

**CORE QUESTIONS and REPORT TEMPLATE  
for  
FY 2014 NSF COMMITTEE OF VISITOR (COV) REVIEWS**

**Guidance to NSF Staff:** This document includes the FY 2014 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2014. Specific guidance for NSF staff describing the COV review process is described in the “COV Reviews” section of NSF’s Administrative Policies and Procedures which can be obtained at <https://inside.nsf.gov/aboutnsf/hownsfworks/rolesresponsibilities/Pages/Committee-of-Visitors.aspx><sup>1</sup>.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and (2) managerial matters pertaining to proposal decisions.

The program(s) under review may include several sub-activities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the sub-activities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may choose to add questions relevant to the activities under review. NSF staff should work with the COV members in advance of the meeting to provide them with the report template, organized background materials, and to identify questions/goals that apply to the program(s) under review.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at <http://budg-eis-01/eisportal/default.aspx>. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

For programs using section IV (addressing portfolio balance), the program should provide the COV with a statement of the program’s portfolio goals and ask specific questions about the program under review. Some suggestions regarding portfolio dimensions are given on the template. These suggestions will not be appropriate for all programs.

**Guidance to the COV:** The COV report should provide a balanced assessment of NSF’s performance in the integrity and efficiency of the *processes* related to proposal review. Discussions leading to answers of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. ***COV reports should not contain confidential material or specific information about declined proposals.*** The reports generated by COVs are made available to the public.

*We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions. For past COV reports, please see <http://www.nsf.gov/od/oia/activities/cov/>.*

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<sup>1</sup> The COV Reviews section has three parts: (1) Policy, (2) Procedures, and (3) Roles & Responsibilities.

## FY 2014 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below is completed by program staff.

<b>Date of COV:</b> June 17-19, 2014
<b>Program/Cluster/Section:</b> Developmental Systems Cluster, Physiological & Structural Systems Cluster, Neural Systems Cluster, Behavioral Systems Cluster
<b>Division:</b> Division of Integrative Organismal Systems (IOS)
<b>Directorate:</b> Directorate for Biological Sciences (BIO)
<b>Number of actions reviewed:</b> 192 <b>Awards:</b> 43 <b>Declinations:</b> 3,031 <b>Other:</b> 76
<b>Total number of actions within Program/Cluster/Division during period under review:</b> 9,753 <b>Awards:</b> 867 <b>Declinations:</b> 3,031 <b>Other:</b> 4,893
<b>Data Source:</b> The data in this section of the self-study are derived from the following sources:  <b>Enterprise Information System (EIS):</b> Many EIS reports readily provide information about the efficiency of the review process and program management. In most instances, the data were used directly in the self-study although processing was required to generate some of the tables and figures.  <b>Sample Jackets:</b> As described below, a random set of proposals was selected and the review materials in eJacket were analyzed by the Division staff.  <b>SQL Query of the NSF Database for the Received Proposals:</b> BIO asks each PI to complete a classification form with submitted proposals. Data from these forms and from other information related to proposals are collected using queries and analyzed by the Division staff.  <b>Manner in which reviewed actions were selected:</b> The Division selected a random jacket sample of 116 competitive awards and declines plus an additional 76 (pre-proposal actions). For qualitative measures (such as recommendation completeness), 192 jackets is a sufficient sample to provide examples of the styles and procedures for all of the program activities. There is a representative number of actions per fiscal year, proportionate to the total number of awards or declines, and including Faculty Early Career Development (CAREER) proposals, conferences and workshops, as well as proposals submitted to all program solicitations covered by the review period 2011-2013. The COV will be able to access the sample jackets via the COV module on eJacket. In addition, eJacket contains a list of all 9077 actions reviewed by the Program over the last three years, including supplements, proposals, returned without review, withdrawn, and preliminary proposals. The COV can request to see any proposals on this list during the meeting. However, COV panelists will not have access to jacket/proposals for which they are in conflict. For the convenience of the COV, a list of commonly used acronyms is available in the DOCUMENTS section of the eJacket COV module.

**COV Membership**

	<b>Name</b>	<b>Affiliation</b>
<b>COV Chair or Co-Chairs:</b>	Marvalee Wake	University of California-Berkeley
<b>COV Members:</b>	Sunny Boyd Marie Burns Daniel Bush Colin Dale Lynn Dobrunz  Henry Fadamiro Robert Fliesher  Karen Hicks Emmitt Jolly  Barbara Lom Carlos Martinez del Rio Karen Plaut Patricia Schwagmeyer	University of Notre Dame University of California-Davis Colorado State University University of Utah University of Alabama, Birmingham Auburn University Smithsonian National Zoological Park Kenyon College Case Western Reserve University Davidson College University of Wyoming Purdue University University of Oklahoma
<b>Advisory Committee Liaison:</b>	Hopi Hoekstra	Harvard University

**INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES  
AND MANAGEMENT**

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

**I. Questions about the quality and effectiveness of the program's use of merit review process.** Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>NSF, including the Division of IOS, uses a combination of reviewing processes. For pre-proposals, IOS uses a panel. For pre-proposals invited for a full proposal submission, IOS relies on both ad-hoc reviewers and a panel. For our assessment, we sampled 45 jackets out of 211 submitted in 2011-2013. Our sample included both pre-proposals and proposals. We found that review methods are, in general, appropriate. Panel reports were very well documented in all cases, although the level of detail was somewhat lower in pre- than in full proposals. This discrepancy is both understandable, given that a large number of pre-proposals are reviewed by panel members, and fitting given the difference in length, detail, and emphasis of these types of proposals. It appears that pre-proposals emphasize significance, context, and relevance of the proposed research, whereas full proposals must also provide significant methodological detail. The subsequent internal review process as revealed by the review analysis appears generally appropriate, but seems less transparent than the panel report. We will elaborate on this point in A5. We did not review the results of site visits as none were found among the jackets. The two-tiered pre- to full proposal system seems to be working efficiently and provides the complementary benefits of panels and ad-hoc reviews.</p> <p>We commend IOS personnel for the thoroughness of its reviews, for overseeing complete and useful panel summaries, and for conducting analyses that justify funding decisions. A clear strength of the review system consists of providing a complete review for all proposals, without recourse to a triage system. We also commend IOS leadership for the thorough analysis of the transition to the pre-proposal system that justifies</p>	<p>YES</p>

