National Science Foundation

Computer and Information Science and Engineering (CISE) Directorate

Computer and Network Systems (CNS) Division

Committee of Visitors (COV) Report

For the Period
FY 2003 – FY 2005

Revision 2.4

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Computer and Network Systems (CNS) Division
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CISE CNS 2006 COV TABLES

1 Executive Summary

1.1 Overview of CNS COV Process

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 beginning Wednesday, March 29, 2006, through Friday, March 31, 2006 at NSF. The COV covered the period of FY 2003 through FY 2005.

The COV was led by Dr. Satish Tripathi and consisted of thirty members. The committee was organized into four Clusters to map the organizational structure of the Division. Each COV Cluster had a Chair who was responsible for managing the Cluster breakout meetings. A list of all the members of the COV can be found in Appendix B.

All COV members met on March 29th and 30th. The Chair and Cluster Chairs remained through March 31st to finalize the COV report. A complete agenda can be found in Appendix B.

The COV members were provided with the following materials and facility:

- A CNS Self Study Report. Appendix A contains a copy of this report.
- A web site that contains all materials required for the COV. The address of the web site is:
  http://www.nsf.gov/cise/cns_cov/
  Appendix C contains a copy of the home page of this web site.
- A sample of 250 proposal jackets. These were randomly selected from approximately 5,500 proposals processed by CNS during the time frame being addressed by the COV. 125 of the proposals were awards, and 125 were declines.
- An E-jacket system that was customized for the COV. Through this system, COV members can access (a) all the e-jackets of the proposals covered by this COV and (b) other relevant program information.

The committee appreciated the materials and facility provided by CNS, referring to them as both sufficient and helpful for the process. A few of 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.

The COV examined the CNS Self Study report, which contained data on all aspects of P.I.'s, reviewers, proposals, workload, and other issues related to program management; reviewed randomly selected proposal jackets of both awards and declines; and explored program award nuggets, annual reports and reports generated by CNS funded workshops. In addition, the COV received reports from the CNS Division Director and representative program managers of CNS Clusters.

1.2 Overview of CNS

CNS is one of three divisions in the directorate of Computer and Information Science and Engineering. The main mission of CNS is to support research and educational activities that invent new computing and networking technologies and that explore new ways to make use of existing technologies. The Division seeks to develop a better understanding of the fundamental properties of computer and network systems, and to create better abstractions and tools for designing, building, analyzing, and measuring future systems. The Division also supports the computing infrastructure that is required for experimental computer science, and it coordinates cross-divisional activities that foster the integration of research, education, and workforce development.

The CNS Division was created when the CISE Directorate was reorganized in 2003. CNS inherited many of the programs, and some personnel that had previously resided in CISE's Experimental and Integrative Activities Division, as well as personnel and programs that were managed in other Divisions.

At the time of the 2003 CISE reorganization, CNS managed more than two-dozen programs. The Division has since streamlined and integrated its offerings to now directly manage less than ten programs within the Division. In addition to the programs that reside in the Division, CNS Program Managers are also involved in other CISE divisions, in Cross-NSF and Cross-agency programs and other activities.

During the COV review period (FY03 – FY05), CNS consisted of four clusters, namely, Computer Systems Research (CSR), Network Systems (NeTs), Computing Research Infrastructure (CRI), and Education and Workforce (EWF). In addition, CNS also manages CISE emphasis areas of Broadening Participation in Computing and Cyber Trust. Except for EWF, each cluster manages relevant research programs pertaining to its area. Proposal solicitations of these programs occur annually. EWF considers proposals focusing on education, workforce development, and other activities of general interest to CISE, that are not covered by other NSF solicitations. Awards may be given to provide seed funding to explore a novel educational idea, support a demonstration project, workshops, or studies on topics of broad interest to CISE.

1.3 Accomplishments, challenges, and recommendations

1.3.1 Program Management and Review Processes

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. 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. 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. 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. The COV also 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. All CNS groups engage in numerous activities that extend beyond the CNS division, both NSF-wide and agency wide.

Despite the outstanding performance CNS has achieved in program management and review processes, the COV would like to make the following recommendations in order to further strengthen the division:

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.

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.

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. For example, the committee noted that in the recent years, the number of site visits has been reduced, while site visits are effective means for NSF to outreach the community and assess the performance of large projects. The committee urges NSF to take actions to address the workload issue by considering limiting the number of proposals submitted, increasing the workforce, and providing better incentive, training, and support to professional and scientific staff.

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. Improvements can be made by providing proper guidelines to reviewers, especially in the newly emerging area (e.g., cyber trust) where a matured reviewer pool may not exist. The NSF should also establish an award system to recognize reviewers who have consistently provided timely and high-quality review services. The committee noted that while the fast-lane system has been an effective tool in the review process, the community is concerned about migrating to the grants.gov system.

1.3.2 Leadership in scientific research

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). 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. 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. The committee commended the active role CNS is taking in GENI initiative. GENI aims to explore new networking capabilities that will advance science and stimulate innovation and economic growth. The GENI Initiative responds to an urgent and important challenge of the 21st Century: to significantly advance the capabilities provided by networking and distributed system architectures. Initiatives such as GENI (and many other cutting edge CISE/CNS directions) are energizing and engaging the community and sustaining high momentum of IT innovation.

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.

1.3.3 Diversity

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. 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. The committee appreciates the efforts of CNS program managers to effectively recruit reviewers from under-represented groups. It is also noted that the program managers are passionate in supporting minority-serving institutions. The role of the "model-institution" is very effective in motivating other minority serving institutions. The committee recommends the division to maintain and enhance explicit mechanisms that insure under-represented groups and minority-serving institutions are effectively served.

1.3.4 Integration of research and education

The committee commended the CNS effort in coordination of CISE-wide education and workforce related activities. The activities of this type have consistently enabled preparation of the nation's computing workforce for the 21st Century. The committee would like to stress the importance of this area and to observe the challenges faced by the computing community, including the downturn in enrollments in computing curricula, the phenomenon of off-shoring, etc. The committee noted that the CNS had initiated planning activities in order to address these issues by effectively integrating research and education. 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.

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2 CISE/Div COV 2006 -- Full-Committee Report

2.1 Sub Committee Report: CNS Cluster I. – Computer Systems

Date of COV: March 29-31, 2006
Program/Cluster/Section: CNS Cluster I
Division: Computer and Network Systems
Directorate: CISE
Number of actions reviewed: Awards: ~40 Declinations: ~40 Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: Declinations: (see below)
Manner in which reviewed actions were selected: ▪ There were approximately 5500 new actions in COV period of 03, 04, 05 ▪ Random samples of 5% of awards and declines were selected, for each cluster listed in the table above, leading to: o CSR Cluster: 40 awards, 39 declines o NeTS Cluster: 66 awards, 65 declines o CRI Cluster: 11 awards, 11 declines o EWF Cluster: 10 awards, 11 declines A list of these proposals as well as a list of all the proposals reviewed by the division over the last three years can be found on the COV web page. The COV can access any proposal on either list during the meeting.

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2.1.1 *CNS Cluster I. Computer Systems* -- PART A. 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 under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

2.1.1.1 CNS CLUSTER I. COMPUTER SYSTEMS -- A.1 Merit Review Procedures

Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[1]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments:	YES
2. Is the review process efficient and effective? Comments: (a) Committee members noted that some proposals with highly competitive reviews in one program were declined while some proposals with less competitive reviews in other programs were funded. It is desirable to have a more consistent review rating scheme. (b) When a Program Manager's recommendation is different from panel's recommendation, it should be well documented. (c) It is recommended that, for revised proposals, reviewers should be instructed to take into consideration of the previous reviews.	YES
3. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments:	YES
4. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments:	YES
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments:	YES

[1] *If "Not Applicable" please explain why in the "Comments" section.*

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[1]
6. Is the time to decision appropriate? Comments:	YES
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: There should be a field in the review form indicating reviewer's confidence level toward the subject area of the proposal, as well as a consistent process for reviewers to pick proposals to which they are most confident to review.	

2.1.1.2 CNS CLUSTER I. COMPUTER SYSTEMS -- A.2 Merit Review Criteria
Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, **DATA NOT AVAILABLE, or NOT APPLICABLE**[2]
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments:	YES
2. Have the panel summaries addressed both merit review criteria? Comments:	YES

[2] *In "Not Applicable" please explain why in the "Comments" section.*

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[2]
3. Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments:	YES
4. Additional comments with respect to implementation of NSF's merit review criteria: It is noted that technical reviews of the proposals are far better than the review of broader impact, particularly regarding integration of research and education. It is suggested that more concrete guidelines be developed to guide the evaluation of broader impact of a proposed project.	

2.1.1.3 CNS CLUSTER I. COMPUTER SYSTEMS -- A.3 Selection of Reviewers
Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[3]
1. Did the program make use of an adequate number of reviewers? Comments:	YES
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments:	YES
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[4] Comments:	YES

[3] *If "Not Applicable" please explain why in the "Comments" section.*

SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[3]
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments:	YES
5. Additional comments on reviewer selection: Though the committee understands the lack of representations by minority groups in the computing profession and CNS has made consistent efforts of increasing diversity in the funding process, it suggests that additional efforts be made to recruit reviewers from minority groups and from minority serving institutions.	

2.1.1.4 CNS CLUSTER I. COMPUTER SYSTEMS -- A.4 Portfolio of Awards
Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[5], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. Comments:	APPROPRIATE
2. Are awards appropriate in size and duration for the scope of the projects? Comments: The committee noted that while the duration of funded projects remains stable, the sizes of awards have been shrinking. The committee also noted that this is the consequence of compromise between maintaining a reasonable award rate and project size, given limited funding in CNS.	APPROPRIATE

[4] *Please note that less than 35 percent of reviewers report their demographics, so the data may be limited.*
[5] *If "Not Appropriate" please explain why in the "Comments" section.*

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[5], OR DATA NOT AVAILABLE
3. Does the program portfolio have an appropriate balance of: Innovative/high-risk projects?[6] Comments: The committee suggests that CNS should further encourage well focused, high-risk high-gain projects, even in small scale funding.	APPROPRIATE
4. Does the program portfolio have an appropriate balance of: Multidisciplinary projects? Comments: An excellent example of this is a project (Award # 0540181) jointly funded project between CNS and NIH. The committee recommends that Program Managers who make serious and successful efforts for such co-funding should be recognized and encouraged.	APPROPRIATE
5. Does the program portfolio have an appropriate balance of: Funding for centers, groups and awards to individuals? Comments:	APPROPRIATE
6. Does the program portfolio have an appropriate balance of: Awards to new investigators? Comments: The committee wishes to note that CNS did an excellent job in supporting and funding new investigators.	APPROPRIATE
7. Does the program portfolio have an appropriate balance of: Geographical distribution of Principal Investigators? Comments:	APPROPRIATE
8. Does the program portfolio have an appropriate balance of: Institutional types? Comments: It is suggested that CNS should provide more detailed break down of institutional types in future data collection of funded proposals.	APPROPRIATE
9. Does the program portfolio have an appropriate balance of: Projects that integrate research and education? Comments: The committee feels that the integration of research and education were not sufficiently evaluated and weighted in the review process, judging from the proposal jackets being	NOT APPROPRIATE

[6] *For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment, available at <www.nsf.gov/about/performance/acpga/reports.jsp>.*

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[5], OR DATA NOT AVAILABLE
sampled. It is suggested that, if integration of research and education remains a review criteria, more concrete review measures should be put in place for future awards.	
10. Does the program portfolio have an appropriate balance: Across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments:	APPROPRIATE
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments: The committee notes that CNS has done a very good job in funding minority PIs and minority serving institutions, and recommends continued effort be made in this area.	APPROPRIATE
13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments:	APPROPRIATE
14. Additional comments on the quality of the projects or the balance of the portfolio:	

2.1.1.5 CNS CLUSTER I. COMPUTER SYSTEMS -- A.5 Management
Questions about Management of the program under review. Please comment on:

REVIEW OF PROGRAM MANAGEMENT
1. Management of the program. Comments: There is a major increase in the number of proposals to the programs managed by CNS while the staffing of the division remains flat. The committee notes that even though CNS has done an excellent job in ensuring the smoothness and integrity of program management, the division is under staffed. To ensure the continued excellence of program management in the areas of computing and IT research managed by CNS, critical to the national priorities, the committee suggests that the number of CNS program managers and staff should be increased.
2. Responsiveness of the program to emerging research and education opportunities. Comments:

REVIEW OF PROGRAM MANAGEMENT
CNS is responsive to emerging research opportunities of the field. This is evident by the creation of new funding programs targeting emerging areas both in CNS and CISE wide cross cutting programs, as well as by the workshops and focus groups that CNS has hosted to solicit input from the research community on future directions of research. Examples: DDDAS, Cyber Trust. Cyber infrastructure.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: CNS has undertaken multi-fold process to identify, plan and develop its program portfolio that has a balanced support for broader research and for strategic initiatives. These efforts include: 1. Division wide systematic process of program development, 2. Initiatives from individual program managers, 3. Solicitation of community input through focused programs and workshops, 4. CISE wide or NSF wide large scale and long term planning effort, e.g. GENI, for developing new initiatives that will make strategic impacts, 5. Consultation with industry through venues like NITRD.
4. Additional comments on program management: The committee suggests that CNS program directors should further improve the responsiveness to PIs questions and inquiries. The committee also notes that majority of program managers have been very responsive and helpful to PIs' inquiries and needs.

2.1.2 *CNS CLUSTER I. COMPUTER SYSTEMS* -- PART B. Results: Outputs and Outcomes of NSF Investments

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- *To promote the progress of science.*
- *To advance national health, prosperity, and welfare.*
- *To secure the national defense.*
- *And for other purposes.*

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative

organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

2.1.2.1 CNS CLUSTER I. COMPUTER SYSTEMS -- B. Strategic Outcome Goals

Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

CNS CLUSTER I. COMPUTER SYSTEMS -- B.1 Outcome Goal for PEOPLE:
Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

Comments:

CNS achieved its outcome goal of developing a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well prepared citizens. The following are examples of success projects in this area funded by CNS:

Award No. 0238492
A Multi-Level Approach to Malicious Code Detection
PI: Giovanni Vigna
Inst: University of California - Santa Barbara

On December 5, 2003, student teams from fourteen universities competed in a day-long "capture the flag" contest organized by Professor Giovanni Vigna of the University of California - Santa Barbara. Each team was provided an operating system image with several services (a web site, an FTP server, etc) prepared by the organizers. The web site contained a number of undisclosed vulnerabilities. The task of the teams was to find the vulnerabilities, fix them for their copy of the site and exploit the same vulnerabilities to compromise the security of other teams' sites. The teams gained points by keeping their web site active and uncompromised and by compromising other teams' sites (that is, "capturing their flag"). This type of exercise was organized and executed on such a large scale among universities for the first time.

Live exercises, such as Red Team/Blue Team exercises, represent a valuable tool to teach the practical aspects of security and the dynamics of network-based attack and defense techniques. However, these exercises are very difficult to organize and execute. For this reason, very few courses offer live exercise as an integral part of the class work. This exercise was organized as part Professor Vigna's class on Network Security and Intrusion Detection. Other institutions involved included Georgia Institute of Technology, the Naval Postgraduate School, North Carolina State University, the United States Military Academy, the University of Texas at Austin, and the University of Illinois at Urbana-Champaign.

This successful exercise received attention from the press (PDF of the first page of the Santa Barbara News Press, copy of the complete article, and PPT presentation describing the event are available upon request).

Award No. 0124641
Scale-up, Evaluation and Institutionalization of the Computing Research Association (CRA) Distributed Mentor Project

PIs: Nancy Amato, Texas A&M
Mary Jean Harrold, Ohio State University
Andrew Bernat, Computing Research Association

The primary goal of the Special Projects-funded Distributed Mentor Program (DMP) is to increase the number of women entering graduate school in Computer Science and Engineering (CS&E), by involving them in research projects with a female mentor at a major research university. This new Special Project award to the Computing Research Association allows for the continuation of the DMP and aims to significantly increase the number of student participants. Since 1994, over 230 students from more than 100 different academic institutions (approximately twenty undergraduates per year) have participated in the research and mentoring activities of the DMP. The students are involved in research, learn how a research university operates, meet graduate students and professors, and get a chance to observe a successful female researcher first hand.

A longitudinal evaluation study of the DMP project, conducted by the LEAD Center of the University of Wisconsin, has

shown it to be spectacularly successful at increasing the number of women entering graduate school in CS&E. Over 51% of the DMP participants who had graduate by 2001 were enrolled in graduate or professional school the year following their graduation. A further measure of the success of the program has been the increase in applicants, from 73 students in the first year to 219 in 2003.

CNS CLUSTER I. COMPUTER SYSTEMS -- B.2 Outcome Goal for IDEAS:
Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

Comments:
CNS achieved its outcome goal of enabling discovery across the frontier of science and engineering, connected to learning, innovation and service to society. The following are samples of successful projects funded by CNS in this area:

Award No: 0335241
Project Title:
Collaborative Research: Testing and Benchmarking Methodologies for Future Network Security Mechanisms, a.k.a. Evaluation Methods for Internet Security Technology (EMIST)

Investigators:
G. Kesidis (PI), P. Liu, P. McDaniel, and D. Miller at PSU; D. Sterne and S. Schwab at McAfee; S. Murphy at SPARTA

For Internet worm attacks, we have begun a series of realistic scale-down experiments on the DETER testbed. Preliminary results for the Slammer worm are reported in Proc. ACM WORM, on 10/29/04. Related work on mathematical modeling for the Slammer will be reported in QoS-IP Workshop on 02/02/05. The realism of our experiments was argued based on comparisons with Internet measurements when Slammer struck on 01/25/03. In the context of future detailed enterprise-network emulations of a worm attack by the EMIST team, this work allows for simple and accurate recreation of the worm scanning traffic *to* the enterprise-network-under test *from* the rest of the Internet. Again for the case of Slammer, the related software is available at the EMIST website.

Award No:
CNS-0311084
Project Title:
Infinite-Dimensional Stochastic Hybrid Systems: A Unified Framework for Distributed Control with Limited and Disrupted Communication

Investigators:
Joao P. Hespanha (PI), Andrew Teel (co-PI)

Institution:
University of California, Santa Barbara

This project addresses the control of spatially distributed linear processes via communication networks. We consider distributed architectures in which multiple local controllers coordinate their efforts through a data network that allows information exchange. The controller's access to the network is mediated by a "communication logic" that determines which data to send to the network, when to send it, and how to process incoming data.

A key research accomplishment for this project was the design of communication logics that result in optimal tradeoffs between (1) the communication load required by the coordination between local controllers and (2) the control performance. When no penalty is posed in the communication load, the optimal solution to this problem degenerates into a centralized control algorithm. The other extreme case in which one simply wants to minimize communication has also been previously solved (by us and others). However, none of these limiting cases is of great use to practical applications.

CNS CLUSTER I. COMPUTER SYSTEMS -- B.3 Outcome Goal for TOOLS:
Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

Comments:

CNS achieved its outcome goal of providing broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation. In addition, the committee suggests CNS to further strengthen linkage with industry and open source community for broader adoption, dissemination and commercialization of the tools. Examples of successful projects funded by CNS in this area include:

Award No: 0335241
Project Title:
Collaborative Research: Testing and Benchmarking Methodologies for Future Network Security Mechanisms, a.k.a. Evaluation Methods for Internet Security Technology (EMIST)

Investigators:
G. Kesidis (PI), P. Liu, P. McDaniel, and D. Miller at PSU; D. Sterne and S. Schwab at McAfee; S. Murphy at SPARTA
Website:
http://emist.ist.psu.edu ; see also http://www.isi.edu/deter for sister DETER project

A preliminary version of the EMIST Experiment Specification and Visualization Tool (ESVT, formerly "GUI") was distributed on 10/29/04. This tool allows an experimenter to conveniently specify a large-scale cyber security attack-defense experiment. Specifically, the tool outputs a TCL file that is compatible with DETER, Emulab or NS-2 (as selected by the user). Upon execution of an experiment, the ESVT can be used to visualize the (TCPDUMP) results. The preliminary EVST was developed for simple worm attack experiments. This tool's capabilities are currently being expanded to include convenient incorporation of currently available (and soon-to-be available, e.g., via DHS PREDICT project) traffic traces and network topologies. Also, we are expanding the existing visualization capability, e.g., in order to mount McAfee's Floodwatch DDoS attack-defense experiments. Finally, we plan to "port" certain features of our EVST tool to the Emulab GUI for wider distribution on a UNIX platform.

Another example of success story is the "Cyber Defense Network Testbed", Award No. 0335264.

CNS CLUSTER I. COMPUTER SYSTEMS -- B.4 Outcome Goal for Organizational Excellence: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[7]
Comments:

CNS has effectively used its resources, as evidenced by the fact that 95% of the budget goes to funding research projects. In terms of the human resource, it has also done an excellent job. It uses 50% outside manpower in terms of IPAs. The merit review process is outstanding and has been successfully conducted. Finally, NSF leads the efforts of automating the process of proposal submission, panel reviews, and post-award monitoring. Fastlane exemplifies as one of the best proposal management tools. The recent effort on developing Electronic Jacket is also commendable.

2.1.3 *CNS CLUSTER I. COMPUTER SYSTEMS* -- PART C. Other Topics

2.1.3.1 CNS CLUSTER I. COMPUTER SYSTEMS -- C.1 Areas for Improvement

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

1. CISE/CNS should work to increase CISE representation in NSF wide cross cutting programs, e.g. IGERT, STC.
2. It is suggested that CNS should make further effort for co-funding of projects with other agencies and NSF directorates.
3. The number of CNS program managers and staff should be increased to maintain continued excellence in program management.

2.1.3.2 CNS CLUSTER I. COMPUTER SYSTEMS -- C.2 Program Performance Issues

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.

[7] *For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.*

2.1.3.3 CNS CLUSTER I. COMPUTER SYSTEMS -- C.3 Agency Wide Issues

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

1. The major decline of basic research funding in computing and information sciences from the Department of Defense and other federal agencies has resulted in significant increase in the number of proposals to NSF, particularly CISE. It is noted that NSF now funds 80% of all basic computer science research in the country. This has caused several serious consequences:
    a. The proposal award ratio from CISE and CNS has decreased significantly,
    b. The award sizes has decreased significantly,
    c. To make up the difference, the PIs in computing research community have spent far more time and effort to submit more research proposals, which compromises time and energy available for conducting real research and education efforts, and thus reduced the productivity and competitiveness of the community as a whole.

    Computing research is critical to the national competitiveness of the country. It is strongly recommended that funding to CISE and CNS be increased to provide adequate support to the critical computing research and education.

2. However, if increased budget allocation to CISE is not possible, there should be CISE wide limit on how many proposals each PI can submit per year to
    a. Reduce NSF workload
    b. Reduce PI workload and increase time for research and education efforts.
    c. Increase award ratio

    This strategy is clearly not desirable, but it is, however, a necessary compromise that need to be made.

3. It is recommended that CISE should further strengthen linkage between research and education in the proposal review process:
    a. Making education a truly important criteria for proposal review and awards.
    b. Require PI to make contribution to his/her department's education programs consistent with the goal of integrating research and education.
    c. Set up criteria in the proposal review process for evaluating the success of integrating research and education in prior NSF support.
    d. Set up criteria for evaluating efforts in recruiting and supporting minority students.
4. Reviewers should instructed by NSF/CISE to take into consideration of prior reviews in re-submitted proposals to ensure the consistency of the review process.
5. Funding and programs should be established to encourage international collaboration.

2.1.3.4 CNS CLUSTER I. COMPUTER SYSTEMS -- C.4 Other Issues

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

2.1.3.5 CNS CLUSTER I. COMPUTER SYSTEMS -- C.5 Improvement of COV Review Process

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

1. COV members should be provided with the necessary documents and information in advance of the visit.

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2.2 Sub Committee Report: CNS Cluster II. – Network Systems

Date of COV: March 29 – 31, 2006
Program/Cluster/Section: Cluster II – Network Systems
Division: CNS
Directorate: CISE
Number of actions reviewed: Awards: ~70 Declinations: ~70 Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: Declinations: Other:
Manner in which reviewed actions were selected: ▪ There were approximately 5500 new actions in COV period of 03, 04, 05 ▪ Random samples of 5% of awards and declines were selected, for each cluster listed in the table above, leading to: o CSR Cluster: 40 awards, 39 declines o NeTS Cluster: 66 awards, 65 declines o CRI Cluster: 11 awards, 11 declines o EWF Cluster: 10 awards, 11 declines A list of these proposals as well as a list of all the proposals reviewed by the division over the last three years can be found on the COV web page. The COV can access any proposal on either list during the meeting.

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2.2.1 *CNS Cluster II. Network Systems* -- PART A. 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 under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

2.2.1.1 CNS CLUSTER II. NETWORK SYSTEMS -- A.1 Merit Review Procedures

Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[8]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments: The review mechanism is appropriate – detailed reviews followed by an effective panel review provide a clear, strong basis upon which the NSF make its funding decisions. In the overwhelming majority of cases the merit review process led to creditable decisions. The COV noticed only a few situations in which the process was followed in form, but not spirit.	**Yes**
2. Is the review process efficient and effective? Comments: We recognize that the program officers have a tremendous workload and that returning a decision in less than six months is impressive and indicative of the efficiency of the process. The process is efficient in the sense that data is accumulated and applied in a time- and effort-efficient manner. When both the form and spirit of the process are followed, adequate bases for funding decisions are established with a relatively limited amount of effort. For most researchers the process is effective in providing useful feedback and a clear basis for decisions. For a small number of cases, this was not the case (see questions 1, 3 and 4).	**Yes**
3. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments:	Yes

[8] *If "Not Applicable" please explain why in the "Comments" section.*

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[8]
Most reviewers take their responsibilities seriously and develop quality reviews upon which sound funding decisions can be made and defended. Program officers have a formidable task in finding qualified reviewers and they are to be commended for their efforts. As the number of submitted proposals continues to grow, management of the peer-review process will become more difficult. A few of the reviews that we read did not supply adequate bases for funding recommendations. In some cases it was clear that reviewers had simply not read the proposals in detail or did not understand one or more sections of the proposal. The program officer should make it clear that he or she expects a quality review. In the case of funded researchers, the PO should not hesitate to use his or her leverage to acquire quality reviews. The COV feels that the review analysis should specifically comment on the quality of the reviews. References to reviewers' recommendations without characterization of the quality of the reviews do not serve well the PIs. The NSF may want to consider maintaining a reviewer database that tracks the quality of reviews. The mere existence of this database may encourage reviewers to provide more thoughtful and detailed reviews.	
4. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments: As with reviewers, panels clearly take their responsibilities seriously and most panel summaries provide PIs with good feedback that both allows the PI to fully understand the rationale for the funding decision and, in addition, provides suggestions for proposal improvement. In a few cases the panel reviews simply quote from the reviews. The panel reviews for the CyberTrust program were notable in exhibiting this problem. This is not sufficient – an effort should be made to develop a panel perspective that is independent of (or complementary to) the reviews. The panel is responsible for helping the researcher to understand the funding decision to provide constructive criticism.	**Yes**
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: In a few cases, the recommendations provided only cursory summaries of the reviews, without providing information as to the quality of the reviews. An "excellent" review that consists of two or three summary sentences should be identified as such. We also noted cases in which the program officer used material from the reviews without attribution. The recommendation should have documented support from detailed reviews.	**yes**
6. Is the time to decision appropriate? Comments: The time to decision is impressive considering the workload.	**Yes**

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[8]
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: The COV was impressed that in several circumstances the Program Officer elected to support a proposal with a reduced budget and reduced period of performance even when the panel and external reviews did not clearly recommend such an action. Panels and reviewers are often hesitant to support high-risk efforts and it is to the credit of NSF that POs, based on their own experience and insight, elect to take a chance on high-risk efforts that have potentially high rewards.	

