Agency will fund mission science teams to incorporate the curricula into their annual meetings. There are five core curriculum areas, ranging from team building to licenses. An upcoming ROSES call will allow divisions to fund their own open science modules to identify and develop tools and practices. The goal is to train more than 20,000 scientists over the next 5 years. NASA is working to engage and support under-represented groups and communities, and there are many interested participants. The AGU collaboration has been incredibly important.

In the WebEx chat, Dr. Bakhtian asked if there are chief data officers in NASA's other directorates and how collaboration works across the Agency. Mr. Murphy said that other directorates do not have public data like SMD does, so there are not equivalent data officers. Dr. Bakhtian also asked how NASA researchers are being prepared to better think about and include previously under-represented community voices in their research. She wondered if there are actions through TOPS that do that. Mr. Murphy said that that is an area of ongoing work. Dr. Bakhtian's third question was whether NASA is creating new types of frameworks or systems to better manage all the new data that will be coming in from JWST to

better enable researchers and analysis going forward. Mr. Murphy replied that some divisions are more forthcoming than others, and his group is still working with APD a bit.

Dr. Tucker explained that technologies are often proprietary to the groups developing them. These may not have actual science data but will have data feeding into them. She asked how the OSSI will address this. Mr. Murphy said that the data coming from the instruments should be available. Dr. Tucker asked about providing measurements but not the algorithm. Dr. Liemohn added that this is about NASA funding that builds on work that has been done by others. Mr. Murphy said that this would be decided on a case-by-case basis. Dr. Liemohn said he looks forward to learning about the training and support for archiving, maintaining, and curating old data and code. PIs move on to new work, so he wondered if NASA will take over ownership of some of this. Mr. Murphy said that NASA will not maintain everyone's code but will archive source code. Investigators can build from there. Dr. Cerf raised the issue of "media archeology" in which old data are discovered and must be preserved. Dr. Murphy said that ARC recently closed some hangars and found 67,000 reels of information that must now be transformed.

SMD Climate Survey Update

Ms. Karen Flynn, SMD Deputy Associate Administrator for Management, and Dr. Kim Barnette, program manager for LMI's team at NASA, implementing diversity, equity, inclusion, and accessibility (DEIA) initiatives within SMD, described the SMD survey of the workforce climate. Ms. Flynn began by reviewing SMD's strategic approach. Of the five IDEA strategic priorities for 2022-23, the first three are within SMD and the other two include the community. The survey addresses the third priority, to ensure that SMD team members can meet the demands of their work and raise challenges safely. The survey also builds on the Federal Employee Viewpoint Survey (FEVS) work from OMB and the Office of Personnel Management (OPM).

Ms. Flynn outlined the survey objectives. The first survey will provide baseline data and go beyond FEVS to identify areas for improvement and initiatives. The survey was designed to measure four pillars of psychological safety maturation: safety to belong; safety to learn; safety to contribute; and safety to challenge. The 31 questions included 21 Likert scale questions, 3 open-ended questions, and 7 demographic questions. Dr. Barnette explained that the pillars build on each other, though they are not strictly sequential. At a minimum, however, employees should feel safe to belong. She offered to send literature to the SC membership explaining this. Dr. Tucker said that some people may feel like they can learn and contribute but not like they belong. Dr. Barnette agreed. Mr. Weiser said that the hybrid and remote environment has muffled signals and created disconnections. Ms. Flynn said that the team is evaluating how various communities feel about these levels. As part of that, they hope to look at intersectionality and also how people feel the impact of the Covid work environment. Mr. Weiser noted that when people make internal moves from one team to another, it can affect the feeling of safety. He sees it at every scale.

Ms. Flynn described the survey process. Initially, OMB would only allow NASA to survey civil servants despite the fact that 34 percent of the NASA workforce is contractors, interns, etc. Just the day before this presentation, however, OMB gave the Agency permission to survey the non-civil-servant workforce; this permission is good for three years, so the team expects to include them in the next survey. The response rate among the civil servants contacted for the first survey was 66 percent. The survey team found no significant differences in response rates among the various demographic groups.

Dr. Barnette then provided information about responses to each of the four pillars. In "Safety to Belong," which is informal admittance to the team, the majority of civil servants did feel a strong sense of belonging, but there was a slight decline in inclusiveness at the Agency level. Ms. Flynn noted that the survey asked about programs, not just management. The public has access to the questions via the Federal Register; Dr. Barnette said that she would send links to the SC members. The survey responses indicated

some uncertainties about diversity and differing points of view. Some people declined to answer the demographic questions, and OMB has not yet opened the gender classification beyond male and female. Ms. Flynn elaborated, saying that OMB requires that surveys use their demographic questions, and respondents can decline to answer any question.

The “Safety to Learn” pillar translates to engagement in the discovery process and the freedom to ask questions. While most of the respondents said they feel safe to learn, a notable number answered “neither agree nor disagree” when asked whether SMD provides relevant IDEA learning experiences. “Safety to Contribute” means feeling invited and expected to perform; it encompasses autonomy. Some respondents felt they could not bring their whole selves to work, though most did. SMD is taking inclusion actions to mitigate the negative feelings. Finally, “Safety to Challenge,” which refers to challenging the status quo without fear of reprisal, had the most disagreement. While again most respondents felt safe to challenge, a notable number disagreed or were neutral about whether they can safely offer opposing views without fear of consequences. Similarly, a notable number indicated that they disagreed or were neutral about speaking of workplace problems or issues. SMD is addressing this through new actions. There has already been an award to an employee who was dogged in raising an issue she did not feel was receiving appropriate attention.