<p>its benefits.</p> <p><b>Data Source: Jackets, Division Personnel</b></p>	
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>In our review of 45 jackets we found that the intellectual merit and broader impact of proposals were always addressed by both the panel and in the review analysis. A small minority of reviewers (4 reviewers in our sample that includes approximately 180 reviewers) did not address broader impact. All these cases were in ad hoc reviews of full proposals. We also encountered a few cases in which ad hoc reviewers gave inappropriately cursory reviews of broader impacts. In general broader impact reviews were shorter and less detailed than reviews of intellectual merit, perhaps appropriately. We suspect, but have limited data to justify this opinion, that broader impacts and their review have improved over the last years. Authors seem to be better at crafting and implementing broader impact activities, reviewers seem to be more aware of the importance of broader impacts and better at reviewing them insightfully, and certainly panel participants and NSF personnel do a very good job at evaluating the merit of broader impacts. However, given that we still found a few delinquent ad hoc reviewers and even a few proposals with inadequate broader impacts, NSF should continue educating its stakeholders about the value of broader impacts and on how to evaluate them. We recommend continuing to give guidelines (length and content, as well as potential elements in a good broader impacts section) to both PIs and reviewers.</p> <p><b>Data Source: Jackets</b></p>	<p>YES</p>

<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>The vast majority of reviews (with the exception of a very few) were constructive and comprehensive. As mentioned above, we suspect that the evaluation of broader impacts has improved in ad hoc reviews.</p> <p>The quality of ad-hoc reviews and panel summaries is evidence of how NSF has created a culture of responsibility and partnership among its stake holders.</p> <p><b>Data Source: Jackets</b></p>	<p>YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>In the vast majority of cases, panel summaries provide clear rationale for panel consensus or lack thereof. In cases where the individual reviews are much more positive (or negative) than the panel placement, it is important that the panel summaries address this apparent disconnect. In the case of pre-proposals, the COV suggests that panel summaries provide substantive advice for improvement to investigators whenever possible.</p> <p><b>Data Source: Jackets</b></p>	<p>YES</p>
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments:</p> <p>The COV finds that, in the majority of cases, the documentation in the jacket provides clear rationale for the award/decline decision. In a few cases, the review analysis did not appear fully aligned with the panel placement, panel summary, and/or individual reviews. We recommend that, whenever there is a discrepancy between the award/decline decision, panel recommendation, panel summary, and/or individual reviews, this discrepancy be explicitly addressed in the review analysis. <b>The COV suggests that IOS consider streamlining the review analysis process to focus efforts on those proposals for which discrepancies take place anywhere in the process.</b></p>	<p>YES</p>

<p>The COV commends IOS for the improvements in documenting the rationale for the award decisions when there is a discrepancy between the reviews and the panel summary, which is seen in the new RA form implemented in 2013.</p> <p><b>Data Source: Jackets</b></p>	
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments:</p> <p>In all jackets examined the PI was provided with a rationale for decisions. The panels and panel summary authors are commended for their clear and complete rationales. However, in a few cases, we felt that the summaries could have provided more guidance to the PI. While awardees likely do not seek further input, rationales for negative decisions (especially when some or all reviews were positive) could be strengthened. PO advice to panelists that write summaries is a key point for enhancement in this regard. It could also be that such guidance to the PIs is provided by PO's but not recorded in the jackets. Documentation of any more informal discussion would strengthen the jackets and improve the effectiveness and transparency of proposal review, although we hesitate to increase program officer workload.</p> <p><b>Data Source: Jackets</b></p>	<p>YES</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>The COV encourages IOS to continue the practice of occasionally using ad hoc reviews for pre-proposals, especially in cases where appropriate expertise is not available on the panel.</p> <p>The COV commends the inclusion of broader impacts as a review criterion, and encourages IOS to continue to emphasize and enhance this.</p>	

**II. Questions concerning the selection of reviewers.** Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>The COV acknowledges the challenge of finding appropriate reviewers, and commends Program Officers for their diligent efforts. The selection of ad hoc and panel reviewers is one of the most important and challenging activities for Division staff. It is also difficult for the COV to quantify from materials provided in the jackets whether Division staff made appropriate choices, but general review of the reviewers and their comments in a sample of jacket proposals suggests the majority of reviewers have appropriate expertise and qualifications. We encourage IOS to continue the careful selection of panel members and judicious use of ad hoc reviewers.</p> <p>It is important that reviewers of pre-proposals be encouraged to concentrate on the importance of the questions and adequacy of the experimental designs to answer them, and less on the use of specific methods or taxa, or evidence of preliminary data. It is important that Division staff continue to identify when these disconnects occur and correct them with additional review, and continue to downgrade any reviews that clearly do not show an understanding of the importance and broader context of a proposal.</p> <p>The collaborative nature of science, along with the new method of identifying conflicts of interest (e.g. pre-proposal submission causing conflict for all panels within the cluster for the entire year) has greatly reduced the number of potential panel reviewers. <b>The COV strongly recommends that NSF reconsider the broad conflict of interest policy because of these unintended consequences.</b></p> <p><b>Data Source: Jackets, Discussion with Program Staff, others</b></p>	<p>YES</p>
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>Our review of a large set of jackets showed that the Division has a robust</p>	



and effective system for recognizing and resolving COIs. Conflicts of interest (COIs) were identified for proposals each year (29-33% across the three FYs). In these cases, the reviewer was disqualified from further review, and, in the case of a panelist, was excluded from providing or witnessing reviews. Another case of COI is when a PI feels that a particular reviewer will provide a review that is biased by some prior interaction or competition with the PI. It is imperative that these designations, given there is not an unreasonable number of them, continue to be respected. Also, it is important for Division staff to continue to identify reviews that represent outliers and assess whether those reviews may be biased and represent a COI.

The newly implemented automated COI identification system seems very useful. The development and use of this system is commended.

**Data Source: Jackets, Presentation from Program**

3. Additional comments on reviewer selection:

The number of ad hoc reviewer requests was cut by more than half between FY11 and each of FY12 and FY13 (from 9,420 to 4,096 and 3,803), largely because panelists were primarily used to review pre-proposals starting in FY12 and there were a reduced number of subsequent proposals requiring full review. On the other hand, the percentage return of reviews by ad hoc reviewers on full proposals was similar across all three years (46.1, 50.4 and 46.6%). This is surprising given one of the justifications for switching to a pre-proposal process was that with fewer ad hoc review requests, the percentage of compliance with the request would rise substantially, which is clearly not the case.