2.2.1.2 CNS CLUSTER II. NETWORK SYSTEMS -- A.2 Merit Review Criteria
Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, **DATA NOT AVAILABLE, or NOT APPLICABLE**[9]
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments: Most reviews addressed both the intellectual merit and the broader impact criteria. Almost all reviews addressed the intellectual merit criteria in good detail though there were a few exceptions. Generally, constructive feedback was provided on the intellectual merit. For proposals receiving poor ratings, the reviews did identify the shortcomings and in several cases provided feedback on what needs to be addressed to improve the proposal. For proposals receiving high ratings, the reviews typically picked up on the innovative aspects of the work and commented adequately. While reviewers did comment on the broader impact of the proposals, we note that the comments were often not specific to the program and mostly related to graduate education. It would be beneficial to encourage the reviewers and the PI to focus the broader impact more on the context of the call for proposals as well as the proposal itself. One mechanism that could address this is to have more specificity in the call for proposals regarding the expected broader impact. The COV was generally impressed by the handling of the career proposals.	**Yes**

[9] *In "Not Applicable" please explain why in the "Comments" section.*

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[9]
2. Have the panel summaries addressed both merit review criteria? Comments: The panel summaries in general do address both the merit review criteria (with some exceptions). In general the discussion of the intellectual merit is more detailed while the broader impact evaluation is brief. However, there are several instances where the panel has provided constructive criticism on how to improve the broader impact.	**Yes**
3. Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments: In a majority of cases, the program manager followed the panel recommendation and the review analysis typically aligned with the panel arguments. However, in some cases the program manager did go against the panel review. We note this as a positive because many high-risk projects tend to receive either split or mediocre panel reviews. Thus, it is up to the program manager to fulfill NSF's larger mission to fund innovative and high risk research.	**Yes**
4. Additional comments with respect to implementation of NSF's merit review criteria: Mostly, each proposal was evaluated based on its specific merits and good PIs track records were not a factor in filling gaps in proposals. Also, the lack of track records by new PIs were not a negative factor in proposal evaluation. We believe that high-risk projects should be evaluated with a strong emphasis on the broad impact. Often, high-risk projects are subject to a more stringent evaluation in panels either because of obvious gaps (which are to be expected in this form of proposal) or because of a research plan that is not as technically clear as possible with an incremental proposal . A strong focus on the broad impact criteria for these proposals will enable a better evaluation of risk versus reward tradeoffs.	

2.2.1.3 CNS CLUSTER II. NETWORK SYSTEMS -- A.3 Selection of Reviewers
Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[10]
1. Did the program make use of an adequate number of reviewers? Comments:	**Yes**

[10] *If "Not Applicable" please explain why in the "Comments" section.*

SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[10]
The program by and large assembled an impressive group of reviewers who are leading experts in their respective fields. Judging by the proposals we have sampled, we found that CNS-NetS does use an adequate number of reviewers.	
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The reviewers are highly qualified and many of them are leaders in academic and industrial organizations. We found that the CNS-NetS uses well-qualified experts in the proposal review process. The division also has tried to invite reviewers right after the deadlines of the programs to improve the participation rate.	**Yes**
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[11] Comments: The program selected a diverse set of reviewers with reasonable balance in geography, academics and industries. However, there appears to be a lack of underrepresented groups. There is a wider range of reviewers in Cybertrust, possibly due to the nature of the program. We found that CNS-NetS had made several specific steps to get reviewers from a balanced mix of institutions for a majority of proposal reviews. For example, we have seen well-qualified reviewers from Europe and Asia, from industry, research labs, other agencies and underrepresented groups.	**Yes**
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: The program made appropriate efforts to recognize and resolve conflicts of interests. NSF should continue to perfect the COI management software to streamline the process.	**Yes**
Other comments: 5. Additional comments on reviewer selection: We notice that reviewers of similar backgrounds tend to arrive at similar conclusions. While reviewers of more diverse background (e.g. a mix of industry and academics) tend to arrive at a wider range of recommendations (e.g. V, G. vs Poor).	

2.2.1.4 CNS CLUSTER II. NETWORK SYSTEMS -- A.4 Portfolio of Awards
Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

[11] *Please note that less than 35 percent of reviewers report their demographics, so the data may be limited.*

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[12], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. Comments: The overall quality of the research and/or education projects supported by the program is excellent (see section B for specific examples).	appropriate
2. Are awards appropriate in size and duration for the scope of the projects? Comments: The average award size per year has decreased from $228,620 for FY 2003 to $151,277 for FY 2005, a reduction of about 30%. At the same time, the average award duration has decreased from 2.98 years to 2.69 years. In practice, this decline in award size translates into the loss of support for one graduate student or reduced funding for the PI (down to 1 summer month). This trend to smaller and shorter awards is troublesome because it may affect the type of research produced and increase the pressure to apply for additional funding. Attempts should be made to stop and reverse this trend. At the same time, the COV recognizes that the above trend reflects an attempt by CNS to respond to the steady increase in the number of new proposals in the presence of limited budget resources by funding more of the highly-recommended proposals, but at a reduced level.	appropriate
3. Does the program portfolio have an appropriate balance of: Innovative/high-risk projects?[13] Comments: The program appears to have an appropriate balance of traditional/safe and innovative/high-risk projects. The POs have made good and innovative use of SGERs to identify and fund high-risk projects.	appropriate
4. Does the program portfolio have an appropriate balance of: Multidisciplinary projects? Comments: Based on the sampled projects, the program portfolio appears to have a reasonable balance of multidisciplinary projects, especially with respect to the ITR initiatives.	appropriate
5. Does the program portfolio have an appropriate balance of: Funding for centers, groups and awards to individuals? Comments: The program has an appropriate balance of funding for centers, groups, and awards to individuals. While the majority of awards are to individuals or groups, the program has	appropriate

[12] *If "Not Appropriate" please explain why in the "Comments" section.*
[13] *For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment, available at <www.nsf.gov/about/performance/acpga/reports.jsp>.*

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[12], OR DATA NOT AVAILABLE
responded to the emergence of important new areas by funding, for example, a S&T Center at UC Berkeley and a cyber trust center for Internet epidemiology and defenses.	
6. Does the program portfolio have an appropriate balance of: Awards to new investigators? Comments: The balance of awards with new investigator involvement appears to be appropriate. The number of submission with new investigator involvement in NeTS increased from 264 in FY 2003 (out of a total of 576) to 482 in FY 2005 (out of a total of 1075). The number of awards with new investigator involvement increased from 51 to 68, representing a 3% decrease in the success rate of submissions with new investigator involvement (from 9% to 6%). It is imperative to continue this trend of supporting new PIs and it is desirable to improve it.	appropriate
7. Does the program portfolio have an appropriate balance of: Geographical distribution of Principal Investigators? Comments: All 50 states and the District of Columbia are represented in the PI pool for Total Awards over the three years time period. The geographic distribution appears relatively consistent with a rough sense of the distribution of both population and strong universities.	appropriate
8. Does the program portfolio have an appropriate balance of: Institutional types? Comments: The program portfolio contains awards across all types of Institutions as defined by the Carnegie Classification. As expected, the greatest number of awards (100s per year) go to Research Intensive PhD Institutions, followed by Non-Research Intensive PhD Institutions. An order of magnitude fewer awards (10s) go to Masters Institutions and Business/State/Local/Foreign Institutions. Another order of magnitude fewer awards (handful) go to 2 Year and 4 Year institutions.	appropriate
9. Does the program portfolio have an appropriate balance of: Projects that integrate research and education? Comments: The data available to answer this question consists of the number of REU site awards and the number of CRCD/EI awards. This data indicates that the number of awards in these programs is declining over time. It would be helpful to understand the basis for this trend. We understand that many (even most) other awards do integrate education and research in (at minimum) the inclusion of graduate students in the research projects. Our review of the sample of awards reveals significant graduate student participation. Overall, it would be helpful to have additional data that address this question, as well as additional emphasis by CISE on strong connections between research and education. We are pleased to hear that this is already in CISE set of future plans.	appropriate (with caveat)

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[12], OR DATA NOT AVAILABLE
10. Does the program portfolio have an appropriate balance: Across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: Our sample of awards indicates that they span considerable breadth in the field, including disciplines and sub-disciplines of security, wireless, network architecture, services, etc. We did notice, however, that support for Optical Networking significantly declined over the time period. This type of work is expensive and the hope is that it will be supported in the future (e.g. by GENI). The COV particularly commend NSF for success in supporting emerging opportunities. We saw several mechanisms used to accomplish this, including funding large and ambitious collaborative projects at a reduced rate and duration to allow ideas to mature.	appropriate
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments: We have data regarding the participation of minorities and women as PIs. In both cases the participation of PIs within the program is consistent with the CISE-wide participation. In both cases, the level of participation of PIs is consistent across the time period, with no losses, but also no gains. We also have data regarding the involvement of minority serving institutions. These institutions struggle to produce successful proposals; the success rates of the proposals submitted is small. It may be worth additional effort by NSF to assist minority serving institutions in producing fundable proposals.	appropriate
13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments: NSF as the dominant source of public research funding, continues to maintain the leadership role that began with its mid-1980s creation of National Research and Education Network that was the basis of today's Internet. The CNS FIND (future Internet design) program is critical because the evolutionary gains from the NSF led 1987-2000 plan is no longer appropriate for the internet's past two decades of exponential growth. Nearly every facet of the network requires re-examination and is part of the program, including: • Data transmission and switching through fiber optic channels – For the last decade, the question of how information is routed between sources and sinks is still to be solved. • New and evolving services resulting from dramatic gains in bandwidth. These range from HDTV to multi-point communication for various new forms of communication and interaction, including realistic 3D conferencing. • Fiber optic network to the home e.g. 100 megabits to 100 million homes • Extension of the edge to wireless networks, including extensive, ubiquitous sensor networks. • Fiber optic networks for science, from astronomy and oceanography to high energy physics. • Current and planned extensions for security, Cyber Trust, and anonymity	appropriate

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[12], OR DATA NOT AVAILABLE
14. Additional comments on the quality of the projects or the balance of the portfolio:	

2.2.1.5 CNS CLUSTER II. NETWORK SYSTEMS -- A.5 Management
Questions about Management of the program under review. Please comment on:

REVIEW OF PROGRAM MANAGEMENT
1. Management of the program. Comments: The overall management structure of the program is very strong. We appreciate the collegiality, the flexibility and the extremely strong work ethic of the CNS program officers. In addition, despite ever- increasing numbers of proposals, CNS has been able to become even faster in processing them. In general: the transparency of NSF operations and the quality of Fastlane continue to grow. One management issue for the program is standing back and assessing the decreasing size and duration of awards. Like everyone, we would like to see whatever means may be brought to change the trend and level or increase the size and duration of award, for the benefit of the awardees (and also the program officers managing the awards).
2. Responsiveness of the program to emerging research and education opportunities. Comments: The diversity of people involved in the program (academia and industry) and the different forms of participation (reviewers, panelists, rotating NSF program officers), the active participation of this program in workshops and conferences constitute fertile grounds for responsiveness. The program officers are aware of current issues and emerging research and education opportunities. The process of division directors submitting white papers to upper NSF levels to create new funding programs is a worthy mechanism enabling such responsiveness.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: CNS has undergone a remarkable simplification process in the recent years. During our period of review the division went from over twenty-five programs to the four-cluster structure. This management change was well founded. The more integrated, multi-disciplinary structure has allowed CNS to respond to external priorities with timely and forward-looking research programs such as Cyber-Trust, FIND and the early planning of GENI. CNS NeTS is one of the few Divisions in NSF initiating high risk and high impact, forward-looking research programs. This management structure has been very successful so far.
4. Additional comments on program management: CNS now does a very good job of encouraging collaborations between academia and industry, which are important in

REVIEW OF PROGRAM MANAGEMENT

many networking and security areas. But this is not easy with a limited budget from a management and funding standpoint. We would like to see more funding from CISE and more explicit recognition of this collaborative research so that it does not come at the expense of reduced budget for academic researchers.

2.2.2 *CNS CLUSTER II. NETWORK SYSTEMS* -- PART B. Results: Outputs and Outcomes of NSF Investments

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- *To promote the progress of science.*
- *To advance national health, prosperity, and welfare.*
- *To secure the national defense.*
- *And for other purposes.*

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

2.2.2.1 CNS CLUSTER II. NETWORK SYSTEMS -- B. Strategic Outcome Goals

Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

CNS CLUSTER II. NETWORK SYSTEMS -- B.1 Outcome Goal for PEOPLE:
Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."
Comments:

The PlanetLab project had a geographic diversity component that were very useful for building a community, and more importantly, it lowered the barrier regarding the level of resources needed to conduct extensive experimentations.

The Accurate project has had a major role in raising the public awareness about many issues related to e-voting, which we regard as a positive step for educating the public at large about an issue crucial to society.

The healthy level of support to graduate students and the increased level of support to REU sites have a positive impact on the development of a well-trained workforce. Moreover, the ability to support cutting-edge research ensures that this workforce is prepared for facing new challenges.

Statistics show a reasonable level of involvement of females in the role of Pis.

CNS CLUSTER II. NETWORK SYSTEMS -- B.2 Outcome Goal for IDEAS:
Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."
Comments:

Accurate (A Center for Correct, Usable, Reliable, Auditable, and, Transparent Elections) http://accurate-voting.org/ is already producing significant results in affecting electronic voting.

PlanetLab http://www.planet-lab.org/ is one of the most important ideas and tools that have come from CNS. Funding began in September 2003 as an overlay network (network on top of internet), and the project has exceeded its goals of being a platform for exploratory planetary-scale network services research, including: a wide range of facilities, services, protocols, security and network health on a world-wide basis. It has grown to over 600 world-wide nodes, resulting in thousands of experiments and resulting papers, and a third of a million Google references. While useful on its own, it has stimulated the much wide scale GENI (Global Environment for Network Innovations).

Prowin http://www.programmablewireless.org/ is a wide-ranging program that includes the FCC, DARPA, DISA's Defense Spectrum Office, DOD's Joint Tactical Radio System Program as well as the Amateur Radio Platforms for Experimentation, GNU (Open Source Radio), and Software Defined Radio Forum. This research has proven to be essential both for its intellectual and technical merit to policy advice regarding the RF spectrum allocation.

Emulab http://www.emulab.net/ is a network emulation test bed that provides integrated access to three disparate experimental environments: simulated, emulated, and wide-wide-are network testbeds for fixed and mobile wireless networks. Numerous experiments have been carried out including the use of remote robots to map the field of wireless sensor networks.

The Cyber Trust centers represent the critical resources for technology, tools, and training for cyber security in light of the national concern for security and terrorism.

Gaps and opportunities:

1. Optical networking.
2. HHS for both privacy and home health care using wireless sensor networks.

CNS CLUSTER II. NETWORK SYSTEMS -- B.3 Outcome Goal for TOOLS:
Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."
Comments:

DETER http://www.isi.edu/deter/ project is a laboratory with the goal to create, maintain, and support a collaborative and vendor-neutral experimental environment for cyber-security research. It is intended to provide a center for interchange and collaboration among security researchers and testbed builders. The DETER effort includes: the Deter testbed: a shared testbed infrastructure that is specifically designed for medium-scale (e.g., 100 node) repeatable experiments, and especially for experiments that may involve "risky" code. The DETER research community: a community of academic, industry, and government researchers working toward better defenses against malicious attacks on our networking infrastructure, especially critical infrastructure.
DETER has been co-funded with the Department of Homeland Security.

CNS CLUSTER II. NETWORK SYSTEMS -- B.4 Outcome Goal for Organizational Excellence: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[14]
Comments:

The electronic jacket system seems to have increased the efficiency of handling proposals and the interactive panel system has definitely improved the process of proposal evaluation.

The new cluster organization proved to be effective in managing the increased number of proposal submissions and the increased diversity in the research areas.

The cooperation between the program officers is commendable and beneficial as evident by the number of programs jointly managed by multiple POs and by the proposals fiunded by multiple programs.

The increased flexibility given to program managers led to a more effective management style that resulted in supporting riskier cutting edge research. It also allowed the POs to better allign the funding decisions with the goals of the cluster, even when those were not aligned with the panel decisions.

[14] *For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.*

2.2.3 *CNS CLUSTER II. NETWORK SYSTEMS* -- PART C. Other Topics

2.2.3.1 CNS CLUSTER II. NETWORK SYSTEMS -- C.1 Areas for Improvement

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

It was clear to the panel that by reducing the load on the POs, they will be able to provide better feed back to the PIs.

Whenever a new program is introduced, it is imperative to make every effort to increase the pool of reviewers available to review the proposals. Some kind of orientation should be provided to the reviewers whenever the reviewers are not familiar with the culture of NSF and the community regarding the review process.

Restricting the number of proposals submitted by each PI may reduce the proposal pressure and thus the load on the POs. It may also increase the pool of reviewers since only reviewers not submitting proposals for a program are allowed to participate in panels for that program.

The COV encourages NSF to fund PIs sufficiently during summer. Reducing the budget for summer support may be counter productive.

2.2.3.2 CNS CLUSTER II. NETWORK SYSTEMS -- C.2 Program Performance Issues

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.

2.2.3.3 CNS CLUSTER II. NETWORK SYSTEMS -- C.3 Agency Wide Issues

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

The pool of highly qualified program officers may greatly increase if NSF makes it more attractive to prominent researchers to serve as POs. Possible measures towards that goal include relaxing the residency requirement, reducing the workload, allowing partial-time appointments, and providing "thank you" awards at the end of POs terms.

The mission of NSF can be greatly enhanced if funding increases, for both administrative responsibility and research.

2.2.3.4 CNS CLUSTER II. NETWORK SYSTEMS -- C.4 Other Issues

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

In 2006, NSF's CNS program in Cyber Trust and security is the dominant source of research, tools, technology, and people in these areas. The GENI (Global Environment for Network Innovations) project in the CNS incubation phase promised to be a large scale network that will enable the exploration of many of these efforts. It's goal is "to enable the research community to invent and demonstrate a global communications network and related services that will be qualitatively better than today's Internet."

2.2.3.5 CNS CLUSTER II. NETWORK SYSTEMS -- C.5 Improvement of COV Review Process

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

Providing the necessary material to COV members a few weeks in advance can increase the efficiency of the COV review process.

Having some capability of sharing files would greatly facilitate the task of writing the COV report.

Scheduling the meetings in the same building would help the COV members adhere to the tight and demanding schedule of the review process.

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2.3 Sub Committee Report: CNS Cluster III. – Research Infrastructure

Date of COV: March 29-31, 2006
Program/Cluster/Section: Cluster III – Research Infrastructure
Division: CNS
Directorate: CISE
Number of actions reviewed: Awards: 11 Declinations: 11 Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: Declinations: Other:
Manner in which reviewed actions were selected: **The 22 proposals actions reviewed were based on the sample provided by the CNS Division.**

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2.3.1 *CNS Cluster III. Research Infrastructure* -- PART A. 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 under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

2.3.1.1 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- A.1 Merit Review Procedures

Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[15]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments: The review process in this cluster is handled through panels, however in some rare cases a small number of mail-in reviews have been used to supplement the panel reviews. Traditionally the program has used site visits for large grants. In the third year of this review period (2005) there was no site visit data provided. This is a program where institutional support would be critical for the success to major infrastructure investments. Site visits are good mechanisms through which institutional support could be better evaluated. It would be good that such instrument be used in proposals for large infrastructure investment submitted by both non-minority serving institutions and minority serving institutions.	YES
2. Is the review process efficient and effective? Comments: The majority of the proposals in this cluster were reviewed within six months of their submission. A review of the dwell time for proposals in FY 2005 showed that proposals took longer to be processed. More resources should be allocated to reduce such delays.	YES
3. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments: Of the proposal reviewed, the majority of reviews provide sufficient information whether the proposal is funded or not. Although some individual reviews are not informative enough on how a proposal could be improved if it were declined, the panel summary makes up for this lack of information. So on balance the reviews were found to be detailed enough to adequately elaborate on the strengths and weaknesses of the proposal to justify the reviewers' ratings.	YES

[15] *If "Not Applicable" please explain why in the "Comments" section.*

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[15]
4. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments: The information contained in the panel summaries conveys sufficient detail for the PIs to understand the rationale for the final recommendation by the panel. Even when a proposal was rated highly but declined, the panel summary captured the essential elements of the weaknesses in the proposal that led to the final decision.	YES
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: Most of the panel summaries consisted of constructive criticism. Even when brief at times, all summaries provided sufficient information to the PI on the main concerns raised by the reviewers and on how the proposal could be improved for a future submission. Furthermore, the review analysis statements are all quite detailed and clearly convey the rationale for the final decision. Some of the review analyses are exceptionally detailed and truly impressive. In summary, the documentation for recommendations on the proposal reviewed was complete and the program officers provided sufficient information and justification for their decision with references made to the panel reviews and NSF policies, and proposal goals.	YES
6. Is the time to decision appropriate? Comments: In general, the time to decision is appropriate.	YES
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: We note that a very small fraction of reviewers provide uninformative reviews. NSF should consider ways to discourage such problems.	

2.3.1.2 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- A.2 Merit Review Criteria
Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, **DATA NOT AVAILABLE, or NOT APPLICABLE**[16]
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments: All reviews have explicitly addressed both merit review criteria in sufficient detail.	YES
2. Have the panel summaries addressed both merit review criteria? Comments: All panel summaries have explicitly addressed both merit review criteria in sufficient detail.	YES
3. Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments: The review analysis statements are all quite detailed and clearly convey the rationale for the final decision. Some of the review analyses are exceptionally detailed and truly impressive.	YES
4. Additional comments with respect to implementation of NSF's merit review criteria: In one e-jacket, the review analysis was placed in the collaborative proposal instead of the lead proposal, but this was a minor issue since the review analysis was placed in the lead proposal in the hard copy jacket.	

2.3.1.3 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- A.3 Selection of Reviewers
Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

[16] *In "Not Applicable" please explain why in the "Comments" section.*

SELECTION OF REVIEWERS	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE**[17]
1. Did the program make use of an adequate number of reviewers? Comments: This cluster tries to effectively manage reviewer's workload by keeping the number of proposals to be reviewed by each reviewer to 8. At the same time, each proposal is receiving 4 to 5 reviews. This balance provide for in depth and substantive reviews.	YES
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Given the constraints under which NSF operates, such as time constraints and need to achieve geographic and demographic balance of the reviewers, the qualifications of reviewers are in large part appropriate. The number of reviewers per panel, and the four reviews per proposal ratio helps ensure that every proposal is reviewed by qualified reviewers.	YES
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[18] Comments: Yes, particularly on the balance in geography, institution type and underrepresented groups, the cluster has done an excellent job. In 2005, the representation of women and underrepresented groups declined with respect to the other years for some unknown reason. It is hoped that this decline is short lived.	YES
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments:	YES
5. Additional comments on reviewer selection:	

2.3.1.4 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- A.4 Portfolio of Awards
Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

[17] *If "Not Applicable" please explain why in the "Comments" section.*
[18] *Please note that less than 35 percent of reviewers report their demographics, so the data may be limited.*

RESULTING PORTFOLIO OF AWARDS	**APPROPRIATE, NOT APPROPRIATE[19], OR DATA NOT AVAILABLE**
1. Overall quality of the research and/or education projects supported by the program. Comments: Excellent to very good in all instances of the proposals reviewed.	APPROPRIATE
2. Are awards appropriate in size and duration for the scope of the projects? Comments: In general, yes. In some instances, the funding was reduced on some proposals, which may have reduced the scope of these projects. This is also understandable given the available budget with respect to the number of proposals that were recommended for funding.	APPROPRIATE
3. Does the program portfolio have an appropriate balance of: Innovative/high-risk projects?[20] Comments: The balance is appropriate for this cluster. The balance is more in favor with innovative projects than with high risk. This is also due in large part to the fact that high-risk proposals are very difficult to review.	APPROPRIATE
4. Does the program portfolio have an appropriate balance of: Multidisciplinary projects? Comments: Yes and the trend is moving towards such projects.	APPROPRIATE
5. Does the program portfolio have an appropriate balance of: Funding for centers, groups and awards to individuals? Comments: Yes, but the trend is more towards centers and groups than to individuals. This is appropriate given the mission of this cluster. We encourage this balance to continue. Furthermore, we encourage the funding of model research centers at Ph.D. granting MSIs.	APPROPRIATE
6. Does the program portfolio have an appropriate balance of: Awards to new investigators? Comments: Compared to other clusters in CNS, this cluster is performing better in funding proposals involving new investigators. Overall, these are very encouraging results for this cluster and	APPROPRIATE

[19] *If "Not Appropriate" please explain why in the "Comments" section.*
[20] *For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment, available at <www.nsf.gov/about/performance/acpga/reports.jsp>.*

RESULTING PORTFOLIO OF AWARDS	**APPROPRIATE, NOT APPROPRIATE[19], OR DATA NOT AVAILABLE**
funding new investigators should continue to be encouraged as it helps them establish their program.	
7. Does the program portfolio have an appropriate balance of: Geographical distribution of Principal Investigators? Comments: The data provided in the self-study document shows an appropriate balance in the geographic distribution of the awards.	APPROPRIATE
8. Does the program portfolio have an appropriate balance of: Institutional types? Comments:	APPROPRIATE
9. Does the program portfolio have an appropriate balance of: Projects that integrate research and education? Comments:	APPROPRIATE
10. Does the program portfolio have an appropriate balance: Across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: From the proposals reviewed, we found a good sampling which showed balance across different areas and disciplines, such as areas security, sensors, grid computing, parallel computing, distributed computing, pervasive computing, networking, visualization, data repository, data mining, human-computer interfaces, and robotics to name a few.	APPROPRIATE
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments:	APPROPRIATE
13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments:	APPROPRIATE
14. Additional comments on the quality of the projects or the balance of the portfolio:	

2.3.1.5 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- A.5 Management
Questions about Management of the program under review. Please comment on:

REVIEW OF PROGRAM MANAGEMENT
1. Management of the program. Comments: The cluster has gone to single program management structure (i.e., CRI Program). This single structure may not provide the appropriate flexibility for the cluster to effectively serve certain segments of the community. Particularly, it is unclear how the single CRI program serves Minority Serving Institution's infrastructure needs. The needs of those institutions have to be seriously taken into consideration within the current management structure or a new mechanism be devised.
2. Responsiveness of the program to emerging research and education opportunities. Comments: The sample from the portfolio indicates that this cluster is adequately responding to the emerging education and research opportunities.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: This goal is met by this cluster.
4. Additional comments on program management:

2.3.2 *CNS CLUSTER III. RESEARCH INFRASTRUCTURE* -- PART B. Results: Outputs and Outcomes of NSF Investments

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- *To promote the progress of science.*
- *To advance national health, prosperity, and welfare.*
- *To secure the national defense.*

- *And for other purposes.*

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

2.3.2.1 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- B. Strategic Outcome Goals
Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- B.1 Outcome Goal for PEOPLE:
Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

Comments:

This cluster is doing an excellent job in achieving the outcome goal for PEOPLE: There is a rich set of educational activities. In addition to the traditional training of graduate students, many projects have produced tools and modules that have been introduced into undergraduate and graduate curricula. A number of projects have integrated cutting edge research into undergraduate and graduate computer science and engineering courses (e.g., 0203446). Other projects are situated at undergraduate institutions, where they have allowed undergraduates a rich set of research opportunities (0216344**). Yet other projects reach out to primary and secondary schools by making their tools accessible for class projects (**0224306). Collaborations between HBCU and HIS have led to joint publications and doctoral degrees for minority students (0220562).

CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- B.2 Outcome Goal for IDEAS:
Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

Comments:

Cluster III with its support of centers, multidisciplinary proposals, and educational/research infrastructure has helped spawn discovery across boundaries of computing, science and engineering. Several nuggets that were reviewed and together with the annual reports available span a wide spectrum of research fields in terms of noted progress in such areas as: security (0313160), high-resolution aerial imagery (0220562), next generation of Web browsing (0454052), robotics (0224363), sensors (0454259), computing (grid/parallel/distributed computing) and networking (0325024, 0421456, 0452180), Immersive/visualization (0403433), data repository/mining, environmental monitoring (0454259) human-computer interfaces (0520811).

CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- B.3 Outcome Goal for TOOLS:
Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

Comments:

This cluster is doing an excellent job in expanding opportunities for the community to have access to the state-of-the-art tools and facilities that enables it to push the boundaries of knowledge in computer science and applications. The following are some of the examples highlighting the iTOOLS related contributions of this cluster. An example of this is the high

performance visualization system called HIPerWall for collaborative earth system science (0421554). Another example is the work done from the CRASAR Center with the R4 Award (0224401) which has deployed some of its robots for search and rescue efforts in hurricanes Katrina and Wilma as well as the La Conchita, CA mudslide. This project also provides its robots to other institutions for research and education through a loan program. The SCOUT project (0224363) has helped Berea College, a small teaching institution, in introducing and involving undergraduate students in research in robotics.

CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- B.4 Outcome Goal for Organizational Excellence: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[21]
Comments:

The interactive panel review process is a significant addition that has improved significantly the efficiency of the review process.

The new e-Jacket system also has significantly improved the management of the proposal review and granting process.

2.3.3 *CNS CLUSTER III. RESEARCH INFRASTRUCTURE* -- PART C. Other Topics

2.3.3.1 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- C.1 Areas for Improvement

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

This is one of the clusters that greatly facilitates cross-funding of activities across the foundation and other agencies. It would be an enormous value to the NSF research community to increase the support to this cluster to facilitate more of inter-agency funding (with for example NIH, DOE) for infrastructure support and inter-disciplinary research.

2.3.3.2 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- C.2 Program Performance Issues

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.

This cluster has done an excellent job in efficiently and effectively managing the portfolio of projects under its supervision. The COV commends the program manager for such outstanding job.

2.3.3.3 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- C.3 Agency Wide Issues

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

We commend the extensive efforts of cluster III program managers who consistently seek funding from across programs/divisions at NSF and other federal agencies.

