National Science Foundation (NSF)
Directorate for Computer and Information Science and Engineering (CISE)

CISE Management Response to the Division Computer and Network Systems (CNS) Committee of Visitors (COV) Report March 29 – 31, 2006

Introduction

The Computer and Network Systems Division (CNS) of NSF's Computer and Information Science and Engineering Directorate (CISE) held its Committee of Visitors (COV) meeting from Wednesday, March 29, 2006, through Friday, March 31, 2006 at NSF. The COV covered the period of FY 2003 through FY 2005.

The COV members were provided with a comprehensive web site, a detailed self-study, award jackets, workshop reports, and other materials relevant to CNS's activities during the COV period as well as staff support during their visit.

The Committee, which was organized by clusters to reflect the CNS cluster organization, prepared detailed reports on each CNS cluster and a comprehensive summary report.

The committee's evaluations and questions during their visit were far-reaching and penetrating. Their reports, which reflect their level of thoroughness, address the criteria provided by NSF to guide the COV process and they evaluated CNS performance in the context of those criteria.

The report of the COV, which in general is quite positive about CNS's operations and outcomes, presents a series of observations, evaluations, and recommendations. In the sections below, we respond to these in detail.

CISE Management is grateful to the members of the CNS COV and their Chair for their commitment and willingness to serve NSF and CISE by engaging in this activity.

CNS Program Management

*The COV found that the **program operations** of CNS demonstrated high quality and integrity. In particular, CNS effectively leverages its cluster organization in order to strengthen its performance.*

> CISE is committed to ensuring excellence in the operations of its divisions. As one of these divisions, CNS will continue to take advantage of the cluster organization in future years to ensure that operations maintain the same quality and integrity that the community has come to expect. Leveraging the cluster organization, CNS programs will be structured in a way that they can cover timely emerging areas and long-term foundations.

*The COV found that CNS followed the general NSF trend that the overall **success rate** had been significantly reduced in recent years, and consistently remained at extremely low levels.*

> We observe that NSF receives more highly qualified proposals than it can fund in almost every area of science and engineering. We are working to increase CNS success rates, by building support for increases in the CISE budget, and by focusing programs so that the number of proposals that overlap others is limited. We will also continue our efforts to cooperate with other federal agencies in order to leverage their resources. We are also encouraging interactions and communication among the Principal Investigator community in order to reduce and eliminate duplicate research and education efforts.

*The COV commended CNS on its effective and efficient operations. Its **dwell time** performance has also been commendable, meeting the NSF requirements for dwell time, while consistently being reduced over the last three years.*

> CISE is committed to continuing efforts to improve dwell time performance using a careful planning process and ensuring effective coordination in program execution. We are pleased to report that CNS performance on dwell time has continued to improve with a 92% completion rate in 2006 -- the best in CISE history.

*All CNS groups engage in numerous **activities that extend beyond the CNS** division, both NSF-wide and government wide.*

> CISE encourages its program managers to serve on agency-wide and governmental committees and working groups. These efforts provide us opportunities to pursue cooperative activities with other agencies, to seek out research and education synergies, and to engage in outreach to the community through conference attendance and other visible activities. This is particularly important in programs such as CPATH and Cyberinfrastructure.

*The COV noted that the **workload** of CNS is extremely high. From FY 2003 to FY 2005, the number of proposal submissions increased 80% while the workforce remained relatively flat. While CNS did an excellent job of managing its programs in light of the overloaded situation, the committee believes that the quality of the programs would eventually be impacted should the overload situation persist.*

> Workload within CISE has grown considerably over the last decade. This is true across NSF as a whole. The agency has been working to build support for increases in staffing levels, funding for which competes with other agency needs such as IT business systems development and support, and physical infrastructure.
>
> In the near-term, to do more with less, CISE is working to improve work efficiency by provide better training and mentoring to staff, and developing and improving computer-based tools for proposal management. Within the agency, we are working to increase our authority to hire, to maintain a full complement of staff at the authorities currently granted, and to capitalize on hiring flexibilities currently available. Over the past year, we have had success with out-sourcing certain tasks (e.g., organizing informational meetings), and will continue to use this mechanism to reduce workload on our staff.