**III. Questions concerning the management of the program under review.** Please comment on the following:

**MANAGEMENT OF THE PROGRAM UNDER REVIEW**

1. Management of the program.

Comments:

The Division has recorded a high turnover rate for Deputy Directors in the past three years. In addition, there are very few permanent program officers who have been in their role for all 3 years of the review period. There is some concern that the shuffling of directors leads to a lack of continuity of vision for IOS, although institutional memory within IOS has generally been maintained. While the rotating program officers are considered a strength, it is not clear whether there is the right mix of permanent officers and rotators to handle the workload most efficiently. **The COV recommends that IOS carefully consider the ideal mix of permanent officers and rotators.**

With the change to one review cycle per year, single year rotators only experience the grant process one time and do not get to take advantages of efficiencies by managing a second round of proposals. Our concern is that rotating program officers might spend more time with the mechanics of the grant review process and less time in discussion of emerging issues in science than is desirable. **The COV recommends having some overlap between incoming and outgoing rotators to assist in training/continuity, and recommends that IOS encourages multi-year terms for rotators.**

The introduction of preliminary proposals in 2012 has resulted in additional management actions and a period of time of intense activity when pre proposals enter the system. The IOS is commended for the rapid processing of this large number of pre proposals. Despite the significant increase in proposal management actions, the management of proposals is excellent with externally reviewed grants having appropriate documentation of actions taken as demonstrated in the electronic jackets.

The COV is concerned about the heavy workload on each of the program officers and recommends that the vacancies in permanent program officers be filled as quickly as possible. In addition, a review of the structure of IOS may allow IOS to find efficiencies in management that help balance the review process with programmatic responsibilities. We applaud the continued development of mechanisms to help automate the grants management process.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

NSF is a leader in recognizing the importance of education as part of broader impacts and clearly has been supportive of efforts in this area. They allow broader impacts to be addressed in numerous ways and have emphasized educational goals in CAREER awards. It is not clear

how or whether they take a leadership role in emerging areas of education pedagogy. For example, web based learning tools are impacting higher education in profound ways, just as the internet changed the music and publishing businesses. Has IOS worked with other directorates in crafting a vision of how this will impact its programs?

IOS has used an external process such as Know Innovation Ideas Lab to engage scientists and fund a few emerging collaborative proposals to further develop emerging research areas. The program officers also take advantage of EAGER and RAPID projects to fund emerging ideas. These ad hoc approaches give the POs the flexibility to fund areas that they think have potential for the future but it does not negate the need for IOS to develop a strategy to identify and respond to emerging issues in a more cohesive way. This is described in further detail in 3.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

It is not clear to the COV how IOS undertakes program planning and defines prioritization within any given research portfolio. External processes such as workshops on photosynthesis, nitrogen, and animal responses to the environment, wikis and blogs are great ways to engage the research community in identifying leading edge research topics. Likewise, program officer participation in national scientific meetings and insights they gain from grant panels are rich venues for staying at the forefront of science. However, exposure alone does not define long-term planning for the organization. The self-study lacked clarity about how POs prioritize research topics and other initiatives within their portfolio.

During the COV visit, the POs talked about balancing their portfolio but were not able to clarify the decision making process used for this. From review of the electronic jackets, there were occasions when proposals in medium priority were funded over high priority proposals to meet the needs of the portfolio and, therefore, the criteria for making these decisions is critical. Moreover, there is no discussion about how IOS develops a strategic vision across the division with respect to portfolio priorities. The criteria for making funding decisions within the context of the research portfolios is fundamental to the mission success of IOS, and deserves a thoughtful process for achieving that goal.

**The COV recommends that IOS Program Officers describe the criteria and processes used to develop portfolio priorities that meet the goals of the clusters and of the IOS division.** This should include POs working together to define those criteria and goals. This will align programmatic needs across the clusters and provide rotators the context for making funding decisions within their cluster.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

The last COV (2011) made several recommendations (see 2011 IOS COV Report). The Division has been very responsive in addressing these recommendations. For instance, the introduction of preliminary proposals in 2012 appears to be a direct response to comments by COVs (2008 and 2011) regarding the flat number/percentage of awards. The Division has made great strides in developing the pre-proposal process and developing methods to measure the effectiveness of the process. The program was designed with both PIs and reviewers in mind. The impact of

workload for the agency needs continued evaluation.

**The 2011 COV also expressed concern that many highly meritorious awards continued to be declined. Our COV shares this concern. Without increased funding levels this will continue to be a debilitating problem.**

**IV. Questions about Portfolio.** Please answer the following about the portfolio of awards made by the program under review.

<p style="text-align: center;"><b>RESULTING PORTFOLIO OF AWARDS</b></p>	<p style="text-align: center;"><b>APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE</b></p>
<p>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</p> <p>Comments:</p> <p>The IOS is divided into four systems clusters, each of which has one or more subsections. The awards are distributed across all sub-disciplines. The budget is partitioned in such a way as to make the number of awards to each cluster proportional to the number of applications that are reviewed in that area. This is adjusted from year to year based on the number of applications reviewed in the prior year. As a result, the distribution is fairly stable over time. This approach provides stability as well as responsiveness to changes in the science, and coupled with ability to fund new initiatives, allows flexibility. This results in an appropriate distribution across disciplines.</p> <p>From 2011-2013, the awards were distributed as approximately 14% to the Developmental Systems Cluster, 43% to the Physiological &amp; Structural Systems Cluster, 24% to the Neural Systems Cluster, and 18% to the Behavioral Systems Cluster. These percentages were relatively stable over the three year period. The percentage of proposals funded by each cluster is similar. There is more variability in the percentage of proposals funded within the sub-disciplines of the clusters.</p> <p>The use of Preliminary Proposals as an initial screen was implemented in 2012. The percentage of Preliminary Proposals invited to submit full proposals decreased from 30% in 2012 to 20% in 2013. The distribution of invited pre-proposals corresponded fairly closely to the overall distribution of the Awards.</p> <p><b>Data Source: IOS Self Study</b></p>	<p>YES</p>
<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>The amount of the average award has risen by about 20% over the three years, resulting in a decrease in the number of proposals awarded. The</p>	<p>YES</p>