2.3.3.4 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- C.4 Other Issues

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

The COV for cluster III would like to commend the excellent job done by the program managers in managing the review process and supporting the researchers under their program. They go beyond the call of duty in insuring that good ideas and researchers doing excellent work get funding within a very constrained environment in terms of personnel and resources.

2.3.3.5 CNS CLUSTER III. RESEARCH INFRASTRUCTURE -- C.5 Improvement of COV Review Process

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

[21] *For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.*

The material for the COV should be available at least one week in advance of the meeting.

2.4 Sub Committee Report: CNS Cluster IV. – Education and Workforce

Date of COV: March 29-31, 2006
Program/Cluster/Section: Cluster IV – Education and Workforce
Division: CNS
Directorate: CISE
Number of actions reviewed: Awards: 19 Declinations: 11 Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: 176 Declinations: 300 Other: 52
Manner in which reviewed actions were selected: **Random sample provided by the division sampling method, supplemented by a few proposals from the division nuggets, a listing of BPC Alliance and Demonstration Project Awards, division annual reports, and perusal of specific programs through the NSF award web site.**

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2.4.1 *CNS Cluster IV. Education and Workforce* -- PART A. 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 under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

2.4.1.1 CNS Cluster IV. Education and Workforce -- A.1 Merit Review Procedures
Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[22]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments: Most proposals were reviewed by peer panels. In a few cases, decisions were made by the program manager, but these either were for supplements to existing awards for a PI's workshop, or for special projects.	Yes
2. Is the review process efficient and effective? Comments: The number of panel reviews was appropriate. There appears to have been variability in the number of panelists per proposal submitted among different programs, suggesting there may be some opportunity for increased efficiency. But there may be other factors not available to the COV that could have influenced this variance. Decisions by panel review were made within six months of submission. Some panels met within two or three months of the submission deadline. Decisions made by program managers were made very quickly after submission, but these probably involved a lot of discussion with the PI prior to submission.	Yes
3. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments: By and large, the reviews were informative. There were a small number of cases where a reviewer did not give substantive comment about the intellectual merit or did not really address broadening issues, but this was the exception.	Yes
4. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments: The panel summaries gave the most salient points of the decision, while not elaborating in the way many of the actual panel reviews did. Since the individual reviews themselves also are returned to the PI, this is not a problem.	Yes

[22] *If "Not Applicable" please explain why in the "Comments" section.*

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[22]
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: Especially in more recent award decisions, there is a review analysis that tends to explain the rationale for the particular proposal decision. There was variability in the manner in which these summaries provided proposal-specific rather than generic information about, say, declinations. In one particular proposal where a close call was made, the program director provided excellent and elaborate justification and direction for why the focus of the proposal was re-directed in the manner that it was. To the extent that the review analysis is mainly for the PI, unless the program director's decision conflicts with what the panel is recommending, there is no need for elaborate justification. Thus, it is appropriate that most review analyses are not elaborate. However, to the extent that this information is mainly for NSF, there should be more consistency among the program managers in the way in which this information is presented.	Sometimes
6. Is the time to decision appropriate? Comments: In terms of timeliness, see the answer to question 2. Decisions seemed to be made in the six-month timeframe expected. The timeliness of decision-making is a strength of this cluster.	Yes
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: None.	

2.4.1.2 CNS Cluster IV. Education and Workforce -- A.2 Merit Review Criteria
Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, **DATA NOT AVAILABLE, or NOT APPLICABLE**[23]
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments: This wasn't uniformly true, but it was true for the vast majority of reviews. The EWF cluster has a more natural focus on broader implications, so this is not surprising.	Yes
2. Have the panel summaries addressed both merit review criteria? Comments: Similar answer to 1. There is sensitivity to broader implications among programs in EWF. This is a strength of the cluster.	Yes
3. Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments: Not uniformly. There are instances of review analyses that are generic in nature. In some other cases, there are no review analyses altogether. This tended to be the case for proposals earlier in the period reviewed by the COV. On the other hand, if the panel summaries and the reviews typically addressed both criteria effectively, there may be no need to repeat this in the review analysis unless the program manager disagrees or there is a close call on the decision. However, it would be useful if there is some consistency among the NSF program managers in the manner in which these review analyses are written.	Yes, generally.
4. Additional comments with respect to implementation of NSF's merit review criteria: None.	

2.4.1.3 CNS Cluster IV. Education and Workforce -- A.3 Selection of Reviewers
Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

[23] *In "Not Applicable" please explain why in the "Comments" section.*

SELECTION OF REVIEWERS	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE**[24]
1. Did the program make use of an adequate number of reviewers? Comments: Except for special projects and some workshops, proposals tended to have at least three reviews and usually more. Some panels provided up to half a dozen reviews, which may be excessive. Some panels appeared to have a large number of panelists relative to the number of proposals being reviewed. Unless there are elements of the program or proposals being reviewed that suggest the need for a larger number of panelists, these panels probably could have been reduced in size.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: For the most part, reviewers included persons from institutions comparable to that of the proposal, though there was a mix of affiliations that comprised different classes of institutions in most cases. However, we noted instances where panels had no one from Research I institutions (though there were proposals being reviewed from such institutions). Reviewers did appear to have appropriate expertise.	Yes
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[25] Comments: This was not true for all individual proposals, but with the exception of one panel where there were no Research I panelists, there appears to have been an effort to include an appropriate balance in the panels.	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: The COV came across no COIs based on institutional affiliations, and had no information from which it could determine if there were any other COIs and, if so, how they were handled.	Data not available
5. Additional comments on reviewer selection: None.	

[24] *If "Not Applicable" please explain why in the "Comments" section.*
[25] *Please note that less than 35 percent of reviewers report their demographics, so the data may be limited.*

2.4.1.4 CNS Cluster IV. Education and Workforce -- A.4 Portfolio of Awards

Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[26], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. Comments: There are some very good ideas that were funded in the mix of proposals we reviewed. It should be noted that, with the expiration of the CLCD program, the ability to support educational development activities within EWF is now limited. ICER is one new proposed program that can help find a home for more education-oriented proposals.	Appropriate
2. Are awards appropriate in size and duration for the scope of the projects? Comments: In general, the size and scope of the projects are appropriate. One collaborative project and one REU site project took cuts of 30% or more with supposedly no impact on scope, according to the review analyses. The COV finds it hard to understand how such cuts could have no impact on scope and, more importantly, on the ability to achieve desired program outcomes.	Appropriate, in general
3. Does the program portfolio have an appropriate balance of: Innovative/high-risk projects?[27] Comments: The COV did not come across proposals that it considered particularly high-risk. One proposal appears to have reviews suggesting some elements of risk, and was a borderline call based on the panel reviews. The program manager decided against funding. The COV believes this is a case where a less risk-aversive decision could have been made.	DATA NOT AVAILABLE
4. Does the program portfolio have an appropriate balance of: Multidisciplinary projects? Comments: The COV reviewed only one proposal that appeared to be multidisciplinary. But the small number of proposals that were reviewed makes it impossible to render a meaningful judgment about the extent to which the portfolio is balanced in general. The REU sites program, for which overall award information was reviewed by the COV, does appear to contain a significant number of multidisciplinary projects.	DATA NOT AVAILABLE
5. Does the program portfolio have an appropriate balance of: Funding for centers, groups and awards to individuals? Comments: There was no data available to the COV from which this could be determined. Awards typically are made to individuals or groups of individuals, from the same or different institutions. The self-study notes that there are no particular targets for supporting centers.	DATA NOT AVAILABLE

[26] *If "Not Appropriate" please explain why in the "Comments" section.*

[27] *For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment, available at <www.nsf.gov/about/performance/acpga/reports.jsp>.*

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[26], OR DATA NOT AVAILABLE
6. Does the program portfolio have an appropriate balance of: Awards to new investigators? Comments: The fraction of awards to new investigators was not out of line with their proportion of proposals.	Appropriate
7. Does the program portfolio have an appropriate balance of: Geographical distribution of Principal Investigators? Comments: There was no data made available to the COV that was specific to EWF. The sample of proposals reviewed by the COV did have a reasonable geographic distribution.	Data not available
8. Does the program portfolio have an appropriate balance of: Institutional types? Comments: There was no data made available to the COV that was specific to EWF. In the sample of proposals reviewed by the COV, none involved a minority-serving institution. Considering the emphasis within EWF on programs involving broadening participation, this was disappointing and of some concern.	DATA NOT AVAILABLE
9. Does the program portfolio have an appropriate balance of: Projects that integrate research and education? Comments: Several proposals reviewed by the COV integrated research and education. It appears that there is a reasonable balance in the portfolio.	APPROPRIATE
10. Does the program portfolio have an appropriate balance: Across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: The REU site portfolio covers an appropriate variety of sub-disciplines within computing. Also, it appears that programs focused on broadening participation among under-represented groups have awards serving different classes of under-represented groups.	APPROPRIATE
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments: The success rate considering only proposals with women involvement in each year exceeded the overall success rate. The success rate for minority PI involvement was in line with the overall success rate. The COV also notes that, in EWF, the proportion of proposal submissions that included women or minority involvement was higher than overall in CNS or CISE.	APPROPRIATE
13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments: EWF's programs are significantly focused on increasing participation of under-represented groups in computing. More generally, they are focused on overall expansion of the pipeline in	Appropriate

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[26], OR DATA NOT AVAILABLE
computing. This is very much in line with national priorities in science and engineering and with the needs of the computing community.	

14. Additional comments on the quality of the projects or the balance of the portfolio:

The EWF jackets available to the COV comprised only a subset of the programs for which EWF has responsibility. EWF has been managing programs for CISE, such as CAREER, IGERT, ADVANCE that are NSF-wide, and for which the COV had no information about specific awards. Thus, the comments in this report reflect only those programs for which the committee had detailed information. Those programs included the CRCD, ITWF, REU sites, and special projects.

The database from which data in the self-study were created counts collaborative awards as multiple awards. Thus, a collaborative award to eight institutions is counted as eight proposals and eight awards. This can significantly skew the data in the tables, especially for a program that does not have a very large number of proposals or awards. In addition, a couple of the proposals in our sample appear to have been miscoded as ITWF projects when they really were REU Site projects. Furthermore, when an award is made for multiple years, if the entire award is made at once all of the monies are counted in the year of the award, while if the award is made piecemeal the data is distributed over multiple years. This also needs to be accounted for when making year-to-year comparisons. NSF also underwent a significant reorganization in 2003, making the data for 2003 and future years somewhat incomparable in aggregate, although for some programs the data is meaningful. Finally, it appears that program data is counted only for the year action is taken. For new programs that began in 2005, such as BPC there was little if any data from which the COV could base any comments.

2.4.1.5 CNS Cluster IV. Education and Workforce -- A.5 Management

Questions about Management of the program under review. Please comment on:

REVIEW OF PROGRAM MANAGEMENT
1. Management of the program. Comments: The EWF cluster comprises one part-time and three full-time program officers, with experience at directing specific programs at NSF related to the mission of this cluster. The experience and capability of these persons is invaluable under the cluster-based organizational structure. The cluster has responsibility for many cross-cutting activities within NSF, which comprise a significant part of the workload of the program officers. The program officers are making decisions in a timely manner in each of the programs for which the COV had data available.
2. Responsiveness of the program to emerging research and education opportunities. Comments: Existing programs, such as REU sites, contain many multidisciplinary awards. This is responsive to the trend toward increasing collaboration between computing and other disciplines. Special projects also have addressed important research and education needs in a sustained manner, particularly with respect to under-represented groups. New programs, such as ICER and BPC, are responsive to workforce needs such as dealing with the significant downturn in computing enrollments and related diversity and educational issues.

REVIEW OF PROGRAM MANAGEMENT
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: The COV did not have information in its materials that was peculiar to this cluster. Based on discussions with program managers, it appears that the same methods are used throughout the division, and those methods appear to be appropriate. They often involve an idea from NSF program managers that is vetted with the community, frequently through workshops, and honed to develop the division's and cluster's priorities.
4. Additional comments on program management: None.

2.4.2 *CNS Cluster IV. Education and Workforce* -- PART B. Results: Outputs and Outcomes of NSF Investments

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- *To promote the progress of science.*
- *To advance national health, prosperity, and welfare.*
- *To secure the national defense.*
- *And for other purposes.*

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

2.4.2.1 CNS Cluster IV. Education and Workforce -- B. Strategic Outcome Goals

Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

CNS Cluster IV. Education and Workforce -- B.1 Outcome Goal for PEOPLE:
Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

Comments:

The programs in the EWF cluster are particularly focused on this outcome goal. EWF also has consistently sponsored programs with professional societies such as CRA and ACM that address this goal. Many projects with CRA-W (e.g., 0434310), support for the Grace Hopper and Tapia conferences (e.g., 0528045, PI-Williams). These projects are very well thought of within the computing community in terms of their developing and energizing a diverse workforce. As another example, the current "Girls are IT!" project (0204398, PI-Henson) uses an innovative approach to bring information technology to locations that otherwise would not be afforded access. Finally, NCWIT and the new CSTA and BPC programs are good recent examples of this support.

CNS Cluster IV. Education and Workforce -- B.2 Outcome Goal for IDEAS:
Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

Comments:
Programs such as REU sites and CRCD are focused on this goal. For example, a collaborative project (0420436, PI-Horwitz) hosted at the University of Wisconsin and involving eight institutions applies a peer-learning approach in introductory computing courses to improve learning and ultimately retention.

CNS Cluster IV. Education and Workforce -- B.3 Outcome Goal for TOOLS:
Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

Comments:
One interesting REU site project (0353687) directed toward this goal is developing a "cool" tool that applies animation and force feedback to assist elementary school children in learning handwriting effectively. Another (0119880, PI-Eglash) is evaluating culturally-situated design tools for their effectiveness is assisting students from under-represented groups in learning mathematics and increasing interest in information technology.

CNS Cluster IV. Education and Workforce -- B.4 Outcome Goal for Organizational Excellence: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[28]
Comments:
The e-jacket system is a good example of technology that assists NSF in managing its workload and documenting its acitvity. The interactive panel system also is useful in managing COIs and in facilitating the panels' workloads. The fastlane system has undergone significant improvements in recent years; it is an overall community resource that has made proposal submission easier, and has particularly facilitated collaborative proposal submission.

[28] *For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.*

2.4.3 *CNS Cluster IV. Education and Workforce* -- PART C. Other Topics

2.4.3.1 CNS Cluster IV. Education and Workforce -- C.1 Areas for Improvement

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

The COV reviewed no proposals from minority-serving institutions. While we recognize the effects sampling can have on this phenomenon, it suggests that there is a much lower than desired fraction of proposals being submitted by such institutions. EWF, with its significant emphasis on serving under-represented populations, is particularly affected by this, and should seek ways to encourage further proposal submission from minority-serving institutions. The COV does note that there are several BPC alliance awards that include minority-serving institutions.

Currently, there is significant attention in the community and the media relative to IT workforce issues related to the downturn in computer science enrollments, outsourcing and off-shoring of jobs, and the type of computing education appropriate for the 21st century marketplace. The COV recognizes that the new ICER program is intended to address this issue, and encourages its support. This problem is multi-faceted and of such magnitude that it may necessitate additional program elements, including additional focus on the pre-university education system and on interaction with other agencies, professional societies and industry in order to increase leverage of these efforts.

EWF also should have a larger portfolio of high-risk, larger scale projects. The focus of this cluster on broadening issues is important and commendable. However, despite supporting many projects that have had notable successes, the workforce diversity problem in computing is in many ways getting worse, as noted in the demographics of the recent enrollment drops in our field. Scaling effective outcomes is a difficult but essential problem. Many projects are relatively local in impact, and current dissemination mechanisms are not having the overall intended effect on the field's demographics. Support for projects that replicate successes, additional support for pre-university workforce-related efforts, and partnerships with other groups seeking to address this problem would be useful.

2.4.3.2 CNS Cluster IV. Education and Workforce -- C.2 Program Performance Issues

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.

The COV believes that an increase in the proportion of innovative, larger scale, high-risk projects in the portfolio can accelerate the achievement of program outcomes. For example, despite the many useful programs supported by EWF to broaden participation among under-represented groups, the recent downturn in CS enrollments highlights the continued problems of participation by these groups. In fact, the downturn among women appears to be greater than that for men. Thus, the broader goals of increased participation are not being realized even if local efforts appear to be somewhat successful. As was noted in C.1, this problem is multi-faceted and solving it requires significant attention by others outside of NSF as well.

2.4.3.3 CNS Cluster IV. Education and Workforce -- C.3 Agency Wide Issues

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

NSF should seek ways to provide additional training for new PIs and MSIs in preparing proposals.

Funding limitations frequently necessitate significant cuts in project budgets for funded proposals. The scope of work is necessarily affected by such cuts and the outcomes that can be expected from projects cut in this manner also should expect to be affected significantly.

2.4.3.4 CNS Cluster IV. Education and Workforce -- C.4 Other Issues

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

None.

2.4.3.5 CNS Cluster IV. Education and Workforce -- C.5 Improvement of COV Review Process

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

The COV process takes place only every three years. By necessity, some programs are just being launched by the time of one review and will have expired before the next review. It would be helpful to have the opportunity to meaningfully review such programs for effectiveness and possible continued funding before they otherwise would naturally expire. The BPC is a good example of such a program in EWF.

Time is very limited while on site. To help the COV prepare more effectively, the self-study and pertinent cluster annual reports covering the period of review should be available on-line to the COV about two weeks prior to the visit. This, along with the desired report template (which was very helpful and *was* made available in advance) can help the COV form a preliminary understanding of the cluster's activities and can help it to focus its time more effectively while on site.

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3 Appendix A – CNS Self Study Report

Self-Study for NSF COMMITTEE OF VISITOR

The Division of Computer and Network Systems

3.1 General Introduction and Program Management Statistics

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. The Committee of Visitor (COV) reviews provide NSF with external expert judgments in two primary areas:

- The integrity and efficiency of the **processes** related to proposal review; and
- The quality of the **results** of NSF's investments in the form of outputs and outcomes that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future.

To facilitate the work of the COV and to provide more time for thoughtful analysis and discussion, CNS prepared this Self Study Report and Response to COV Guidelines. The material provided maps exactly onto the standardized COV report template, and provides data, tables, definitions and explanations -- question by question. It does not draw conclusions from the information presented but presents information that CNS believes the COV will find useful in coming to their conclusions and preparing their report. In Part C. Other Topics, CNS presents reflections on areas that are problematic, laudable, or in some way reflect on the performance of the Division.

3.1.1 Introduction to CISE's CNS Division

3.1.1.1 CISE Reorganization

The CISE Directorate was reorganized in 2003. Since the prior CISE reorganization, in 1997, the Directorate's budget grew by 113% (vis a vis 52% for NSF) and the number of proposals submitted increased by more than 125% (vis a vis16% for NSF). In large measure, the considerable growth in both budget and in Directorate workload was due to the success of the Information Technology Research (ITR) priority area. CISE capitalizes on the research and educational opportunities made possible through the ITR priority area funding infusion, including making investments in new multidisciplinary areas. In addition, even with improved efficiency of existing operations, the rapid growth in CISE workload argued for carefully planned workforce growth and organizational adjustment.

The reorganization positioned CISE to realize the following:

- Increased programmatic focus and budget flexibility in support of computer and information science and engineering activities at the knowledge frontier;
- Enhanced intellectual coherence in CISE cross-cutting, thematic areas, such as in education and workforce, cyber-security and cyber-infrastructure;
- Increased research and education opportunities that broaden the participation of under-served communities in CISE activities; and
- Improved effectiveness and efficiency of CISE business practices by reducing program overlap and enhancing program synergy.

The CISE reorganization sought to accomplish the following objectives:

- Decrease the number of CISE programs, thereby combating the tendency to reductionism in programmatic activity while promoting more integration;
- Encourage the growth of cohesive scientific communities in important or emerging sub-disciplines;
- Provide for more flexibility in defining and in re-defining cross-cutting priorities and emerging priorities of national and/or societal interest;
- Empower CISE staff with the organizational, budgetary, and management support necessary to remain focused on key programmatic activities and goals. A portfolio management approach was implemented

to: balance individual, small group and center-scale awards; ensure the participation of a rich and diverse mix of PIs and co-PIs; and integrate research and education in all activities. This institutionalizes NSF core strategies in CISE processes and practices and provides for a stronger CISE community;

- Position the Directorate for continued budgetary growth and programmatic evolution.

3.1.1.2 CISE Divisional Structure

CNS	CCF	IIS
CNS – Supports research and educational activities that explore properties of new computing and networking technologies and that build software systems that take advantage of those technologies. Focuses on designing and building experimental prototypes and test beds, measuring and evaluating system properties, and constructing complex systems that involve traditional additional technologies (e.g., sensors). Also supports the infrastructure needed for experimental computing research.	CCF -- Supports research and educational activities to explore the foundations of computing and communication devices and their usage. Advances computing and communication theory, algorithms for computer and computational sciences, and architecture and design of computers and software. Investigates revolutionary computing paradigms based on emerging scientific ideas and technologies.	IIS -- Supports research and educational activities to increase the capabilities of human beings and machines to create, discover and reason with knowledge by advancing the ability to represent, collect, store, organize, locate, visualize and communicate information. Contributes to interdisciplinary research on how empirical data leads to discovery in the sciences and engineering.

3.1.1.3 CNS Mission

CNS supports research and educational activities that invent new computing and networking technologies and that explore new ways to make use of existing technologies. The Division seeks to develop a better understanding of the fundamental properties of computer and network systems and to create better abstractions and tools for designing, building, analyzing, and measuring future systems. The Division also supports the computing infrastructure that is required for experimental computer science, and it coordinates cross-divisional activities that foster the integration of research, education, and workforce development.

In addition to the current proposal solicitations pertaining to CNS research and education, CNS also considers proposals focusing on education, workforce development, and other activities that are of general interest to CISE and that are not covered by other NSF solicitations. Awards may be given to provide seed funding to explore a novel educational idea, support a demonstration project, workshops, or studies on topics of broad interest to CISE.

The CNS Division is organized into ***four clusters***, each of which is responsible for a related set of activities.

3.1.1.4 CNS Computer Systems Cluster

Future computing systems will be required to control a greater variety of computing, communication, storage, and external devices; to support a broader range of increasingly demanding applications; and to manage hundreds of asynchronous activities correctly, securely, and reliably. This cluster supports research and educational activities that address these requirements in a variety of systems, including distributed, mobile, and embedded systems; sensing and control systems; dynamically configured, multiple-component systems; parallel systems; and trusted systems.

Areas of current interest include new ways to organize systems (e.g., peer to peer); software architectures that scale to handle thousands of components or a spectrum of heterogeneous components; ways to handle complex combinations of requirements, such as meeting real-time constraints and coordinating control in an embedded, failure-prone environment; methods that enable systems to detect problems and to take corrective action without human intervention; tools to analyze and predict the behavior of complete computing systems; compiler and runtime techniques for developing and controlling the execution of complex, dynamically changing applications; storage systems that are low-cost, scalable, and reliable; and operating systems and libraries for new technologies.

3.1.1.5 CNS Network Systems Cluster

Future networks are likely to exhibit unpredictable and complex behavior and dynamics; to span a broad range of technologies and bandwidths, from wireless sensors to high-performance, international connections; and to carry increasingly large amounts of increasingly demanding traffic. This cluster supports a range of research and educational activities in networking technology and systems. Its goals are to sustain the science and technology needed to create next-generation networks as well as to address the limitations of existing networks.

Topical areas of current interest include projects to create next-generation networks, increase fundamental understanding of large and complex heterogeneous networks, and continue the evolution of the network by overcoming existing limitations and by adding new capabilities and services. Targeted focus areas are programmable wireless networks, which seek to exploit the capabilities of programmable radios to make more effective use of the frequency spectrum and to improve wireless network connectivity; and networking of sensor systems, which seeks to create architectures, tools, algorithms, and systems that will make it easy to assemble and configure a network of sensor systems.

3.1.1.6 CNS Computer Research Infrastructure

An important component of experimental computing is building prototypes and test beds, which requires an experimental infrastructure. This cluster provides support for the acquisition, enhancement, and operation of experimental facilities for all CISE research and educational areas. Supported facilities range from instrumentation needed by a few projects to major experimental facilities for an entire department. Support is also provided to enhance the computational and human infrastructure in minority-serving institutions and to support the equipment needs of collaborative, distributed research projects. A goal for the next year is to support a wider range of infrastructure needs, research projects, and institutions.

3.1.1.7 CNS Education and Workforce Cluster

Rapid advances in computing technology lead to the need to transfer research results into the classroom. Developing and making effective use of new research results requires a well-educated and diverse workforce that is representative of and able to interact with the entire populace. This cluster supports projects that integrate research and education across CISE, study the causes of the current lack of diversity in the information technology workforce, and lead to a broadening of participation by all under-represented groups. To achieve these goals, the cluster works closely with all CISE divisions. It also coordinates the participation by CISE in a portfolio of NSF-wide education and workforce programs.

3.1.1.8 CNS Program Clustering for COV

The programs that were in effect during FY03-05 that are managed by the CNS Division are aggregated as shown in
.

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announcement Number(s)	Proposal Deadline Dates	Cognizant Program Officers	Prog. Elem. Code
I. Computer Systems						
	CSR	Computer Systems Research (CSR)	NSF 05-629	January 11, 2006 Second Friday in November beginning November 2006	Frederica Darema Helen Gill Brett Fleisch	7354
		Computer Systems Research (CSR)	NSF 04-609	November 23, 2004 November 11, 2005 Second Friday in November annually thereafter	Frederica Darema Helen Gill Brett Fleisch	7354
		Distributed Systems (DS)	pd042876	?	Helen Gill Brett Fleisch	2876
		Embedded and Hybrid Systems (EHS)	NSF 01-161	December 5, 2001; and first Wednesday of December annually thereafter.	Helen Gill	2801
		Next Generation Software (NGS)	NSF 01-147 NSF 00-134	November 2, 2001 First Friday in November, yearly thereafter	Frederica Darema	2884
		Operating Systems and Compilers (OSC)	pd982876	November 23, 2000 and September 21, 2000	Brett Fleisch	2876

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announcement Number(s)	Proposal Deadline Dates	Cognizant Program Officers	Prog. Elem. Code
	DDDAS	Dynamic Data Driven Application Systems (DDDAS)	NSF 05-570	June 13, 2005	Frederica Darema Anita La Salle	7481
	SoD	Science of Design (SoD)	NSF 04-552	May 19, 2004	Anita La Salle	7372
	ITR (04)	Information Technology Research for National Priorities	NSF 04-012	February 24, 2004	Guru Parulkar	7314
II. Network Systems						
	NeTS	Networking Technology and Systems (NeTS)	NSF 05-505	January 21, 2005 December 14, 2005 Second Wednesday in December annually thereafter	Darleen Fisher Guru Parulkar David Goodman	7363
		Network Technology Systems (NTS)	NSF 04-540	April 14, 2004	Darleen Fisher Guru Parulkar	7363
		Networking Research Testbeds (NRT)	NSF 03-538	May 8, 2003	Darleen Fisher Guru Parulkar	7253
		Experimental Infrastructure Network (EIN)	NSF 03-539	May 8, 2003	Darleen Fisher Guru Parulkar	7251
		Special Projects in Networking Research (SPN)	NSF 03-555	June 10, 2003	Darleen Fisher Guru Parulkar	4095
		Networking Research Program (NR)	NSF 02-123 04-54 04-23 01-65 99-2 98-164	August 1, 2002 February 1, 2003	Darleen Fisher Guru Parulkar	4097
	STI	Strategic Technologies for the Internet	NSF 03-533 02-093 01-90	April 24, 2003	Darleen Fisher Guru Parulkar	1766
	NMI	NSF Middleware Initiative (NMI)	NSF 04-555	May 14, 2004	Darleen Fisher Guru Parulkar	4089
		NSF Middleware Initiative (NMI)	NSF 03-513	First Friday in March beginning in March 2002	Darleen Fisher Guru Parulkar	4089
		NSF Middleware Initiative (NMI)	NSF 02-028	None specified	Darleen Fisher Guru Parulkar	4089
	CT	Cyber Trust (CT)	NSF 05-518	February 07, 2005 February 06, 2006 First Monday in February annually thereafter	Karl Levitt Helen Gill Harriet G. Taylor	7371 7456
		Cyber Trust (CT)	NSF 04-524	March 03, 2004 Single Investigator or Small Group Proposals and Team Proposals March 31, 2004 Center-Scale Proposals	Karl Levitt Helen Gill Harriet G. Taylor	7371
		Trusted Computing (TC)	NSF 01-160 04-2 04-23 02-123 03-2	December 5, 2001; and first Wednesday of December annually thereafter.	Karl Levitt	2802
III. Computing and Network Research Infrastructure						
	CRI	Computing Research Infrastructure (CRI)	NSF 04-588	August 22, 2005 Fourth Monday in August annually	Stephen Mahaney Rita Rodriguez	7359

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announcement Number(s)	Proposal Deadline Dates	Cognizant Program Officers	Prog. Elem. Code
		Minority Institutions Infrastructure (MII)	NSF 96-15	Second Tuesday in February of each year	Rita Rodriguez	2885
		Research Resources (RR)	NSF 01-100	July 6, 2001 First Monday in February in 2002 and thereafter	Rita Rodriguez Stephen Mahaney Darleen Fisher	2890
		Research Infrastructure (RI)	NSF 00-5 02-2 00-5 98-159	JANUARY 25, 2000 Subsequent Fiscal years will have a due date on the Third Monday in October of each year (2000 and After)	Rita Rodriguez Darleen Fisher	2885
IV. Education and Work-force						
	ITWF	Information Technology Workforce (ITWF)	NSF 03-609	January 21, 2004	Caroline Wardle Harriet Taylor	1713
		Information Technology Workforce (ITWF)	NSF 01-33 04-23 02-136 96-102	March 19, 2001 Future ITWF deadlines will be the first Monday in November, starting on November 5, 2001.	Caroline Wardle	1713
	REU	Research Experiences for Undergraduates (REU)	NSF 05-592	September 7, 2005	Harriet Taylor	1139
		Research Experiences for Undergraduates (REU)	NSF 04-584	August 17, 2004	Harriet Taylor	1139
		Research Experiences for Undergraduates (REU)	NSF 03-577	September 15, yearly	Harriet Taylor	1139
		Research Experiences for Undergraduates (REU)	NSF 02-136	None specified	Harriet Taylor	1139
	CRCD/EI	CISE Combined Research and Curriculum Development and Educational Innovation Program (CRCD/EI)	NSF 04-001		Anita La Salle	1709
		CISE Combined Research and Curriculum Development and Educational Innovation Program (CRCD?\EI)	NSF 02-082	November 4, 2002 November 1, 2004	Anita La Salle	1709
	RET	Research Experience for Teachers (RET)	n/a	n/a	n/a	1359 or original award
	CAREER	Faculty Early Career Development (CAREER) Program	NSF 05-579	July 19, 2005	Brett Fleisch	n/a
		Presidential Early Career Awards for Scientists and Engineers (PECASE)	NSF 02-111 01-040 01-84A 00-89 99-110 97-87	July 23, 2002 July 22, 2003 July 20, 2004	Darleen Fisher	n/a

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announcement Number(s)	Proposal Deadline Dates	Cognizant Program Officers	Prog. Elem. Code
	BPC	Broadening Participation in Computing (BPC)	NSF 05-562	June 14, 2005 – BPC Alliance and Demonstration Projects ONLY April 05, 2006 – BPC Alliance and Demonstration Projects ONLY April 04, 2007 – BPC Alliance and Demonstration Projects	Jan Cuny	7482
	EESE	Ethics Education in Science and Engineering	NSF 05-532	March 10, 2005	Caroline Wardle	?
	Spec. Proj.	Special Projects	n/a	n/a	Caroline Wardle	1714

Table 1. CNS Program Clusters for COV

3.1.2 CNS COV Data Analysis for Targeted Programs

3.1.2.1 CNS COV Source Data

The following summarizes the targeted actions for the CISE/CNS 2006 COV:

- There were approximately 5500 new actions in COV period of 03, 04, 05
- Random samples of 5% of awards and declines were selected, for each cluster listed in the table above, leading to:
  - CSR Cluster: 40 awards, 39 declines
  - NeTS Cluster: 66 awards, 65 declines
  - CRI Cluster: 11 awards, 11 declines
  - EWF Cluster: 10 awards, 11 declines

A list of these proposals as well as a list of all the proposals reviewed by the division over the last three years can be found on the COV web page. The COV can access any proposal on either list during the meeting.

