

OCI Management Response  
to the  
Report of the Committee of Visitors for the  
Office of Cyberinfrastructure

December 16, 2008

## **Foreword**

The Committee of Visitors for the Office of Cyberinfrastructure (OCI) met April 1-3, 2008 at the National Science Foundation. This is, in essence, OCI's inaugural COV as the previous COV, in June 2005, took place when OCI was still a division within CISE, the Division of Shared Cyberinfrastructure. As that COV meeting was taking place, NSF's senior management team was developing and implementing a new approach to cyberinfrastructure governance that resulted in the creation of OCI during the summer of 2005.

## **Introduction**

The Committee of Visitors (COV) for the Office of Cyberinfrastructure (OCI) met April 1-3, 2008, to review and provide its expert judgment on the programs and plans of OCI. The COV provided expert judgment on OCI's programmatic portfolio, focusing on two areas: 1) Assessment of the quality and integrity of OCI's operations and program-level technical and managerial matters pertaining to proposal decisions; and 2) comments on how the outputs and outcomes generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

## **Summary of COV findings in Process and Management**

Regarding the integrity and efficiency of OCI's processes and management, the COV responded positively to all COV questions posed. The COV noted that the overall "... *quality of the review is of high quality.*"

- With respect to the quality and effectiveness of OCI's use of merit review procedures, the COV found that: while the number of reviewers was appropriate, in the case of multidisciplinary proposals the number of reviewers might be larger in order to provide for greater coverage. They encouraged the use of site visits for the Track-1 (HPC) proposals. Overall, the COV noted "*Commend OCI for pioneering the use of virtual panels at NSF – should be encouraged. Mail review for HPC was a good idea.*"
- With respect to implementation of NSF's two merit review criteria (intellectual merit and broader impacts), the COV found that individual reviews, panel summaries and review analyses addressed both merit review criteria, and noted that reviewers tended to be more supportive of proposals in which each area of broader impacts was clearly and directly addressed. However, it noted that large solicitations would benefit from having specific criteria provided as to how broader impacts will be reviewed and further that milestones and deployment be required for broader impacts.
- Concerning individual reviewer comments, the COV found, not unexpectedly, that there was some variance in the substantive comments being provided by reviewers and that while critical comments might be helpful, constructive comments are also important but found to be in less evidence. Individual reviews should be more carefully constructed.
- The COV also had some concern regarding selection of reviewers with appropriate expertise and cited the CI-TEAM review panels for not having

sufficient number of reviewers with an education background participating. It did note that “there appears to be a genuine effort to include reviewers from underrepresented areas...” and recognized that this is not always easy to evaluate due to reliance on self-identification in collecting the reviewer data.

- With respect to jacket documentation and rationale for award/decline decisions the COV found that the review analysis did not, in some cases, adequately address conflict of interest issues and recommended that specific recommendations about award/decline should be placed in a specific location so as to be readily identified. However, it noted that this was not necessarily a quality control process issue, but rather that it would make future audits easier.
- Regarding the resulting portfolio of OCI awards, the COV found that the review process is resulting in research that appears to be promising and appropriate “*as far as the programs go*” but that three-year awards might not be enough in some cases. However, they struggled with this criterion in the context of OCI’s mission. There is an inherent lag between OCI’s investments in cyberinfrastructure and the benefits derived from those investments. It also felt that infrastructure sustainability was not being adequately addressed and that increased use of SGER and REU awards should be considered. Finally, the COV commended “... *OCI for its attention to the need to broaden participation and for the efforts it has made in this regard.*”
- In considering the management of the program, the COV found the program management to be highly dedicated and doing an excellent job; indeed it even found these efforts to be “heroic”. It then expressed concern about continued reliance on those heroic efforts in order to achieve goals and noted that significant increases in resources were required. The COV believed that such continued reliance would result in either staff burn-out with resulting failure in expectations (probably permanently damaging OCI as an office) or; the vision would be scaled back to fit the available resources, negatively impacting the entire cyberinfrastructure enterprise and the people it is meant to serve. This was also highlighted by the previous COV and continues to be a problematic area especially considering that OCI investments typically demand greater program oversight than “typical” NSF investments.
- Additionally, the COV felt that the complexity and nature of infrastructure (e.g Track-1 and Track-2) investments were such that NSF’s dwell time of 6-months should not be applicable, but that there was insufficient data made available to adequately make this assessment. Also, that it would be useful to have downstream reviews of these investments to assess their efficacy and lessons learned.