<p>Behavioral Systems Cluster had the largest increase in Award size; it was noted in the previous review that the Behavioral Systems Cluster seemed underfunded, and this appears to have been rectified.</p> <p>There is a close correlation between the requested and awarded budget amounts, with most deviations resulting from decreases in budget. The reductions in budget were variable across the different clusters.</p> <p>Looking at the original and revised budgets for a sampling of awards showed some had large reductions that could potentially negatively impact the projects, while others had more moderate reductions. Many of them reduced or eliminated salary for the PIs in the revised budgets.</p> <p><b>To help support the community that is funded by IOS, the COV recommends considering reducing the size of awards to fund more of them.</b> One approach might be to include an additional small awards program.</p> <p><b>Data Source: IOS Self Study.</b></p>	
<p>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</p> <p>Comments:</p> <p>In addition to standard proposals, there are two specific mechanisms for supporting innovative or potentially transformative projects, the EAGER (Early-concept Small Grants for Exploratory Research), and the RAPID mechanism. Both types are only reviewed internally, which is appropriate. EAGER and RAPID Awards make up approximately 4% of the total number of Awards.</p> <p>Moreover, panel members identify proposals that are potentially transformative. Table 24 in the Self Study reports 15-20% of full proposals are identified as potentially transformative. It is too soon to know what the overall impact will be of these potentially transformative projects. It is not clear whether there is a system for following up on these projects to see what the impact has been. A higher percentage of pre-proposals designated as potentially transformative are invited for full proposals, which seems appropriate.</p> <p>Projects that are innovative and of high impact can also be designated as "Highlights" and publicized by NSF. The number of highlights declined significantly over the three year period; there were 30 in 2011, 23 in 2012, and 8 in 2013. The reason for this is not known, but the COV wonders if the high workload for Program Officers might contribute to this decline.</p> <p>The NSF Strategic Plan states that potentially transformative research is a major focus, and that NSF will "emphasize interdisciplinary and system-oriented approaches that often lead to transformative concepts." It is not clear how this is being done.</p> <p><b>Data Source: IOS Self Study</b></p>	<p>YES</p>

<p>4. Does the program portfolio include inter- and multi-disciplinary projects?</p> <p>Comments:</p> <p>Interdisciplinary projects include aspects of two or more disciplines within biology, whereas multidisciplinary research has one or more areas of science outside of biology, such as engineering or mathematics.</p> <p>PIs identify the fields of science that their proposals include, and this information is used for determining the multidisciplinary nature of the project. It was recommended in the previous COV report that all multidisciplinary designations should be validated at the time of the award, but it is not clear if this is being done. COV recommends that panel members might be asked to confirm this.</p> <p>Based on PI's classifications, 10-15% of awards are multidisciplinary, and 10% of pre-proposals are multidisciplinary. The most widely reported additional disciplines are psychology, chemistry, computer science, and engineering.</p> <p>Multidisciplinary awards were shared with other Divisions or Clusters for co-review in 2011 (7.9% of awards) and 2012 (8.9% of awards). However, this dropped to 0 in 2013, in part because of IOS and DEB policy not to co-review preliminary proposals. Because they are not co-reviewed, the use of pre-proposals could discourage multidisciplinary projects. However, the percentage of multidisciplinary awards among invited pre-proposals was similar to that for awarded proposals, potentially alleviating this concern.</p> <p>Significant funding was contributed to IOS awards from other Divisions of Biological Sciences, and the amount grew slowly from 2011 to 2013. Funding was also contributed from other Directorates outside of BIO, with the largest amounts from Mathematics &amp; Physical Sciences (MPS) and EPSCoR. IOS also contributed to awards in other divisions of BIO; the amount was greatly reduced in 2013 (From \$3400K to \$600K). It is not clear what the reason for the reduction is, or whether it will continue. IOS contributed funding for awards in other Directorates, with the largest amounts being to Computer &amp; Informational Science &amp; Engineering (CISE) and MPS.</p> <p>It is not clear whether there is any consideration given during the review process to the interdisciplinary or multidisciplinary nature of proposals.</p> <p><b>Data Source: IOS Self Study</b></p>	<p>YES</p>
<p>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</p> <p>Comments:</p>	<p>YES</p>

<p>IOS provided awards to PIs in all 50 states during FY2011-FY2013. As shown in Fig. 8 of the 2014 Self-Study, the number of new awards plus invited preliminary proposals varied substantially across states. PIs from six states, for example, had fewer than 10 new awards or invited pre-proposals, whereas California PIs had 255. Much of this variation in numbers of awards per state seems likely to stem from differences among states in the number of proposals submitted (and number of prospective PIs).</p> <p><b>Data Source: IOS Self Study.</b></p>	
<p>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</p> <p>Comments:</p> <p>The overwhelming majority of IOS awards (82-87%) fund research conducted at Ph.D.-granting institutions, as shown in Table 30 of the Self-Study. The 2011 COV had noted that the percentage of the Division's new awards that were made to PIs at 2-4 year schools was very low (~2.5%); this situation has not improved (range in % of portfolio: 1.4% in FY2013 to 3.1% in FY 2011). The IOS response to the 2011 COV comment mentions that they would be considering additional outreach efforts directed at increasing awards to 4-year institutions.</p> <p>Additional data provided to the 2014 COV show that the success rate of full proposals to PIs or co-PIs at 2-4 year schools varied from 17.2-29.4% across years. The yearly rates are very similar (within about 3%) to those at Ph.D. granting institutions, with the exception of FY 2013, in which Ph.D. granting institutions achieved a 27.5% full proposal success rate, and 2-4 year colleges had only a 17.2% success rate (5 of 29 full proposals were successful). Preliminary proposal success rates (FY 2012 and FY 2013) for 2-4, Masters, and Ph.D granting institutions are very similar. These results collectively suggest that additional efforts to encourage pre-proposal submissions by PIs/co-PIs at 2-4 year institutions may be the key to increasing the total number of awards they receive. Relative to the number of full proposals submitted in FY2011 (65), the number of 2-4 year institution pre-proposals submitted in FY2012 and 2013 (mean of 77.5 per year) increased by only about 19%. By contrast, the number of pre-proposals submitted by PIs or co-PIs at Masters-level institutions in FY2012 and 2013 (mean of 255/year) represented an increase of 36% over their 2011 full proposal submissions (187).</p> <p><b>The COV recommends that the IOS continue efforts to increase the participation of 2-4 year institutions in the IOS portfolio.</b></p> <p><b>Data Source: IOS Self Study</b></p>	<p>YES</p>
<p>7. Does the program portfolio have an appropriate balance of awards to new investigators?</p>	<p>YES</p>



NOTE: A new investigator is an investigator who has not been a PI on a previously funded NSF grant.