Dr. Bakhtian pointed out that the recommendations do not show that there have been conversations with leadership about how they might change. Ms. Flynn said that those discussions have taken place, though unevenly, and this was to be addressed further in the presentation.

Dr. Barnette summarized the gender and race variances. Generally, female-identifying individuals felt more negativity about voicing opposing opinions. Dr. Godwin asked if some of this might be learned behavior that predated NASA employment. Dr. Barnette agreed that was possible. Mr. Weiser added that there is often bias in hiring for certain personality traits. Dr. Barnette explained that there is a lot of nuance in teasing this out. The team may do focus groups or deeper dives to learn more. The survey is a starting point. Mr. Weiser praised the effort as exceptional, and Dr. Barnette said that SMD has been forward-thinking about wanting to collect and understand data. Ms. Flynn said that other studies indicate that people open up more in smaller environments, which is why the study group is shifting to smaller conversational opportunities.

In the summary of age data, the study found more neutral or negative responses. Dr. Barnette said that the 60+ age cohort was more likely to believe they were not safe to make mistakes, and a significant number of those who did not provide demographic data felt that they could not have healthy disagreements within SMD. In terms of career stage, a notable number of GS 14-15 workers felt negative about growing their careers within SMD, and at lower GS levels there were a lot of neutral responses. This calls for SMD to act and communicate, especially with the seemingly discouraged higher-level employees. Ms. Flynn reviewed the actions that have been taken already, including release of NASA’s Science Career Path Tool (<https://sciencecareers.apps.nasa.gov>) to help those who do not have a strong sense of career options within the Agency. There have also been small group dialogues and monthly conversations, the latter including the “Picture a Scientist” film. All of these actions began after NASA shifted to virtual work at the beginning of the pandemic. Preparations are being made for in-person activities. Dr. Barnette said she would share the SMD IDEA annual report with SC.

Ms. Flynn said that the next steps include addressing the findings and continuing to move forward with the next climate survey now that OMB has approved inclusion of contractors and others. The effort has focused on Headquarters and GSFC. JPL is next in terms of its SMD workforce, but it is not purely NASA. The other centers are well below those two in terms of the amount of science work done. The team began Headquarters and GSFC because where they could do the most good. While the team tries to work with the chief scientists and the centers, they have their own environments. Dr. Barnette said that

the team has met with JPL's new IDEA officer. Dr. Diniega asked about possible roll-out to large missions and how this might play into developing CoCs. Dr. Barnette replied that a draft CoC was just sent to NASA legal. The team is also exploring learning opportunities for those joining mission teams who might not be NASA staff. Dr. Cerf described a program at the American Institute for Physics (AMI), which reacted to the data on Black physicists and astrophysicists. AMI has now funded a \$25 million to increase their numbers. Dr. Barnette and Ms. Flynn expressed interest in the contacts he offered.

Discussion, Recommendations, and Findings

The Committee session to develop findings and recommendations began with the big data presentation. Dr. Diniega remained concerned about timing, as the community is being asked to adapt faster than the support system is being developed. It would be good to learn about community reaction to SPD-41. Dr. Bakhtian sought assurance that this will be more than a data dump, noting that data management plans are often not taken seriously enough. Dr. Godwin liked that they were trying to set up infrastructure. Dr. Diniega added that PSD has evolved and clarified its plans. She wondered how review panels will evaluate this. Dr. Cerf was attracted to the idea of big data being a function of NASA as an institution. People and projects come and go, but the records persist. NASA is not alone in facing this as a federal research agency. It may require a federal institution that serves to preserve the data. A lot of information is unavailable without the right software for the format. The commercial sector can play a role here. He wondered if the SC might make an observation that there should be more institutionalization of the SPD-41 effort. Dr. Williams added that the unexpected could happen, as has occurred with social media and the proliferation of misinformation. How would NASA deal with data misuse, and what about data integrity? Dr. Cerf agreed that there could be data modification and bad outcomes, so this has to be managed.

Dr. Tucker asked about management of intellectual property (IP) concerns and drawing the line between instrument technology data and science data, in terms of what NASA needs stored. Dr. Liemohn added that NASA is not the only funder, and it could be difficult to account for situations in which researchers are funded by multiple sources. This could discourage people from seeking NASA funding. He also raised the possibility that an extended mission could be considered a new start that falls under SPD-41. Dr. Godwin raised the issue of rewriting software.

The draft findings/recommendations on big data were to endorse the aim of open science, but express concern about the timing of SPD-41 implementation, which is shorter than that for infrastructure. SC had unanswered questions about IP and multiple-funder situations.