The COV struggled with some of the review criteria and its appropriateness to OCI due to the nature of OCI’s mission and investments. For example, in the area of balance of awards to new investigators the COV felt it was not an appropriate measure for OCI. Rather it felt that OCI should be encouraged to explore use of CAREER awards to better address this area. Another area was balance across disciplines and sub-disciplines where it was felt that this is inherently true for OCI due to its mission, and that the appropriate

question might be “*are the right people from different disciplines involved*” and are those disciplines that should be involved, involved?

In the summary statement in this area the COV highlighted the shortfall of resources and the gap that this has generated between the *Cyberinfrastructure Vision for the 21<sup>st</sup> Century* document and the OCI investments made, resulting in a significant imbalance. Further, to quote: “*OCI has established itself as program with core research strengths, and is developing a workforce to address the challenges faced by the nation. OCI is vital and must continue. The OCI program is doing very well given the constraints it faces; the program staff face the impossible situation of trying to meet genuine needs with insufficient resources.*”

### **COV Processes and Management Recommendations and Management Response**

The COV made a number of recommendations in this area:

- Create a database of possible reviewers. *This activity will be initiated in FY09 making sure that NSF guidelines and restrictions about such a database are adhered to.*
- Develop expectations and metrics in the area of integration of research and education. *This is an area that OCI had already taken action on in its more recent solicitations and reviews and shall continue to do so.*
- Address sustainability of investments. *This is an area of increased activity, for example the DataNet solicitation explicitly identifies sustainability as a selection criteria. Sustainability concerns will continue to be addressed in upcoming awards.*
- Consider increased use of SGER, CAREER and REU awards. *OCI is limited by budget constraints but increases in all of the mentioned areas are of high priority for the FY09 and future budget building years.*
- Increase number of industrial partners and participation by Minority Serving Institutions (MSI). *OCI needs to do a better job in highlighting the already significant achievements made in the area of industrial partners through the Track-1, Track-2 and TeraGrid awards. We shall continue that activity and look at ways of increasing it. With respect to MSIs, OCI shall explore ways in which increased participation can be achieved. In particular, it will work closely with EPSCoR to address some of these issues.*
- Program officers should give careful instruction on the criteria set out in the solicitation and how those should be used for evaluation. *OCI shall put together a set of panel orientation presentations, consistent with this recommendation, which can be used by all OCI program officers. In addition, OCI shall continue to address this area during our staff meetings.*
- More information regarding dwell times should be provided to enable a better assessment of timeliness of OCI’s time-to-decision. Also, downstream reviews should be conducted to assess efficacy of large infrastructure investments. *A more detailed break-down of dwell times shall be made available to future OCI COVs. The suggestion to conduct downstream reviews shall be followed-up. Indeed, there have been studies of large infrastructure investments, such as*

*TeraGrid, to assess their impact and lessons learned and such reviews will be continued.*

OCI management appreciates the disparity between the Vision document and current set of OCI investments. As OCI defines and builds future year budgets, priority will be given to those areas demanding particular attention.

### **Summary of COV findings in OCI integration of NSF Strategic Plan**

Regarding review of OCI investments in the context of the NSF's strategic goals in Discovery, Learning, Research Infrastructure and Stewardship:

- **Discovery:** The COV found OCI, without question, to be addressing this goal by its fostering of research to advance the frontiers of knowledge as a direct result of its investments in cyberinfrastructure and research. It went further to look at OCI as a research infrastructure organization and felt that in order for it to create cutting-edge research infrastructure OCI must actively and deeply engage in the research itself.
- **Learning:** The COV found that this is one of OCI's most important objectives, and pointed to OCI's CI Team as a potential major contributor in this area. It also identified other OCI initiatives in this area, specifically: Acevedo, a CI-TEAM demonstration project monitoring soil moisture in a watershed; Nanohub, a science gateway providing simulation tools in the area of nanotechnology and; the International Research Network Connections program for allowing partners around the world to collaborate.
- **Research infrastructure:** this is an area that OCI directly addresses - the application of, and understanding the role of, infrastructure in advancing knowledge and learning. The COV pointed out the apparent tension between research investments and infrastructure investments. They pointed out that directorates have no problems funding infrastructure directly tied to their research, and do not refer to them as infrastructure. However "they balk at the idea of paying for cyberinfrastructure for their fields because such infrastructure competes with real research." This, they continue, "sets up an artificial and destructive pattern of conflict over who should pay for what."