*An area of concern is the circumstance in which **NSF is now the primary funding source** for research in Computer Science in the country. This is considered to be neither a healthy situation for the field of CS, or for the nation's security or competitiveness.*

> CISE is working via NITRD with other agencies in coordinating research and development efforts in the area of Computer Science and Engineering. We understand that it is in our country's best interest to sufficiently support fundamental research and education in computer science.

CNS Proposal Review Processes

*The overall quality of the CNS **review process** is excellent. While CNS program managers generally followed panel recommendations, there were many good examples of their exercise over individual prerogative, in making decisions for funding proposals that were high-risk, while at the same time exhibited strong potential.*

> We appreciate the comments of the COV. We are committed to improving our proposal evaluation process, thereby increasing the quality of our program. We encourage program managers to support high-risk, promising projects. For example, we are experimenting with reducing the number of rankings from three (non competitive, competitive, and highly competitive) to two (non competitive and competitive). We hope this will allow panel members to focus on the proposals' research agendas and impacts, rather than their relative rankings.

*The COV also suggests that NSF take measures to help reviewers to strengthen **the review quality.** The committee observed in a few cases that reviews did not contain sufficient information and that broad impact was addressed in a boilerplate style.*

> We agree with the COV. We agree that reviews are not always as informative as they could be. CISE has appointed a committee on peer review to develop recommendations to improve the quality of reviews, including training for both program managers and reviewers. We are addressing this through changes to the merit review documentation procedures, which we expect to result in better feedback to investigators. Changes include more rigorous standards for documentation of decisions, with program director comments provided to proposers in some cases.
>
> As part of our changes to the review procedures, we have produced guidelines for reviewer or panelist instructions. These guidelines include a discussion of the broader-impacts criterion. In cases where the program director needs to convey concerns about broader-impacts to proposers, the program officer comments provide a vehicle for this communication.

*The NSF should also establish an award system to **recognize reviewers** who have consistently provided timely and high-quality review services.*

> This is an interesting and timely idea that should and will be explored. We are enormously grateful for the willingness of reviewers to serve NSF repeatedly in this capacity.

*The committee appreciates the efforts of CNS program managers to effectively recruit **reviewers from under-represented groups.***

> While we are pleased to see CNS ranked well on this aspect, we hope to further improve our performance in this regard. Recognizing the importance of engaging underrepresented individuals in NSF activities, CISE created a working group to explore processes for both recruiting staff and reviewers from underrepresented groups.

CNS Portfolio of Awards

*The CNS projects tended to be **multi-disciplinary**, involving a variety of research organizational structures such as groups, centers, and multiple institutions in order to maximize the research resources.*

> Providing effective reviews and management and oversight of multidisciplinary research and education is a continual challenge for NSF. CISE uses several approaches to promote and support multidisciplinary research and education. The cluster organization is one approach, which encourages proposals that span the disciplines within one cluster. In future year budget planning, we are considering directorate-wide programs that specifically promote multidisciplinary research and education opportunities. Finally, multidisciplinary proposals are always welcome. Individual program directors are encouraged to interact with their peers throughout the organization to avoid funding silos. We will continue to work to identify multidisciplinary opportunities and to support research and education in those areas.

*The Committee appreciated the efforts by the program managers to **leverage NSF funding** through cooperation with other Federal agencies. As a result, CNS funded a portfolio of highly innovative projects to address significant scientific problems.*

> As mentioned earlier, CISE is working (via NITRD) with other agencies to coordinate research and development in the area of Computer Science and Engineering. CISE encourages its program managers to continue collaborating with other funding agencies in order to meet the needs of the nation's scientific community and other agencies, while leveraging available funding.

*The committee believed that the CNS research areas are of **strategic importance** to the Nation. The research results of CNS programs have consistently made tremendous impact. The committee commends the program managers' efforts in leveraging NSF funding through cooperation with other Federal agencies. Nevertheless, the committee urges the government to significantly **increase its funding** to the CNS programs in order to support innovative research in CNS areas that are vital to national competitiveness.*

> CISE management agrees that CNS research areas are important to the nation and CISE will act within its authority to increase funding for CNS programs within competing priorities, improve their efficiency, and hence meet the needs of the nation's scientific community.