The next topic was the climate survey. Dr. Williams said that the survey population is very small, and it is important to expand this to the centers. Dr. Tucker pointed out that GSFC and JPL already have IDEA activities; Dr. Liemohn said that Langley and ARC are the next level of centers. Dr. Williams said that while JPL is more like an FFRDC, most centers are government-owned and -operated. Mr. Callahan said that Dr. Thomas Zurbuchen, Associate Administrator of SMD, is more interested in what SMD does with the survey. Dr. Tucker noted that the larger context of a person's culture and personal history matter. NASA plays a role in opening this up.

It was agreed that most of the focus seems to be on people speaking up rather than on changes in leadership and management; it needs to be both. Dr. Williams was also interested in how this affects science missions. It was noted that GSFC has employee resource groups (ERGs), an inclusion strategy that helps like-minded people to meet. Dr. Liemohn wondered if a survey like this through ROSES might help identify what works well and what requires more resources. Dr. Tucker wanted to include the large missions, as they are where much of NASA's work is done.

The draft findings/recommendations on the climate survey recommended expansion of the survey to a larger population, including the centers, large/directed missions, and possibly the space science community as a whole. SC found that achieving IDEA objectives helps SMD accomplish the science mission. In addition, understanding the workforce climate is important in establishing and measuring the effectiveness of CoCs.

The Committee then discussed SCan. Dr. Diniega remained concerned about timing and nimbleness, and Dr. Bakhtian advised ensuring that NASA does not lose internal capability when TDRS goes away. Dr. Williams cited the need to make sure the community knows how to access data downlinks and management. Dr. Tucker suggested that this could be part of PI training. Dr. Cerf felt that SCan was falling into an architecture trap and needs to think further ahead. He wanted a better explanation of long-term thinking and the organizational model of the future. Mr. Weiser said it raises questions of how things will change with more bandwidth, beyond continued expansion. He was concerned that NASA has fallen behind on optical downlink technology. Dr. Cerf pointed out that the commercial sector is trying to get ahead of this, and SCan needs to think speculatively about future needs. In the longer term, others might need access in addition to NASA, and how will that be handled? Dr. Tucker wondered if they were coordinating with CDCS in any way.

The elements of the draft findings/recommendations on SCan included concern about the transition schedule; loss of internal capacity and expertise; the potential trap in not thinking beyond the one-hop downlink model; the status of optical communications; and future data requirements.

On JWST, it was agreed to recommend that NASA acknowledge all the teams involved in this effort. SC also wanted the Agency to do an analysis to learn from both successes and failures, as JWST was a HR/Hi mission.

In discussing the SMD overview, Mr. Callahan said that he will request information about the STMD/SMD interplay on HR/Hi initiatives. Dr. Tucker observed that an overarching theme was PI training, which can be at the ROSES level as well as the missions. Dr. Diniega cautioned against putting all of the burden on the proposer. NASA should provide tools and templates. Mr. Weiser emphasized the concept of providing help to under-represented groups through new research organizations. Dr. Williams added that it is a huge burden for some of the smaller institutions to have a research office. Dr. New said that that remains an impediment, and he would appreciate feedback and ideas.

The preliminary findings/recommendations on the SMD overview mentioned the need for PI training, including HR/Hi definitions and extending beyond workshops; SMD use of ISS; which demographic data should be collected; possible new organizations to provide front- and back-end research support, especially institutions serving under-represented populations; more information about the NASEM report on diversity initiatives at NASA; an update on TOPS and community input; and how STMD activities flow into SMD.

Outbrief to SMD Deputy AA

Dr. Williams presented SC's first pass at the findings and recommendations to Dr. New. She began by presenting the concerns about SCan commercialization. SC was specifically uneasy about the ability of the internal NASA workforce to understand and manage space communications in the scenarios presented. There were also many concerns about how this will impact PIs on small missions. SC would like to see educational opportunities on data downlinks and how to use them. The SCan focus seems to be on two-way linkages, but the future could be multidirectional, which was another concern, along with the state of optical communications. For data communications, SCan needs to be ready to deal with SMD needs and should therefore talk to SMD CDCS.

Dr. New asked if there was discussion of DSN, but the closest to that was a mention of overlap in the cislunar environment. Dr. New explained that SMD has talked to SCA_N a lot about Artemis and SMD bandwidth needs. DSN was originally developed for the Apollo program. There are also needs for upgrades on ground stations. Aricebo is a warning sign; while it was old, these things need to be maintained. He was not sure that SCA_N and CDCS have engaged much because SCA_N is focused on the commercial sector and LEO. Dr. Tucker said there needs to be a connection, as the two organizations should discuss the pipeline between downlinks and archives. Dr. New said he will look into that. Dr. Williams added that data integrity is a huge issue. SCA_N has to protect what is transmitted.

On JWST, SC wanted to acknowledge the outstanding accomplishment and also wants SMD to acknowledge the JWST workforce. The Committee is seeking a post-launch review on the mission's HR/HR situations and how it pushed through to achieve best practices. Dr. New thought this was a good idea. Dr. Liemohn said that this can extend to other missions that had difficulties, like the Parker Solar Probe (PSP). Dr. New observed that both missions did a lot of technology development. Dr. Diniega said that a remaining unhappiness is the naming controversy. She asked that these discussions please call the mission by its acronym.

