**Response to the Recommendations from the Committee of Visitors**
**Division of Integrative Organismal Systems**
**June 28-July 1, 2022**

**INTRODUCTION**

The Directorate for Biological Sciences (BIO) would like to thank the Committee of Visitors (COV) for their efforts in evaluating the management and review processes of the Division of Integrative Organismal Systems (IOS) at NSF. BIO is aware of the extraordinary amount of work that the COV members contributed before and during the meeting and is especially appreciative of their commitment to this important review. The thorough and thoughtful report that emerged from the COV deliberations is greatly appreciated by BIO and IOS.

IOS especially appreciated the COV's thoughtful recommendations to advance our efforts to broaden participation including engaging more with postdoctoral researchers (postdocs), beginning and early career investigators, and principal investigators (PIs) and potential PIs from minority serving institutions (MSIs), EPSCoR states, primarily undergraduate institutions (PUI)s and master's granting institutions. Multiple COV recommendations also requested IOS to address implicit bias and improve transparency in the review process. In the responses below we describe specific details for our plans aligned with these recommendations for improvement. Note however, that several COV recommendations relate to NSF-wide and federal government policies and guidelines, such as how broader impacts are evaluated and reported and how voluntary demographic information is collected. In these cases, we will convey the COV recommendations to the appropriate authorities.

**I.    Questions about the quality and effectiveness of the program's use of merit review process.**

**Recommendation:** *The COV committee suggests IOS analyze whether the number of external reviews influences funding decisions.*

Response**:** BIO/IOS plans to analyze a number of factors relative to funding recommendations including the total number of reviews, co-review, and the number of panel vs. ad hoc reviews among other factors. We will report the results of this analysis at the next COV.

**Recommendation:** *The COV encourages ad hoc specialist reviews incorporated into all core program proposal evaluations.*

Response: IOS is cognizant of the need for comprehensive review while also balancing the burden on the review community. IOS adheres to the guidance in the NSF Proposal and Awards Manual (PAM), which specifies that all full proposals must be reviewed by three to eight external reviewers. The PAM further states that programs can obtain external peer review by three methods: ad hoc only, panel only, and ad hoc plus panel review, and therefore does not require a specific number of ad hoc vs. panelist reviewers. It is an IOS best practice to use both ad hoc and panelist reviews for proposal review in all the core programs listed in the IOS solicitation NSF 23-547. Program Directors in all core programs solicit ad hoc reviews to varying degrees of success for an individual proposal, except when a proposal is co-reviewed at 2 panels since it will automatically have more than 3 reviews. Co-review allows consideration of integrative projects that overlap with two or more programs and allows the

managing Program Director to make use of the additional expertise of the co-reviewing panel and program.

**Recommendation:** *The COV encourages the use of both in-person and virtual panels moving forward. The COV also suggests IOS conduct an analysis on the demographics and acceptance rates of in-person versus virtual panels to determine if virtual panels broaden participation.*

Response: Shortly after the COV convened in August 2022, the NSF Office of the Director issued guidance to all of NSF indicating that for the foreseeable future virtual panels will be the default, with in-person panels used for special situations. Therefore, IOS expects that most of its future panels will be virtual. We are exploring the use of additional PI meetings, outreach, and workshops to better achieve some of the community-building and networking benefits of in-person panels and will continue our commitment to broadening participation at all IOS activities.

We thank you for the suggestion but acknowledge that the limited number of in-person panels will complicate the suggested analysis. NSF has started to examine whether virtual panels support its efforts to broaden participation, as described in [OIG Report No. 22-6-003 on Remote Versus In-Person Merit Review Panels](). We are encouraged that that this analysis will continue to be evaluated at the NSF-wide level based on the recommendations in that report, including that NSF "identify and implement solutions to improve merit review panelist demographic data."

**Recommendation:** *The COV recommends greater emphasis on recruiting additional ad hoc reviewers, as needed.*

Response*:* Our response to this recommendation is primarily answered above in the recommendation about incorporating ad hoc specialist reviews. Additionally, we also note that we are actively working on expanding and diversifying our reviewer pool as part of our broader outreach goals.

