

NSF Office of Cyberinfrastructure

Management Response to CoV

November 2011

Introduction

The Office of Cyberinfrastructure at the National Science Foundation (NSF) held a Committee of Visitors (CoV) meeting on September 19 – 21, 2011. 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 managerial matters pertaining to proposal decisions; and (2) comments on how the results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

In addition to receiving numerous documents to review via a web-based collaboration portal, the CoV heard presentations from the Director of OCI, the Deputy Director of OCI, and Program Directors for each of the program areas in OCI: Networking and Cybersecurity, Data, High Performance Computing, Learning and Workforce Development, and Virtual Organizations. In addition, the Chair of the CoV held conference calls with OCI program staff in advance of the CoV meeting in order to make sure the CoV would have access to all the materials needed to conduct the evaluation. OCI Management is extremely grateful to the Chair and all the members of the CoV for their willingness to serve NSF and for the commitment and enthusiasm they brought to their duties.

PART A: Integrity and Efficiency of the Program's Processes and Management

Merit Review

We are pleased that the CoV finds the merit review process in OCI generally works well. The CoV noted that "*OCI did an excellent job of obtaining required reviews for the proposals and using the best review method for a given program*". The CoV also finds that OCI did an excellent job of insuring review criteria were addressed in panel summaries and in the program officer review analyses and that good communication on the rationale for a review decision was provided to principal investigators. We are also pleased that the CoV finds "*the program officers did an excellent job getting reviewers with needed expertise*" and that "*program officers went the extra mile to get appropriate reviewers*" when conflicts arose. Below, we address concerns raised by the CoV with respect to merit review.

CoV Finding: The CoV finds that dwell time for small to medium proposals was within established guidelines. While acknowledging that dwell time for larger grants might take longer than 6 months, the CoV raises concerns about a few proposals, including DataNet, for which the

CoV cites a dwell time of 2 years. For this and for programs such as HPC XD, the CoV finds that more transparency and communication is needed with the community to explain changes in plans and timeframes as they occur.

Management Response: Conducting merit review for large projects entails significant challenges, and the CoV recognizes that “*a significant number of conflicts exist with the large-scale grants*”. In addition, the commitment of significant financial resources requires due diligence in pre-award management to maximize the likelihood of success. Delays are frustrating to all parties. It is also important that OCI communicate clearly to stakeholders, when delays occur. OCI has recently hired a Ph.D. level scientist with government project management and communications experience to work both on coordination and on communication for all OCI programs. We will continue to work to make sure our web site is updated regularly and that we use as many communication channels as we can to keep the community updated on the status of projects and the reasons for delays.

Portfolio of Awards

We are pleased that the CoV finds that “*OCI has an excellent portfolio of research programs*” and that “*OCI has funded top research and education projects*” and also that OCI has an appropriate balance of multidisciplinary projects with involvement from other directorates at NSF.

CoV Finding: The CoV finds that past DataNet awards have not been appropriate in size and duration for the scope of the projects. The solicitation entailed awarding 5 grants for \$20 million each over 5 years, but one has been discontinued, and three additional centers are being funded at a much reduced amount of \$8 million each.

Management Response: A new DataNet solicitation will state the parameters of the three most recent DataNet awards, which the CoV notes were awarded at \$8 million each. As with all NSF programs, the DataNet program must operate within constrained resources while attempting to deliver the highest value. The importance of data is increasing in all scientific disciplines. OCI has responded to the needs of these communities by broadening the program to a larger set of centers. Distributing funds into a greater number of small awards has been perceived as a better way to manage innovation risk in solving the myriad of challenges related to the “data deluge”. The Office recognizes the need to better communicate with all stakeholders when a change in strategy, plan, or scope is made with respect to its programs. We will be making efforts to do that through the Web site and other communications channels in the future.

CoV Finding: The COV found that OCI is critically important to the broad field of computational and data science and engineering. OCI established 6 Task Forces in 2009, for which significant community input was involved. The COV commends OCI for establishing some programs, such as SI2, resulting from the Task Force reports. It is important that OCI continue tracking the

outcomes from the reports in addition to utilizing various mechanisms to continue to obtain community input.

Management Response: OCI recognizes the tremendous efforts from the community that went into producing the six Task Force Reports. These reports were finalized in March 2011. They have recently been printed in hard copy and have been distributed to the NSF CIF21 Strategy and Leadership Group and will be given to ACCI members. The NSF has performed an initial analysis of recommendations from the report and will be incorporating these recommendations into the CIF21 planning process and into future CI initiatives.

Management of the Program

CoV Finding: Overall OCI is doing well with the management of its programs, especially given the rapid turnover of program directors. The current program directors are excellent and it is obvious that significant time is spent managing the programs. The two issues with Track 1 and DataNet, however, emphasize the need for program directors of large-scale programs to have the following skill set: large program management experience and subject matter expertise. Furthermore, it is important to have permanent program managers of the large-scale programs, similar to other large-facility programs at NSF (e.g., MREFC). With respect to the skill set needed, it should be noted that there are multiple ways to achieve this goal – having the skill set in one person or having the large-programs managed by a permanent staff and an IPA with complementary skills.

Lastly, when panels are used to monitor the progress of sites receiving large awards, it is important to emphasize the need to provide recommendations in addition to concerns. Panel recommendations are the primary mechanisms heavily used at NSF to provide community input about major concerns. It was noted with the Blue Waters Track 1 award, the panels provided a summary of concerns with very few and minor recommendations.