Dr. Williams described the draft findings stemming from the SMD overview. She noted the need for PI training, which should extend beyond workshops. SC wants to learn about ISS usage and how that is likely to continue or change. They appreciate the demographic information and had questions about support for institutions without internal research support organizations. The Committee would also like an update on the NASEM diversity report, as well as a discussion on STMD/SMD interfaces. Dr. New agreed. He explained that the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) asks all who register to answer questions about binary gender, classic census race/origin questions, disability status, and career state. Those are the only data the Agency is allowed to collect without further permission from OMB, which turns down most requests. The NASEM report just came out and SMD will share its responses once they are developed. There is another report NASA requested that gets at the issue of what data should be collected: how to measure the health and vitality of a science community, and what data should be collected to use those measurements. He wants this before he responds to the PI diversity report, and he hopes to have it by SC's next meeting. SMD commissioned the second study to bolster its case with OMB to expand its questions. Currently allowed questions are dated and overly broad. Anything SC can do to help SMD pressure OMB will be useful.

Dr. Williams presented the big data draft findings. Concerns included issues about the alignment of PI and NASA timelines. SC wants some thought put into this to avoid overburdening PIs. There were also questions about open science vis-à-vis proprietary information, multiple funders, and technology versus science data. These issues could affect implementation, as has occurred with other agencies. Dr. New explained that the SPD-41 version currently in place only has the requirements that other parts of the government have placed on NASA. A revision is being drafted to go beyond the minimal requirements of the original, and there does need to be an implementation discussion. Dr. Williams added that SC had unanswered questions about the open source science timeline and infrastructure, as the timelines of need and resources are not aligned.

Dr. New cautioned that the word "proprietary" has legal definitions within government. NASA lawyers do not even know how to answer the question of who owns a proposal. The Agency will only release the abstract of a proposal, and the quad chart must be releasable. Dr. Williams stated that she believes her proposal is her IP. Dr. New asked who has authority to release it. If it is the institution, how does it work when there are co-Is from other institutions? He asked SC to be careful with wording. Dr. Liemohn noted that he might not want to share his ideas. Dr. New said that that has never been legally tested at NASA. Dr. Cerf said that the question might arise as to what NASA spends these funds. This came up with NSF when the House demanded to see all proposals in order to study the peer review process.

Next, Dr. Williams presented the points SC developed on the workforce climate survey. SC would like to see the survey extended and wanted to know if the questions could be made available to the space science community as a whole. It would be good to have clarity on the IDEA objectives as well. Dr. Liemohn mentioned rolling it out to smaller units. Dr. New agreed that it would be nice to do this on a larger canvas. OMB is still a player, however. SMD does what it can. The issue is with distributing it to a wider community. After Dr. Tucker mentioned CoCs, Dr. New said that certain NASA-funded conferences require these, and there are templates being reviewed by Agency attorneys. He would like to fix loopholes. Dr. Williams noted the importance of understanding the workforce climate in creating and enforcing CoCs.

Adjourn

The meeting was adjourned at 12:10 p.m.

Appendix A
Participants

NAC Science Committee Members

Dr. Ellen Williams, University of Maryland, *Chair*
Dr. Noël Bakhtian, Lawrence Berkeley National Laboratory
Dr. Vinton G. Cerf, Google
Dr. Linda Godwin, University of Missouri
Dr. Michael W. Liemohn, University of Michigan
Dr. Sara Tucker, Ball Aerospace
Mr. Marc Weiser, RPM Ventures
Dr. Charles E. Woodward, University of Minnesota, Astrophysics Advisory Committee
Mr. Jason Callahan, NASA Headquarters, *Designated Federal Officer*

Other Participants

Kim Barnette
Angela Clark-Williams
Serina Diniega
Karen Flynn
Reiner Friedel
Gregory Heckler
Kevin Murphy
Michael New
Enidia Santiago-Arce
Elizabeth Sheley

Appendix B
NAC Science Committee
Membership

Dr. Ellen Williams (Chair)
University of Maryland

Mr. Jason Callahan (Designated Federal Officer)
NASA SMD

Dr. Noël Bakhtian
Lawrence Berkeley National Laboratory

Dr. Vinton G. Cerf
Google

Dr. Linda Godwin
University of Missouri

Dr. Michael W. Liemohn
University of Michigan

Dr. Amy Mainzer
University of Arizona

Dr. Willie May
Morgan State University

Dr. Sara Tucker
Ball Aerospace

Mr. Marc Weiser
RPM Ventures

Dr. Charles E. Woodward
University of Minnesota

Appendix C
Presentations

1. SCaN Commercialization and Impacts to SMD; *Gregory Heckler*
2. SMD Update; *Michael New*
3. PAC: Planetary Science Advisory Committee Report; *Serina Diniega*
4. APAC: Astrophysics Advisory Committee Report; *Charles Woodward*
5. HPAC: Heliophysics Advisory Committee Report; *Michael Liemohn*
6. ESAC: Earth Science Advisory Committee Report; *Sara Tucker*
7. Big Data Management in SMD; *Kevin Murphy*
8. SMD Climate Survey Update; *Karen Flynn, Kim Barnette*