**Recommendation:** *The COV recommends that reviewers be given more specific instructions for assessing Broader Impacts. Similar guidelines should also be shared with proposal writers.*

Response: The five questions below are listed in the Proposal and Award Prolicies & Procedures Guide (PAPPG) and every solicitation in the section entitled "Merit Review Principles and Criteria" as elements that should be considered for both intellectual merit and broader impacts when drafting a proposal. These five questions therefore provide the basis for the assessment of both intellectual merit and broader impacts when either ad hoc reviewers or panelists submit their written reviews. They are:
1) What is the potential for the proposed activity to (a.) Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and (b.) Benefit society or advance desired societal outcomes (Broader Impacts)?
2) To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3) Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4) How well qualified is the individual, team, or organization to conduct the proposed activities?
5) Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

During outreach activities and pre-panel informational meetings, IOS regularly shares the ARIS Broader Impacts Guiding Principles document found in the Broader Impacts Toolkit that further discusses the five questions. In addition, IOS leadership emphasizes during panel welcomes that we are looking for societal impact and cohesion of the intellectual merit and broader impacts, not a checklist of activities that needs to be satisfied.

**Recommendation:** *The COV recommends providing more detailed instructions for evaluating Data Management and Postdoc Mentoring plans. For full transparency, these assessment strategies should also be shared with proposal writers.*
Response: BIO has and continues to provide additional guidance for the preparation and expectations of Data Management Plans. A link to this guidance can be found in the IOS Core Programs solicitation within the Proposal Preparation Instructions section.

Postdoctoral Researcher Mentoring Plan guidance is available to all reviewers and proposers in the PAPPG Ch.II,D.2.i. stating "the mentoring plan must describe the mentoring that will be provided to all postdoctoral researchers supported by the project, regardless of whether they reside at the submitting organization, any subrecipient organization, or at any organization participating in a simultaneously submitted collaborative proposal" and that "Mentoring activities provided to postdoctoral researchers supported on the project will be evaluated under the Broader Impacts review criterion." It goes on to provide examples of activities.

As part of our response to the COV, IOS has updated its Panel Summary Template. Both the prior version and current version contain separate sections for evaluation of the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, with the new version containing additional prompts about what should be included in the panel discussion. At each panel, panelists have specific roles and responsibilities relative to the discussion of items in the panel summary template. We will continue to emphasize the importance of input on these elements.

**Recommendation:** *The COV suggests that reviewers be prompted to address Broader Impacts, mentorship, and Data Management in addition to the Intellectual Merit of prior NSF support.*
Response*: In response to the COV's suggestions about evaluation of the "Results from Prior Support", IOS has updated its Panel Summary Template to include additional prompts in this section.

**Sub Recommendations:**

*1. Reviewers should continue to be reminded in panel that the panel summaries are meant to help principal investigators to improve their proposals.*
Response: Although the main purpose of the panel summary is to provide an overview of the discussion to help PIs understand the panel ranking, the summaries can also provide the basis for an improved resubmission of declined proposals and additional suggestions to consider when initiating awarded proposals. IOS will continue to strive for greater clarity in panel summaries on the major strengths and weaknesses identified by the reviewers to better communicate the rationale for the panel's ranking of the proposal to the PI(s).

2. *Perhaps a unified structure for the panel summary, including required prompts and suggested word counts, would help to make the summaries more consistent.*

Response: For over a decade, IOS has used a standardized Panel Summary Template. During a panel, NSF staff are diligent about checking panel summaries for clarity and completeness prior to approving them. In response to the COV's suggestions, we have updated the template to add additional prompts to encourage greater consistency and clarity.

3. *Consider more dedicated time during panel for reviewers to write and focus on summaries. A shared group document (e.g., Sharepoint) could also be considered for multiple reviewers to contribute simultaneously to a draft (as opposed to summary written mainly by one reviewer and approved by others).*

Response: IOS includes dedicated panel summary writing time at least 1 or 2 times per day in panel schedules. With the move to both continuous (no deadline) submission and virtual panels, we have also reduced the number of proposals assigned to each panelist to review, which thereby also reduces the number of panel summaries an individual panelist is writing.

We appreciate the suggestion for improvement to the panel summary writing process. NSF policy requires that all panel summaries must be prepared using the Interactive Panel System (IPS) software, which cannot accommodate simultaneous co-authoring. Given the constraints of IPS, one panelist (the scribe) is assigned to writing the first draft and editing the summary. All other assigned panelists plus a Program Director and NSF staff member are responsible for contributing to the final version and must approve it.

NSF is in the process of updating the software for panel summary writing to replace IPS and a new modern system is expected to be available prior to the next COV. When this new software is available, IOS will be able to evaluate whether other options for the panel summary drafting process may be available.