Comments:

Based on Table 31 of the 2014 Self-Study, from 12-19% of IOS awards during 2011-2013 were made to beginning investigators (PIs with no history of previous federal funding). As noted in the Self-Study, there has been concern that the transition to a preliminary proposal procedure would be accompanied by a decline in awards to beginning investigators. However, additional data provided by IOS indicate that the preliminary proposal success rate of these individuals is virtually identical to the overall success rate, potentially alleviating this concern. Further, while beginning investigators who submitted full proposals in FY2012 did not fare as well, the success rate of their FY2013 full proposals was nearly equal to the overall success rate, and the total number of awards to beginning investigators in FY2013 (49) was similar to the number they received in FY2011 (50).

The Division is commended on its initiative to start the data driven process to track the effects of the pre-proposal system on new investigators.

**Data Source: IOS self study**

8. Does the program portfolio include projects that integrate research and education?

YES

Comments:

The integration of research and education is strongly emphasized in all NSF proposals, and is the specific intent of many popular programs and supplements that support science education at all levels. These include education for K-12 teachers (RET supplements), high school students from under-represented groups (RAHSS), undergraduates (REU supplements), graduate students and postdocs, as well as faculty from teaching institutions.

The number of awards in each of these areas is relatively small and uneven, both within a year and across years. **COV recommends that IOS provide sustained support for RUIs, which is essential to keep a balanced portfolio.**

Future support of educational activities would be facilitated by reinstating DDIGs, which currently are only offered by Animal Behavior. **COV recommends expanding DDIGs for the entire division in order to both directly support existing research programs as well as to integrate research with education for the next generation of PIs.**

In general, far larger and sustained financial commitments to science education within our society are needed to overcome the persistent, profound challenges in recruiting and retaining a diverse scientific community.

<p><b>Data Source: Jackets, IOS self study, NSF website</b></p>	
<p>9. Does the program portfolio have appropriate participation of underrepresented groups<sup>2</sup>?</p> <p>Comments:</p> <p>The percentage of proposals awarded to minority PIs is comparable to the percentage of proposals submitted, reflecting successful navigation through the review process. It is not clear from the Review Assessments whether PO's currently engineer selection of proposals for funding, or if this is entirely panel-driven. Regardless, the number of proposals being submitted by PIs of under-represented groups is unacceptably low, and underscores the importance of sustained outreach and further strengthening of educational programs for these groups even earlier in their academic careers.</p> <p>The COV commends IOS for diversity broadening activities that have attempted to cultivate under-represented group involvement in IOS, such as reaching out to larger membership societies. According to leadership presentations and the IOS self-study, this has had limited success. <b>The COV recommends increased efforts to reach out to minority institutions and regional societies with higher minority memberships, as well as inner city schools and rural areas without regional influence of colleges and universities.</b></p> <p>The percentage of proposals awarded to women has held steady, from 30% in 2011 (COV 2011 report) to 28-36% in 2011-2013, which is comparable to the percent holding faculty positions in the biological sciences but below the percent of women receiving PhDs in biology (52% in 2006; (<a href="http://www.nsf.gov/statistics/infbrief/nsf08308/">http://www.nsf.gov/statistics/infbrief/nsf08308/</a>)). The implementation of the Career-Life Balance (CLB) Initiative in 2012 (<a href="http://www.nsf.gov/pubs/2012/nsf12065/12065.jsp">www.nsf.gov/pubs/2012/nsf12065/12065.jsp</a>), which was incorporated into CAREER supplements in 2013, is an important step towards retaining women in the academic ranks. It is not evident whether these initiatives have been supported by IOS, and whether their implementation has been even across clusters. It may be necessary to educate POs in this program. <b>The COV urges IOS to take the lead at NSF and re-instate a mechanism for support of parental leave (men and women) for child and/or elder care for both postdocs and PIs at all stages of career.</b></p> <p><b>Data Source: IOS Self Study, COV 2011 report</b></p>	<p>YES and NO</p>
<p>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p>	<p>YES</p>

<sup>2</sup> NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

<p>Comments:</p> <p>The Division of IOS is helping to fulfill the national priorities outlined by the annual prioritizing letters of the Office of Science and Technology Policy and Office of Management, particularly in the stated goal of “understanding complex biological systems”. The IOS portfolio of 500+ awards from 2011-2013 includes plant and animal organismal development, species interactions like symbiosis and organism-environmental interactions, and the mechanisms and organization of neural circuits underlying behavior.</p> <p>The Division of IOS is also fulfilling NSF’s mission “to promote the progress of science” through their support of rigorous and broad scientific research outlined above, and has demonstrated agility in adapting to emergent trends across scientific disciplines, e.g. IOS's participation in President Obama's BRAIN initiative. In addition, IOS has served “to advance national health, prosperity and welfare” by investing in science education and career development (within their budgetary allowances) to support future generations of scientists in our society. For example, between 2011-2013 IOS supported nearly 9,000 students and researchers with new awards (Table 34).</p> <p>What are the other mechanisms that IOS, BIO and NSF as a whole can use to disseminate the knowledge obtained by the funded research to inform and inspire the public, and especially our nation’s students? We note the popularity of Science Cafes, FaceBook, YouTube, Twitter, and other social media and suggest that they could be inexpensive and effective approaches to recruit and foster the next generation of scientists and communicate science to the public.</p> <p><b>Data Source: IOS Self-study, Jackets</b></p>	
<p>11. Additional comments on the quality of the projects or the balance of the portfolio:</p> <p>Comments:</p> <p>We envision IOS as a world leader exemplifying an agency in support of integrative biological systems. Toward this goal, IOS could clarify its mission with quantitative metrics that could be evaluated yearly to assess the quality and balance of the portfolio.</p> <p>Presently, the significance and impact of the funded projects is difficult to discern. In the future, it would be very helpful for IOS to provide a list of publications and bulleted summaries of the most significant achievements of each cluster during the review period (not merely providing a list of Highlights titles).</p> <p>As previous COVs have also stated, it is imperative that IOS quantitatively measure the impact of its programs retrospectively. Infrastructural support in the form of adequate staff, meeting space, and implementation of computational resources appear to severely limit portfolio management as well as logistics. The COV strongly applauds IOS’s development of a new</p>	

database management platform to begin to mine IOS data.