The Following analyses summarize CNS actions during the COV period in terms of proposal pressure, distribution of funding, dwell times, award and declination trends including for underrepresented groups, minority institutions, state distributions, representation in the portfolio of high-risk awards, reviewer statistics and other data and trends that characterize the management of CNS's workload.

3.1.2.2 CNS Program and Proposal Data

CNS Proposal Pressure and Finding Rates

The following tables are included to provide a context for CNS Division data.

Table 2 shows the proposal actions (i.e., new proposals submitted) for NSF during the COV period.

FY	Proposal Actions	Awards	Funding Rate	CGIs	Contracts	Supplements	Withdrawals	Preproposals	Other Actions
2003	40,133	10,843	27%	7,613	338	3,715	518	2,488	714
2004	43,836	10,385	24%	8,189	319	3,720	367	2,338	794
2005	41,751	9,793	23%	8,308	420	3,615	216	2,120	805

*Table 2. Final actions and funding rates for **NSF** during the COV period.*

Table 3 shows the proposal actions for CISE during the COV period.

FY	Proposal Actions	Awards	Funding Rate	CGIs	Contracts	Supplements	Withdrawals	Preproposals	Other Actions
2003	5,346	1,174	22%	1,023	0	354	36	59	83
2004	6,266	1,017	16%	1,298	0	401	16	9	78
2005	5,236	1,088	21%	1,398	0	585	6	1	60

*Table 3. Final actions and funding rates for **CISE** during the COV period.*

Table 4 shows the total number of proposals submitted to CNS during the COV period along with the outcomes of proposal management.

	2003	2004	2005	Total	Percent
Total # of new proposals	1,388	2,089	2,103	5,580	
# Proposals Declined	975	1,692	1,590	4,257	76.3%
# Proposals Awarded	371	376	468	1,215	21.8%
# Proposals Returned without Review	29	19	44	92	1.6%
# Proposals Withdrawn by PI	13	2	1	16	0.3%

*Table 4. Total number of proposals submitted to **CNS** during the COV period*

CNS Cluster Funding Data for COV Period.
The following tables the proposal pressure in terms of numbers of proposals and budget request along with the funding success rates for CNS for FY 2003 through FY 2005 by cluster and program.

CLUSTER/PGM FY 2003 Data	# of New Pro-posals Sub-mitted	Total # of De-clined Propos als	Total # Awards	Total Requested Dollars For all new proposals	Total Requested Dollars for all awarded proposals	Actual Total Awarded Dollars	Success Rate as a function of # proposals	Success Rate as a function of budget request	SGER (Small Grants for Experi-mental Research)
CSR									
1640 Information Technology Research	5	0	5	$5,001,495	$5,001,495	$1,895,880	100%	38%	0
1686 ITR Small	97	60	37	$39,494,745	$14,663,809	$10,146,163	38%	26%	0
1687 ITR Medium	145	96	49	$317,607,534	$117,875,773	$52,110,349	34%	16%	0
1688 ITR Large	29	18	11	$127,892,946	$42,379,689	$37,641,987	38%	29%	0
2801 Embedded & Hybrid Systems	97	78	19	$44,971,006	$7,109,737	$4,721,150	20%	10%	0
2802 Trusted Computing	120	92	28	$67,413,530	$12,056,145	$7,332,375	23%	11%	0
2876 Distributed Systems	84	70	14	$35,155,719	$5,172,085	$3,862,984	17%	11%	0
2884 Next Generation Software	44	30	14	$38,162,271	$11,101,848	$5,627,577	32%	15%	0
7314 ITR for National Priorities	0	0	0	$0	0	0	n/a	n/a	0
NeTS									
1766 Strategic Tech. For Internet	40	38	2	$26,138,431	$1,125,172	$1,165,813	5%	4%	0
4089 Network Centric Middleware	4	0	4	$2,190,485	$2,190,485	$1,709,993	100%	78%	0
4090 Adv. Network Infrastructure & Research	19	0	19	$7,026,105	$7,026,105	$6,231,539	100%	89%	1
4095 Special Projects in Network Research	45	26	19	$42,374,244	$12,717,942	$10,150,355	42%	24%	1
4097 Networking Research	325	284	41	$125,656,099	$12,372,852	$9,349,439	13%	7%	1
7251 EIN	5	0	5	$11,454,842	$11,454,842	$14,083,811	100%	123%	0
7253 Network Research Test-beds	16	2	14	$59,395,043	$57,023,725	$39,812,133	88%	67%	0
CRI									
1189 Major Research Instrumentation	44	22	22	$28,208,385	$12,936,095	$9,916,363	50%	35%	0
2885 Research Infrastructure	57	49	8	$58,308,633	$12,556,807	$9,275,023	14%	16%	0
2890 CISE Research Resources	17	0	17	$10,880,162	$10,880,162	$7,392,213	100%	68%	0
7399 CISE Minority Institution Infrastructure (MII)	4	0	4	$5,173,043	$5,173,043	$3,488,499	100%	67%	0
EWF							14%	16%	
1139 Research Experience for	41	0	34	$1,337,454	$1,337,454	$1,083,428			

Undergraduates							100%	81%	0
1629 BE-non announcement research	1	0	1	$499,353	$499,353	$399,868	100%	80%	0
1709 CISE Education Research & Curric. Dev.	51	41	10	$24,776,910	$5,295,469	$4,463,383	20%	18%	0
1713 Workforce	81	66	15	$36,816,802	$6,812,564	$6,187,125	19%	17%	0
1714 CISE Special Projects	9	1	8	$538,864	$507,040	$467,114	100%	81%	0

Table 5. Proposal, Funding and Success Rate Data for CNS -- FY 2003

CLUSTER/PGM FY 2004 Data	# of New Pro-posals Sub-mitted	Total # of De-clined Propos als	Total # Awards	Total Requested Dollars For all new proposals	Total Requested Dollars for all awarded proposals	Actual Total Awarded Dollars	Success Rate as a function of # proposals	Success Rate as a function of budget request	SGER (Small Grants for Experi-mental Research)
CSR									
1640 Information Technology Research	1	1	0	$3,129,545	0	0	0%	0%	0
1686 ITR Small	3	3	0	$1,341,764	0	0	0%	0%	0
1687 ITR Medium	27	8	19	$53,422,776	$30,227,077	$10,616,996	70%	19%	0
1688 ITR Large	1	1	0	$14,993,127	0	0	0%	0%	0
2801 Embedded & Hybrid Systems	126	100	26	$58,920,839	$11,540,928	$6,544,354	21%	11%	3
2802 Trusted Computing	3	0	3	$210,000	$210,000	$201,999	100%	96%	2
2876 Distributed Systems	104	85	19	$46,431,178	$6,160,081	$6,178,081	18%	13%	0
2884 Next Generation Software	90	63	27	$72,251,678	$21,967,131	$8,565,945	30%	12%	1
7314 ITR for National Priorities	272	249	23	$362,886,088	$33,531,257	$15,131,488	9%	4%	0
NeTS									
1766 Strategic Tech. For Internet	49	49	0	$25,195,976	0	0	0%	0%	0
4090 Adv. Network Infrastructure & Research	117	84	33	$59,958,472	$16,613,909	$14,616,902	28%	24%	0
4095 Special Projects in Network Research	72	72	0	$73,262,690	0	0	0%	0%	0
4097 Networking Research	7	5	2	$1,698,469	$40,000	$40,000	29%	2%	0
7251 EIN	18	18	0	$65,022,456	0	0	0%	0%	0
7253 Network Research Testbeds	29	29	0	$43,883,590	0	0	0%	0%	0
7362 Network Systems	1	0	1	$10,500	$10,500	$10,500	100%	100%	0
7363 Research in Networking Tech. & Systems	443	341	102	$320,768,862	$73,601,700	$41,010,022	23%	13%	0
7371 Cyber Trust	368	337	31	$395,132,051	$30,295,871	$24,995,060	8%	6%	0
CRI									
1189 Major Research Instrumentation	60	35	25	$42,272,851	$16,862,098	$11,339,675	42%	27%	0
2885 Research Infrastructure	27	20	7	$34,647,536	$9,282,823	$8,146,346	26%	24%	0
2890 CISE Research Resources	43	29	14	$14,456,733	$2,087,509	$1,925,371	33%	13%	0
7399 CISE Minority	14	11	3	$16,730,577	$4,493,394	$2,990,026			

Institution Infrastructure (MII)							21%	18%	0
EWF									
1139 Research Experience for Undergraduates	38	33	5	$12,001,077	$1,455,330	$737,071	13%	6%	0
1681 Advance Fellows	7	5	2	$2,691,838	$566,619	$566,619	29%	21%	0
1709 CISE Education Research & Curric. Dev.	70	67	3	$37,586,321	$1,655,434	$843,798	4%	2%	0
1713 Workforce	69	45	24	$31,154,764	$4,821,237	$4,857,237	35%	16%	0
1714 CISE Special Projects	9	2	7	$4,819,847	$4,651,503	$4,772,705	78%	99%	0

Table 6. Proposal, Funding and Success Rate Data for CNS -- FY 2004

CLUSTER/PGM FY 2005 Data	# of New Pro-posals Sub-mitted	Total # of De-clined Propos als	Total # Awards	Total Requested Dollars For all new proposals	Total Requested Dollars for all awarded proposals)	Actual Total Awarded Dollars	Success Rate as a function of # proposals	Success Rate as a function of budget request	SGER (Small Grants for Experi-mental Research)
CSR									
2801 Embedded & Hybrid Systems	6	1	5	$1,677,898	$822,734	$539,770	83%	32%	0
2802 Trusted Computing	1	1	0	$161,441	0	0	0	0	0
2876 Distributed Systems	3	1	2	$721,522	$197,562	$200,000	67%	28%	0
2884 Next Generation Software	3	1	2	$3,049,685	$1,841,460	$93,333	67%	3%	0
7214 Highly Dependable Computing	1	1	0	$270,000	0	0	0%	0%	0
7314 ITR for National Priorities	7	6	1	$7,221,245	$999,990	999,990	14%	14%	0
7354 Computer Systems	489	373	116	$263,163,407	$68,178,507	$35,745,125	24%	14%	3
7372 ITR-SOD	27	25	2	$20,681,035	$1,372,435	$1,140,091	7%	6%	0
7481 Dynamic Data Driven Appl Systs	130	92	38	$93,290,656	$33,106,384	$12,489,297	29%	13%	0
NeTS									
4090 Adv. Network Infrastructure & Research	6	0	6	$3,343,593	$3,343,593	$2,443,244	100%	73%	0
4097 Networking Research	5	1	4	$706,700	$253,833	$150,000	90%	21%	2
7362 Network Systems	75	55	20	$38,127,904	$9,549,833	$7,320,489	27%	19%	1
7363 Research in Networking Tech. & Systems	624	507	117	$349,997,674	$68,054,406	$41,092,929	19%	12%	5
7371 Cyber Trust	364	309	55	$249,043,919	$29,248,381	$31,143,594	15%	13%	5
CRI									
1189 Major Research Instrumentation	49	23	26	$32,675,333	$18,295,217	$11,660,676	53%	36%	0
2885 Research Infrastructure	1	1	0	$559,459	0	0	0%	0%	0
2890 CISE Research Resources	1	0	1	$25,000	$25,000	$25,000	100%	100%	0
5761 Industry/Univ Coop Res Centers	1	0	1	$119,702	$119,702	$119,702	100%	100%	1
7359 Computing Res	212	168	44	$127,964,543	$25,427,721	$17,805,452	21%	14%	0

Infrastructure									
7399 CISE Minority Institution Infrastructure (MII)	3	0	3	$1,606,398	$1,606,398	$148,580	100%	9%	0
EWF									
1139 Research Experience for Undergraduates	25	22	3	$9,128,856	$881,738	$881,738	12	9	0
1709 CISE Education Research & Curric. Dev.	1	1	0	$405,294	0	0	0	0	0
1713 Workforce	2	0	2	$847,461	$847,461	$988,056	100	117	0
1714 CISE Special Projects	16	0	16	$1,305,470	$1,305,470	$1,433,104	100	109	0
7361 Education & Workforce	2	1	1	$562,473	$35,621	$26,044	50	5	0
7482 Broadening Partici in Computing	3	0	3	$675,585	$675,585	$524,683	100	78	0

Table 7. Proposal, Funding and Success Rate Data for CNS -- FY 2005

The following proposal data is presented in groups of three tables – each group describes the proposal activities for FY 2003, 2004, 2005 for Clusters I – IV.

Proposal Data for **Cluster I -- Computer System Cluster** – FY 2003

	Distributed Systems 2876	Embedded Hybrid Sys. 2801	NG Software 2884	Trusted Comp 2802	CAREER	Total
Number Proposals Received	81	92	46	120	59	398
Number Awards	24	18	19	35	18	114
Number Declines	56	72	27	82	41	278
Other Actions	1	2	0	3	0	6
Number of New Projects	18	11	14	32	18	93

Table 8. Proposal Activities for CSR Cluster – FY 2003

Proposal Data for **Cluster I -- Computer System Cluster** – FY 2004

	Distributed Systems 2876	Embedded and Hybrid Systems 2801	Next Generation Software 2884	Total
Number Proposals Received	113	139	93	345
Number Awards	20	32	26	78
Number Declines	85	100	58	243
Other Actions	8	7	9	24
Number of New Projects	19	26	22	67

Table 9. Proposal Activities for CSR Cluster – FY 2004

Proposal Data for **Cluster I -- Computer System Cluster** – FY 2005

	FY 05 CSR 7354
Number Proposals Received	469
Number Awards	128
Number Declines	341
Other Actions	0
Number of New Projects	111

Table 10. Proposal Activities for CSR Cluster – FY 2005

Proposal Data for **Cluster II -- Network Cluster** – FY 2003

	Networking Research 4097	Special Projects 4095	Exp Infr Netwkss 7251	Net Res Testbeds 7253	Strategic Tech Int. 1766	CAREER	Total
Number Proposals Received	316	53	27	51	73	63	583
Number Awards	61	27	9	17	30	16	160
Number Declines	243	24	18	31	39	47	402
Other Actions	12	2	0	3	4	0	21
Number of New Projects	40	15	3	17	14	16	105

Table 11. Proposal Activities for NeTS Cluster – FY 2003

Proposal Data for **Cluster II -- Network Cluster** – FY 2004

	NeTS 7363
Number Proposals Received	498
Number Awards	105
Number Declines	378
Other Actions	15
Number of New Projects	87

Table 12. Proposal Activities for NeTS Cluster – FY 2004

Proposal Data for **Cluster II -- Network Cluster** – FY 2005

	NeTS 7363
Number Proposals Received	539
Number Awards	124
Number Declines	410
Other Actions	5
Number of New Projects	98

Table 13. Proposal Activities for NeTS Cluster – FY 2005

Proposal Data for **Cluster III -- Infrastructure Cluster** – FY 2003

	Research Resources 2890	Major Res. Instrument. 1189	Res. Infra. 2885	Minority Inst. Infra. 2885	Total
Number Proposals Received	29	50	27	19	125
Number Awards	14	29	12	8	63
Number Declines	14	21	14	7	56
Other Actions	1	0	1	4	6
Number of New Projects	10	23	7	4	44

Table 14. Proposal Activities Infrastructure Cluster – FY 2003

Proposal Data for **Cluster III -- Infrastructure Cluster** – FY 2004

	Research Resources 2890	Major Res. Instrument. 1189	Res. Infra. 2885	Minority Inst. Infra. 7399	Total
Number Proposals Received	50	63	33	18	164
Number Awards	20	26	10	6	62
Number Declines	29	36	19	11	95
Other Actions	1	1	4	2	8
Number of New Projects	16	25	7	5	53

Table 15. Proposal Activities Infrastructure Cluster – FY 2004

Proposal Data for **Cluster III -- Infrastructure Cluster** – FY 2005

	Computing & Research Infrastructure 7359	Minority Research Infrastructure 1189	Total
Number Proposals Received	247	50	297
Number Awards	56	26	82
Number Declines	169	22	191
Other Actions	22	2	24
Number of New Projects	48	26	74

Table 16. Proposal Activities Infrastructure Cluster – FY 2004

Proposal Data for **Cluster IV -- Education and Workforce Cluster** – FY 2003

	IT Workforce 1713	EI/CRCD 1709	REU Sites 1713	Special Projects 1713/1714	Total
Number Proposals Received	49	66	47	14	176
Number Awards	19	16	8	10	53
Number Declines	30	41	34	1	106
Other Actions	0	9	5	3	17
Number of New Projects	10	10	7	9	36

Table 17. Proposal Activities Education and Workforce Cluster – FY 2003

Proposal Data for **Cluster IV -- Education and Workforce Cluster** – FY 2004

	REU Sites 1139	CRCD/EI 1709	ITWF 1713	Special Projects 1714	Total
Number Proposals Received	53	108	80	11	252
Number Awards	13	19	30	6	68
Number Declines	33	75	45	1	154
Other Actions	7	14	5	4	30
Number of New Projects	13	11	24	5	53

Table 18. Proposal Activities Education and Workforce Cluster – FY 2004

Proposal Data for **Cluster IV -- Education and Workforce Cluster** – FY 2005

	REU Sites 1139	EWF 1709,1713,1714, 7361, 7482	Total
Number Proposals Received	57	43	100
Number Awards	13	42	55
Number Declines	39	1	40
Other Actions	5	0	5
Number of New Projects	13	21	34

Table 19. Proposal Activities Education and Workforce Cluster – FY 2005

CNS Award Types

Table 20. CNS Awards by Award Type, shows the distribution of awards in CNS by type – Standard, or single payment awards, or Continuing, or multiyear payment awards.

	2003	2004	2005
Continuing	192	191	183
Standard	179	187	287

Table 20. CNS Awards by Award Type

3.1.2.3 Budget Data

Distribution of Program Funding

The following table summarizes **NSF** funding for Research and Related activities only.

DIR	2003 Program Funds Only	DIR	2004 Program Funds Only	DIR	2005 Program Funds Only
00 NSB	$4,422,420	00 NSB	$4,679,370	00 NSB	$4,879,618
01 O/D	$9,243,695	01 O/D	$9,849,053	01 O/D	$59,144,851
02 IRM	$8,457,003	02 IRM	$3,049,000	02 IRM	$5,400,254
03 MPS	$1,104,390,087	03 MPS	$1,173,238,443	03 MPS	$1,147,022,412
04 SBE	$230,157,503	04 SBE	$264,814,491	04 SBE	$219,134,844
05 CSE	$641,256,939	05 CSE	$622,507,577	05 CSE	$617,269,680
06 GEO	$756,311,735	06 GEO	$779,186,730	06 GEO	$767,257,046
07 ENG	$573,143,493	07 ENG	$601,916,469	07 ENG	$586,780,038
08 BIO	$580,200,960	08 BIO	$607,631,546	08 BIO	$593,139,146
09 EHR		09 EHR		09 EHR	
10 BFA	$4,817,292	10 BFA	$4,795,708	10 BFA	$5,236,938
11 HER	$1,055,253,215	11 EHR	$1,035,040,369	11 EHR	$923,460,715
12 NCO	$1,145,041	12 NCO	$868,576	12 NCO	$1,845,102
13 NNCO	$226,000	13 NNCO	$633,200	13 NNCO	$771,650
14 OPP	$415,386,647	14 OPP	$444,393,786	14 OPP	$435,799,700
Grand Total	$5,384,412,031	Grand Total	$5,552,604,319	Grand Total	$5,367,141,994

Table 21. Distribution of NSF Funding by Directorate for Program Funding Only

The following table breaks down the CISE budget by Division.

DIV	2003 Program Funds Only	DIV	2004 Program Funds Only	DIV	2005 Program Funds Only
0500 A/D	$1,560,797	0500 A/D	$1,245,413	0500 A/D	$182,379
0501 CCF	$134,590,916	0501 CCF	$143,089,865	0501 CCF	$146,766,547
0502 IIS	$119,241,298	0502 IIS	$162,526,516	0502 IIS	$151,454,148
0503 SCI	$179,313,893	0503 SCI	$131,838,006	0503 SCI	$125,976,780
0505 CNS	$101,274,272	0505 CNS	$183,807,776	0505 CNS	$192,889,826
0506 EIA	$105,275,763	0506 EIA	$0	0506 EIA	
		0504 MIP		0504 MIP	
Grand Total	$641,256,939	Grand Total	$622,507,577	Grand Total	$617,269,680

Table 22. Distribution of CISE Funding by Division for Program Funding Only

Distribution of Funding by CNS Cluster Programs

The following table is provided to show the program migrations and funding for the CNS Division during the COV period.

PGM	2003 Operating Plan	PGM	2004 Operating Plan	PGM	2005 Operating Plan
		1139 RSCH EXPER FOR UNDERGRAD SITES	$1,079,207	1139 RSCH EXPER FOR UNDERGRAD SITES	$850,000
		1189 MAJOR RESEARCH INSTRUMENTATION	$10,254,218	1189 MAJOR RESEARCH INSTRUMENTATION	$7,240,441
		1328 IGERT PREPROPOSALS		1328 IGERT PREPROPOSALS	
		1335 IGERT FULL PROPOSALS	$4,221,171	1335 IGERT FULL PROPOSALS	$4,230,000
1359 RES EXP FOR TEACHERS (RET)-SITE	$55,000	1359 RES EXP FOR TEACHERS (RET)-SITE	$0	1359 RES EXP FOR TEACHERS (RET)-SITE	
1629 BE: NON-ANNOUNCEMENT RESEARCH		1629 BE: NON-ANNOUNCEMENT RESEARCH		1629 BE: NON-ANNOUNCEMENT RESEARCH	
1640 INFORMATION TECHNOLOGY RESEARC	$5,131,489	1640 INFORMATION TECHNOLOGY RESEARC	$5,114,104	1640 INFORMATION TECHNOLOGY RESEARC	$1,192,295
1674 NANOSCALE: INTRDISCPL RESRCH T		1674 NANOSCALE: INTRDISCPL RESRCH T		1674 NANOSCALE: INTRDISCPL RESRCH T	
1675 NANOSCALE: SCIENCE & ENGIN CTR		1675 NANOSCALE: SCIENCE & ENGIN CTR		1675 NANOSCALE: SCIENCE & ENGIN CTR	
1676 NANOSCALE: EXPLORATORY RSRCH		1676 NANOSCALE: EXPLORATORY RSRCH		1676 NANOSCALE: EXPLORATORY RSRCH	
1681 ADVANCE – FELLOWS		1681 ADVANCE - FELLOWS	$560,619	1681 ADVANCE - FELLOWS	$0
1686 ITR SMALL GRANTS	$4,563,206	1686 ITR SMALL GRANTS	$4,354,933	1686 ITR SMALL GRANTS	$1,301,703
1687 ITR MEDIUM (GROUP) GRANTS	$8,333,571	1687 ITR MEDIUM (GROUP) GRANTS	$19,512,941	1687 ITR MEDIUM (GROUP) GRANTS	$16,238,127
1688 ITR LARGE GRANTS	$9,955,296	1688 ITR LARGE GRANTS	$10,507,987	1688 ITR LARGE GRANTS	$10,531,924
1691 BE: DYN COUPLED NATURAL-HUMAN		1691 BE: DYN COUPLED NATURAL-HUMAN		1691 BE: DYN COUPLED NATURAL-HUMAN	
1692 BE: COUPLED BIOGEOCHEMICAL CYC		1692 BE: COUPLED BIOGEOCHEMICAL CYC		1692 BE: COUPLED BIOGEOCHEMICAL CYC	
1693 BE: GENOME-ENABLE ENVIR SCI&EN		1693 BE: GENOME-ENABLE ENVIR SCI&EN		1693 BE: GENOME-ENABLE ENVIR SCI&EN	
		1709 CISE EDUCAT RES & CURRIC DEVEL	$2,578,201	1709 CISE EDUCAT RES & CURRIC DEVEL	$418,816
		1713 WORKFORCE	$6,672,593	1713 WORKFORCE	$2,700,000
		1714 SPECIAL PROJECTS - CISE	$1,800,058	1714 SPECIAL PROJECTS - CISE	$3,500,000
		1738 ADVANCE - INSTITUTIONAL TRANSF	$2,109,374	1738 ADVANCE - INSTITUTIONAL TRANSF	$2,950,000
		1739 ADVANCE - LEADERSHIP	$0	1739 ADVANCE - LEADERSHIP	
1766 STRATEGIC TECH FOR INTERNET	$8,000,000	1766 STRATEGIC TECH FOR INTERNET	$1,188,340	1766 STRATEGIC TECH FOR INTERNET	$387,518
2801 EMBEDDED & HYBRID SYSTEMS(EHS)		2801 EMBEDDED & HYBRID SYSTEMS(EHS)	$6,554,905	2801 EMBEDDED & HYBRID SYSTEMS(EHS)	$3,634,328
		2802 TRUSTED COMPUTING	$3,536,863	2802 TRUSTED COMPUTING	$2,484,752
		2876 DISTRIBUTED SYSTEMS	$5,631,487	2876 DISTRIBUTED SYSTEMS	$3,169,398
		2884 NEXT GENERATION SOFTWARE PROGR	$6,545,667	2884 NEXT GENERATION SOFTWARE PROGR	$5,005,163
		2885 CISE RESEARCH INFRASTRUCTURE	$7,169,525	2885 CISE RESEARCH INFRASTRUCTURE	$4,479,972