4. *One suggestion for future self-studies is to track the quality of the panel summaries over time as specific changes are made (e.g., switch to no-deadline structure, any changes to panel template, etc.)*

Response: Table 19, a standard piece of data in the COV self-study report included an analysis of panel summaries to evaluate whether they included substantive comments on both NSF review criteria from 2018 to 2021, which included the time frame that IOS core programs switched to no deadline. Additionally, since the move to continuous (no deadline) submission, NSF has been closely monitoring the implications of the change for proposal review through NSF's Evaluation and Assessment Capability Section (EAC). The EAC methods of analysis and initial outcomes are now available.

**Recommendation**: *Future COV might be given a way to more easily find proposals that include outlier or inconsistent reviews, for instance those that the panel gives an outstanding rating but did not get funded. For example, perhaps a searchable filter could be added to the eJacket system for proposal score.*

Response: We apologize for any difficulties the COV encountered. While BIO/IOS does not have the ability to modify the eJacket system, we will pass along this suggestion to the NSF Office of Integrative Activities (OIA), who coordinates all of NSF's COVs. The eJacket COV module can only display a subset of the IOS proposals, so we will continue to supplement

this information by providing future COVs an Excel file that includes information on all the proposals considered by IOS. Columns in this Excel file, which includes the panel rating and program recommendation, can be sorted and filtered for specific proposal attributes.

**Recommendation**: *One suggestion is that the COV receive more guidance on how to interpret the "Average Review Score". Split scores should be included in this average.*
Response: The Average Review Score automatically calculated in eJacket cannot be modified by BIO/IOS, but we will pass along your suggestion that split scores should be included. IOS is also exploring the possibility of including averages with split scores in the Excel file for the next COV using an export of the same data from a newer internal NSF enterprise reporting system.

**Recommendations:** *The COV suggests that reviews be labeled as "panel" versus "ad hoc" for increased transparency when feedback is given to the principal investigator. We also recommend that a clear statement from the PD is consistently shared with the principal investigator helping to explain any such aspects of the review process and final decision. This statement can help the principal investigator better understand any discrepancies. In addition, we suggest some PDs include their contact information in the text of their comments to the principal investigator, which the COV notes is an effective mechanism for encouraging direct communication.*
Response: NSF policy does not permit the distinction between panel versus ad hoc reviewers, which has the potential to compromise the anonymity of the reviewers. Furthermore, Program Directors generally put more emphasis on the content of the reviews, than on whether the review came from a panelist or an ad hoc reviewer when making their funding recommendations.

Following this suggestion, we are reviewing our best practices for the use of PO comments with an eye to more clearly communicating the basis for the recommendation to PIs and to encourage more PIs to communicate directly with their Program Director if they have questions.

**Recommendation:** *Create a structure for principal investigator and reviewer feedback.*
Response: NSF regularly surveys all applicants and reviewers through the biennial merit review survey (last conducted in October 2021, covering the period between October 1, 2018, and September 20, 2020). We are expecting the results of that survey shortly. Due to the Paperwork Reduction Act, all surveys of the public must be approved by the Office of Management and Budget prior to their use, which can as long as 12 months, thus IOS relies on the NSF-wide survey. The results of these surveys are reported to the National Science Board (NSB) in the publicly available [NSF Merit Review Reports](#), which often also includes information from COV reports. However, these constraints on surveys do not hold for panelists who are "special government employees", so we have updated our post-panel panelist survey that we will begin re-employing in January 2023.

## II.      Questions concerning the selection of reviewers.

**Recommendation:** *Consider additional approaches to identify additional expert reviewers to obtain at least 3 expert reviews, including but not limited to reconsidering COI restrictions and making reviewer training more available. Specific details for these recommendations are provided in Section 2.3.*

Response: As described above in the response to the second recommendation of this document, IOS adheres to the guidance in the PAM, which specifies that all full proposals must be reviewed by three to eight external reviewers.

The Office of General Council and the Office of Government Ethics develop and oversee the list of potentially disqualifying conflicts of interest. BIO/IOS must follow these guidelines to ensure that review policies are consistent across all of NSF, but we will pass along your additional comments to these offices about reconsidering Conflict of Interests (COI) restrictions.