**Data Source: IOS Self-study, Highlights, COV documents**

## **PART B. RESULTS OF NSF INVESTMENTS**

**B1. OUTCOME GOAL for DISCOVERY:** “Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering.”

Comments:

IOS has supported research that advances the frontiers of knowledge in scientific areas that are prioritized by the National Research Council as important and beneficial to the nation. Between 2011 and 2014, 867 proposals were awarded. Of these awards, 182 were identified as potentially transformative by expert scientific reviewers. Grants supported by IOS encompass a broad spectrum topics ranging from assessing the effects of magnet fields in mice to identify classes of spatial neurons that receive magnetic input from earth-strength magnetic fields, to characterizing the effects the arachnid internal clock on spider aggression and brain chemistry. To increase the propensity for new and more risky scientific discovery, IOS has supported Exploratory EAGER Awards (~40 awarded). The diversity of impactful research supported by IOS promotes our national science and collectively coincides with the missions of the NSF. For this, IOS should be commended.

Based on the current set of awards, future IOS award selection is expected to be consistent if award funding levels keep pace with annual inflation. However, a list of manuscripts, patents, and products that can be directly connected to IOS funding may be more effective to evince productive outcomes of IOS support, and is correlative with the need for a more data-driven assessment of funding impact.

**B.2 OUTCOME GOAL for LEARNING:** “Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.”

Comments:

IOS has fostered a science and engineering workforce through the support of programs and strategies that promote science education, training, and research. This is established at several educational levels-RUIs for undergraduate research experiences (~43 awarded), DDIG support for graduate student dissertations (87 awarded), and CAREER awards for new scientific investigators (~49 awarded). In addition, each individual grant application must include broader impacts produced from research proposal. Furthermore, the recent OSTP Public Access Memo promotes open access to IOS funded research, thus making discoveries available to researchers and the general public as quickly as possible.

The COV commends IOS for its significant efforts. However, an expansion of the DDIG program is recommended in order to foster Ph.D. student skills in synthesis, critical thinking, development of independent research ideas, experimental design, and written communication. In addition, scientific literacy for all citizens can be expanded by investing more in primary and secondary science education, especially in science desert areas observed in inner city schools and rural areas.

**B.3 OUTCOME GOAL for RESEARCH INFRASTRUCTURE:** “Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.”

Comments:

IOS makes significant contributions to building the nation's research capability by supporting research programs and scientists judged through a very competitive peer-review process to be asking critical research questions with innovative experimental tools. The results of this work expand scientific knowledge and tools available to the community. IOS's emphasis on supporting scientists at all career stages from undergraduates to senior researchers is an important step to ensure our nation has a capable and engaged supply of research scientists. IOS's careful eye to support basic research in a wide variety of model and non-model organisms encourages both depth and exploration while maintaining agility. However, the self-study and supporting materials did not include sufficient examples of specific experimental tools, approaches, and contributions to the national infrastructure stimulated by IOS initiatives. The COV did not find the Highlights provided particularly compelling to make the important point that IOS initiatives enhance multiple dimensions of the nation's research infrastructure.

The requirement for data management plans (DMPs) initiated in 2011 is an important new component to building digital infrastructure for sharing research outcomes (particularly those not published). When research outcomes are shared in this manner the scientific community gains important archives and potential insights that complement the published research literature. These archives not only have important potential to enhance the reliability and rigor of scientific research, but also have potential to reduce redundancy and create new archives that can be mined for future purposes that may currently be unappreciated. **However, the COV recommends better dissemination of best practices and education for investigators regarding how to develop appropriate DMPs for their specific data.** Given the recency of the DMP requirement the COV was unable to evaluate how well PIs are implementing DMPs.

Finally, it is important to note that other complementary arms of NSF/BIO such as DBI explicitly support instrumentation and facilities necessary to carry out the intellectual aims and broader impacts of the scientific inquiry prioritized by IOS.

**B.4. OUTCOME GOAL FOR ORGANIZATIONAL EXCELLENCE:** “Provide an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.”

Comments:

The National Science Foundation in general and IOS in particular are model organizations. The combination of permanent staff and rotators ensures a balance between stability and change. This balance, however, is delicate. Maintaining this balance can be difficult, especially in the face of having to guarantee the careful and professional evaluation of thousands of proposals. These proposals represent the work for the scientists who craft the research plans, the reviewers who evaluate the proposals, as well as the NSF staff who coordinate reviews and administer the awards and declinations. IOS demonstrated sensitivity to the burdens of proposal writing and reviewing burdens by transitioning to a pre-proposal system. This new system significantly reduced the number of reviews without compromising quality or significantly altering the metrics regarding who submits proposal and receives awards. Moreover, IOS cites the use of the Electronic Jacket awards processing system and Excel-based tools as internal

systems that have enhanced their administrative efficiency, though it is difficult for the COV to assess these efficiencies.

We see their receipt of a Director's Award for Superior Accomplishment as an indication of the value of these changes to their business practices. The collaboration between the program analyst and cluster/program officers is both commendable and exemplary. We encourage IOS to not only continue this collaboration, but to expand it to include assessment of outcomes of initiatives and funded projects. IOS and NSF are at an exceptionally good moment to use data to evaluate the success of initiatives, aspects of these initiatives that must be changed, and to identify initiatives that are deemed particularly successful and importantly, unsuccessful. From previous COV reports, it appears that this is an area that the community has demanded. Assessment of achievement of mission goals is a fundamental good business practice.