### **COV Recommendations in area of NSF Strategic Goals and Management Response**

The COV made a number of recommendations in the area of NSF's strategic goals and their relationship to OCI. These recommendations are being given serious consideration, as discussed below:

- **Discovery:** the segregation of infrastructure from research is problematic and as such there needs to be a considerable and sustained effort to bridge the divide between the infrastructure programs and the research programs. Also the COV noted that the infrastructure itself is a "direct and immediate product of ongoing research" and that cyberinfrastructure enjoys a special relationship with infrastructure due to its tightly coupled association with the research frontier and the need to remain current. *This is an area that OCI leadership will continue to socialize with the entire foundation as OCI builds new initiatives and continues to explore the efficient utilization of cyberinfrastructure. OCI believes strongly that*

- it should take a leading role in developing programs in researching, prototyping, developing next-generation cyberinfrastructure, harvesting more basic research carried out in CISE and MPS in particular.*
- Discovery: there needs to be complementary investments in networks, applications and collaborations to match the investments made in the area of high performance computing. While recognizing that there are some investments being made by OCI in these areas, they were found to be less than optimal and could result in major opportunity losses. *OCI agrees with this assessment; as it defines and builds its future budgets, it will work aggressively to address these other areas.*
  - Learning: the COV appreciated the challenges faced by OCI in trying to create a pipeline of students in the cyberinfrastructure area and the tension this has with trying to establish a curriculum in science and engineering which are already heavily burdened. *In FY09 OCI initiated a new activity in this area, Integrating Research and Education through Cyberinfrastructure (IREC). In addition, OCI anticipates actively participating in CAREER and REU awards as it defines and creates its out-year budgets, and is also investigating creating new programs in supporting graduate student and postdoctoral fellowships in computational science.*
  - Learning: the COV identified a need for increased international cyberinfrastructure initiatives, in addition expressed a concern of OCI not being able to exploit the promise of increased citizen science and engineering engagement as a result of a lack of an extensive workforce development initiative. *During FY09 OCI actively began discussions with international organizations having similar programs and needs as OCI (e.g. the European Commission's programs such as DEISA, EGEE, PRACE). OCI will also be working with other agencies, e.g. DOE, in future international collaborations. Workforce development is an activity that is being explored via an OCI created task force in this area that is charged with identifying possible programs to meet workforce development needs.*
  - Research Infrastructure: alternatives to funding cyberinfrastructure were briefly discussed with the conclusion that treating cyberinfrastructure as a community level activity (as it currently is) is the correct thing to do. Mechanisms need to be created that would align interests across the directorates and OCI, funded at the appropriate level. Unless this is addressed early on, i.e. before substantial investments are made, OCI may be "left holding the bag." *This is an area that OCI management and staff will continue to address and socialize with the rest of the foundation as new programs and/or initiatives are explored.*

## **Conclusion**

In summary, in addition to areas where OCI was praised for its activities, there were essentially four areas of major concern and opportunity for future development:

- A large gap exists between the vision of cyberinfrastructure that OCI has been created to support, and the actual programs it has been able to develop. This has led to an imbalance in its portfolio of activities, where HPC dominates and other

areas, including networking, data, software, and virtual organizations are insufficiently funded. *OCI agrees, and will work aggressively to build out the portfolio of activities needed to support research across all areas of the Foundation. In particular, it is developing a series of Task Forces to help it identify top priorities for new programs in all areas.*

- Staff are insufficient to run the needed programs. “OCI cannot continue through heroic efforts.” The COV was concerned about staff burnout. *OCI is working to add numerous high-quality staff to support existing and future programs.*
- Research activities need to be supported as an integral part of OCI’s activities. In effect, the COV makes the case that computational science research should be a fundamental part of OCI’s mission. *OCI has been working with directorates and outside groups (e.g., SIAM, NAS/NAE, CCC) to develop the case for supporting computational science research, both in NSF and in universities.*
- Catalyzing community activity across the Foundation should be a natural role for OCI to play. *OCI agrees, and is in a unique position, as a neutral partner in NSF, to catalyze the development of interdisciplinary applications of the CI it is developing and deploying. It will work closely with Directorates to develop a strategy and new programs for complex problem solving in the coming years.*

All four of these areas will receive major attention in the coming years; indeed they are the four top priorities of the office. This was an insightful COV report that provided a validation to many of the ideas and approaches being followed by NSF in creating OCI and, at the same time, highlighted many of the challenges remaining. NSF management is indebted to the members of the COV for their comprehensive and substantive inputs and recommendations.