The National Science Board released a "Statement on training to improve peer reviewing and address unconscious biases in the merit review process." While this statement noted that further improvement is needed NSF-wide, it also highlighted the value of NSF's video on The Art and Science of Reviewing Proposals which provides an orientation on the merit review process as well as tips and information on implicit bias. While all ad hoc and panelist reviewers are instructed to watch this video upon entering NSF's review system, it has currently been an underutilized training resource, so we have also been strongly encouraging reviewers to watch the video in all our review request letters. IOS will also continue to provide additional training for panelists at pre-panel information sessions and at the start of each panel.

### Recommendation: *For consistency and transparency, COIs should be documented similarly in the jackets across all proposals.*

Response: All COIs continue to be listed in the Review Record in eJacket. NSF-wide practices for documenting COIs and their mitigation changed from placing them in Review Analyses to using diary notes during the COV review period. Currently, the diary notes consistently document all COIs and their mitigation. If there are no COIs noted in the Review Record, a diary note is not required.

## III.    Questions concerning the management of the program under review

### Recommendation: *The COV encourages IOS to continue a tradition of retreats, whether virtual or in-person, to manage expectations and improve communication among staff and PDs.*

Response: IOS typically has retreats twice per year, in the winter and summer months. In fall of 2022 we added a portfolio analysis retreat to this rotation just prior to the start of the new fiscal year (federal fiscal years start October 1st). We agree that retreats are a useful tool to increase IOS cohesion, consider larger issues, and improve communication.

### Recommendation: *The COV encourages NSF to establish a remote work policy so that at least some of the staff/PDs can continue to perform their duties in the virtual environment.*

Response: Following negotiation with AFGE local 3403, NSF updated the collective bargaining agreement in September 2022 to create a hybrid workforce, including both remote work and enhanced telework. Currently, the majority of employees can telework up to 80% time (the equivalent of 4 days per week) with supervisor approval. Many IOS employees make use of remote work and telework.

**Recommendation:** *The COV encourages the IOS PDs to continue their exemplary work in coordinating with other divisions and directorates, with an eye toward communication that better manages the expectations of their fellow PDs.*

Response: Thank you, "coordination and liaison" is a part of the performance plans for all Program Directors, and we will continue to encourage Program Directors to make significant efforts in this area including managing the expectations of their colleagues.

**Recommendation:** *The COV encourages IOS to continue these outreach efforts beyond the pandemic (however long it lasts), as VOHs lower the barrier to PIs with less social capital. We also recommend that PDs caution panels about bias against applicants with reduced productivity due to the pandemic.*

Response: IOS is pleased with how well received and well attended the Virtual Office Hours (VOHs) have been. We agree that they can help level the playing field and expect to continue them indefinitely.

Past reductions in productivity and the potential for lasting impacts are ongoing topics of discussion within IOS and across NSF. NSF took steps to mitigate the effects of the pandemic using the special American Rescue Plan appropriation and IOS continues to monitor the repercussions of the pandemic and offer no-cost extensions and supplements to support negatively impacted PIs and their labs.

We also agree that there is a need to consider differential effects of the pandemic on all members of research teams and how that might affect the reporting of productivity in proposal sections such as Results from Prior Support and Biosketches. During panel welcomes, IOS includes a statement about the effect of the pandemic on PIs and that its impacts will be long lasting. The effects in the biological sciences have also been well documented (e.g. https://www.nature.com/articles/s41562-020-0921-y) and panelists in recent panels seem well aware of the issue, often bringing it up with an eye to generosity.

**Recommendation:** *The COV encourages IOS to pilot efforts to change demographic information language while the long process of changing these policies institute-wide is underway. We also encourage the addition of a pronouns designation, perhaps in the Biosketch, so that PI/co-PIs can be referred to appropriately in reviews and panel discussions.*

Response: Both the demographic information language and the format of the Biosketch are NSF-wide and outside of BIO/IOS control. We will pass your comments along to agency officials involved in ongoing efforts to reform the way we request demographic information as part of the plan each agency is required to develop in response to the President's Executive Order on Advancing Equality for Lesbian, Gay, Bisexual, Transgeder, Queer and Intersex Individuals.

**Recommendation:** *The COV encourages IOS to provide text on the demographic information request page to make clear why NSF need these data and how they will be used.*

Response: Neither BIO nor IOS have the ability to edit the demographic information request page, so we will pass along your suggestion to officials involved in efforts to improve our collection of demographic information. In an upcoming VOH and blog post, IOS will explain why this information is collected and how it is used and encourage PIs and reviewers to voluntarily provide their demographic information.