Although we see IOS as an effective unit, we are concerned about a few aspects of its function. First, we are concerned that high turnover in IOS's leadership, including the rotation of 5 Deputy Division Directors from 2011 to 2013, might lead to program instability and reduced morale. We hope that this shuffling in leadership is a temporary problem, and **we recommend longer term stability in IOS leadership.** Second, COV members would have liked to see justification of how the Division's organization and structure best satisfies its mission and goals. **The COV recommends consideration of the subdivision of clusters into multiple programs, the balance between program officers/directors and program specialists, analysts, and assistants, and the hiring and length of stay of rotators.** State-of-the-art business practices demand that organizational structure matches long term mission and short term goals.

## C. OTHER TOPICS

C.1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

The IOS programs are already broadly integrative; current efforts and interactions enhance its scope. The effort overall is substantive and well envisaged. Core components are working well so far; even as we make suggestions for fine-tuning, we urge the Division not detract from the many elements that are fully functional and forward-thinking. We have some minor concerns: we did not receive as much information regarding the nature of inter-program activities or inter-divisional funding and solicitation; these obviously exist, but might be better emphasized in any subsequent self-study so that we see clearly how they provide new directions. We also expected to see more co-funding, especially in such areas as computational neuroscience, but this might be an omission in text, not in action. The text discussed process, such as COI issues, rather than outcomes. Again, this may be an information gap, rather than a programmatic one. A second concern is that the several specific subprograms should emphasize their integrative nature, because we fear that when the science is broken into specialized areas, integrative work may not be facilitated. At the same time, we note that solicitations for targeted research in integrative, cross-program areas would help to advance the science. We were not able to assess the extent of cross cluster, cross division, and cross directorate efforts. We encourage such integrative interactions to avoid the potential problem of apparently facilitating overly specific research efforts that operate in isolation.

C.2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

We reiterate that core functions are working very well. Proposal processing and notification are timely, and pre-proposal and proposal turnaround are being implemented well. Other major

actions are progressing and being fine-tuned. We believe that the program's performance in meeting its specific goals and objectives is very good. We have a few suggestions: 1) we urge IOS to continue awards to mid-career people for re-training; 2) we recommend resurrecting the career-life balance supplement awards. Few members of the community seem to be aware of them, and IOS should take the lead at NSF in encouraging these important awards; 3) we suggest that IOS enhance international collaborations more actively (some exist, both for NSF personnel regarding program development and for individual investigators). We commend IOS on interacting with other divisions and directorates in funding international programs, for example sometimes incorporating USAID funding for partner nations and in the BREAD program. This is the out-of-the-box thinking that will maximize support and research interactions.

C.3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

We see three general areas that we urge NSF to address that might strengthen the program's efforts. One has to do with proposal review: as research is becoming more collaborative, the broad conflict-of-interest interpretation (e. g., eliminating collaborators within 48 months) may exclude many potential reviewers and much expertise. Pre-proposal requirements have exacerbated the difficulty. The second is that it would be desirable to continue to develop research and discussion/policy interactions with other Federal agencies, NGOs, and, in some instances, professional societies. Some ongoing and new programs exist and illustrate good value, but more are needed. Third, it would strengthen programmatic efforts if data regarding publications, patents, and new techniques are gathered from annual/final reports using new data management tools. These outcomes should be made available publically to illustrate more widely the results and impacts of NSF support for research.

C.4. Please provide comments on any other issues the COV feels are relevant.

See items 5 and 6 below.

C.5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

Our COV worked quite effectively, given the NSF COV framework. We realize that many aspects are mandated in order to assure comparable reviews among units. We do have some concerns and recommendations, however. We request that the preparers of the divisional self-study try to assure that the data, examples, and other materials fit the review template, especially in the area of NSF goals. Parts of the draft fit well; other areas were not really filled out but rather referred to Highlights and various documents. It would have been useful to have the information in the documents summarized to provide the interpretation or to substantiate a goal. Also, it would be more informative to provide examples of accomplishments, in addition to examples of processes.

Discussion time with IOS program officers during our visit was very useful; perhaps separate times for separate clusters, rotators and permanent people, POs from other Divisions, might be provided. Access to the eJacket module proved cumbersome for several COV members (e. g., too many COV members had password and other problems; some files couldn't be opened, etc.). We also had some issues with data comparability, of which IOS is well aware from its own perspective.

The diversity of research background, institution type, geography, and gender of our COV members benefitted our discussions.

As did the 2011 COV review, we urge that NSF make the review report template as flexible as possible. It would be useful to find a mechanism that would allow use of multiple computers (not just NSF's), and to find a way to make the report template shareable via in Google Docs or Dropbox so all COV members could insert, revise, and edit (within control standards). A mechanism similar to that used for sharing panel summaries might suffice.

## C.6 Division-Specific Issues

Please address the following additional questions:

1. How might we ensure that scientists at all levels are equipped with appropriate skills to participate in multidisciplinary, collaborative, and integrative research?

This is an arena that needs careful thought and planning. It is necessary to first identify the skills that are necessary (at beginning, intermediate, senior levels) and to be specific about what the terms mean. The skills should be those appropriate to careers in fields outside of academia, but making use of one's scientific training and interest (and the "equipping" starts at pre-school).

In addition:

- a. IOS should emphasize that integrative and collaborative research should be a goal of graduate training, as we move away from the single independent investigator model.
  - b. IOS should continue to provide specific opportunities for cross-disciplinary re-training.
  - c. Techniques, equipment, principles should be broadly shared; this might be accomplished by developing more inclusive web-based activities, etc.
  - d. Travel and sabbatical grants that emphasize collaborative and integrative research could be provided.
  - e. Broader Impact statements that emphasize best practices in education and other relevant areas should be encouraged.
  - f. IOS could take the lead in BIO in emphasizing the employment of integrative and cross-disciplinary skills in a broader range of opportunities within and outside of academia, including those developed by NSF.
2. IOS is in the third year of a data driven three-year pilot period of the new proposal evaluation procedure involving the submission of preliminary proposals, what are the most important considerations as we move forward?

The new pre-proposal, once a year evaluation system has created quite a bit of angst within the research community. A major reason for this anxiety is that it would take two years to obtain funding, at the minimum, if a pre-proposal is not selected for a full proposal or, even if selected, it is not awarded. Two years is especially hard for new faculty because of their limited timeline for acquiring funding. The COV recognizes CAREER awards are not limited by the pre-proposal process, so young faculty have a "safety valve" for keeping projects in the review process. IOS should continue to promote this alternative to the community. We also recognize the average timeline for funding was close to two years in the old system, a number the POs should also note to the community.