**The National Science Foundation  
Advisory Committee for Cyberinfrastructure (ACCI)**

**December 16-17, 2008  
National Science Foundation, Room 1235  
Arlington, VA**

**Minutes**

**Members Present:**

**James Duderstadt, Chair**, University of Michigan, Ann Arbor, MI

**Shenda Baker**, Chemistry and Global Clinic Director, Harvey Mudd College, Claremont, CA

**Jim Bottom**, Vice Provost for Computing and Information Technology, Clemson University, Clemson, SC

**Mark Ellisman**, Center for Research in Biological Systems, University of California San Diego, La Jolla, CA

**Stuart Feldman**, Vice President, Google, New York, NY

**Terry Gaasterland\***, Scripps Institution of Oceanography, UCSD, La Jolla, CA

**Ann Gates**, Program Head, Computer Science, The University of Texas at El Paso, El Paso, TX

**Wesley Harris**, Dept. of Aeronautics and Astronautics, Massachusetts Institute of Technology, Cambridge, MA (CEOSE liaison)

**Tony Hey**, Corporate Vice President of External Research, Microsoft, Redmond, WA

**Brewster Kahle**, Founder, Digital Librarian Internet Archive, Presidio of San Francisco, CA

**David Keyes**, Professor of Applied Mathematics, Columbia University, New York, NY

**James L. Kinter, III**, Center for Ocean-Land-Atmosphere Studies, Int. of Global Environment and Society, Inc., Calverton, MD

**Rich Loft**, Director of Technology Development, National Center for Atmospheric Research, Boulder, CO

**Elizabeth Lyon\***, Director, UKOLH, University of Bath, Bath, United Kingdom

**Priscilla Nelson**, Provost and Sr. VP for Academic Affairs, New Jersey Institute of Technology, Newark, NJ

**J. Tinsely Oden**, Director, Institute for Computational Engineering and Sciences (ICES), The University of Texas – Austin, TX

**James Rice**, Director, South Dakota EPSCoR Program, Brookings, SD

**Michael Stubblefield**, Vice Chancellor, Southern University and A&M College, Baton Rouge, LA

\* Participated via telephone

**Members Absent:**

**Sara Kiesler**, Professor of Computer Science and Human Computer Interaction, Carnegie Mellon, Pittsburgh, PA

**John King**, Vice Provost for Academic Information, University of Michigan, Ann Arbor, MI

**Diana Oblinger**, Vice President, EDUCAUSE, Raleigh, NC

### ***OCI COV Response***

Each NSF Office and Division is reviewed by an external Committee of Visitors (COV) every three years. This year was OCI's first COV review. Dr. José Muñoz presented the OCI Management Response to the 2008 Committee of Visitors (COV). The three-year period reviewed was FY2005-FY2007. Dr. Muñoz reviewed the charge and scope of the COV Review. The findings on the process and management of OCI were shown. Dr. Muñoz reviewed the OCI response with the ACCI. The findings of OCI and the NSF Strategic Plan were shown.

In conclusion, the COV recommendations focused on four areas:

- Current CI investments are out of balance with NSF's strategy.
- Additional personnel are needed. Current staff cannot keep up with the workload
- OCI needs to become more research-oriented and develop its own research program.
- OCI should increase its role across NSF-initiatives.

### **Discussion:**

- OCI's current efforts are consistent with these recommendations.
- Conflict of interest may be a more difficult problem for CI. Might want to develop a document that defines what identifies a conflict of interest. Talked about preparing some guidance information.
- May find some previously written guidelines that are applicable from the review of the PACI program.
- Institution – LONI network – hired computational scientists. Is there any consideration – see CI-TEAM program – in combining research infrastructure and training to engage those institutions?
- Restoring balance – if you don't get funds, will you cut the budget for hardware? If budgets don't go up by a factor of four, what will you do? Dr. Seidel – asked for input from the ACCI – these are hard decisions OCI is faced with. We cannot do what is needed without an increase in budget.

Dr. Duderstadt moved for acceptance of the COV report. It was accepted.