PGM	2003 Operating Plan	PGM	2004 Operating Plan	PGM	2005 Operating Plan
		2890 CISE RESEARCH RESOURCES	$4,191,280	2890 CISE RESEARCH RESOURCES	$3,213,313
4088 HIGH PERF NETWK CONNECT-SCIENG	$2,000,000				
4089 NETWORK CENTRIC MIDDLEWARE SVC	$7,400,000	4089 NETWORK CENTRIC MIDDLEWARE SVC	$12,000	4089 NETWORK CENTRIC MIDDLEWARE SVC	$0
4090 ADVANCED NET INFRA & RSCH	$8,627,315	4090 ADVANCED NET INFRA & RSCH	$9,772,521	4090 ADVANCED NET INFRA & RSCH	$6,100,000
4091 NETWORK INFRASTRUCTURE	$6,717,483				
4095 SPECIAL PROJECTS IN NET RESEAR	$7,610,689	4095 SPECIAL PROJECTS IN NET RESEAR	$3,036,116	4095 SPECIAL PROJECTS IN NET RESEAR	$2,167,195
4096 COMMUNICATIONS RESEARCH		4096 COMMUNICATIONS RESEARCH		4096 COMMUNICATIONS RESEARCH	
4097 NETWORKING RESEARCH	$15,901,603	4097 NETWORKING RESEARCH	$1,104,025	4097 NETWORKING RESEARCH	$871,659
		4725 EXPERIMENTAL SYSTEMS/CADRE	$443,520	4725 EXPERIMENTAL SYSTEMS/CADRE	$74,316
				5761 INDUSTRY/UNIV COOP RES CENTERS	$550,000
				7172 GRADUATE FELLOWSHIPS	$1,160,000
		7179 GRAD TEACHING FELLOWS IN K-12		7179 GRAD TEACHING FELLOWS IN K-12	$240,000
		7180 EDUCATIONAL RESEARCH INITIATIV	$1,000,000	7180 EDUCATIONAL RESEARCH INITIATIV	
		7214 HIGHLY DEPENDABLE COMPUTING	$350,000	7214 HIGHLY DEPENDABLE COMPUTING	$300,000
7219 NANOTECHNOLOGY UNDERGRAD EDUCA		7219 NANOTECHNOLOGY UNDERGRAD EDUCA		7219 NANOTECHNOLOGY UNDERGRAD EDUCA	
7251 EIN	$10,000,000	7251 EIN	$2,195,719	7251 EIN	$2,252,510
7253 NETWORK RESEARCH TESTBEDS	$5,000,000	7253 NETWORK RESEARCH TESTBEDS	$6,542,368	7253 NETWORK RESEARCH TESTBEDS	$7,378,307
		7273 ENVIRONMENTAL RESEARCH & EDUCA		7273 ENVIRONMENTAL RESEARCH & EDUCA	
		7314 ITR FOR NATIONAL PRIORITIES	$9,138,785	7314 ITR FOR NATIONAL PRIORITIES	$999,998
		7354 COMPUTER SYSTEMS	$0	7354 COMPUTER SYSTEMS	$15,917,206
		7359 COMPUTING RES INFRASTRUCTURE		7359 COMPUTING RES INFRASTRUCTURE	$8,000,000
		7361 EDUCATION AND WORKFORCE		7361 EDUCATION AND WORKFORCE	
		7362 NETWORK SYSTEMS		7362 NETWORK SYSTEMS	
		7363 RES IN NETWORKING TECH & SYS	$24,826,846	7363 RES IN NETWORKING TECH & SYS	$31,753,775
		7371 CYBER TRUST	$3,644,987	7371 CYBER TRUST	$7,005,000
		7372 ITR-SCIENCE OF DESIGN		7372 ITR-SCIENCE OF DESIGN	$1,140,091
		7373 ITR-INFORMATION INTEGRATION		7373 ITR-INFORMATION INTEGRATION	
		7399 CISE MINOR INST INFRA (MII) PR	$3,434,446	7399 CISE MINOR INST INFRA (MII) PR	$2,582,460
		7417 S AND T HIGH-END COMPUTING	$1,739,644	7417 S AND T HIGH-END COMPUTING	$0
		7456 ITR-CYBERTRUST	$10,117,018	7456 ITR-CYBERTRUST	$14,895,064
		7469 ITR-HEC		7469 ITR-HEC	
				7481 DYNAMIC DATA	$2,651,055

PGM	2003 Operating Plan	PGM	2004 Operating Plan	PGM	2005 Operating Plan
				DRIVEN APPL SYSTS	
				7482 BROADENING PARTIC IN COMPUTING	
				7581 ITR-DYNAMIC DATA DRIV APP SYS	$7,000,000
9145 SPECIAL PROGRAMS-RESERVE		9145 SPECIAL PROGRAMS-RESERVE		9145 SPECIAL PROGRAMS-RESERVE	$0
9199 UNDISTRIBUTED PANEL/IPA FUNDS	$1,978,620	9199 UNDISTRIBUTED PANEL/IPA FUNDS	$2,866,308	9199 UNDISTRIBUTED PANEL/IPA FUNDS	$6,323,439
2003 Grand Total	$101,274,272	2004 Grand Total	$183,807,776	2005 Grand Total	$192,889,826

Table 23. Distribution of Funding by CNS Programs

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Responses to COV Guidelines

This section of the CNS COV Self-Study maps directly to the COV template that Visitors have available to carry out their audit.

Part A. Integrity and Efficiency of Processes

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Responses to COV Guidelines

3.2 Part A. Integrity and Efficiency of Processes

3.2.1 Proposal Review

3.2.1.1 Review Methodologies

In keeping with NSF policy that allows various types of review mechanisms and encourages programs to use those best suited to the types of proposals under review, the CNS Division used the merit review mechanisms shown in Table 24 for the specified programs during the last three years:

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announce-ment Number(s)	Cognizant Program Officers	Review Methodology (s) M – Mail Only P – Panel Only B – Both Panel and Mail
I. Computer Systems					
	CSR	Computer Systems Research (CSR)	NSF 05-629	Frederica Darema Helen Gill Brett Fleisch	B
		Computer Systems Research (CSR)	NSF 04-609	Frederica Darema Helen Gill Brett Fleisch	B
		Distributed Systems (DS)	pd042876	Helen Gill Brett Fleisch	B
		Embedded and Hybrid Systems (EHS)	NSF 01-161	Helen Gill	B
		Next Generation Software (NGS)	NSF 01-147 NSF 00-134	Frederica Darema	B
		Operating Systems and Compilers (OSC)	pd982876	Brett Fleisch	B
	DDDAS	Dynamic Data Driven Application Systems (DDDAS)	NSF 05-570	Frederica Darema Anita La Salle	B
	SoD	Science of Design (SoD)	NSF 04-552	Anita La Salle	P
	ITR (04)	Information Technology Research for National Priorities	NSF 04-012	Guru Parulkar	B
II. Network Systems					
	NeTS	Networking Technology and Systems (NeTS)	NSF 05-505	Darleen Fisher Guru Parulkar David Goodman	B
		Network Technology Systems (NTS)	NSF 04-540	Darleen Fisher Guru Parulkar	B
		Networking Research Testbeds (NRT)	NSF 03-538	Darleen Fisher Guru Parulkar	B
		Experimental Infrastructure Network (EIN)	NSF 03-539	Darleen Fisher Guru Parulkar	B
		Special Projects in Networking Research (SPN)	NSF 03-555	Darleen Fisher Guru Parulkar	B
		Networking Research Program (NR)	NSF 02-123 04-54 04-23 01-65 99-2 98-164	Darleen Fisher Guru Parulkar	B

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announce-ment Number(s)	Cognizant Program Officers	Review Methodology (s) M – Mail Only P – Panel Only B – Both Panel and Mail
	STI	Strategic Technologies for the Internet	NSF 03-533 02-093 01-90	Darleen Fisher Guru Parulkar	B
	NMI	NSF Middleware Initiative (NMI)	NSF 04-555	Darleen Fisher Guru Parulkar	B
		NSF Middleware Initiative (NMI)	NSF 03-513	Darleen Fisher Guru Parulkar	B
		NSF Middleware Initiative (NMI)	NSF 02-028	Darleen Fisher Guru Parulkar	B
	CT	Cyber Trust (CT)	NSF 05-518	Karl Levitt Helen Gill Harriet G. Taylor	B
		Cyber Trust (CT)	NSF 04-524	Karl Levitt Helen Gill Harriet G. Taylor	B
		Trusted Computing (TC)	NSF 01-160 04-2 04-23 02-123 03-2	Karl Levitt	B
III. Computing and Network Research Infrastructure					
	CRI	Computing Research Infrastructure (CRI)	NSF 04-588	Stephen Mahaney Rita Rodriguez	B
		Minority Institutions Infrastructure (MII)	NSF 96-15	Rita Rodriguez	B
		Research Resources (RR)	NSF 01-100	Rita Rodriguez Stephen Mahaney Darleen Fisher	B
		Research Infrastructure (RI)	NSF 00-5 02-2 00-5 98-159	Rita Rodriguez Darleen Fisher	B
IV. Education and Work-force					
	ITWF	Information Technology Workforce (ITWF)	NSF 03-609	Caroline Wardle Harriet Taylor	B
		Information Technology Workforce (ITWF)	NSF 01-33 04-23 02-136 96-102	Caroline Wardle	B
	REU	Research Experiences for Undergraduates	NSF 05-592	Harriet Taylor	P
		Research Experiences for Undergraduates	NSF 04-584	Harriet Taylor	P
		Research Experiences for Undergraduates	NSF 03-577	Harriet Taylor	P
		Research Experiences for Undergraduates	NSF 02-136	Harriet Taylor	P
	CRCD/EI	CISE Combined Research and Curriculum Development and Educational Innovation Program	NSF 04-001	Anita La Salle	B

COV Cluster	Programs under review (Acronym)	Programs under review (Full Title)	Program Announce-ment Number(s)	Cognizant Program Officers	Review Methodology (s) M – Mail Only P – Panel Only B – Both Panel and Mail
		CISE Com0bined Research and Curriculum Development and Educational Innovation Program	NSF 02-082	Anita La Salle	
	RET	Research Experience for Teachers	n/a	n/a	n/a
	CAREER	Faculty Early Career Development (CAREER) Program	NSF 05-579	Brett Fleisch	B
		Presidential Early Career Awards for Scientists and Engineers (PECASE)	NSF 02-111 01-040 01-84A 00-89 99-110 97-87	Darleen Fisher	B
	BPC	Broadening Participation in Computing	NSF 05-562	JanCuny	B
	EESE	Ethics Education in Science and Engineering	NSF 05-532	Caroline Wardle	B
	Spec. Proj.	Special Projects	n/a	Caroline Wardle	M

Table 24. Program Review Methodologies

The following tables summarize the proposal review methods in use during CNS's COV period.

FY	Number of Proposals	Panel Reviews	Panel Sum-maries	Mail Reviews Returned	Mail Reviews Request-ed	Mail Reviews Conflict	Mail Reviews Declined	Mail Reviews Late
2003	12	0	0	44	46	0	2	0
2004	16	0	0	56	73	0	10	7
2005	32	0	0	115	125	0	3	7

Table 25. From 2003 to 2005 – Mail-Only Reviews

FY	Number of Proposals	Panel Reviews	Panel Summaries
2003	1,147	5,394	1,227
2004	1,907	8,129	1,968
2005	1,778	7,377	1,799

Table 26. From 2003 to 2005 – Panel-Only Reviews

FY	Number of Proposals	Panel Reviews	Panel Sum-maries	Mail Reviews Returned	Mail Reviews Request-ed	Mail Reviews Conflict	Mail Reviews Declined	Mail Reviews Late
2003	128	584	139	175	219	2	14	28
2004	110	495	131	147	162	1	10	4
2005	198	761	204	265	311	2	17	27

Table 27. From 2003 to 2005 – Panel-plus--Mail Reviews

Certain categories of proposals do not require review such as Supplements, Workshops with a budget request under a certain threshold, etc. The proposal data falling into this category is listed in the following table.

FY	Number of Proposals
2005	176
2004	135
2003	113

Table 28. From 2003 to 2005 – No Reviews

3.2.1.2 CNS Proposal Review Data Analyses

The table below shows the relationship of reviews to proposals during the CNS COV period along with average scores. Note – the row labeled "Average of Number of Reviews" is misleading (inflated) because of the following idiosyncrasy of the reviewer system. The NSF reviewer system counts a reviewer's "association" (i.e., a reviewer's name is linked to a proposal even though the reviewer may not actually review that proposal) in the proposal's review count. A minimum of three reviews is required for each proposal. However, in actual practice, proposals have between four and six reviews and even more if the proposal is multidisciplinary in nature.

FY	Proposal/Reviewer Data	AWD	DECL	Grand Total
2003	# of Proposals	370	975	1,345
	Average of # of Reviews	8.17	10.97	10.20
	Average of Average Score	3.29	2.76	2.90
	Average of Reviews that Met Both Review Criteria	3.92	3.97	3.96
2004	# of Proposals	376	1,692	2,068
	Average of # of Reviews	11.26	12.80	12.52
	Average of Average Score	3.29	2.70	2.81
	Average of Reviews that Met Both Review Criteria	3.67	3.67	3.67
2005	# of Proposals	468	1,589	2,057
	Average of # of Reviews	10.22	11.78	11.42
	Average of Average Score	3.20	2.74	2.84
	Average of Reviews that Met Both Review Criteria	3.50	3.73	3.68
Total # of Proposals		1,214	4,256	5,470
	Total Average of # of Reviews	9.92	12.00	11.54
	Total Average of Average Score	3.25	2.73	2.84
	Total Average of Reviews that Met Both Review Criteria	3.68	3.76	3.74

Table 29. CNS Proposal/Reviewer Data

3.2.1.3 Review Criteria

The Division requests that reviewers evaluate proposals using the NSF review criteria as found in the Guide to Programs. These **two criteria** are:

"What is the intellectual merit of the proposed activity?

> *How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?"*

"What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?"

In addition, many of the programs in the division have additional review criteria. Those criteria are described in the program announcements that are found on the Division's COV website.

The Division examined randomly selected reviews from the sub-sampled jackets to determine if reviews were consistent with specific review criteria for specific programs. The results of this assessment are found in Table 30. Assessment of CNS Reviews with respect to NSF Criteria.

Sub-sample	2003	2004	2005
Number of reviews surveyed	33	67	113
Number consistent with criteria	30	64	108
Number inconsistent with criteria	3	3	5

Table 30. Assessment of CNS Reviews with respect to NSF Criteria

3.2.1.4 Review Thoroughness

The Division encourages reviewers to provide substantive reviews that provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation and to assist Program Managers with funding decisions. When non-substantive reviews are submitted they become part of the review record but usually contribute little to the decision making process.

CNS panels generally use a template for their summaries. The template, minimally, has sections for each merit review criterion, a synthesis/summary section and a rating line. Science Assistants and Program Managers review the summaries as they are produced during the panel meeting and return to the panelist scribe summaries that have not addressed the two merit review criteria as well as additional criteria outlined by the program announcement.

The Division examined randomly selected reviews from each sub-sampled jacket and tabulated whether the information provided was sufficient for a PI to understand the basis for the reviewer's recommendation (score) and the Program Managers' recommendations about funding. The result of this sampling is shown in Table 13.

Sub-sample	2003	2004	2005
Number of reviews surveyed	33	67	113
Number considered "thorough"	30	64	109
Number considered not "thorough"	3	3	4

Table 31. Thoroughness of Reviews

3.2.1.5 Program Officer Decision-Making Documentation

Per NSF policy, complete documentation means that each jacket contains the following information:
Reviews (3 are required per NSF policy unless there is a waiver of external review e.g. SGER, workshop proposals),

- Panel summary (if reviewed by a panel),
- Context statement,
- Table of Reviewers (also known as the Form 7) and
- Program Officer Narrative Review Analysis. The Narrative Review Analysis must:
    - Present the rationale for the Program Officer's recommendation,
    - Address any Conflicts of Interest by panelists or mail reviewers,
    - Address both NSF-wide review criteria and any specialized criteria, and
    - Address any EXCELLENT reviews received for proposals that are being recommended for a decline and any POOR reviews received for proposals, which are being recommended for an award.

The random sub-sample of jackets was examined for the above components. The results follow:

Sub-sample	FY 2003	FY 2004	FY2005
Number of jackets surveyed	6	13	21
Number containing "sufficient" documentation	4	13	20
Number containing "insufficient" documentation	2	0	1

Table 32. Jacket Documentation to Support Decision Making

In addition to the *types* of documents that should be included in a jacket, a more subjective issue is "Is there sufficient information in the review analysis so that if you were a program officer picking up the jacket a year later would you be able to understand why the program officer made the recommendation they did?" If the answer is yes, then one could conclude that sufficient *justification* was provided for making a recommendation. COV members are encouraged to examine the random sub-sample of jackets and ascertain for themselves the adequacy of information.

In addition to proposal reviewing processes and documentation, proposals must be managed in a timely manner. The self-study includes, in the first section, "dwell-time" data comparisons for the Foundation, Directorates, Divisions, and individual programs managed by CNS.

3.2.1.6 Timeliness of Decisions: Dwell Time Data Analysis

Dwell time is defined as the elapsed time between the requested submission date for proposals and the date when the project is awarded or declined[29].
Table 34 and show the dwell times for all of NSF and all of the CISE Directorate.

FY	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
2003	40,114	5.31	2.16	77%	19%	3%	1%
2004	43,823	5.43	2.14	77%	19%	3%	1%
2005	41,711	5.52	3.53	76%	20%	3%	1%

Table 33. NSF Dwell Time for All NSF Proposals

FY	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
2003	5,346	5.43	1.98	78%	19%	2%	1%
2004	6,264	5.35	2.09	79%	19%	2%	1%
2005	5,236	5.02	2.07	82%	15%	2%	1%

Table 34. Dwell Time for All CISE Proposals

Dwell-time Analyses for CISE Divisions and CNS Clusters:
The following section includes tables that summarize the dwell times for each CISE Division and each CNS Cluster for the three years of the COV period[30].

FY 2003 Dwell Time – **CISE**:

[29] *Please see section C. Other Topics for an explanation of some anomalies that may exist with respect to dwell time.*
[30] *Note: The CISE reorganization occurred after the beginning of FY03. The reorganization involved changes of codes used to identify programs and transfers of all or portions of programs and their management into and across CISE Divisions. Consequently, in these and subsequent tables, there may be some minor inconsistencies within the data reported in the tables.*

DIV	Number Of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
0501 CCF	1,772	4.81	1.51	81%	18%	1%	0%
0502 IIS	2,001	5.67	1.83	80%	16%	2%	2%
0505 CNS	1,327	5.84	2.59	71%	23%	4%	3%
0506 EIA	246	5.75	0.90	67%	33%	0%	0%

Table 35. Dwell Times for All CISE Divisions in FY 2003

FY 2003 Dwell Time – **CNS Clusters**:

CLUSTER/PGM	# of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
I. CSR							
2876 Distributed Systems	92	4.77	1.54	80%	20%	0%	0%
2884 Next Generation Software	44	8.79	6.05	9%	57%	32%	2%
2801 Embedded and Hybrid Systems	96	4.68	1.67	73%	27%	0%	0%
2802 Trusted Computing	122	5.12	1.54	69%	31%	0%	0%
II. NeTS							
1766 Strategic Technology for Internet	52	3.81	0.27	100%	0%	0%	0%
4089 Network Centric Middleware	19	4.81	0.26	100%	0%	0%	0%
4090 Adv.Network Research & Infrastructure	10	0.95	0.38	100%	0%	0%	0%
4095 Special Projects in Networking	45	4.56	2.65	91%	7%	0%	2%
4097 Network Research	339	6.80	2.60	75%	9%	8%	9%
7251 EIN	9	2.93	0.06	100%	0%	0%	0%
7253 Network Research Testbeds	19	3.16	0.23	100%	0%	0%	0%
III. CRI							
2885 CISE Research Infrastructure	78	6.87	4.22	45%	42%	10%	3%
IV. EWF							
1713 Workforce	88	5.97	1.47	61%	35%	2%	1%
1714 Special Projects	10	3.00	2.65	90%	0%	10%	0%
1709 Combined Research and Curriculum Development/Educational Innovation	51	6.45	1.36	47%	51%	2%	0%

Table 36. Dwell Times for All CNS Clusters in FY 2003

FY 2004 Dwell Time – **CISE**:

DIV	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
0501 CCF	1,825	5.39	1.53	75%	24%	1%	0%
0502 IIS	2,364	4.95	2.59	88%	10%	2%	1%
0505 CNS	2,070	5.77	1.76	73%	24%	1%	1%
0506 EIA	5	8.19	0.47	0%	100%	0%	0%

Table 37. Dwell Times for All CISE Divisions in FY 2004

FY 2004 Dwell Time – **CNS Clusters:**

CLUSTER/PGM	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
CSR							
2801 Embedded & Hybrid Systems	125	6.40	1.64	57%	42%	2%	0%
2802 Trusted Computing	3	8.48	5.01	33%	0%	33%	33%
2876 Distributed Systems	104	5.85	0.75	69%	31%	0%	0%
2884 Next Generation Software	90	8.03	5.21	66%	19%	3%	12%
7314 ITR for National Priorities	272	5.81	0.46	87%	13%	0%	0%
NeTS							

1766 Strategic Tech. For Internet	49	5.71	0.16	80%	20%	0%	0%
4090 Adv. Network Infrastructure & Research	117	6.81	0.79	0%	100%	0%	0%
4095 Special Projects in Network Research	72	4.79	1.12	93%	6%	0%	1%
4097 Networking Research	7	9.49	6.51	29%	14%	0%	57%
7251 EIN	18	5.63	0.02	100%	0%	0%	0%
7253 Network Research Testbeds	29	5.52	0.17	100%	0%	0%	0%
7362 Network Systems	1	0.03		100%	0%	0%	0%
7363 Research in Networking Tech. & Systems	443	4.87	0.83	100%	0%	0%	0%
7371 Cyber Trust	368	5.74	0.56	60%	40%	0%	0%
CRI							
2885 Research Infrastructure	27	5.95	2.75	63%	11%	26%	0%
2890 CISE Research Resources	43	5.61	0.15	95%	5%	0%	0%
7399 CISE Minority Institution Infrastructure (MII)	14	6.08	0.35	79%	21%	0%	0%
EWF							
1139 Research Experience for Undergraduates	45	5.31	0.63	87%	13%	0%	0%
1709 CISE Education Research & Curric. Dev.	72	6.42	1.02	49%	51%	0%	0%
1713 Workforce	69	4.14	1.60	72%	28%	0%	0%
1714 CISE Special Projects	9	5.77	2.85	56%	33%	11%	0%

Table 38. Dwell Times for All CNS Clusters in FY 2004

FY 2005 Dwell Time – **CISE**:

DIV	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
0501 CCF	1,299	4.96	1.47	84%	15%	1%	0%
0502 IIS	1,880	4.47	2.63	88%	8%	2%	3%
0505 CNS	2,057	5.55	1.63	75%	21%	4%	0%

Table 39. Dwell Times for All CISE Divisions in FY 2005

FY 2005 Dwell Time – **CNS Clusters:**

CLUSTER/PGM	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
CSR							
2801 Embedded & Hybrid Systems	6	4.82	5.04	67%	0%	17%	17%
2802 Trusted Computing	1	13.38		0%	0%	0%	100%
2876 Distributed Systems	3	3.46	4.24	67%	33%	0%	0%
2884 Next Generation Software	3	11.45	0.13	0%	0%	100%	0%
7354 Computer Systems	489	5.78	0.99	83%	16%	0%	0%
7481 Dynamic Data Driven Application Systems	130	3.38	0.25	100%	0%	0%	0%
NeTS							
4090 Adv. Network Infra. & Res.	6	5.56	0.13	100%	0%	0%	0%
4097 Networking Research	5	4.94	4.06	60%	20%	20%	0%
7362 Network Systems	75	5.24	0.87	93%	7%	0%	0%
7363 Res. In Network Tech. & Systems	624	5.23	1.16	78%	22%	0%	0%
7371 Cyber Trust	364	5.69	1.34	88%	10%	1%	1%
CRI							
2885 CISE Research Infrastructure	1	5.85		100%	0%	0%	0%
2890 CISE Research Resources	1	1.35		100%	0%	0%	0%
7399 CISE Minority Infrastructure (MII)	3	9.25	0.53	0%	67%	33%	0%
7359 Computing Research Infrastructure	212	7.36	2.04	5%	65%	29%	1%

CLUSTER/PGM	Number of Proposals	Average (Months)	Std_dev (Months)	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
EWF							
1139 Research Experience for Undergraduates Sites	25	4.22	0.20	100%	0%	0%	0%
1709 CISE Education Res. Curriculum Development	1	9.90		0%	0%	100%	0%
1713 Workforce	2	3.53	1.09	100%	0%	0%	0%
1714 CISE Special Projects	16	1.05	0.89	100%	0%	0%	0%
7361 Education & Workforce	2	3.80	1.79	100%	0%	0%	0%
7482 Broadening Participation in Computing	3	2.13	1.89	100%	0%	0%	0%

Table 40. Dwell Times for CNS Clusters in FY 2005

3.2.1.7 Cumulative Data on Review Processes

The data in the following table were obtained from NSF's EIS information system and thus include all proposals reviewed in the last three years. The review template in NSF's FastLane is structured so that there are separate sections for addressing criterion 1, 2 and a summary. When a review is submitted if there are at least five words in a section the review is scored as positive for having addressed that criterion.

	2003	2004	2005
Number of reviews	33	67	113
Percent that addressed both NSF criteria	30	64	108
Percent missing one or other NSF merit criteria	3	3	5

Table 41. Analysis of CNS Compliance with Review Criteria

NSF does not have a standard template for panel summaries. Consequently, cumulative data about panel summaries compliance with NSF "Two criteria" is not included here. Likewise, Program Officer Review Analyses are not electronically evaluated for compliance criteria. Consequently, the data in the table above come from examining the random sub-sample.

3.2.1.8 Selection of Reviewers

There are several issues relating to the selection of reviewers:
Portfolio of reviewers -- is the pool of reviewers sufficiently large, does it include new reviewers over time, does panel makeup change from year to year.

- Expertise of reviewers – is the expertise of the reviewers appropriate for the proposals they reviewed.
- Balance – does the pool of reviewers reflect diversity, geographical balance, a range of reviewer experience and home institution or organizational type.

There are several ways that the COV can evaluate effectiveness of the selection of reviewers. CNS generated a ***spreadsheet of all reviewer characteristics*** during the COV period of 2003 through 2005. This material is available on the CNS COV website.

NSF strives to engage the entire scientific community in the review process. Consequently, program officers are encouraged to select reviewers and panelists from different areas of the country, from different types of institutions, and from groups underrepresented in science.