Pre-proposal panels have been an issue at times because of the high number of proposals each member reviews. In addition, panel reviewers can be inconsistent by focusing on the big picture, yet still drilling down to methodological details to ask if a PI can achieve goals. **The COV recommends that the POs continue to train both the PIs and the panelists to write and to evaluate the shorter pre-proposal format.**



The prohibition from adding Co-PIs for the full proposals seems counter-productive. Projects selected for full proposals still get critical comments from the pre-proposal panel that should be addressed in the full proposal. Sometimes the best response to a critical need might require the addition of a Co-PI with expertise in a highly technical area to convince a panel that part of the project can be achieved. PIs should have the freedom to add an additional Co-PI in some cases.

**The COV recommends that IOS continues to engage the research community in discussions about fine tuning the pre-proposal process.**

3. How might the Division promote a balance between the core programs support of emerging science and new empowering initiatives? What opportunities in integrative organismal biology might those initiatives address?

Again, Program Officers need time to work together to assess how to efficiently balance core program support of emerging science, and the implementation of new empowering initiatives. The working groups that have been discussed seem to be the appropriate vehicles for discussion, but we are concerned that POs have little time to think through means of identifying and facilitating new ideas and emerging sciences. In fact, we worry that too frequent statements of new initiatives that then exist for only very short periods may occur, given the breadth of the core programs. New initiatives should lead to significantly new science. There are many kinds of opportunities that IOS could develop, but, again, they must be judicious about outcomes and impacts. We think of a diversity of examples, such as:

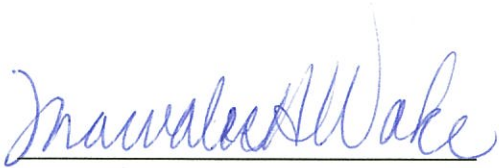
- 1) Promote workshops that bring together international leaders in development of research tools and techniques, bioinformatics, etc. such that methodologies can be interchangeable.
- 2) Promote integrative research across disciplines, taxa, and techniques by bringing together “unanticipated” areas that could form collaborations, e. g. nanobiology in ecological research, micro C-T scanning at multiple scales for paleontologists, systematists, developmental biologists, and ecologists (both plants and animals).
- 3) Promote the connection of IOS with large initiatives such as NEON.

4. How might the Division assess the quality and impacts of science supported by the Division?

As COV 2011 suggested, outcomes (e.g. final reports) for NSF awards should be evaluated. In addition, we suggest gathering data from a selected set of awardees 5 and 10 years post-award, asking about the impact of a) the awards on their research development, and b) of their research on major, current scientific and societal concerns. Quantitative and qualitative data and descriptive accounts could be gathered for assessment. IOS should do more to encourage its community to communicate the value and impact of organismal biological research on both scientific dimensions and on societal issues. We suggest that Highlights (including more from IOS) be much more actively and widely circulated, perhaps to people and agencies on NSF lists, institutions receiving support, professional societies, etc., with the recommendation that they be used to help to educate the public and policy-makers. Tools are available to tabulate appearances and responses, such as online hits per Highlight. In addition, we congratulate IOS program analysts on their development of analytical tools. We encourage them to continue to develop new tools, collaborate with other analysts, and share these tools across NSF.

We close by commending IOS for serving the integrative biology community efficiently and effectively. This is true especially given the increasingly difficult funding climate, which has resulting record low funding rates. We want to emphasize that the major obstacle for IOS in achieving its goals is funding constraints.

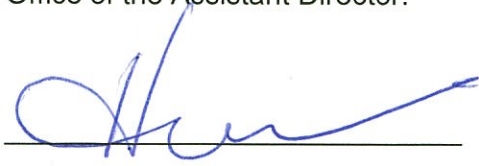
**SIGNATURE BLOCK:**

A handwritten signature in blue ink that reads "Marvalee Wake". The signature is written in a cursive style and is positioned above a thin horizontal line.

For the IOS COV  
Marvalee Wake  
Chair

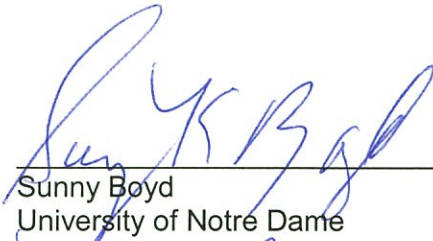
Thursday, June 19, 2014


As the designated Advisory Committee Representative to BIO/IOS 2014 Committee of Visitors, I hereby submit the attached Fiscal Year 2014 COV Report to the Directorate for Biological Sciences Office of the Assistant Director.

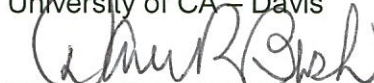


Hopi Hoekstra  
Advisory Committee Representative


Integrative Organismal Systems  
Committee of Visitors Meeting  
Signature Block


  
Sunny Boyd  
University of Notre Dame


  
Marie Burns  
University of CA – Davis


  
Daniel Bush  
Colorado State

  
Lynn Dobrunz  
University of AL – Birmingham

  
Henry Fadamiro  
Auburn University

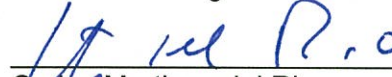
  
Robert Fleischer  
National Zoo


  
Karen Hicks  
Kenyon College

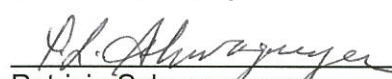
  
Hopi Hoekstra, BIO AC Liaison  
Harvard University


  
Emmitt Jolly  
Case Western Reserve

  
Barbara Lom  
Davidson College


  
Carlos Martinez del Rio  
University of Wyoming

  
Karen Plaut  
Purdue University

  
Patricia Schwagmeyer  
University of Oklahoma

  
Marvalee Wake, Chair  
University of CA – Berkeley

As the designated Advisory Committee Representative to the BIO/IOS 2014 Committee of Visitors, I hereby submit the attached Fiscal Year 2014 Report to the Directorate for Biological Sciences, Office of the Assistant Director.

  
Hopi Hoekstra  
Designated Representative of the BIO Advisory Committee

06/19/14  
Date