Appendix D
Agenda

**NASA Advisory Council
Science Committee
Meeting
July 12-13, 2022**

Tuesday, July 12, 2022

9:00 – 9:15	Opening Remarks / Introduction of Members	Mr. Jason Callahan Dr. Ellen Williams
9:15 – 9:20	Goals of the Meeting	Dr. Ellen Williams
9:20 – 10:15	SCaN commercialization and impacts to SMD	Dr. Jeff Volosin Mr. Gregory Heckler Mr. Philip Baldwin
10:15 – 10:30	Break	
10:30 – 11:30	JWST First Images presentation	NASA TV
11:30 – 11:45	Public Comments	
11:45 – 1:00	Lunch	
1:00 – 2:00	SMD Update	Dr. Michael New
2:00 – 3:00	Division Advisory Committee (DAC) Chair Report Astrophysics Advisory Committee Planetary Science Advisory Committee Heliophysics Advisory Committee Earth Science Advisory Committee	Dr. Charles Woodward Dr. Amy Mainzer Dr. Michael Liemohn Dr. Sara Tucker
3:00 – 3:15	Break	
3:15 – 4:30	Wrap-Up Discussion	All

Wednesday, July 13, 2022

8:00 – 8:10	Re-open Meeting	Mr. Jason Callahan Dr. Ellen Williams
8:10 – 9:10	Big Data Management in SMD	Mr. Kevin Murphy

NAC Science Committee Meeting, July 12-13, 2022

9:10 – 10:10 SMD Climate Survey Update

Ms. Karen Flynn
Dr. Kim Barnette

10:10 – 10:25 Break

10:25 – 11:25 Discussion, Recommendations, and Findings

All

11:20 – 12:00 Outbrief to SMD Deputy AA

Dr. Ellen Williams
Dr. Michael New

12:00 Adjourn

Appendix E

WebEx Chat Transcripts

DAY 1

from Serina Diniega | she/her (Ext) to everyone: 8:57 AM
Could folks in the room hear me when I said good morning?

from Noel Bakhtian (Ext) to everyone: 9:16 AM
What does SCan stand for

from Lauren Holt (Ext) to everyone: 9:18 AM
Will Greg be able to share his slides? If you share his email, we can follow up with him individually

from Noel Bakhtian (Ext) to everyone: 9:46 AM
Can someone explain what DTE means? is it a type of transmission, or is it a transition between different transmission models?

from Noel Bakhtian (Ext) to everyone: 9:58 AM
What's the T word that's being used? Tidres?

from Noel Bakhtian (Ext) to everyone: 9:59 AM
so it's TDRS - is that the right acronym?

from Jason Callahan (Ext) to everyone: 9:59 AM
Tracking Data Relay Satellite (TDRS), or TDRSS if referring to the entire system of satellites and supporting systems.

from Noel Bakhtian (Ext) to everyone: 9:59 AM
Thanks Jason!

from Chick Woodward (Ext) to everyone: 10:01 AM
need to get units correct :-)

from Chick Woodward (Ext) to everyone: 10:09 AM
agreed that commercialization will provide the adaptive network for flexibility

from Chick Woodward (Ext) to everyone: 10:09 AM
roman next in line

from Chick Woodward (Ext) to everyone: 10:45 AM
Need TDRSS !

from Noel Bakhtian (Ext) to everyone: 10:49 AM
Does anyone know if there are new types of data frameworks/systems to house all this new data (big data!) for maximum ability for researcher analysis to be incorporated?

from Chick Woodward (Ext) to everyone: 10:51 AM

This is a good question to ask on day 2 for the Big Data Management presentation in SMD

from Noel Bakhtian (Ext) to everyone: 10:52 AM

thanks!

from Noel Bakhtian (Ext) to everyone: 10:52 AM

"scientific nerd center" :)

from Jason Callahan (Ext) to everyone: 10:52 AM

That will be an excellent question for Kevin Murphy tomorrow morning! I know that the Space Telescope Science Institute at JHU built an entirely new facility for JWST but I don't know the specifics on the data collection/storage systems\.

from Noel Bakhtian (Ext) to everyone: 11:04 AM

Northrop with the full-body cheers - love it!

from Chick Woodward (Ext) to everyone: 11:05 AM

job well done at NG

from Serina Diniega | she/her (Ext) to everyone: 11:18 AM

I need to take kid to school. I will return by the end of your lunch break.

from Jason Callahan (Ext) to everyone: 11:19 AM

Got it, thanks.

from Chick Woodward (Ext) to everyone: 11:23 AM

jason et al. will rejoin at 1pm EDT after chatting to local press re: image releases ..will stay connected but muted...

from Jason Callahan (Ext) to everyone: 11:23 AM

Thanks Chick.

from Robert T (Ext) to everyone: 11:31 AM

Will JWST be able to detect effects of CME from sun on other planets to understand how one would effect Earth?

from Robert T (Ext) to everyone: 11:31 AM

Coronal Mass Ejection

from Robert T (Ext) to everyone: 11:33 AM

Last question...are there any other instruments being used to automatically point JWST? So another sensor detects something and cues JWST to take an image.