**Recommendation: *IOS should consider adding incentives in the evaluation of the proposals that are associated with reducing questionable research practices in the research design phase*.**

Response: Given that the reviewing community and the applicant community are the same, in FY24 and FY25, IOS will support workshops, seminars and conferences to raise awareness of the research design issues and ways to improve practices. We expect that more thorough knowledge of these issues will effectively result in more effective evaluation.

**Recommendation: *IOS should consider expanding efforts to enhance the reproducibility of NSF-funded research*.**

Response: We thank the COV for the suggestion. IOS communities with a strong history of data sharing, such as PGRP and EDGE, already embrace the FAIR (Findable, Accessible, Interoperable, and Reusable) data principles. We have supported research coordination networks to promote these efforts in the past and agree with the COV and the National Academies reports on reproducibility and replicability that it is important to continue to raise community awareness of these issues. NSF recently announced a new DCL NSF 23-018 on Reproducibility and Replicability in Science and a new funding opportunity, Pathways to Enable Open Source Ecosystems (POSE NSF 23-556) in this space. IOS will support workshops on best practices for data management and sharing in FY24 and FY25.

NSF has required data management and sharing plans be submitted with each proposal since 2011. BIO provided regularly updated Guidance on Data Management Plans (DMPs) to ensure that PIs are well versed in understanding that their DMPs should identify plans for dissemination and access in a manner consistent with FAIR data principles with the expectation that PIs make use of recognized, accessible, community-accepted repositories that conform to appropriate national and international standards for such facilities. This guidance is also referenced and linked in the IOS core programs solicitation to ensure that applicants can easily access it.

**Recommendation: *IOS should consider enhancing the training of PD's, ad-hoc reviewers, and panelists to minimize different types of biases (e.g., gender, race, cognitive, etc.) during the proposal assessment process (both before and during panel meetings). As mentioned above, reduced productivity due to the pandemic is not uniform across demographics, and potential bias resulting from these disproportionate effects will need to be addressed in reviews/panels for many years to come.***

Response**:** IOS is committed to fairness in the merit review process, and we note that IOS Program Directors are already allowed to modulate the panel discussion to avoid bias. We mentioned above that we will work on strongly encouraging the IOS reviewer community to watch the NSF merit review orientation video that provides an overview of the different types of implicit biases that can arise during the review process and specific strategies to reduce this bias. During the Division Director's (DD) panel welcome, we will also add discussion of these issues to put them at the top of mind of both Program Directors and panelists.

As relayed above, we also agree that there is a need to consider differential effects of the pandemic on all members of research teams and how that might affect the reporting of productivity in proposal sections such as Results from Prior Support and Biosketches. During panel welcomes, IOS includes a statement about the effect of the pandemic on PIs and that its impacts will be long lasting. The effects in the biological sciences have also been well documented (e.g. https://www.nature.com/articles/s41562-020-0921-y) and

panelists in recent panels seem well aware of the issue, often bringing it up with an eye to generosity.

**Recommendation: *Listening sessions where PDs elicit information about pain points and specific needs in grant submission/management at MSIs, and perhaps at bachelors and masters-granting institutions more generally, could be informative.***
Response: Following this COV recommendation, IOS has charged its Outreach Working Group with conducting a series of dialogue sessions with geographic and demographic communities underrepresented in the IOS portfolio prior to the next COV. We will also continue to partner and learn from programs in NSF's [Broadening Participation Portfolio](#) in order to gather feedback from other listening sessions (e.g., 2022's series of [Tribal Nations Listening Sessions](#)) and [broadening participation events](#)). We will use this information, along with lessons learned from increasing outreach efforts NSF- and BIO-wide (such as the annual [HBCU-EiR proposal writing workshops and the HSI STEM Resource Hub's grantsmanship workshops](#)), to develop additional training opportunities through our virtual office hours and other venues to meet the needs of a broader IOS community.

Through the use of the IOS blog, VOHs, and other outreach activities, we will also aim to expand awareness and participation of the IOS community in new programs such as [BIO-LEAPS](#) and the NSF-wide [GRANTED](#) initiative and ongoing programs such as [ADVANCE](#) and [INCLUDES](#). These programs provide opportunities for IOS researchers and the broader scientific community to evaluate, design and implement needs and strategies for broadening participation via support to professional societies, conferences, symposia and workshops that can include training and listening sessions to address challenges associated with the proposal process.