Reviewer Data for Cluster I -- Computer Systems Cluster – FY 2003

	Distributed Systems 2876	Embedded Hybrid Sys. 2801	NG Software 2884	Trusted Comp 2802	CAREER	Total
Number of Reviewers	21	42	30	52	36	181
Number of Panel Revs.	275	379	269	460	356	1,739
Number of Mail Reviews Returned	Unknown	18	14	34	4	70
Number of Female Reviewers	2	10	5	10	4	31
Number From Under-represented Groups	3	4	2	3	1	13
Number New Reviewers	2	6	20	Unknown	3	31

Table 42. Reviewer Data for Computer Systems Cluster – FY 2003

Reviewer Data for Cluster I -- Computer Systems Cluster – FY 2004

	Distributed Systems 2876	Embedded and Hybrid Systems 2801	Next Generation Software 2884	Total
Number of Reviewers	41	53	25	173
Number of Panel Reviews	423	529	399	1,351
Number of Mail Reviews Returned	21	1	4	26
Number of Female Reviewers	1	3	7	7
Number from Underrepresented Groups	1	6	5	12
Number of New Reviewers	5	5	5	15

Table 43. Reviewer Data for Computer Systems Cluster – FY 2004

Reviewer Data for Cluster I -- Computer Systems Cluster – FY 2005

	Total
Number of Reviewers	242
Number of Panel Reviews	1,952
Number of Mail Reviews Returned	118
Number of Female Reviewers	11
Number from Underrepresented Groups	2
Number of New Reviewers	Unknown

Table 44. Reviewer Data for Computer Systems Cluster – FY 2005

Reviewer Data for Cluster II -- Network Cluster – FY 2003

	Networking Research 4097	Special Projects 4095	Exp Infr Netwkss 7251	Net Res Testbeds 7253	Strategic Tech Int. 1766	CAREER	Total
Number of Reviewers	110	48	13	16	40	27	254
Number of Panel Reviews	1,177	465	190	252	365	325	2,774
Number of Mail Reviews Returned	2	2	10	20	10	4	48
Number of Female Reviewers	9	1	0	1	3	3	17
Number From Under-represented Groups	5	2	0	0	1	0	8
Number New Reviewers	26	Unknown	4	Unknown	Unknown	3	33

Table 45. Reviewer Data for Network Cluster – FY 2003

Reviewer Data for Cluster II -- Network Cluster – FY 2004

	NeTS 7363
Number of Reviewers	178
Number of Panel Reviews	1,677
Number of Mail Reviews Returned	9
Number of Female Reviewers	8
Number from Underrepresented Groups	14
Number of New Reviewers	23

Table 46. Reviewer Data for Network Cluster – FY 2004

Reviewer Data for Cluster II -- Network Cluster – FY 2005

	NeTS 7363
Number of Reviewers	399
Number of Panel Reviews	2,841
Number of Mail Reviews Returned	38
Number of Female Reviewers	24
Number from Underrepresented Groups	9
Number of New Reviewers	Unknown

Table 47. Reviewer Data for Network Cluster – FY 2005

Reviewer Data for Cluster III -- Infrastructure Cluster – FY 2003

	Research Resources 2890	Major Res. Instrument. 1189	Research Infra. 2885	Minority Inst. Infra. 2885	Total
Number of Reviewers	12	25	20	7	64
Number of Panel Reviews	161	186	96	43	486
Number of Mail Reviews Returned	0	9	14	0	23
Number of Female Reviewers	2	9	1	2	14
Number From Under-represented Groups	0	5	3	2	10
Number New Reviewers	2	15	0	4	21

Table 48. Reviewer Data for Infrastructure Cluster – FY 2003

Reviewer Data for Cluster III -- Infrastructure Cluster – FY 2004

	Research Resources 2890	Major Research Instrumentation 1189	Research Infra-structure 2885	Minority Institution Infra-structure 7399	Total
Number of Reviewers	21	10	12	14	57
Number of Panel Reviews	165	255	107	56	583
Number of Mail Reviews Returned	0	0	4	0	4
Number of Female Reviewers	1	1	2	1	5
Number from Underrepresented Groups	4	4	3	3	13
Number of New Reviewers	7	4		4	15

Table 49. Reviewer Data for Infrastructure Cluster – FY 2004

Reviewer Data for Cluster III -- Infrastructure Cluster – FY 2005

	Computing & Research Infrastructure 7399	Minority Research Infrastructure 1189	FY 2005 Total
Number of Reviewers	117	37	154
Number of Panel Reviews	1,207	200	1,407
Number of Mail Reviews Returned	18	7	25
Number of Female Reviewers	15	3	18
Number from Underrepresented Groups	3	4	7
Number of New Reviewers	Unknown	Unknown	Unknown

Table 50. Reviewer Data for Infrastructure Cluster – FY 2005

Reviewer Data for Cluster IV -- Education and Workforce Cluster – FY 2003

	IT Workforce 1713	EI/CRCD 1709	REU Sites 1713	Special Projects 1713/1714	Total
Number of Reviewers	24	20	11	17	72
Number of Panel Reviews	250	198	155	0	603
Number of Mail Reviews Returned	0	3	0	17	20
Number of Female Reviewers	16	6	4	7	33
Number From Under-represented Groups	3	2	0	3	8
Number New Reviewers	21	19	6	0	46

Table 51. Reviewer Data for Education and Workforce Cluster – FY 2003

Reviewer Data for Cluster IV -- Education and Workforce Cluster – FY 2004

	REU Sites 1139	CRCD/EI 1709	ITWF 1713	Special Projects 1714	Total
Number of Reviewers	43	52	26	36	157
Number of Panel Reviews	220	300	337	6	863
Number of Mail Reviews Returned	0	6	0	33	39
Number of Female Reviewers	5	5	7	5	22
Number from Underrepresented Groups	7	6	10	5	28
Number of New Reviewers	2	2	12	0	16

Table 52. Reviewer Data for Education and Workforce Cluster – FY 2004

Reviewer Data for Cluster IV -- Education and Workforce Cluster – FY 2005

	REU Sites 1139	EWF 1709,1713,1714, 7361, 7482	FY 2005 Total
Number of Reviewers	13	29	42
Number of Panel Reviews	29	3	32
Number of Mail Reviews Returned	3	29	47
Number of Female Reviewers	3	7	10
Number from Underrepresented Groups	5	8	13
Number of New Reviewers	1	3	4

Table 53. Reviewer Data for Education and Workforce Cluster – FY 2005

The following tables summarize several reviewer characteristics including: geographical distribution, under-represented groups (women, minorities), new reviewers, and institution type.

Reviewer Distribution by State

The following table shows the state that reviewers listed in their address information in the reviewer database along with the absolute number and percentage of reviewers from each state.

		FY			
		2003	2004	2005	Grand Total
AK	#		1	1	2
	%	0.00%	0.07%	0.06%	0.05%
AL	#	7	9	10	26
	%	0.61%	0.60%	0.57%	0.59%
AR	#	4	3	4	11
	%	0.35%	0.20%	0.23%	0.25%
AZ	#	23	31	29	83
	%	2.00%	2.06%	1.64%	1.88%
CA	#	134	182	244	560
	%	11.63%	12.08%	13.82%	12.66%
CO	#	20	24	30	74
	%	1.74%	1.59%	1.70%	1.67%
CT	#	8	11	15	34
	%	0.69%	0.73%	0.85%	0.77%
DC	#	25	25	28	78
	%	2.17%	1.66%	1.59%	1.76%
DE	#	8	6	6	20
	%	0.69%	0.40%	0.34%	0.45%
FL	#	30	45	41	116
	%	2.60%	2.99%	2.32%	2.62%
GA	#	31	39	41	111
	%	2.69%	2.59%	2.32%	2.51%
HI	#	5	3	4	12
	%	0.43%	0.20%	0.23%	0.27%
IA	#	14	14	18	46
	%	1.22%	0.93%	1.02%	1.04%
ID	#	1	3	3	7
	%	0.09%	0.20%	0.17%	0.16%
IL	#	51	62	76	189
	%	4.43%	4.12%	4.30%	4.27%
IN	#	25	40	46	111
	%	2.17%	2.66%	2.60%	2.51%
KS	#	7	14	15	36
	%	0.61%	0.93%	0.85%	0.81%
KY	#	7	7	6	20
	%	0.61%	0.46%	0.34%	0.45%
LA	#	10	11	13	34
	%	0.87%	0.73%	0.74%	0.77%
MA	#	59	97	103	259
	%	5.12%	6.44%	5.83%	5.85%
MD	#	60	83	95	238
	%	5.21%	5.51%	5.38%	5.38%
ME	#	3	2	1	6
	%	0.26%	0.13%	0.06%	0.14%
MI	#	32	39	42	113
	%	2.78%	2.59%	2.38%	2.55%
MN	#	18	24	26	68
	%	1.56%	1.59%	1.47%	1.54%
MO	#	13	21	26	60
	%	1.13%	1.39%	1.47%	1.36%
MS	#	4	9	9	22
	%	0.35%	0.60%	0.51%	0.50%
MT	#	1	2	2	5
	%	0.09%	0.13%	0.11%	0.11%
NC	#	20	36	45	101
	%	1.74%	2.39%	2.55%	2.28%
ND	#	2	2	1	5
	%	0.17%	0.13%	0.06%	0.11%
NE	#	4	5	5	14
	%	0.35%	0.33%	0.28%	0.32%
NH	#	8	8	5	21
	%	0.69%	0.53%	0.28%	0.47%
NJ	#	60	80	88	228
	%	5.21%	5.31%	4.98%	5.15%
NM	#	7	12	15	34
	%	0.61%	0.80%	0.85%	0.77%
NV	#	2	1	1	4
	%	0.17%	0.07%	0.06%	0.09%
NY	#	85	105	123	313
	%	7.38%	6.97%	6.96%	7.08%
OH	#	20	22	26	68
	%	1.74%	1.46%	1.47%	1.54%
OK	#	7	7	11	25
	%	0.61%	0.46%	0.62%	0.57%
OR	#	16	16	23	55
	%	1.39%	1.06%	1.30%	1.24%
PA	#	61	74	91	226
	%	5.30%	4.91%	5.15%	5.11%
PR	#	1	3	3	7
	%	0.09%	0.20%	0.17%	0.16%
RI	#	7	7	9	23
	%	0.61%	0.46%	0.51%	0.52%
SC	#	6	10	10	26
	%	0.52%	0.66%	0.57%	0.59%
TN	#	14	19	23	56
	%	1.22%	1.26%	1.30%	1.27%
TX	#	55	67	75	197
	%	4.77%	4.45%	4.25%	4.45%
UT	#	16	16	20	52
	%	1.39%	1.06%	1.13%	1.18%
VA	#	75	91	113	279
	%	6.51%	6.04%	6.40%	6.31%
VT	#			2	2
	%	0.00%	0.00%	0.11%	0.05%
WA	#	22	32	36	90
	%	1.91%	2.12%	2.04%	2.03%
WI	#	9	11	16	36
	%	0.78%	0.73%	0.91%	0.81%
WV	#	2	4	4	10
	%	0.17%	0.27%	0.23%	0.23%
WY	#	1		1	2
	%	0.09%	0.00%	0.06%	0.05%
Blank	#	52	71	86	209
	%	4.51%	4.71%	4.87%	4.72%
Total	#	1152	1506	1766	4424
Total	%	100.00%	100.00%	100.00%	100.00%

Table 54. Analysis of CNS Reviewers by State

Reviewer Distribution by Reviewer-Characteristics

The following tables show the distribution of CNS reviewers by gender, minority designation and declared disability.

		FY			
		2003	2004	2005	Grand Total
AR	#			1	1
	%	0.00%	0.00%	0.80%	0.34%
AZ	#		1	1	2
	%	0.00%	0.95%	0.80%	0.68%
CA	#	5	12	13	30
	%	7.81%	11.43%	10.40%	10.20%
CO	#	2	2	2	6
	%	3.13%	1.90%	1.60%	2.04%
CT	#	1	2	1	4
	%	1.56%	1.90%	0.80%	1.36%
DC	#	2	3	4	9
	%	3.13%	2.86%	3.20%	3.06%
FL	#	2	3	2	7
	%	3.13%	2.86%	1.60%	2.38%
GA	#	4	4	6	14
	%	6.25%	3.81%	4.80%	4.76%
HI	#	2	1	1	4
	%	3.13%	0.95%	0.80%	1.36%
IA	#	1		1	2
	%	1.56%	0.00%	0.80%	0.68%
IL	#	5	7	9	21
	%	7.81%	6.67%	7.20%	7.14%
IN	#	1	3	4	8
	%	1.56%	2.86%	3.20%	2.72%
KS	#	1	1	1	3
	%	1.56%	0.95%	0.80%	1.02%
KY	#			1	1
	%	0.00%	0.00%	0.80%	0.34%
LA	#	1	2	3	6
	%	1.56%	1.90%	2.40%	2.04%
MA	#	6	9	14	29
	%	9.38%	8.57%	11.20%	9.86%
MD	#	3	8	5	16
	%	4.69%	7.62%	4.00%	5.44%
ME	#	1			1
	%	1.56%	0.00%	0.00%	0.34%
MI	#			2	2
	%	0.00%	0.00%	1.60%	0.68%
MO	#			1	1
	%	0.00%	0.00%	0.80%	0.34%
MS	#		1	1	2
	%	0.00%	0.95%	0.80%	0.68%
NC	#	2	6	6	14
	%	3.13%	5.71%	4.80%	4.76%

		FY			
		2003	2004	2005	Grand Total
NE	#	1			1
	%	1.56%	0.00%	0.00%	0.34%
NJ	#	3	5	6	14
	%	4.69%	4.76%	4.80%	4.76%
NY	#	2	3	6	11
	%	3.13%	2.86%	4.80%	3.74%
OH	#		1	1	2
	%	0.00%	0.95%	0.80%	0.68%
OK	#	2	2	1	5
	%	3.13%	1.90%	0.80%	1.70%
OR	#	1	1	2	4
	%	1.56%	0.95%	1.60%	1.36%
PA	#	7	9	12	28
	%	10.94%	8.57%	9.60%	9.52%
RI	#	1			1
	%	1.56%	0.00%	0.00%	0.34%
TN	#		1	1	2
	%	0.00%	0.95%	0.80%	0.68%
TX	#	1	3	4	8
	%	1.56%	2.86%	3.20%	2.72%
UT	#	2	2	1	5
	%	3.13%	1.90%	0.80%	1.70%
VA	#	2	5	3	10
	%	3.13%	4.76%	2.40%	3.40%
WA	#		1	2	3
	%	0.00%	0.95%	1.60%	1.02%
WI	#	1	2	2	5
	%	1.56%	1.90%	1.60%	1.70%
WV	#	1	1	1	3
	%	1.56%	0.95%	0.80%	1.02%
Blank	#	1	4	4	9
	%	1.56%	3.81%	3.20%	3.06%
Total	#	64	105	125	294
Total	%	100.00%	100.00%	100.00%	100.00

Table 55. Analysis of CNS Female Reviewers by State

		FY			
Gender	Data	2003	2004	2005	Grand Total
Female	# of Reviewers	64	105	125	294
	% of Reviewers	5.6%	7.0%	7.1%	6.6%
Male	# of Reviewers	293	411	481	1,185
	% of Reviewers	25.4%	27.3%	27.2%	26.8%
Undetermined	# of Reviewers	19	24	17	60
	% of Reviewers	1.6%	1.6%	1.0%	1.4%
Blank	# of Reviewers	776	966	1,143	2,885
	% of Reviewers	67.4%	64.1%	64.7%	65.2%
Total # of Reviewers		1,152	1,506	1,766	4,424
Total % of Reviewers		100.0%	100.0%	100.0%	100.0%

Table 56. Summary-Analysis of CNS Reviewers by Gender

		FY			
		2003	2004	2005	Grand Total
AZ	#	1	1	1	3
	%	16.67%	12.50%	14.29%	14.29%
CA	#		1		1
	%	0.00%	12.50%	0.00%	4.76%
CT	#	1	1	1	3
	%	16.67%	12.50%	14.29%	14.29%
IL	#	1	1		2
	%	16.67%	12.50%	0.00%	9.52%
KS	#		1	1	2
	%	0.00%	12.50%	14.29%	9.52%
MA	#	1	1	1	3
	%	16.67%	12.50%	14.29%	14.29%
MS	#	1	1	1	3
	%	16.67%	12.50%	14.29%	14.29%
NJ	#	1	1	1	3
	%	16.67%	12.50%	14.29%	14.29%
NY	#			1	1
	%	0.00%	0.00%	14.29%	4.76%
Total #		6	8	7	21
Total %		100.00%	100.00%	100.00%	100.00%

Table 57. Analysis of CNS Reviewers with Declared Disabilities by State

		FY			
Minority Status	Data	2003	2004	2005	Grand Total
No	# of Reviewers	348	492	575	1,415
	% of Reviewers	30.2%	32.7%	32.6%	32.0%
Yes	# of Reviewers	28	48	48	124
	% of Reviewers	2.4%	3.2%	2.7%	2.8%
Blank	# of Reviewers	776	966	1,143	2,885
	% of Reviewers	67.4%	64.1%	64.7%	65.2%
Total # of Reviewers		1,152	1,506	1,766	4,424
Total % of Reviewers		100.0%	100.0%	100.0%	100.0%

Table 58. Summary-Analysis of CNS Reviewers with Declared Disabilities

		FY			
		2003	2004	2005	Grand Total
AL	#		1		1
	%	0.00%	2.08%	0.00%	0.81%
AR	#		1	1	2
	%	0.00%	2.08%	2.08%	1.61%
AZ	#	1	2	2	5
	%	3.57%	4.17%	4.17%	4.03%
CA	#	4	6	6	16
	%	14.29%	12.50%	12.50%	12.90%
CT	#			1	1
	%	0.00%	0.00%	2.08%	0.81%
DC	#			1	1
	%	0.00%	0.00%	2.08%	0.81%
FL	#	3	6	2	11

		FY			
		2003	2004	2005	Grand Total
	%	10.71%	12.50%	4.17%	8.87%
GA	#	1	1	1	3
	%	3.57%	2.08%	2.08%	2.42%
HI	#			1	1
	%	0.00%	0.00%	2.08%	0.81%
IL	#		2	2	4
	%	0.00%	4.17%	4.17%	3.23%
LA	#	1	1	1	3
	%	3.57%	2.08%	2.08%	2.42%
MA	#	3	2	3	8
	%	10.71%	4.17%	6.25%	6.45%
MD	#	1	1	1	3
	%	3.57%	2.08%	2.08%	2.42%

		FY			
		2003	2004	2005	Grand Total
MI	#	1	1	1	3
	%	3.57%	2.08%	2.08%	2.42%
MS	#		1		1
	%	0.00%	2.08%	0.00%	0.81%
NC	#	1	2	2	5
	%	3.57%	4.17%	4.17%	4.03%
NE	#		1		1
	%	0.00%	2.08%	0.00%	0.81%
NJ	#	1	5	6	12
	%	3.57%	10.42%	12.50%	9.68%
NY	#	1	2	2	5
	%	3.57%	4.17%	4.17%	4.03%
OK	#	1	1	1	3
	%	3.57%	2.08%	2.08%	2.42%
OR	#	2	2	2	6
	%	7.14%	4.17%	4.17%	4.84%
PA	#	3	3	2	8
	%	10.71%	6.25%	4.17%	6.45%

		FY			
		2003	2004	2005	Grand Total
PR	#		1	1	2
	%	0.00%	2.08%	2.08%	1.61%
RI	#		1	1	2
	%	0.00%	2.08%	2.08%	1.61%
TX	#	2	1	3	6
	%	7.14%	2.08%	6.25%	4.84%
UT	#	1	1		2
	%	3.57%	2.08%	0.00%	1.61%
VA	#	1	2	3	6
	%	3.57%	4.17%	6.25%	4.84%
WI	#		1	1	2
	%	0.00%	2.08%	2.08%	1.61%
WY	#			1	1
	%	0.00%	0.00%	2.08%	0.81%
Total #		28	48	48	124
Total %		100.00%	100.00%	100.00%	100.00%

Table 59. Analysis of CNS Minority Reviewers by State

		FY			
Minority Status	Data	2003	2004	2005	Grand Total
No	# of Reviewers	348	492	575	1,415
	% of Reviewers	30.2%	32.7%	32.6%	32.0%
Yes	# of Reviewers	28	48	48	124
	% of Reviewers	2.4%	3.2%	2.7%	2.8%
Blank	# of Reviewers	776	966	1,143	2,885
	% of Reviewers	67.4%	64.1%	64.7%	65.2%
Total # of Reviewers		1,152	1,506	1,766	4,424
Total % of Reviewers		100.0%	100.0%	100.0%	100.0%

Table 60. Summary-Analysis of CNS Minority Reviewers

The following table summarizes the CNS reviewers by their institution type.

Institution Type		FY			
		2003	2004	2005	Grand Total
2 Yr Degree Institution	# of Reviewers	1	1		2
	% of Reviewers	0.09%	0.07%	0.00%	0.05%
4 Yr Degree Institution	# of Reviewers	7	10	8	25
	% of Reviewers	0.61%	0.66%	0.45%	0.57%
Foreign, Business, State & Local, Other	# of Reviewers	117	139	181	437
	% of Reviewers	10.16%	9.23%	10.25%	9.88%
Masters Granting Institution	# of Reviewers	28	38	34	100
	% of Reviewers	2.43%	2.52%	1.93%	2.26%
Non-Research Intensive PhD Institutions	# of Reviewers	231	313	363	907
	% of Reviewers	20.05%	20.78%	20.55%	20.50%
Research Intensive PhD Institutions (Top 100)	# of Reviewers	363	472	574	1,409
	% of Reviewers	31.51%	31.34%	32.50%	31.85%
Blank	# of Reviewers	405	533	606	1,544
	% of Reviewers	35.16%	35.39%	34.31%	34.90%
Total # of Reviewers		1,152	1,506	1,766	4,424
Total % of Reviewers		100.00%	100.00%	100.00%	100.00%

Table 61. Summary-Analysis of CNS Reviewers by Institution Type

With respect to the expertise of reviewers, Program Officers obtain reviewers' names from a wide variety of sources, including their own knowledge of the subject, suggestions provided by the PI in the proposal, references in the proposal, the NSF reviewer database, other databases (e.g. Science Citation Index and other bibliographic databases), the web, colleagues and other program officers. Because the issue of "appropriate expertise" is a function of a particular proposal and the reviewers selected for that proposal, the Division encourages the COV members to examine the sub-sample jackets and assess for themselves if the expertise of the reviewer selected was appropriate.

3.2.1.9 Reviewer Conflict of Interest Management

There are several types of disqualifying conflicts that would legally prevent someone from a participating in the review of a proposal. They are: close family or personal relationship with the PIs or co-PIs, being from the same institution as the PI, collaboration with the PI within the last 48 months (this includes post docs), or being the thesis advisor or advisee of the PI or co-PI. There are other conflicts that are not legally disqualifying and may be waived for good cause at the discretion of the managing program officer. These include: having received a modest honorarium from a submitting institution within the last year, being on a policy making position of the submitting organization, or having been employed by the submitting institution within the last 12 months.

To identify conflicts, program officers first carefully review the collaborator lists provided by the PI(s) and note the institutions involved with the proposal. When mail reviewers self-identify that they are in conflict with a proposal, they may or may not provide a review. A score of "C" is recorded on the computer Reviewer Form and the review, if any, is not provided to the panel or taken into consideration in the decision making process. All reviewers, mail or panel, are prevented from seeing the text of the review.

Panelists who are in conflict with a particular proposal are either identified by the program prior to the panel meeting or self-identify during the meeting. In either case, the panelist in conflict is asked to leave the panel room and does not participate in any aspect of the review of the proposal. The program officer notes the panelist's name and that they left the panel room on the narrative review analysis and a score of "C" is recorded on the Computer Review Form. The new interactive electronic panel system is designed so that panelists are blocked from having access to proposals with which they're in conflict.

When program officers are in conflict with a particular proposal, they are removed from the entire review process, including the panel review, leaving the room when that particular proposal is discussed. Another program officer will handle all aspects of the review. Their conflict and departure from the room is also noted on the narrative review analysis. The Electronic Jacket System also prevents the program officers in conflict from seeing and acting on these proposals.

The following table is based on an examination of the jacket sub-sample. The division examined the Program Officer Review Analysis and the computer Form 7 to determine which jackets had a COI, and if they were properly documented and resolved.

	FY 2003	FY 2004	FY2005
Number of Jackets	6	12	21
Number of proposals with Conflicted Reviewer(s) or Program Officer	1	2	8
Number not properly resolved	0	0	0

Table 62. Summary of Sampling for Conflict of Interest Management

3.2.2 Portfolio of Awards

3.2.2.1 Award Size and Duration

Programs attempt to fully fund highly competitive projects whose budgets are well justified. However, when the limitation of resources makes this impossible, the Program Officer determines an amount that they can provide for a project and informs the PI of this amount. If the reduction is greater than 10% of the amount originally requested, the Program Officer requests a revised budget and impact statement. The Program Officer notes the budget reduction and the rationale for it in the jacket.

The following table contains information related to award size and duration for the CNS Division. Data were obtained from the EIS system and include all the awards made by the division during the time indicated.

FY	Data	Total
2003	# of Proposals	1,345
	Average of Annual Dollars	$228,620
	Average of Award Duration	2.98
2004	# of Proposals	2,068
	Average of Annual Dollars	$161,331
	Average of Award Duration	3.07
2005	# of Proposals	2,057
	Average of Annual Dollars	$151,277
	Average of Award Duration	2.69
Total # of Proposals		5,470
Total Average of Annual Dollars		$178,605
Total Average of Awd Duration		2.90

Table 63. All CNS Proposals

FY	Data	Total
2003	# of Proposals	370
	Average of Annual Dollars	$228,620
	Average of Award Duration	2.98
2004	# of Proposals	376
	Average of Annual Dollars	$161,331
	Average of Award Duration	3.07
2005	# of Proposals	468
	Average of Annual Dollars	$151,277
	Average of Award Duration	2.69
Total # of Proposals		1,214
Total Average of Annual Dollars		$178,605
Total Average of Award Duration		2.90

Table 64. All CNS Awards

Award PI Data

Proposal PI Data for Cluster I -- Computer Systems Cluster – FY 2003

	Distributed Systems 2876	Embedded Hybrid Sys. 2801	NG Software 2884	Trusted Comp 2802	CAREER	Total
Total Number	81	92	46	120	59	398
Females	7	4	7	17	10	45
Males	72	66	39	101	46	324
Gender Unknown	2	22	0	2	3	29
New PIs (awarded)	5	5	10	11	Unknown	31
EPSCOR PIs	2	6	5	8	7	28
Underrepresented Minorities	2	2	0	5	Unknown	9

Table 65. Proposal PI Data for Computer Systems Cluster – FY 2003

Proposal PI Data for Cluster I -- Computer Systems Cluster – FY 2004

	Distributed Systems 2876	Embedded & Hybrid Sys 2801	Next Gen Software 2884	Total
Total Number	113	139	93	345
Females	17	12	9	38
Males	89	113	73	275
Gender Unknown	7	14	11	32
New PIs (awarded)	3	7	9	19
EPSCOR PIs (awarded)	2	5	6	13
Underrepresented Minorities (awarded)	0	2	2	2

Table 66. Proposal PI Data for Computer Systems Cluster – FY 2004

Proposal PI Data for Cluster I -- Computer Systems Cluster – FY 2005

	FY 05 CSR 7354	FY 04 CSR 7354
Total Number	469	345
Females	88	38
Males	381	275
Gender Unknown	0	32
New PIs (awarded)	25	19
EPSCOR PIs (awarded)	13	13
Underrepresented Minorities (awarded)	5	2

Table 67. Proposal PI Data for Computer Systems Cluster – FY 2005

Proposal PI Data for Cluster II -- Network Cluster – FY 2003

	Networking Research 4097	Special Projects 4095	Exp Infr Netwks 7251	Net Res Testbeds 7253	Strategic Tech Int. 1766	CAREER	Total
Total Number	316	53	27	51	73	63	583
Females	35	5	2	3	3	13	61
Males	263	44	23	48	66	40	484
Gender Unknown	18	4	2	0	4	10	38
New PIs (awarded)	7	7	0	2	1	Unknown	17
EPSCOR PIs	25	6	2	3	6	10	52
Underrepresented Minorities	11	1	1	2	3	Unknown	18

Table 68. Proposal PI Data for Network Cluster – FY 2003

Proposal PI Data for Cluster II -- Network Cluster – FY 2004

	NeTS 7363
Total Number	498
Females	65
Males	393
Gender Unknown	40
New PIs (awarded)	24
EPSCOR PIs (awarded)	3
Underrepresented Minorities (awarded)	3

Table 69. Proposal PI Data for Network Cluster – FY 2004

Proposal PI Data for Cluster II -- Network Cluster – FY 2005

	FY 05 NeTS 7363
Total Number	539
Number of Females	85
Number of Males	454
Gender Unknown	0
New PIs (awarded)	29
EPSCOR PIs (awarded)	4
Underrepresented Minorities (awarded)	2

Table 70. Proposal PI Data for Network Cluster – FY 2005

Proposal PI Data for Cluster III -- Infrastructure Cluster – FY 2003

	Research Resources 2890	Major Res. Instrument. 1189	ResearchInfra. 2885	Minority Inst. Infra. 2885	Total
Total Number	29	50	27	19	125
Females	1	6	1	3	11
Males	27	42	25	14	108
Gender Unknown	1	2	1	2	6
New PIs (awarded)	5	0	0	3	8
EPSCOR PIs	0	5	3	7	15
Underrepresented Minorities	1	4	1	9	15

Table 71. Proposal PI Data for Infrastructure Cluster – FY 2003

Proposal PI Data for Cluster III -- Infrastructure Cluster – FY 2004

	Research Resources 2890	Major Research Instru-mentation 1189	Research Infrastructure 2885	Minority Institution Infrastructure 7399	Total
Total Number	50	63	33	18	164
Females	5	8	5	2	20
Males	37	50	23	15	125
Gender Unknown	8	5	5	1	19
New PIs (awarded)	7	7	1	0	15
EPSCOR PIs (awarded)	2	5	0	1	8
Underrepresented Minorities (awarded)	1	1	0	2	4

Table 72. Proposal PI Data for Infrastructure Cluster – FY 2004

Proposal PI Data for Cluster III -- Infrastructure Cluster – FY 2005

	Computing & Research Infrastructure 7359	Minority Research Infrastructure 1189	FY 2005 Total
Total Number of PIs	247	50	297
Number of Females	35	5	40
Number of Males	183	45	228
Gender Unknown	29	0	29
New PIs (awarded)	9	12	21
EPSCOR PIs (awarded)	4	6	10
Underrepresented Minorities (awarded)	4	1	5

Table 73. Proposal PI Data for Infrastructure Cluster – FY 2005

Proposal PI Data for Cluster IV -- Education and Workforce Cluster – FY 2003

	IT Workforce 1713	EI/CRCD 1709	REU Sites 1713	Special Projects 1713/1714	Total
Total Number	49	66	47	14	176
Females	33	5	6	6	50
Males	16	61	40	8	125
Gender Unknown	0	0	1	0	1
New PIs (awarded)	6	4	3	1	14
EPSCOR PIs	9	9	9	0	27
Underrepresented Minorities	12	2	2	2	18

Table 74. Proposal PI Data for Education and Workforce Cluster – FY 2003

Proposal PI Data for Cluster IV -- Education and Workforce Cluster – FY 2004

	REU Sites 1139	CRCD/EI 1709	ITWF 1713	Special Projects 1714	Total
Total Number	53	108	80	11	252
Females	12	11	39	4	66
Males	31	65	29	4	129
Gender Unknown	10	32	12	3	57
New PIs (awarded)	1	0	11	2	14
EPSCOR PIs (awarded)	1	1	1	0	3
Underrepresented Minorities (awarded)	0	0	5	1	6

Table 75. Proposal PI Data for Education and Workforce Cluster – FY 2004

Proposal PI Data for Cluster IV -- Education and Workforce Cluster – FY 2005

	REU Sites 1139	EWF 1709,1713,1714, 7361, 7482	FY 2005 Total
Total Number of PIs	57	43	100
# of Female PIs	9	18	27
Males	40	21	61
Gender Unknown	8	4	12
New PIs (awarded)	0	5	5
EPSCOR PIs (awarded)	2	3	5
Underrepresented Minorities (awarded)	3	9	12

Table 76. Proposal PI Data for Education and Workforce Cluster – FY 2005

3.2.2.2 Award Portfolio Balance

The Division encourages all its clusters and programs to develop a balanced portfolio of awards. This means that portfolios are expected to contain awards that are high risk and innovative. In addition, the portfolio should include awards: to a variety of institution types, to institutions across the US, to new and established investigators, and to individuals from groups underrepresented in sciences. Since NSF does not have quotas for any of these categories and proposal numbers vary from year to year, the balance in the awards portfolio across categories will vary as well.