from Robert T (Ext) to everyone: 11:34 AM

In the intel world we often cue spectral and IR from SIGINT or other source

from Robert T (Ext) to everyone: 11:35 AM

Thanks for doing this. Very exciting.

from Noel Bakhtian (Ext) to everyone: 1:11 PM

<https://skyandtelescope.org/astronomy-news/iss-end-commercial/>

from Serina Diniega | she/her (Ext) to everyone: 1:17 PM

Regarding the Psyche launch delay, this was the news I saw: <https://www.nasa.gov/press-release/nasa-announces-launch-delay-for-psyche-asteroid-mission>

from Jason Callahan (Ext) to everyone: 1:25 PM

Info on TROPICS: <https://www.nasa.gov/feature/esnt/2022/nasa-to-launch-6-small-satellites-to-monitor-study-tropical-cyclones>

from Noel Bakhtian (Ext) to everyone: 1:32 PM
analysis of language in funding opportunities too - has that been done?

from Serina Diniega | she/her (Ext) to everyone: 1:34 PM
If a demographics check is done, it would also be interesting to check on gender and institution-type and for other minoritized identities, just to see if there are additional moderating factors.
from Serina Diniega | she/her (Ext) to everyone: 1:34 PM
^for HR/HI ... who submits and who is selected

from Noel Bakhtian (Ext) to everyone: 1:35 PM
Would be interesting to know if high risk/high reward is integrated as a review criteria, etc, or at least called out.
from Noel Bakhtian (Ext) to everyone: 1:36 PM
may be concern if there's limits to how many proposals people can submit

from Reiner Friedel (Ext) to everyone: 1:38 PM
The evidence on HR/HI that shows that such proposal actually have a BETTER chance of getting funded needs to be better communicated to our proposers. It is not generally appreciated, and if more widely known, may lead to more HR/HI proposals being submitted.

from Serina Diniega | she/her (Ext) to everyone: 1:43 PM
We might want to let Michael keep going - he's on slide 17 of 33 :-)

from Noel Bakhtian (Ext) to everyone: 1:47 PM
jason, can we get michael's email address, want to connect him to someone - thanks!
from Jason Callahan (Ext) to everyone: 1:47 PM
will do.
from Noel Bakhtian (Ext) to everyone: 1:50 PM
awesome thanks!

from Noel Bakhtian (Ext) to everyone: 1:53 PM
what's UAP?
from Jason Callahan (Ext) to everyone: 1:54 PM
Unidentified Aerial Phenomenon
from Jason Callahan (Ext) to everyone: 1:55 PM
Or phenomena if you're referring to multiple incidents.

from Chick Woodward (Ext) to everyone: 1:56 PM
How does UAP "science" differ in the end in the mind of the public as the SETI Project (and stakeholders on the Hill)?

from Serina Diniega | she/her (Ext) to everyone: 2:04 PM
We're going off schedule - how much longer is Michael to speak?

from Noel Bakhtian (Ext) to everyone: 2:05 PM
what's R&A
from Serina Diniega | she/her (Ext) to everyone: 2:05 PM

Research & Analysis

from Noel Bakhtian (Ext) to everyone: 2:05 PM

thanks

from Serina Diniega | she/her (Ext) to everyone: 2:06 PM

What about selected proposals with female PIs?

from Serina Diniega | she/her (Ext) to everyone: 2:06 PM

And how was gender ascertained?

from Serina Diniega | she/her (Ext) to everyone: 2:10 PM

IDEACon: <https://www.hou.usra.edu/meetings/advancingidea2022/>

from Serina Diniega | she/her (Ext) to everyone: 2:11 PM

FYI: when we move to the AC reports - I need to leave 3-4pm EDT to run another meeting.

from Serina Diniega | she/her (Ext) to everyone: 2:12 PM

Nice.

from Chick Woodward (Ext) to everyone: 2:15 PM

<https://science.nasa.gov/science-red/s3fs-public/atoms/files/FINAL-APAC-2022-SnrRev-LetterReport.pdf>

from Chick Woodward (Ext) to everyone: 2:34 PM

https://science.nasa.gov/science-red/s3fs-public/atoms/files/2022_Senior_Review_Subcommittee_Report.pdf

from Serina Diniega | she/her (Ext) to everyone: 2:37 PM

NASA PAC site: including agenda, findings, and presentations from our last meeting:

<https://science.nasa.gov/researchers/nac/science-advisory-committees/pac>

from Serina Diniega | she/her (Ext) to everyone: 2:37 PM

And additional information about codes of conduct, from a community push (disclaimer: I was lead author for this white paper): <https://baas.aas.org/pub/2021n4i448/release/1>

And a video overview of the white paper, by Randall Smith (Smithsonian Astrophysical Observatory) and me. Code of Conduct is discussed in the second half; first half is about publication policies – another important policy to consider for mission and research teams. <https://youtu.be/plC2P4IZT58>

from Serina Diniega | she/her (Ext) to everyone: 2:50 PM

IDEA from the start! part of doing science!

from Noel Bakhtian (Ext) to everyone: 2:51 PM

+1 on Serina!