**Recommendation: Following the example of REU programs, it would be useful to have more granular information on the demographics of awardees of the REPS and RAMP programs**.
Response: We appreciate the COV's interest in these broadening participation programs. Although IOS participates in both programs, REPS and RAMP are part of the BIO-wide broadening participation program portfolio and reside in the Division of Biological Infrastructure (DBI). Thus, participant demographics, impact and other information about the programs will be reviewed by the upcoming DBI COV that will be publicly available on the [Office of Integrative Activities COV Reports website](#).

**Recommendation: *IOS should consider explicitly asking for a more retrospective accounting of BI activities [for those who have received grants previously], and a more minor role for future activities.***
Response**:** Accounting and assessment of Broader Impacts activities should be included in annual reports. Our [IOS Blog post](#) gives tips for writing annual reports. IOS is discussing how to provide guidance to PIs to provide more comprehensive information in the annual reports.

**Recommendation: IOS should consider establishing uniform guidelines/SOPs, across programs and clusters, for how PDs discuss the weighting and evaluation of IM and BI at the beginning of panels.**
Response: IOS adheres to the NSF standard regarding the relative evaluation of Intellectual Merit and Broader Impacts. At the beginning of panels, Program Directors review the NSF Merit Review Principles that are discussed within each solicitation and categorically state: "**Both** criteria are to be given **full consideration** during the review and decision-making

processes; each criterion is necessary but neither, by itself, is sufficient". Program Directors also instruct the panel on the use of the IOS panel ranking category definitions, which have a statement for both Intellectual Merit and Broader Impacts in each ranking category, and on the use of the panel summary template which includes sections specifically for the strengths and weaknesses of each criteria giving them equal emphasis.

**Recommendation***: IOS should consider piloting the use of new rubrics for evaluating BI.*
Response: Thank you for the suggestion. As stated in the PAPPG, Broader Impacts are the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. NSF does not want to be prescriptive about the societal outcomes that a project addresses because there can be many different types depending on the project and the PIs expertise. NSF wants the input of the research community (reviewers) in this assessment. We discussed the possibility of using these newly developed rubrics (e.g., BI Plan Rubric in the ARIS BI Toolkit developed by Rutgers University) with the Program Directors, but it was felt that using more detailed rubrics introduces prescription into the BI. Additionally, the NSB passed a resolution at its December 2022 meeting to establish a special commission of the Merit Review policy and criteria relative to NSF's broader impacts goals. BIO/IOS will wait for agency-wide guidance on the review of BI following recommendations from the NSB commission before reviewing our practices.

Instead of adding a rubric, we have added a discussion of the Broader Impacts at our panel welcomes as described above. In addition, we are strongly encouraging all panelists to watch the NSF tips for reviewers video before panel. This short video covers evaluation of the Broader Impacts as well as other important topics such as implicit bias.

**Recommendation: *If IOS does not use panel summaries as a third review in practice, this should be stated as explicit policy.***
Response: We apologize for any confusion about this topic created by the COV self-study. Although use of panel summaries as a third review is allowed by NSF policy, IOS does not do so and did not do so at any time during the review period. The DD/Deputy Division Director (DDD) must concur with each recommendation, and proposals are returned to the Program Director for further review if there are not at least 3 substantive reviews. IOS best practices exclude the use of the panel summary as a third review.

**Recommendation: *IOS should consider development of an SOP around using PO comments more effectively.***
Response: IOS regularly updates its standard operating procedures and guidance documents. NSF is revising how PO comments are used and IOS is using that opportunity to look at ways to use the PO comments to communicate to PIs more clearly.

**Recommendation: *IOS should consider a compromise position where more information is given on the website and/or in a VOH about the pros and cons of including this information in a revised proposal.***
Response: As "this information" was not specified in this statement, it is difficult to answer this question. We have asked the VOH working group and the Blog working group to engage the issue of revising and resubmitting proposals with the goal of encouraging PIs to focus on the most important issues that affected the recommendation rather than the comments of individual reviewers. It is important to note that from NSF's perspective, all proposals are considered new submissions.

**Recommendation:** *IOS should consider piloting a post-panel survey that would include a question like "how did you hear about this opportunity?".*

**Response:** All public surveys need significant lead time as they require approval from the President's Office of Management and Budget. As such, NSF generally reserves the use of surveys for higher level feedback such as the biennial merit review survey that forms the basis for the Merit Review Reports to the NSB. For example, our recent success in attracting an entirely new group of PIs for the Partnerships to Advance Conservation Science and Practice program, the majority of which had never submitted to NSF before, suggests that the combination of press releases by NSF and our partner, the Paul G. Allen Family Foundation, webinars, VOHs and blog posts could be an effective way to reach a broad group of individuals for other programs as well.