3.2.2.3 Award Portfolio and Balance of: Innovative, High-Risk Projects

Small Grants for Exploratory Research (SGER) CNS- funded high-risk research. Proposals for small-scale, exploratory, high-risk research (SGERs) in the fields of science, engineering, and education normally supported by NSF may be submitted to individual programs. Such research is characterized as: preliminary work on untested and novel ideas; ventures into emerging research ideas; application of new knowledge or new approaches to "established" research topics; having a severe urgency with regard to the availability of or access to, data, facilities, or specialized equipment, including quick-response research on natural disasters and similar unanticipated events; or projects likely to catalyze rapid and innovative advances. The maximum award size was $100,000 (recently, this has been increased to $200,000) and maximum duration is 2 years. Per NSF policy, SGERs are exempt from external review and instead are reviewed internally by Program Officers. For the purpose of this self-study, the division has surveyed the Small Grants for Exploratory Research (SGER) awards to provide a picture of CNS's high-risk portfolio. The following table lists the of the awards granted during the CNS COV years that were high-risk Small Grants for Exploratory Research.

FY	Number of SGERs	Percent of Total Awards
2003	5	.3%
2004	8	.4%
2005	30	1.5%

Table 77. Small Grants for Exploratory Research (SGER)

While SGERs are obvious examples of high-risk projects, many of the other projects funded by the division are identified as high risk, either by the program officers, mail reviewers, or panelists. However, since these awards are not coded as such in the NSF data system, it is difficult to accurately capture the true % of the awards portfolio that is composed of high-risk projects.

The COV is encouraged to examine the awards list for other high-risk research awards.

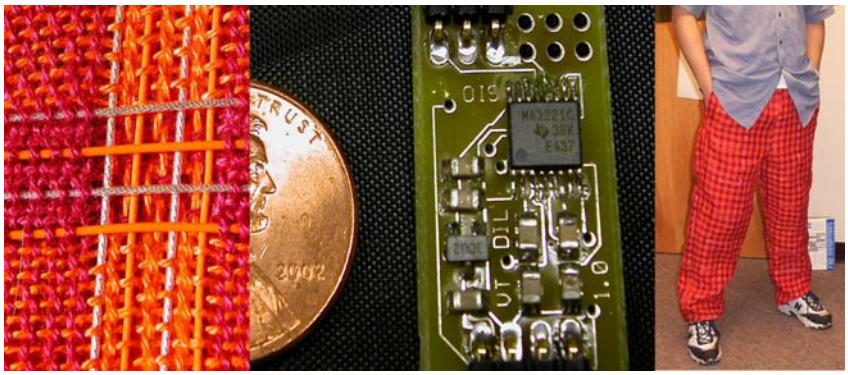
Innovative Awards

Innovative is a highly subjective term. Innovative research may be finding new uses for existing instruments or the development of completely new instruments; the creation of new teaching paradigms; or research that leads to new perspectives on existing questions. The Division has provided examples of innovative research funded in each of the survey years below. Many more examples of innovative research funded by CNS can be found at the COV web site.

Representative Project Nuggets from FY2003

Embedded Hybrid System Nugget -- 2003

0219809 Tailor-Made: Design of e-Textile Architectures for Wearable Computing
PI: Tom Martin and Mark Jones
Inst: Virginia Polytechnic Institute and State University



The images illustrate a close-up of the woven fabric and the pants that will be used in the motion and mapping experiments. Left: Fabric with wires for interconnection woven in. Middle: Electronic "buttons" for processors and sensors. Right: Finished e-textile shape-sensing garment for detecting user activity (running, sitting, walking, etc.)

Project Description: The Tailor-Made project develops information technology for wearable networks and computing. Fabrics woven with integrated networking and computing elements are expected to have immense potential for applications such as medical monitoring and assistive technologies for homebound elderly persons. The e-textile design and simulation environment developed in this project has been used to study issues in on-fabric networking, power distribution, fault tolerance, and human motion. The environment currently is being used to design a garment for determining user activity and another garment for mapping a building as the user walks through it.

This e-textiles work has received mention in Science (Aug. 15, 2003, vol. 301, pp. 909-911) and Materials Today (Oct. 2003, pp. 38-43).

The project is in contact with Dan River, Inc., a textile manufacturer in Danville, Virginia, regarding the possibility of using their production looms to weave e-textiles. This new technology stimulates domestic textile production. An array of new workforce skills will be needed in this area. The project exhibits a strong emphasis on education. In the last semester, two Master's students and one Ph.D. student completed their degrees, with two more Master's students on schedule to graduate in the spring/summer of 2004.

Website: The URL for the Tailor-Made project is http://www.ccm.ece.vt.edu/etextiles/

CISE Research Resources Nugget -- 2003

0224363 Teams of Miniature Mobile Robots
PIs: Nikolaos Papanikolopoulos
Maria Gini, Daniel Boley, Bradley Nelson, William Durfee
Inst: University of Minnesota

COTSScout, MegaScout, and Scout Robots.

Project Description: This project attempts to address the currently implemented deficiencies in the first generation Scout that together prevent an individual Scout from operating ideally in some environments. The project also includes the development of a small number of re-designed Scouts and MegaScouts yearly as well as robotic teams that consist of Scouts, MegaScouts, and COTSScouts, and partial support for two PhD students.

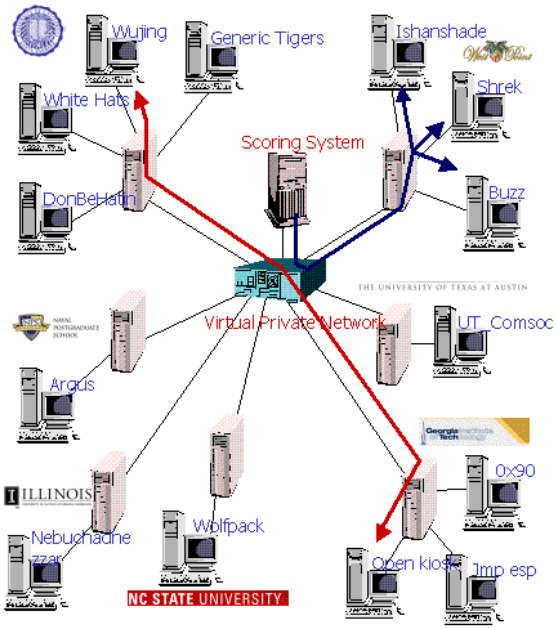
Decision processes, such as basic behaviors or planning algorithms, which control the actions of mobile robots, need to be able to connect to all of the individual resources (sensors, robots) that are necessary to move the physical hardware. To be able to use multiple robots together, each control process must obtain control of a number of resources. Thus, a distributed software control architecture has been developed which dynamically coordinates hardware resources transparently across a network of computers and shares them among the various client processes. The architecture, designed to be extremely modular, allowing for rapid addition of behaviors and resources to create new missions, includes various types of user interfaces for robot teleoperation and sensor interpretation algorithms for use with autonomous control clients.

The award enabled the completion of the MegaScout design. The MegaScout is designed to support a Scout robotic team as well as perform missions independently. When supporting a Scout mission, the MegaScout can be equipped with command transmitters and video receivers to communicate with a host of Scouts. It can then relay this information back to a base station, effectively increasing the range of a Scout team. If communication back to the base station should fail, the MegaScout is also equipped with sufficient computing power to control the Scout team. When supporting a Scout mission, the MegaScout can be equipped with an array of sensors that would otherwise be too large to be deployed on the Scouts. We plan to extend the capabilities of the MegaScout with the addition of a 6-DOF manipulator. The MegaScouts or humans, through several innovative user interfaces, can control the regular Scouts. In certain instances, the user can employ a Personal Digital Assistant (PDA) to control small teams of these robots.

Website: http://distrob.cs.umn.edu

Trusted Computing Nugget -- 2003

0238492 A Multi-Level Approach to Malicious Code Detection
PI: Giovanni Vigna
Inst: University of California - Santa Barbara



Inter-University “Capture the Flag” Contest Set-up

Project Description:

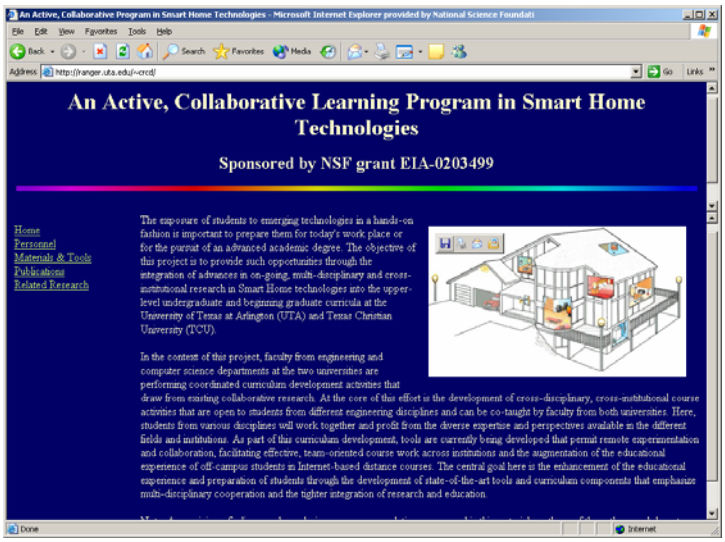
On December 5, 2003, student teams from fourteen universities competed in a day-long "capture the flag" contest organized by Professor Giovanni Vigna of the University of California - Santa Barbara. Each team was provided an operating system image with several services (a web site, an FTP server, etc) prepared by the organizers. The web site contained a number of undisclosed vulnerabilities. The task of the teams was to find the vulnerabilities, fix them for their copy of the site and exploit the same vulnerabilities to compromise the security of other teams' sites. The teams gained points by keeping their web site active and uncompromised and by compromising other teams' sites (that is, "capturing their flag"). This type of exercise was organized and executed on such a large scale among universities for the first time.

Live exercises, such as Red Team/Blue Team exercises, represent a valuable tool to teach the practical aspects of security and the dynamics of network-based attack and defense techniques. However, these exercises are very difficult to organize and execute. For this reason, very few courses offer live exercise as an integral part of the class work. This exercise was organized as part Professor Vigna's class on Network Security and Intrusion Detection. Other institutions involved included Georgia Institute of Technology, the Naval Postgraduate School, North Carolina State University, the United States Military Academy, the University of Texas at Austin, and the University of Illinois at Urbana-Champaign.

This successful exercise received attention from the press (PDF of the first page of the Santa Barbara News Press, copy of the complete article, and PPT presentation describing the event are available upon request).

Educational Innovation and Combined Research Curriculum Development Nugget – 2003

0203499 An Active, Collaborative Learning Program in Smart Home Technologies
PI: Manfred Huber
Inst: University of Texas, Arlington



Project Description: This multi-disciplinary and multi-institutional project is integrates state-of-the-art Smart Home technologies and related research results into the engineering and computer science curricula to provide a hands-on learning experience that includes participation in multi-disciplinary teams. For this purpose, faculty in engineering and in computer science at the University of Texas at Arlington (UTA) and at Texas Christian University (TCU) are collaborating in research as well as in the development of curriculum components and corresponding classroom tools. These will be used in the individual department's curricula as well as in a joint, multi-institutional course scheduled for the second year of the project. In the first year of the project, the activities at both campuses have focused mainly on the testing and construction of appropriate laboratory facilities for Smart Home experiments, the development of simulation tools for use in course assignments, and on the construction and testing of course components for a set of existing course subjects. In addition, initial tests and investigations into collaborative multi-institutional teaching technologies for the joint course offering have been undertaken. The project

- Shows how a teacher was able to use a CSDT to leverage poor computing resources into a positive IT experience for her students.
- Shows statistically significant evidence for the advantages of CSDTs in raising standards-based math test scores for minority students, a significant barrier for minority students in IT and other science and technology careers.
- Indicates potential for the role of CSDTs in minority professional development and graduate education.

Special Projects Nugget -- 2003

0124641 Scale-up, Evaluation and Institutionalization of the Computing Research Association (CRA) Distributed Mentor Project

PIs: Nancy Amato, Texas A&M
Mary Jean Harrold, Ohio State University
Andrew Bernat, Computing Research Association

Project Description: The primary goal of the Special Projects-funded Distributed Mentor Program (DMP) is to increase the number of women entering graduate school in Computer Science and Engineering (CS&E), by involving them in research projects with a female mentor at a major research university. This new Special Project award to the Computing Research Association allows for the continuation of the DMP and aims to significantly increase the number of student participants. Since 1994, over 230 students from more than 100 different academic institutions (approximately twenty undergraduates per year) have participated in the research and mentoring activities of the DMP. The students are involved in research, learn how a research university operates, meet graduate students and professors, and get a chance to observe a successful female researcher first hand.

A longitudinal evaluation study of the DMP project, conducted by the LEAD Center of the University of Wisconsin, has shown it to be spectacularly successful at increasing the number of women entering graduate school in CS&E. Over 51% of the DMP participants who had graduate by 2001 were enrolled in graduate or professional school the year following their graduation. A further measure of the success of the program has been the increase in applicants, from 73 students in the first year to 219 in 2003.

Representative Project Nuggets from FY2004

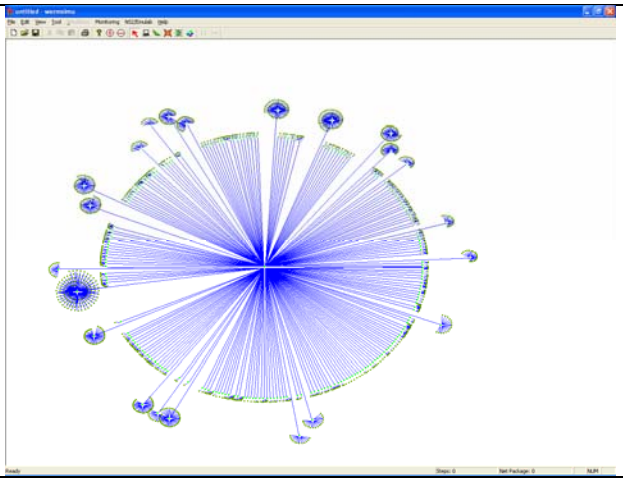
CSR Cluster -- 2004

Award No: 0335241

Project Title:
Collaborative Research: Testing and Benchmarking Methodologies for Future Network Security Mechanisms, a.k.a. Evaluation Methods for Internet Security Technology (EMIST)

Investigators:
G. Kesidis (PI), P. Liu, P. McDaniel, and D. Miller at PSU; D. Sterne and S. Schwab at McAfee; S. Murphy at SPARTA

Institution:
Pennsylvania State University (with subcontracts to McAfee and SPARTA)



Website:
http://emist.ist.psu.edu ; see also
http://www.isi.edu/deter for sister DETER project

Description of Graphic Image:
Topology of scaled-down Slammer worm attack recreation experiment conducted on the DETER testbed. Results of this experiment were reported by ICSI and PSU EMIST teams in ACM Workshop on Rapid Malcode (WORM), 10/29/04.

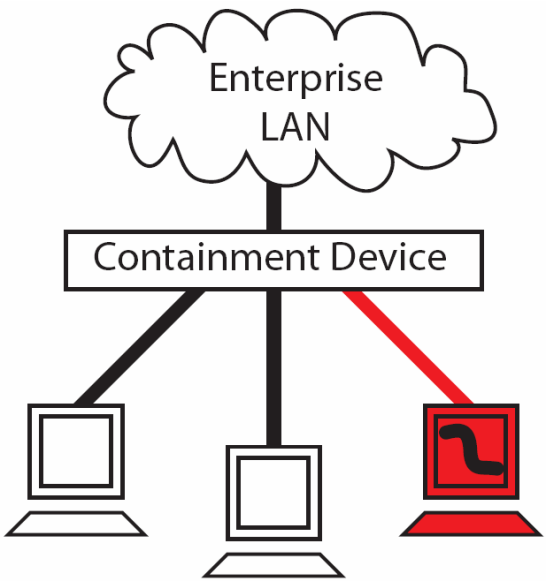
Project Description and Outcome:

Ideas:
For Internet worm attacks, we have begun a series of realistic scale-down experiments on the DETER testbed. Preliminary results for the Slammer worm are reported in Proc. ACM WORM, on 10/29/04. Related work on mathematical modeling for the Slammer will be reported in QoS-IP Workshop on 02/02/05. The realism of our experiments was argued based on comparisons with Internet measurements when Slammer struck on 01/25/03. In the context of future detailed enterprise-network emulations of a worm attack by the EMIST team, this work allows for simple and accurate recreation of the worm scanning traffic *to* the enterprise-network-under test *from* the rest of the Internet. Again for the case of Slammer, the related software is available at the EMIST website.

Tools:
We have distributed via our website a preliminary version of the EMIST Experiment Specification and Visualization Tool (ESVT, formerly "GUI") on 10/29/04. This tool allows an experimenter to conveniently specify a large-scale cyber security attack-defense experiment. Specifically, the tool outputs a TCL file that is compatible with DETER, Emulab or NS-2 (as selected by the user). Upon execution of an experiment, the ESVT can be used to visualize the (TCPDUMP) results. The preliminary EVST was developed for simple worm attack experiments. This tool's capabilities are currently being expanded to include convenient incorporation of currently available (and soon-to-be available, e.g., via DHS PREDICT project) traffic traces and network topologies. Also, we are expanding the existing visualization capability, e.g., in order to mount McAfee's Floodwatch DDoS attack-defense experiments. Finally, we plan to "port" certain features of our EVST tool to the Emulab GUI for wider distribution on a UNIX platform.

People:
Our computer science PhD graduate students (e.g., I. Hamadeh and L. Li) are receiving multidisciplinary training including cyber security and related simulation/emulation and mathematical modeling techniques. They are also participating in the development of software tools that, together with the existing EMIST/DETER outreach effort, provide an opportunity for support and collaboration with interested industrial and academic partners, including those already part of the EMIST/DETER teams.

Nets Cluster – 2004
Cyber-Trust Nugget

Award No: NRT-0335290	
Project Title: Evaluation Methods for Internet Security Technology (EMIST)	
Investigators: Vern Paxson Nicholas Weaver	
Institution: International Computer Science Institute	
Website:	**Description of Graphic Image:** Containment protects a network from worms by detecting and blocking infected systems, preventing further infection

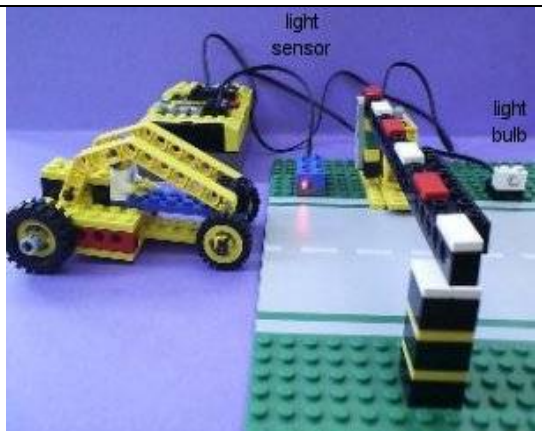
Project Description and Outcome *(Provide content for one or more of the following outcome goals)*

Ideas:
Worms, self-propagating malicious programs, can spread faster than people can hope to respond. Worms such as Blaster and Slammer have caused incalculable damage to critical systems. An effective countermeasure is ***containment***: systems to automatically detect and block infected systems, preventing the worm from spreading. ICSI researchers Vern Paxson and Nicholas Weaver, in collaboration with Stuart Staniford of Nevis Networks, have developed and evaluated substantially improved containment techniques which they detailed in a paper at the *Usenix Security 2004* conference. They have developed a hardware-friendly algorithm which could be integrated into common Ethernet switches, shown how a small amount of communication can greatly enhance containment, and evaluated many possible attacker countermeasures and defender counter-countermeasures. These researchers have shown how it is now practical to stop scanning worms from spreading through the critical networks.

EWF Cluster -- 2004

Award No: 0219547	
Project Title: A Community-based Partnership for Integrated Research and Education (COPIRE)	
Investigators: Patrick Otoo Bobbie, PI Jennifer Uboh, Co-PI Randall Adams, Co-PI	

Institution:
Southern Polytechnic State University



Description of Graphic Image:
The picture below depicts the assembly of a robotic, Lego™-based traffic-light system controlled by sensors, built by the high-school students.

Website: nsfcopire.spsu.edu

Project Description and Outcome

Tools:
As a result of the NSF-COPIRE project, a laboratory of about dozen computers (including workstations and servers) has been established and dubbed *The NSF-COPIRE Embedded Systems Lab*. The lab has become an integral part of the School of Computing and Software Engineering's collection of research labs. Additional computers and resources, including a video camera and digital camera, were purchased for documenting and disseminating the achievements of the group. (See the project website – a byproduct of the project.)

People:
So far all the high-school students – regardless of gender and racial backgrounds – have shown consistent and satisfactory level of interest. The females showed equal passion for the 'technological' nature of the projects. Since the inception of the COPIRE project, fifteen (15) students of the college students have graduated with BS or MS degrees, and moved on to positions in the industry or academia. The roll-call is impressive as listed in the table below. (As a result of the project, 52 students so far have been impacted.)

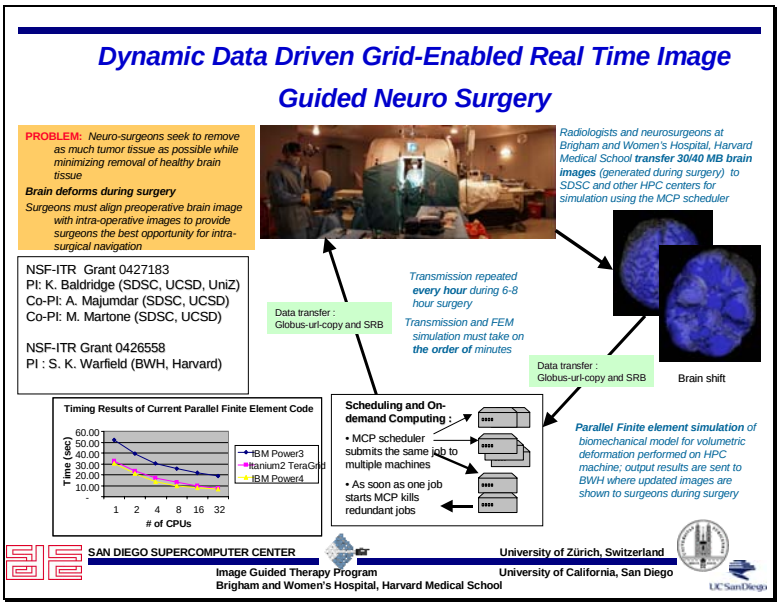
Name (Race, Gender)	***School & Degree***	***Where To (Area/Position)***
Rachel Smith (C,F)	Kennesaw Mountain High	Georgia Tech (BS Architecture)
Rachael Morgan (B, F)	South Cobb High	Atlanta High Tech Inst (Dig Design /Animation
David Hern (C, M)	Kennesaw Mountain High	Georgia Tech (BS Marketing)
Li Chun (A, F)	Kennesaw Mountain High	MIT (BS Materials Engineering)
Brandon Myers (B, M)	South Cobb High	U of Georgia, Athens (BS Comp Science)
David Harner (C, M)	Kennesaw Mountain High	SPSU (BS Mech. Eng. Tech)
Joseph Peppers (C, M)	South Cobb High	SPSU (BS Computer Science)
Joshua Cottrill (C, M)	South Cobb High	Georgia Tech (BS Computer Science)
Marlena Compton (C, F)	SPSU (BS Comp Sci)	Choice Point –IT Company, Atlanta, Georgia
Jesse Wattenbarger (C, M)	SPSU (BS Comp Sci)	Company (unknown)
Sagar Pujari (A, M)	SPSU (BS Elect Eng Tec)	Avaya – IT Co. , Denver, Colorado
Chris Jackson (B, M)	SPSU (BS Comp Sci)	Google – IT Co.
Hema Chaudhari (A, F)	SPSU (MS Comp Sci)	DBA position – IT Co, Atlanta
A.-Lateef Yussiff(B, M)	SPSU (MS CS & MS IT)	(Seeking PhD Admission)
Chaudary-Z. Arif (A, M)	SPSU (MS Comp Sci)	PhD Program – U of Florida (admitted)

Video of finished work can be played from (select #3): http://nsfcopire.spsu.edu/VideosandPhotos.htm

Description of Graphic Image:
The picture of the high-schools students constructing a distance sensor – circuit-wiring project – for a robotic device control, assisted by an undergraduate research assistant

Representative Project Nuggets from FY2005

CSR Cluster -- 2005



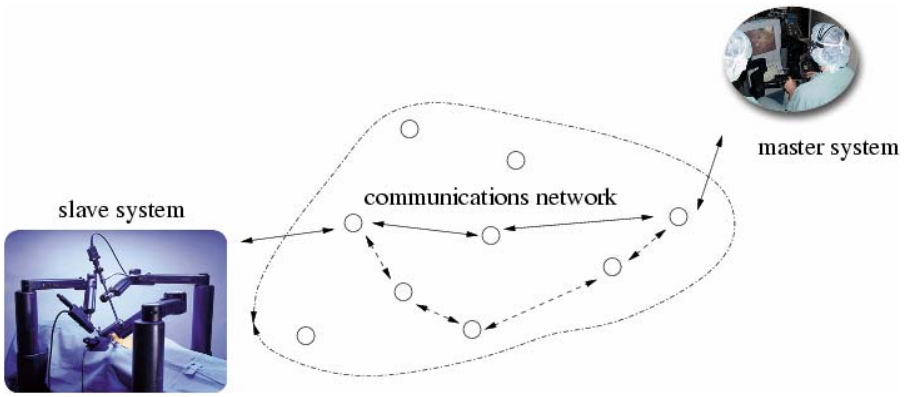
Nets Cluster – 2005

Award No:
CNS-0311084

Project Title:
Infinite-Dimensional Stochastic Hybrid Systems: A Unified Framework for Distributed Control with Limited and Disrupted Communication

Investigators:
Joao P. Hespanha (PI), Andrew Teel (co-PI)

Institution:
University of California, Santa Barbara



Description of Graphic Image:
Master-slave system for robotic surgery running over a digital network. Multiple network routing paths can increase reliability and bandwidth but introduce variability in latency.

Project Description and Outcome

Ideas:
This project addresses the control of spatially distributed linear processes via communication networks. We consider distributed architectures in which multiple local controllers coordinate their efforts through a data network that allows information exchange. The controller's access to the network is mediated by a "communication logic" that determines which data to send to the network, when to send it, and how to process incoming data.

A key research accomplishment for this project was the design of communication logics that result in optimal tradeoffs between (1) the communication load required by the coordination between local controllers and (2) the control performance. When no penalty is posed in the communication load, the optimal solution to this problem degenerates into a centralized control algorithm. The other extreme case in which one simply wants to minimize communication has also been previously solved (by us and others). However, none of these limiting cases is of great use to practical applications.