*The committee is pleased to observe that CNS has been **successfully achieving its mission** of scientific research. The committee commended critical leadership roles CNS has played in the federal government with Networking and Information Technology Research and Development (NITRD).*

NITRD is an important coordination organization for networking and information technology research and development. In the near-term, CNS will increase its activities in this critical program. For example, CNS has actively organized GENI workshops with NITRD in order coordinate networking research and research infrastructure development.

*Investment by CNS research programs has consistently generated fundamental discoveries that produce valuable technologies**. CNS research infrastructure** program has effectively provided quality facilities and infrastructure that are essential to transform research and enable discovery.*

CISE management agrees with the COV that investments in research infrastructure have had tremendous impact. CNS will continuously improve its programs by leveraging cluster organization principles, participating in NITRD coordination, and providing outreach to the community at large.

*The portfolio of proposals examined by the Committee, the projects outcomes described by the CNS Program Managers, as well as the project Nuggets, demonstrate that CNS is encouraging **high-risk research.***

CISE management agrees that CNS is funding high-risk research. The NSF Director encourages support of high-risk, high impact projects across all fields of science and engineering. NSF currently uses the SGER mechanism to allow program directors to encourage and fund high-risk proposals and CNS uses this mechanism broadly. At present, program directors and NSF staff try to identify high-risk research and include some in their portfolios of projects. We have been making more use of SGERs for such projects.

*The committee commended the active role CNS is taking in **GENI initiative***

CISE is delighted that the COV is supportive of the scientific leadership demonstrated in GENI. In planning for GENI, CISE has supported numerous community workshops and supports on-going planning efforts, including needs assessment and requirements for the GENI Facility. CISE held town meetings and will continue to support future workshops in order to broaden community participation. CISE will work with industry, other U.S. agencies, and international groups to broaden participation in GENI beyond NSF and the U.S. government.

*The committee recommends that **integration of research and education** be a coherent part of proposal assessments. Clear and specific guidelines should be given to reviewers on assessing this aspect of the proposals.*

CISE emphasizes the need to address education in the context of research funding in all solicitations. In addition, CISE has launched a Directorate-wide educational initiative, CPATH -- Pathways to Revitalized Undergraduate Computing Education, targeted at transforming computing undergraduate education in the nation.

CNS Targeted Audiences

*The committee commended CNS pro-activity in addressing **diversity issues** in education and research. CNS manages the Broadening Participation in Computing (BPC) Program, which is truly a laudable effort in trying to expand opportunities in computing professions for underrepresented colleagues in the U.S.*

> CISE agrees that the BPC program is critical. CNS program managers are directed to improve this program and maximize its impact.

*CNS programs have also been consistently supportive of activities that promote participation of **women in computer science**. The grantees have generated remarkable results and have been recognized by various national awards.*

> From an American competitiveness perspective, it is crucial that computer science be inclusive of women since women comprise approximately 50% of the available workforce. CISE management is pleased to see the results realized by various CNS programs that promote and support increased participation by women.

*The committee recommends that the division maintain and enhance explicit mechanisms that insure **under-represented groups and minority-serving institutions** are effectively served.*

> CISE requires that divisions ensure that under-represented groups and minority institutions continue to be served. CISE understands the importance of supporting under-represented groups and minority serving institutions. We will continue to explore mechanisms that ensure underrepresented groups and minority-serving institutions are effectively served.

COV Processes and Support

*The committee appreciated the materials and facility provided by CNS, referring to them as both sufficient and helpful for the process. A few of the visitors requested specific pieces of information that were not included in the **CNS Self-Study**, but which were provided upon request, in a timely manner. CNS Professional Support Staff provided assistance during the event (primary sessions and breakout sessions), offering efficient and effective support to visitors.*

> CISE believes that the evaluation provided by the COV is one of the most important activities in our assessment process. We are pleased to have had a chance to reflect on our past successes and to prepare for future challenges.