**Recommendation***: IOS should continue to explore ways to highlight and disseminate the impressive impact of IOS-funded research to the public, including asking PIs to use #IOS_funded or similar in social media posts about IOS-funded research.*

**Response:** Thank you the suggestion. The NSF Office of Legislative and Public Affairs (OLPA) is responsible for sharing research impacts. Program Directors and PIs share research and broader impacts results with the BIO Communication Specialist, who must obtain OLPA approval for any NSF-sanctioned dissemination by these methods. OLPA has an ongoing media campaign called "Science Happens Here" whose goal is to encourage PIs and students to share their NSF story using the hashtag #NSFstories. IOS will join this effort by publicizing it on our IOS Blog and during the IOS VOH, encouraging use of this campaign at our conference booths, and raising further awareness at IOS PI meetings and other outreach activities.

**Recommendation:** *IOS should evaluate whether it is feasible to integrate at least some of the findings of the Evaluation and Assessment Capability (EAC) Section in the self-study.*

Response: Thank you for that suggestion, we are forwarding this to the OIA team coordinating COVs NSF wide and investigating what is available and how it might be used for future COVs.

**Recommendation:** *IOS should consider the 2018 COV recommendation for incorporating cohort-building activities for IOS-funded postdocs.*

Response:  The IOS PI Meeting Working Group has been charged with organizing a postdoc PI meeting for the IOS core programs in addition to the cohort building activities that PGRP continues to hold for the Competitive Area 3 Plant Genome Postdoctoral Research Fellows.


## IV.    Questions about Portfolio.

**Recommendation: IOS should consider pilot testing tools to support reviewers in evaluating broader impacts and their potential to be "creative, original, or potentially transformative."**

**Response:** In response to multiple suggestions from the COV, IOS is revising its Panel Summary Template. This will include a specific prompt to consider the potentially transformative nature of both the Intellectual Merit and Broader Impacts.

**Recommendation:** *We encourage IOS to continue the important efforts that they have been making to encourage proposals from Bachelor's and Master's granting*

***institutions. In addition, we encourage IOS to experiment with listening sessions focused towards underrepresented institutional types, as suggested in III.3 regarding MSIs.***

Response: As noted in the response to III.3, the IOS Outreach Working Group has been charged with conducting a series of dialogue sessions prior to the next COV with PIs from a broad range of geographically diverse MSI, PUI and master's degree granting institutions. We will also continue to partner and learn from other programs in NSF's Broadening Participation Portfolio in order to gather feedback from other listening sessions (e.g., 2022's series of Tribal Nations Listening Sessions) and broadening participation events . We will use this information, along with lessons learned from increasing outreach efforts NSF- and BIO-wide (such as the annual HBCU-EiR proposal writing workshops and the HSI STEM Resource Hub's grantsmanship workshops), to learn how to better facilitate the needs of a broader IOS community.

Through the use of the IOS blog, VOHs, and other outreach activities, we will also aim to expand awareness about NSF's Broadening Participation Portfolio that can be easily filtered on NSF's Funding Search, so that MSIs, PUIs, and master's degree granting institutions can identify a wider range of funding opportunities in addition to IOS core programs.

**Recommendation: The COV recommends expanding their efforts in supporting beginning and early-career investigators in better understanding the proposing and reviewing of awards, as it will likely lead to higher-quality proposals and reviews in IOS.**

Response: IOS continues to address these topics in the VOHs and through the Blog as well as during in person outreach at conferences. We will also continue to incorporate these efforts into our PI meetings with beginning and early career investigators, as well as our upcoming 2023 meeting with postdocs funded under IOS grants.

**Recommendation: Consider supplements to proposals to further elucidate the integration of research and education in programs other than CAREER and RUI.**

Response: BIO/IOS will pass your suggestion of adding a graduate student mentoring plan as supplementary documentation to the NSF Policy Office. Requiring additional documentation comes under special scrutiny due to federal laws (e.g., Paperwork Reduction Act) to limit the paperwork burden on proposers.

**Recommendation: the COV suggests that IOS continue to employ established and novel efforts to both increase the number of submissions from, and the overall success rate of, individuals from under-represented groups.**

Response: The IOS Outreach Working Group has been charged with developing and implementing an outreach plan with this goal. In addition, the NSF has set a goal of receiving 10% more proposals from under-represented groups in 2023. IOS will coordinate with BIO- and NSF-wide efforts to address this issue.