from Serina Diniega | she/her (Ext) to everyone: 2:55 PM

This is what I was asking about - you need to have a good and fast-responding system to handle backup plans

from Serina Diniega | she/her (Ext) to everyone: 2:55 PM

missed passes happen a lot in planetary due to weather, dish maintenance, etc.

from Chick Woodward (Ext) to everyone: 3:32 PM

agreed finding for after review w/ senior leadership at webb

from Noel Bakhtian (Ext) to everyone: 3:43 PM

saw this news recently - just adding to your read list and wondering what science implications (or if supports SCan): <https://www.space.com/aquarian-space-startup-high-speed-internet-moon-mars>

from Chick Woodward (Ext) to everyone: 3:43 PM

thanks noel .. interesting link

from Jason Callahan (Ext) to everyone: 3:45 PM

NASA LCRD is an optical communication demo mission launched in dec 2021

from Chick Woodward (Ext) to everyone: 3:47 PM

costs, accessess, and reliability

from Noel Bakhtian (Ext) to everyone: 4:00 PM

I don't know enough about sunsetting ISS, but this all makes sense, just don't know if I've heard about how NASA is helping bridge that gap in facility/capabilities to ensure this all doesn't die!

from Serina Diniega | she/her (Ext) to everyone: 4:03 PM

Hello, Serina is back.

from Jason Callahan (Ext) to everyone: 4:03 PM

Hi Serina, welcome back.

from Serina Diniega | she/her (Ext) to everyone: 4:08 PM

The report from the IDEACon includes this recommendation for funding agencies:

<https://zenodo.org/record/6656887#.Ys3Uy3bML-h>

from Serina Diniega | she/her (Ext) to everyone: 4:10 PM

Recommendation A.1: Create an outward-facing position within the NASA Science Mission Directorate (SMD) to advance and implement IDEA principles within NASA.

from Chick Woodward (Ext) to everyone: 4:13 PM

<https://go.nasa.gov/3xSsOP1>

from Chick Woodward (Ext) to everyone: 4:13 PM

codes of conduct

from Serina Diniega | she/her (Ext) to everyone: 4:13 PM

not even go find them - pay attention!

from Serina Diniega | she/her (Ext) to everyone: 4:13 PM

they're there. Women and folks from underrepresented groups.

from Noel Bakhtian (Ext) to everyone: 4:16 PM

who's speaking?

from Ellen Williams (Ext) to everyone: 4:17 PM

Michael New?

from Jason Callahan (Ext) to everyone: 4:17 PM

Right now? Marc Weiser

from Serina Diniega | she/her (Ext) to everyone: 4:17 PM

I don't think so.

from Serina Diniega | she/her (Ext) to everyone: 4:17 PM
thx

from Noel Bakhtian (Ext) to everyone: 4:19 PM

can we get the video to move over?

from Serina Diniega | she/her (Ext) to everyone: 4:20 PM

they have to have only one mic unmuted to get the camera to focus on the speaker

from Noel Bakhtian (Ext) to everyone: 4:20 PM

ok. just trying to figure out who's talking right now

from Jason Callahan (Ext) to everyone: 4:20 PM

Marc

from Noel Bakhtian (Ext) to everyone: 4:20 PM

thanks!

from Chick Woodward (Ext) to everyone: 4:25 PM

shaed two slides from a recent presentation to the APAC that goes to some our points

from Jason Callahan (Ext) to everyone: 4:28 PM

Mike, was this the report? <https://nap.nationalacademies.org/read/26385/chapter/1>

from Serina Diniega | she/her (Ext) to everyone: 4:32 PM

The PAC presentation: <https://science.nasa.gov/science-red/s3fs-public/atoms/files/14-McCauleyRench-Milazzo-Crawford-PDE-SPD41.pdf> (slide 40+)

from Chick Woodward (Ext) to everyone: 4:34 PM

i will be on travel tomorrow so send actions to me

from Serina Diniega | she/her (Ext) to everyone: 4:34 PM

Yep, I forgot and got up at 4:30am today. :-P

DAY 2

from Serina Diniega | she/hr (Ext) to everyone: 8:00 AM

Good morning, all.

from Noel Bakhtian (Ext) to everyone: 8:01 AM

can someone elevate mer?

from Noel Bakhtian (Ext) to everyone: 8:01 AM

me?

from Noel Bakhtian (Ext) to everyone: 8:01 AM

thanks!

from Serina Diniega | she/her (Ext) to everyone: 8:32 AM

To read up more on the mission lifecycle: <https://www.nasa.gov/seh/3-project-life-cycle>

from Noel Bakhtian (Ext) to everyone: 8:37 AM

I'm starting to think about the archivists you see in all of the scifi books :)

from Serina Diniega | she/her (Ext) to everyone: 8:40 AM

:-) I am thinking, we are moving towards missions needing to hire experts in these areas. Planetary scientists _today_ are not necessarily trained in the level of documentation and software legalese that would be needed to properly support this. I fully agree with accessibility, but as has been brought up the implementation is hard and there's a very large transition.