Management Response: OCI recognizes the need to have continuity of operations for management of the large projects and recently hired a permanent program director to manage the Track 1 (Blue Waters) project. We recognize the benefits of both rotators and permanent program directors. This is an issue faced by many directorates and offices at NSF, and we will continue to articulate the unique nature of OCI programs and work within NSF-wide constraints to optimize the balance. OCI currently has several staff members trained in project management techniques. High risk research and infrastructure development projects present challenges, and we will continue to work with other offices at NSF, including those that build large facilities, to see what knowledge and skills we can bring to our projects. We will also work with panels, particularly on large projects, to make sure that NSF is receiving concrete recommendations from the review process.

CoV Finding: The current OCI program portfolio is excellent, as it responds to internal (through working groups so as to engage other directorates) and external (workshops, task force reports, IPAs, etc.) input with the CIF21 vision providing the context by which the programs are related. As OCI has limited resources, with respect to funding and people, prioritization is important. It is important that OCI develop a prioritization process that can be easily articulated within OCI as

well as with the other directorates. This is a good time to define this process, as OCI program portfolio is evolving in a very good way.

Management Response: The OCI is serving as the Executive Secretary and provides planning support to the NSF-wide CIF21 Strategy and Leadership Group to help guide the entire Foundation to a shared sense of vision in terms of leveraging new and existing cyberinfrastructure components. In December 2011, the OCI will hold an all staff retreat focused on strategic planning and operational issues within OCI, where the Office will work on its prioritization process for its continually evolving program portfolio.

CoV Finding: With respect to office staff, the COV recognized the need for OCI to increase in this area. While the program directors have increased since the last COV, the office staff has remained the same, yet the program portfolio has increased. It is important for OCI to increase the office staff for efficiency and efficacy.

Management Response: It is clear that workload demands on staff continue to grow in OCI. The CoV has perceptively observed that office staff numbers have not increased with the increasing portfolio load. OCI will strive to increase our staff but more importantly will make sure that we have a work environment that supports a highly capable and effective staff. We will continue to improve the thoughtfulness we bring to our work and scientific environments so that we can accomplish our goals given the likely staffing and workload constraints that will be present. The CoV further commented that the *“committee was pleased to see that the rapid turnover in office support staff has decreased and that the current office manager and staff are capable, efficient, and contributing to the overall success of the program”*

PART B: Results of NSF Investments

The CoV reviewed projects that included Petascale applications in earthquake science and in climate modeling, a CI Team Project to broaden access to hands on STEM learning via remote online laboratories, a data repository program, research and education connectivity to Pakistan, and a game called WiiMD developed by the Pittsburgh Supercomputer Center, to demonstrate molecular dynamics in a fun and interactive way.

The CoV was pleased with the results of all of the highlighted programs.

PART C: Other Topics

Gaps or Areas that need improvements within program areas

CoV Finding: OCI naturally focuses on infrastructure, which requires long-term attention and stability. However, many of the key players (Director, Program Officers, etc.) are IPAs and therefore are temporary. Rapid turnover of key players is not conducive to long-run development of infrastructure. Having permanent people in such roles can bring problems of its

own (e.g., regulatory capture), but at the moment the CoV is concerned about rapid turnover when longer-term engagement is desirable.

Management Response: The management of long term programs requires long term institutional knowledge, experience in project management, and scientific background to recognize and spur innovation. OCI has recently hired a permanent program officer in the HPC program, so now all program staff members in the HPC program are permanent. The Office is currently seeking to bring in an additional rotator for additional subject matter knowledge. The Office also now has a permanent Deputy Director. This will be helpful to monitor the exchange of information as staff rotates.

CoV Finding: OCI is both an old and a new organization. OCI is deeply engaged with a well-established community of science and engineering work that has grown up around high-performance computing over a period of two decades. OCI thus deals with an incumbent constituency that is important and powerful. On the other hand, OCI is attempting to create a new community around data-intensive science, and this is a long term effort that requires patience and persistence. OCI resource growth has been constrained since the Office was created. This creates severe competition for resources.

Management Response: A few years ago, it seemed like NSF's budget was set to increase substantially, but political and economic changes now mean that is not going to happen in the foreseeable future. Competition for resources is something that occurs across NSF between the scientific communities served by the various components of NSF. The CoV perceptively noted the challenges of continuing to serve a well-established community and nurture a new one. This is a balancing act that can only occur with commitment from across NSF to build cyberinfrastructure and nurture data-intensive science and engineering. We agree with the CoV that infrastructure should be part of the research and that "*OCI must partner with the directorates to discover, exploit, and sustain cyberinfrastructure as part of the overall research goals*". We will continue to formalize these partnerships through the cross-NSF CIF21 portfolio.

CoV Finding: OCI deals with technologies that are inherently volatile due to rapid evolution. This leads to a lack of equilibrium; it is virtually impossible for any endeavor to be the "best" for very long. To be more committed to "high-risk, high-return" science and engineering, NSF and OCI must take risks, and this occasionally results in expectation failure. Such failure should not be punished. Yet, it is important for NSF to continue to learn how to manage risks well. With high staff turnover, it is tempting (and almost unavoidable) to make the problems "individual" rather than organizational.

Management Response: As the CoV also observed, the implementation of CIF21 is driving the entire Foundation to support cyberinfrastructure and consider higher levels of risk. EarthCube, for example, in the Geoscience Directorate is striving for a high level of innovation, with its inherent risk. We agree with the CoV that risk management is an organizational issue. We are looking to many models to help OCI improve its risk management practices, including the NSF MREFC programs.