**Recommendation: Further efforts should be considered by IOS to increase gender representation.**

Response: The IOS Outreach Working Group has been charged with developing and implementing an outreach plan with this goal. IOS will coordinate with BIO- and NSF-wide efforts to address this issue.

**Recommendation: To address the possibility, the COV recommends that IOS expand efforts to educate the community on the impacts of, and best practices to minimize, implicit biases and/or structural inequities.**

Response: IOS strongly encourages all panelists to watch the NSF tips for reviewers training video before panel. This short video does a good job of providing guidance on mitigation of bias. We are also revisiting the panel instructions given by Program Directors at the start of the panel. During the Division Director's panel welcome, we will add discussion of these issues to put them at the top of the minds of both Program Directors and panelists.

**Recommendation: Overall, while the COV recognizes that NSF and federal policies determine the available categories to those for self reporting, IOS is strongly encouraged to actively employ all avenues (i.e., solicitations, websites, virtual office hours (VOHs), symposia presentations, addition of new or additional language/text to the demographic request to inform how the information is utilized, etc.) to inform constituents on the importance of such information to the mission of NSF in general (and by extension, IOS).**

Response: We are planning a blog post and VOH to highlight the use and importance of the demographic information.

## V.     Other Topics

**Recommendation: The COV recommends developing a system of collecting and aggregating BI assessments as a way for IOS to clearly demonstrate the societal impact of their portfolio. IOS may consider sub-contracting this work to groups who are interested in research impacts as a way to better understand and document these societal benefits.**

Response: The 2-page document provided to analyze Broader Impacts was part of an NSF wide pilot for the National Science Board. We are glad that the COV appreciated these efforts. The PAPPG Ch II A. 1. Merit Review Principles instructs PIs and institutions that assessment of Broader Impacts activities may be more effective at an aggregated institutional level rather than the individual project. NSF is currently discussing the follow ups to this pilot.

**Recommendation: The COV encourages IOS to consider whether they want to prioritize certain broader impacts goals or if they want a balanced portfolio and consider setting goals to achieve in this area. More engagement with the IOS community through VOH or other mechanisms to explore the full breadth of BI might also be fruitful.**

Response: IOS does not consider achieving broader impacts goals and having a balanced portfolio as mutually exclusive. IOS will therefore continue to encourage programs to maintain a balanced portfolio of scientific topics in their program area and Broader Impacts.

**Recommendation: The COV encourages NSF to establish a permanent remote work policy extending beyond pandemic-related restrictions.**

Response: Following negotiation with AFGE local 3403, NSF updated the collective bargaining agreement in September 2022 to create a hybrid workforce, including both remote work and enhanced telework. Currently, the majority of employees can telework up to 80% time (the equivalent of 4 days per week) with supervisor approval.

**The COV applauds the level of implicit bias training for PDs but urges a more formal training for panelists before they begin reviewing proposals**.
Response: IOS strongly encourages all panelists to watch the NSF tips for reviewers training video before panel. This short video covers evaluation of the Broader Impacts as well as other important topics such as implicit bias.

**The NSF demographic request terminology needs to be updated, and the "do not wish to provide" option, which has made this information less useful, should be reconsidered**.
Response: We will pass your suggestion along to officials involved in efforts to improve our collection of demographic information. We note that revisions are currently under way, but collection of demographic information will remain voluntary.

**The COV recommends that NSF consider implementing an open access publication policy.**
Response: NSF has an open access policy which states for research funded after January 2016, publications resulting from the research must be deposited in the NSF Public Access Repository, be available free of charge no later than 12 months after publication, possess machine readable metadata that is available free of charge, be managed to ensure long term preservation and reported in the annual and final reports with a persistent identifier that links to the full text and metadata. More information about the current public access plan can be found at: Public Access - Special Report | NSF - National Science Foundation .

**The COV recommends that NSF consider developing additional mechanisms to provide opportunities for post-doctoral and early-career scientists to receive focused training and experiences that provide a foundation for long-term engagement with NSF activities and mission.**
Response: The IOS PI Meeting Working Group has been charged with creating IOS wide postdoc and CAREER awardee PI meetings to connect these beginning and early career scientists to IOS and each other. The IOS Outreach Working Group, with help from all IOS Program Directors, plans and conducts outreach to these groups at the many conferences we attend each year.