from Noel Bakhtian (Ext) to everyone: 9:00 AM

3 questions for Kevin:

from Noel Bakhtian (Ext) to everyone: 9:00 AM

1) are there chief data officers in all the other directorates, and what does the collaboration across NASA look like on open data

from Noel Bakhtian (Ext) to everyone: 9:02 AM

2) at our committee meeting a few months ago we heard from the IDEA team, and something that I think ended up in our follow-on document was around the question of how NASA researchers are being prepped to better thinking about and include previously under-represented community voices in their research, and wondering if there are actions through this initiative that do that (i understand we are doing more top down outreach to communities, but seems like if it's baked into our PI process and thinking, that will help).

from Noel Bakhtian (Ext) to everyone: 9:03 AM

3) question I asked yesterday about JWST and was told to ask Kevin: are we creating new types of frameworks/systems to better manage all the new data that will be coming in from JWST to better enable researchers and analysis going forward?

from Serina Diniega | she/her (Ext) to everyone: 9:04 AM

There is a new data Chief Scientist for PSD (started in Dec 2021, Moses Milazzo), with the Planetary Data Ecosystem.

from Noel Bakhtian (Ext) to everyone: 9:04 AM

helpful thanks!

from Noel Bakhtian (Ext) to everyone: 9:13 AM

Hangar One!!

from Noel Bakhtian (Ext) to everyone: 9:14 AM

Archealogy map - where everything is stored!

from Serina Diniega | she/her (Ext) to everyone: 9:38 AM

Question (can be answered later): Can we get a copy of the survey questions?

from Serina Diniega | she/her (Ext) to everyone: 9:40 AM

Would be very interested, thank you!

from Serina Diniega | she/her (Ext) to everyone: 9:54 AM

Whether the reason someone feels unable to speak up due to prior experiences or due to experiences at NASA, there still is something for the organization to work on.

from Serina Diniega | she/her (Ext) to everyone: 10:13 AM

A wording change: "Black physicists and astrophysicsts are not yet able to participate at the levels we'd like to see" - the issue is with the systems and existing power structures, not the impacted community from Serina Diniega | she/her (Ext) to everyone: 10:14 AM

Reconvening at 10:30am EDT

from Noel Bakhtian (Ext) to everyone: 10:14 AM

+1 on Serina's chat comment

from Ellen williams (Ext) to everyone: 10:29 AM

I don't have sound from the room

from Noel Bakhtian (Ext) to everyone: 10:29 AM

me either

from ENIDIA SANTIAGO-ARCE Int (Ext) to everyone: 10:44 AM

open source software main concerns are about IP ownership and distribution rights

from Serina Diniega | she/her (Ext) to everyone: 10:49 AM

JPL doesn't have the climate survey yet

from Serina Diniega | she/her (Ext) to everyone: 10:50 AM

expanding through the missions also would be good

from Serina Diniega | she/her (Ext) to everyone: 10:50 AM

although I can understand that may be a later step

from Serina Diniega | she/her (Ext) to everyone: 10:53 AM

Good point, Noel. The recommendation may be to extend out, potentially through coordination of local activities.

from Serina Diniega | she/her (Ext) to everyone: 10:54 AM

At least sharing their questions and plan with the centers may help individual center/institution efforts happen with some consistency, wihtout forcing all to fit the same mold.

from Noel Bakhtian (Ext) to everyone: 10:54 AM

i like that

from ENIDIA SANTIAGO-ARCE Int (Ext) to everyone: 10:57 AM

Center's have Advisory Committee

from Serina Diniega | she/her (Ext) to everyone: 10:58 AM

JPL has ERGs, which might be similar but slightly different from what Vince is describing

from Serina Diniega | she/her (Ext) to everyone: 11:02 AM

in addition to workshops, templates can help take the burden off the proposers while keeping best practices

from Noel Bakhtian (Ext) to everyone: 11:08 AM

Does this session end at :20 or :25?

from Serina Diniega | she/her (Ext) to everyone: 11:09 AM

obv we'll employ the time machine

from Serina Diniega | she/her (Ext) to everyone: 11:23 AM

so maybe not a Finding yet

from Noel Bakhtian (Ext) to everyone: 11:23 AM
agree

from Serina Diniega | she/her (Ext) to everyone: 11:42 AM
For this recommendation on info to collect, we can amplify an ask by pointing to the Planetary Sci and Astrobiology Decadal Survey recommendation (and endorsed by PAC)

from Serina Diniega | she/her (Ext) to everyone: 11:42 AM
I know there are many issues, but those are not reasons in and of themselves to not ask SMD to continue to work on this

from Serina Diniega | she/her (Ext) to everyone: 11:49 AM
over a year ago. I filled it in as often as I see an ask :-)

from Serina Diniega | she/her (Ext) to everyone: 11:50 AM
New PIs, not current ones (it is forward looking) - but still an issue

from Serina Diniega | she/her (Ext) to everyone: 12:04 PM
This would be good to do for competed missions too ... and nice to pair with code of conduct and other such efforts

from Serina Diniega | she/her (Ext) to everyone: 12:05 PM
so there is a path forward!

from Serina Diniega | she/her (Ext) to everyone: 12:09 PM
Perhaps with this Finding or a separate one, this committee can echo the PAC finding that all NASA-funded activities should have a code of conduct

from Serina Diniega | she/her (Ext) to everyone: 12:10 PM
Thank you, all!