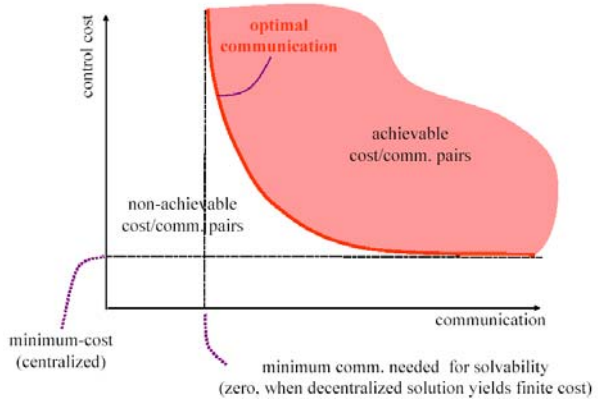
This led us to consider the optimal trade-off between communication and control. We showed that these optimal tradeoffs can be found as the solution to an average cost stochastic optimization problems, which can be solved using techniques from dynamic programming. Our solutions can be extended to consider network delays and noise.

Tools:
A comprehensive set of materials was developed to teach hybrid systems. These include tutorial papers, lecture notes and presentation material (power-point), homework assignments, and simulation software. All material are available on the web at the PI's web page:

http://www.ece.ucsb.edu/~hespanha/

These material have been used to support a course recently created at UCSB (see *People* below). They have also been used outside UCSB, e.g., to teach a course at Virginia Tech. (by Prof. Pushkin Kachroo) and to give a tutorial at a CDC workshop on stochastic hybrid systems (by Prof. Maria Prandini). We have also given permission to several scholars outside UCSB to use portions of this material in PhD thesis and technical papers.

People:
A new course has been created at UCSB on hybrid control systems. The course starts by presenting a modeling framework for hybrid systems that combines elements from automata theory and differential equations. The students are then guided through a set of techniques that can be used to analyze and design hybrid control systems. The course also includes an overview of simulation tools for hybrid systems with emphasis on Simulink/Stateflow, SHIFT, and Modelica. In the last part of the course, we cover several fundamental applications of hybrid control. Communication networks are used throughout the course as one of the key application areas and students are asked to apply the knowledge acquired in the course to problems related to computer networks. The development of this course was co-sponsored by the NSF award ANI-0322476.



Description of Graphic Image:
Trade-off between communication load and control cost in networked control systems. Under this project, mathematical techniques were developed to construct communication schemes that lie on the Pareto front (red line in graph).

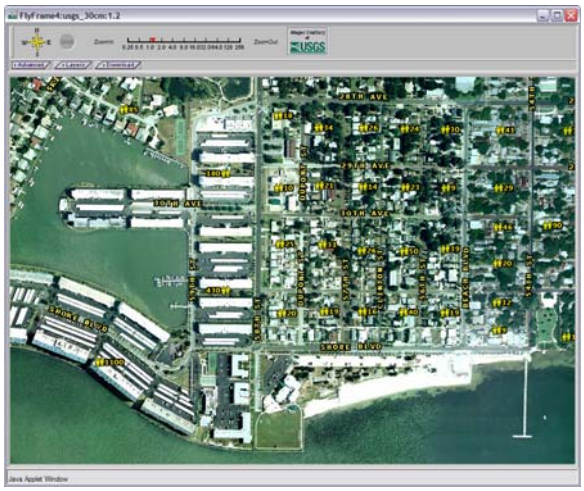
Infrastructure Cluster – 2005

Award No:
0220562

Project Title:
MII Consortium: Infrastructure for Research and Training in Database Management for Web-based Geospatial Data Visualization with Applications to Aviation

Investigators:
Naphtali Rishe, Ben Wongsaroj

Institution:
Florida International University
Florida Memorial University



Website:
http://hpdrc.cis.fiu.edu
http://terrafly.fiu.edu

Description of Graphic Image:
Web-browsable high-resolution aerial imagery layered with street, business, and demographic data. The TerraFly tool will enable emergency organizations to quickly visualize relevant data prior to and after disaster event such as a hurricane.

Project Description and Outcome

Tools:
TerraFly, created at Florida International University (FIU), allows its users to "fly over" and manipulate geospatial data. The database used by http://TerraFly.fiu.edu currently contains textual, remotely-sensed and vector data (graphical maps), which can be viewed and manipulated via applets using any standard browser, such as Internet Explorer or Mozilla. Textual data is available for the description and location of specific areas of interest. Graphical maps provide overlays that aid in the visualization and handling of remotely sensed data. Internet capability allows the system to access numerous data sets without the installation of any specialized GIS programs. A friendly graphical user interface is provided for ease of use. This system offers a simpler and more convenient method to access spatial data. TerraFly's graphical user interface and portability make remotely sensed data available to both casual and expert users.

TerraFly serves as a test-bed for our NSF-sponsored database research. We are developing this test-bed into a service for Emergency Managers and Responders. For base imagery, we are using what has already been provided to FIU by the Federal government (30cm metropolitan areas, 1m elsewhere). On top of this imagery, we overlay layers that FIU has access to (streets, demographics, property lines, public buildings, etc) as well as other layers of information of use to disaster managers around the state, including some or all of the information presently available via state disaster management initiatives as well as model output, near-real-time observations, public health data, and economic data. When overlay of sensitive data is desired, TerraFly will limit access to that data to only properly authorized individuals.

People:
The project has enabled the creation of a consortium between Florida International University (FIU) and Florida Memorial University (FMU). A pipeline of students from FMU, a four year HBCU, to FIU, a Carnegie-I HSI has been formed. The consortium exposes FMU project participants to research work that has not been available to them in the past and we believe that this will lead to additional students joining the FIU graduate program. FMU participation in the TerraFly project includes setting up a test-bed at FMU that will enable experimentation with new data dissemination techniques while maintaining a functional web service. FIU project participants are able to further their learning opportunities by acting as students at FIU while helping to lead FMU students in their research endeavor. The first three years of the award resulted in fifty-one papers published; MII-supported students have received four doctoral degrees, four master's degrees, and thirteen bachelor's degrees (9 from FMU and 4 from FIU).

EWF Cluster – 2005

Award No:
0353687

Project Title:
REU Site: Research Experiences for Undergraduates in Virtual Reality, Visualization, and Imaging

Investigators:
Sharon Stansfield

Institution:
Ithaca College

Website:
http://www.ithaca.edu/faculty/sstansfield/research.html

Description of Graphic Image:
REU participant, Christina Felix, tries the force feedback handwriting prototype at the summer research poster session.

Project Description and Outcome

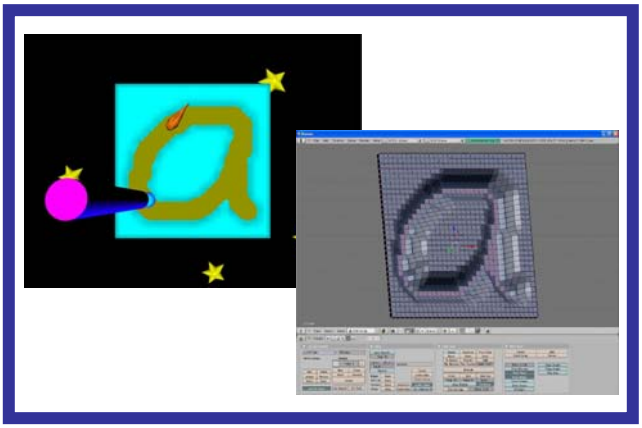
Tools:

Handwriting is taught early in elementary school, and failing to master this skill can lead to cascading problems in subsequent learning and life tasks. When students have difficulty with handwriting, the current intervention is to have them participate in additional tutoring sessions where they repeatedly practice writing the letters. This task quickly gets boring for students. The goal of our project is to create a program that uses a force feedback pen to allow a child to practice handwriting in a fun and stimulating environment. This includes using the force feedback pen to passively guide the child's hand in correctly creating a letter, as well as utilizing interactive, 3D graphics to create a game atmosphere that encourages the child to use the too and thus develop his or her handwriting skills.

This work utilizes the Sensable Technologies Phantom® Omni®™ device. A prototype has been implemented to test the limits and possibilities of the device and to help envision how the final tool might be realized. The prototype graphically renders a letter with an animation of a small fish swimming along the path to show how the letter should be written. Once the student begins to write, the corresponding force-rendered letter prevents him or her from leaving the path. When the letter is completed, an animation is shown to indicate success.

A good deal of further research needs to be done on this project before any conclusive results can be made about the effectiveness of the tool. Continuing work will create the remainder of the force-rendered letters, along with a more complex, interactive 3D "game" to engage the student.

People:
During the Summer 2005 Program, this REU supported two women and two under-represented minority students, two of who worked on this project.



Description of Graphic Image:
Graphically-rendered *a* and pen, along with a representation of the force-rendered *a*.

3.2.2.4 Award Portfolio and Balance of: Funding for centers, groups and awards to individuals

The majority of awards made by the division are to individuals or groups (here defined as a project with at least one co-PI on the cover page or having senior personnel listed on a sub-award budget). There are no particular targets for the number of centers a division should support.

3.2.2.5 Award Portfolio and Balance of: Awards to new investigators

For the purpose of this report a new investigator is one that has not been a Principal Investigator on a previous NSF award. Data for this table were generated using EIS.

Involvement of New Investigators – Data Analyses

	2003						
	Total Submitted	Total Submitted w/New Investigator Involvement	Total Awarded	Total Awarded w/New Investigator Involvement	Success Rate All Submissions (Non-new Investigators)	Success Rate All Submissions (New Investigator Involvement)	Success Rate (% New Investigator Involvement) to all New Investigators
CISE	5329	2659	1167	435	22%	8%	16%
CNS	1025	493	246	106	24%	10%	22%
CSR	225	98	47	17	21%	8%	17%
CRI	79	39	30	17	38%	22%	44%
NeTS	576	264	132	51	23%	9%	19%
EWF	145	92	37	21	26%	14%	23%

	2004						
	Total Submitted	Total Submitted w/New Investigator Involvement	Total Awarded	Total Awarded w/New Investigator Involvement	Success Rate All Submissions (Non-new Investigators)	Success Rate All Submissions (New Investigator Involvement)	Success Rate (% New Investigator Involvement) to all New Investigators
CISE	6236	3628	680	132	11%	2%	4%
CNS	2001	994	349	136	17%	7%	14%
CSR	624	279	114	42	18%	7%	15%
CRI	84	54	24	13	29%	15%	24%
NeTS	1060	519	172	61	16%	6%	12%
EWF	233	142	39	20	17%	9%	14%

	2005						
	Total Submitted	Total Submitted w/New Investigator Involvement	Total Awarded	Total Awarded w/New Investigator Involvement	Success Rate All Submissions (Non-new Investigators)	Success Rate All Submissions (New Investigator Involvement)	Success Rate (% New Investigator Involvement) to all New Investigators
CISE	5219	2430	1080	382	21%	7%	16%
CNS	1974	887	439	156	22%	8%	18%
CSR	632	267	163	57	26%	9%	21%
CRI	218	111	49	24	22%	11%	22%
NeTS	1075	482	202	68	19%	6%	14%
EWF	49	27	25	7	51%	14%	26%

Table 78. Involvement of New Investigators in FY 2003, 2004 and 2005

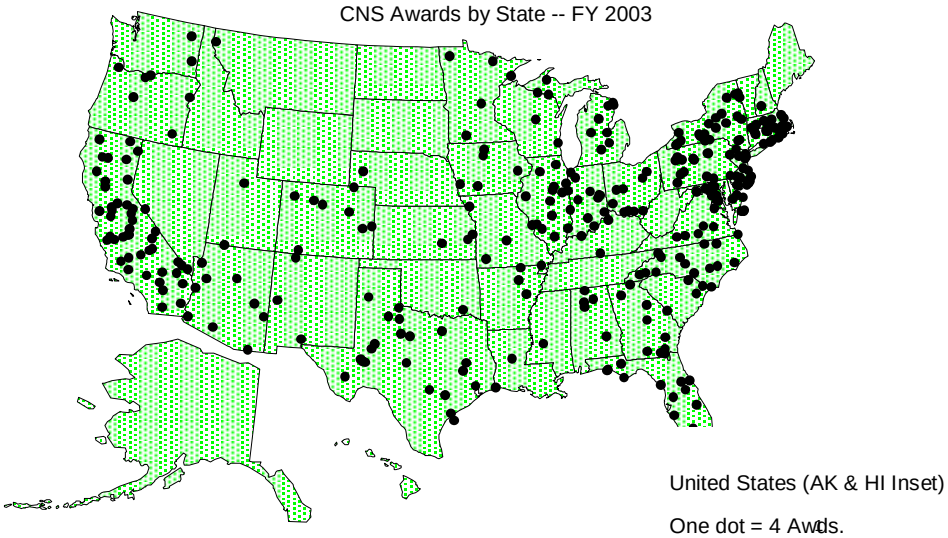
3.2.2.6 Award Portfolio and Balance of: Geographical distribution of Principal Investigators

To ensure that CNS is serving the needs of the entire scientific community it strives for a geographically diverse portfolio of principal investigators. The maps below represent the number of awards funded by the division to each state for that particular year.

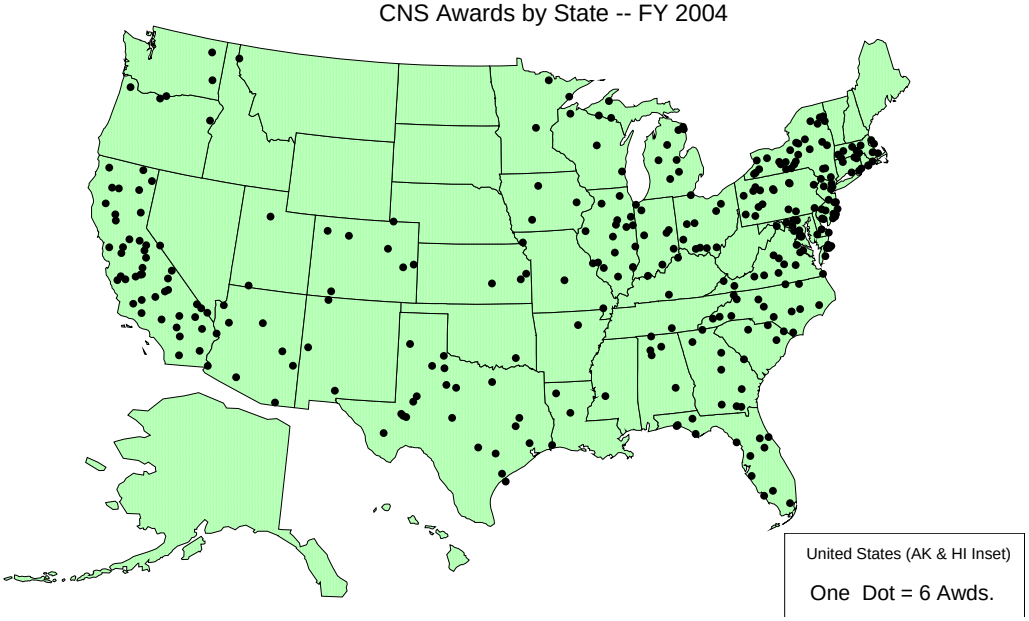
State	2003 Awards	2004 Awards	2005 Awards	Total Awards
Alabama	17	29	20	66
Alaska	2	5	1	8
Arizona	28	44	31	103
Arkansas	8	8	6	22
California	194	284	240	718
Colorado	32	45	29	106
Connecticut	13	18	15	46
Delaware	9	17	16	42
District of Columbia	15	26	15	56
Florida	56	79	81	216
Georgia	39	53	66	158
Hawaii	2	3	4	9
Idaho	4	6	5	15
Illinois	65	101	102	268
Indiana	45	53	79	177
Iowa	17	21	31	69
Kansas	13	20	16	49
Kentucky	7	12	13	32
Louisiana	4	13	27	44
Maine	0	1	1	2
Maryland	34	62	61	157
Massachusetts	78	100	125	303
Michigan	44	75	80	199
Minnesota	20	19	16	55
Mississippi	4	10	16	30
Missouri	26	29	36	91
Montana	2	4	4	10
Nebraska	14	10	12	36

State	2003 Awards	2004 Awards	2005 Awards	Total Awards
Nevada	1	3	3	7
New Hampshire	4	2	5	11
New Jersey	52	85	103	240
New Mexico	9	13	13	35
New York	99	182	142	423
North Carolina	45	68	50	163
North Dakota	1	4	5	10
Ohio	36	59	56	151
Oklahoma	6	11	20	37
Oregon	23	22	17	62
Pennsylvania	73	120	139	332
Rhode Island	2	3	7	12
Rhode Island	6	11	7	24
South Carolina	11	18	14	43
South Dakota	1	1	1	3
Tennessee	15	26	35	76
Texas	88	133	128	349
Utah	10	17	24	51
Vermont	1	2	2	5
Virginia	43	96	87	226
Washington	14	21	19	54
West Virginia	2	2	5	9
Wisconsin	11	22	24	57
Wyoming	0	0	3	3

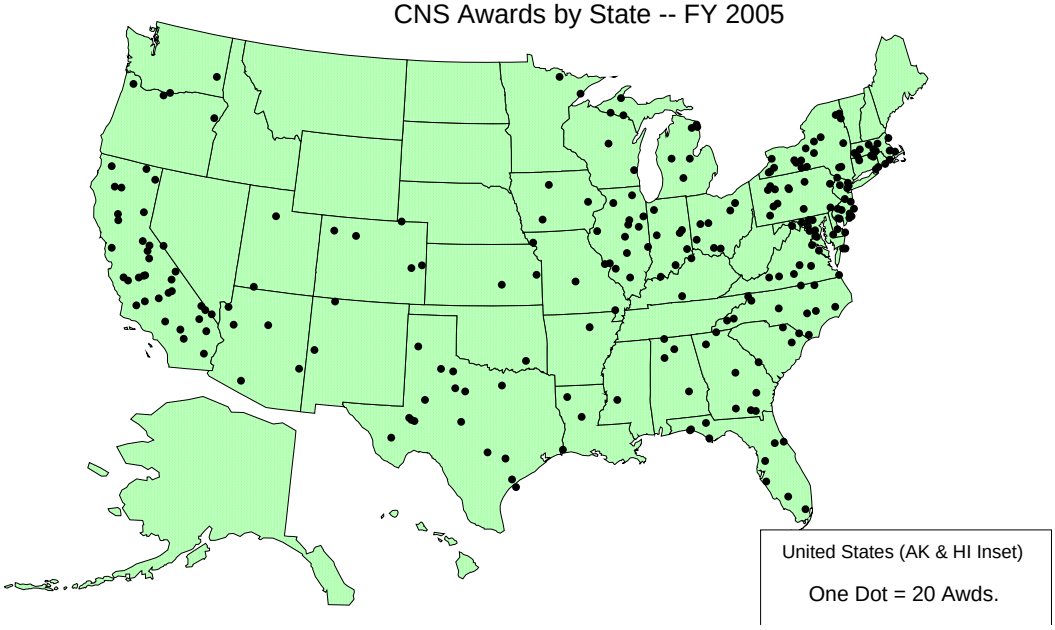
Table 79. Distribution of CNS PIs by State



CNS Awards by State -- FY 2004



CNS Awards by State -- FY 2005



3.2.2.7 Award Portfolio and Balance of: Institutional types

	2003			2004			2005			
Inst Type	AWD	DECL	Total	AWD	DECL	Total	AWD	DECL	Total	Grand Total
2 Yr		1	1	2	1	3				4
4 Yr		5	5	2	12	14	3	9	12	31
Business, State & Local, Foreign, Other	22	36	58	23	94	117	24	59	83	258
Masters	13	66	79	13	110	123	12	88	100	302
Non-Research Intensive PhD Institutions	39	240	279	61	406	467	50	374	424	1,170
Research Intensive PhD Institutions (Top 100)	296	627	923	275	1,069	1,344	379	1,059	1,438	3,705
Grand Total	370	975	1,345	376	1,692	2,068	468	1,589	2,057	5,470

Table 80. CNS Portfolio of Awards and Declines by Carnegie Classification

3.2.2.8 Award Portfolio and Balance of: Projects that integrate research and education

All NSF awards seek to integrate research and education. However, specific programs have this as a special goal. These include CAREER, REU (Research Experience for Undergraduates) sites, RUI (Research at Undergraduate Institutions), and C-RUI (Collaborative Research at Undergraduate Institutions) as well as others. Data on the number of these awards made during the last three years are presented below.

	2003	2004	2005
REU Sites	34	5	3
CRCD/EI	10	3	0

Table 81. CNS Projects Integrating Research and Education

3.2.2.9 Award Portfolio and Balance of: Across disciplines and sub disciplines of the activity and of emerging opportunities

Before funding decisions are made, the Program Officers review the portfolio of potentially fundable projects to ensure an adequate representation of the relevant scientific disciplines and CISE sub disciplines. CISE/CNS projects of the 21st Century are inherently multidisciplinary and therefore creating natural linkages between disparate disciplines and reducing barriers between sub-disciplines.

The COV is encouraged to refer to the COV website and examine the entire awards list and the cluster annual reports. The Annual Reports provide an overview of the programmatic activities within the Division for each year. These reports help the Division identify research trends and emerging fields.

3.2.2.10 Award Portfolio: appropriate participation of underrepresented groups

The Division recognizes the importance of increasing the participation of underrepresented groups in all of areas of science. CNS Program Officers do outreach activities at academic institutions, professional society meetings and conferences to encourage broader participation by underrepresented groups.

Data were generated using NSF's EIS Information Management System. A proposal is categorized as having "minority involvement" if the Principal or co-Principal Investigator self-identify themselves as a minority at the time of proposal submission. Minority Serving Institutions data are generated based on the U.S. Department of Education Accredited Minority Postsecondary Education listings.

Involvement of Minority Serving Institutions – Data Analyses

FY	Total Props	MSI Awarded	MSI Declined	Total MSI
2003	1,345	12	43	55
2004	2,068	9	70	79
2005	2,057	0	66	66

Table 82. CNS Data for Minority Serving Institutions

Involvement of Minority PI/Co-PI – Data Analyses

	2003						
	Total Submitted (All Other Categories)	Total Submitted w/PI Minority Involvement	Total Awarded (All Other Categories)	Total Awarded w/PI Minority Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Minority Involvement) to all Submissions	Success Rate (% Minority Involvement) to all Minority PIs
CISE	5,329	362	1,167	71	22%	1%	20%
CNS	1,025	85	246	27	24%	3%	32%
CRI	78	17	29	8	37%	10%	47%
CSR	226	9	48	3	21%	1%	33%
EWF	145	25	37	5	26%	3%	20%
NeTS	576	34	132	11	23%	2%	32%

	2004						
	Total Submitted (All Other Categories)	Total Submitted w/PI Minority Involvement	Total Awarded (All Other Categories)	Total Awarded w/PI Minority Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Minority Involvement) to all Submissions	Success Rate (% Minority Involvement) to all Minority PIs
CISE	6,236	470	1,013	62	16%	1%	13%
CNS	2,002	168	349	23	17%	1%	14%
CRI	85	22	24	5	28%	6%	23%
CSR	623	32	114	1	18%	0%	3%
EWF	187	37	39	8	21%	4%	22%
NeTS	1,107	77	172	9	16%	1%	12%

	2005						
	Total Submitted (All Other Categories)	Total Submitted w/PI Minority Involvement	Total Awarded (All Other Categories)	Total Awarded w/PI Minority Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Minority Involvement) to all Submissions	Success Rate (% Minority Involvement) to all Minority PIs
CISE	5,219	336	1,080	68	21%	1%	20%
CNS	1,974	153	439	36	22%	2%	24%
CRI	218	33	49	7	22%	3%	21%
CSR	633	52	164	12	26%	2%	23%
EWF	48	10	24	5	50%	10%	50%
NeTS	1,075	58	202	12	19%	1%	21%

Table 83. CNS Data on Minority PIs and Co-PIs

Involvement of Women-PI – Data Analyses

	2003						
	Total Submitted	Total Submitted w/Women Involvement	Total Awarded	Total Awarded w/Women Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Women Involvement) to all Submissions	Success Rate (% Women Involvement) to all Women PIs
CISE	5,329	1,247	1,167	285	22%	5%	23%
CNS	1,025	229	246	68	24%	7%	30%
CSR	226	34	48	11	21%	5%	32%
CRI	78	22	29	9	37%	12%	41%
NeTS	576	102	132	26	23%	5%	25%
EWF	145	71	37	22	26%	15%	31%

	2004						
	Total Submitted	Total Submitted w/Women Involvement	Total Awarded	Total Awarded w/Women Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Women Involvement) to all Submissions	Success Rate (% Women Involvement) to all Women PIs
CISE	6,236	1,475	1,013	255	16%	4%	17%
CNS	2,001	510	349	99	17%	5%	19%
CSR	624	155	114	28	18%	4%	18%
CRI	84	31	24	11	29%	13%	35%
NeTS	1,107	228	172	35	16%	3%	15%
EWF	186	96	39	25	21%	13%	26%

	2005						
	Total Submitted	Total Submitted w/Women Involvement	Total Awarded	Total Awarded w/Women Involvement	Success Rate (% All Other) of All Submissions	Success Rate (% Women Involvement) to all Submissions	Success Rate (% Women Involvement) to all Women PIs
CISE	5,219	1,219	1,080	259	21%	5%	21%
CNS	1,974	442	439	107	22%	5%	24%
CSR	630	120	161	35	26%	6%	29%
CRI	218	75	49	18	22%	8%	24%
NeTS	1,077	230	204	43	19%	4%	19%
EWF	49	17	25	11	51%	22%	65%

Table 84. CNS Data on Female PIs and Co-PIs

3.2.2.11 Relevance to national priorities, agency mission, relevant fields and other customer needs

The NSF mission is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. The Foundation's organic legislation authorizes it to engage in the following activities:

- Initiate and support, through grants and contracts, scientific and engineering research and programs to strengthen scientific and engineering research potential, and education programs at all levels, and appraise the impact of research upon industrial development and the general welfare.
- Award graduate fellowships in the sciences and in engineering.
- Foster the interchange of scientific information among scientists and engineers in the United States and foreign countries.
- Foster and support the development and use of computers and other scientific methods and technologies, primarily for research and education in the sciences.
- Evaluate the status and needs of the various sciences and engineering and take into consideration the results of this evaluation in correlating its research and educational programs with other Federal and non-Federal programs.
- Provide a central clearinghouse for the collection, interpretation, and analysis of data on scientific and technical resources in the United States, and provide a source of information for policy formulation by other Federal agencies.
- Determine the total amount of Federal money received by universities and appropriate organizations for the conduct of scientific and engineering research, including both basic and applied, and construction of facilities where such research is conducted, but excluding development, and report annually thereon to the President and the Congress.
- Initiate and support specific scientific and engineering activities in connection with matters relating to international cooperation, national security, and the effects of scientific and technological applications upon

society.

- Initiate and support scientific and engineering research, including applied research, at academic and other nonprofit institutions and, at the direction of the President, support applied research at other organizations.
- Recommend and encourage the pursuit of national policies for the promotion of basic research and education in the sciences and engineering. Strengthen research and education innovation in the sciences and engineering, including independent research by individuals, throughout the United States.
- Support activities designed to increase the participation of women and minorities and others under-represented in science and technology.

CNS's primary mission is to support the vitality of the CNS logical sciences at US colleges and universities, especially in those areas where NSF has major responsibilities such as supporting young investigators, underrepresented groups, a diverse array of institutional types, the integration of research & education and international collaborations.

Priorities are also identified through National Research Council reports, and community workshop and planning activities. Examples of these that have occurred during the last three years include:

Proposal	Program Element Code	PI	Title	Institution
0451269	1713	Trauth	Workshop: ITWF/EWF PI Conference 2004	Pennsylvania State Univ University Park
0515808	1713	Karshmer	Broadening Participation: A Workshop to Foster Participation of Disabled Persons in Computer and Information Science and Engineering	University of South Florida
0303541	1714	Arunachalam	Special Projects: Workshop on Research Agenda for Enabling Tools, Technologies and Policies for Sustainable Development	Carnegie-Mellon University
0307461	1714	Sastry	CISE REU Principal Investigator Meeting 1/10/03	University of California-Berkeley
0317269	1714	Chen	NSF Workshop: Symposium on Intelligence and Security Informatics	University of Arizona
0455861	1714	Bernat	Workshop in Support of Broadening Participation, October 20-21, 2004, Rosslyn, VA	Computing Research Association
0520856	1714	Pollock	Workshop: Support for the CRA-W Career Mentoring Workshop for Women in Research Careers in Computer Science and Engineering	Computing Research Association
0528045	1714	Williams	The Richard Tapia Celebration of Diversity in Computing Conference 2005	Association Computing Machinery
0538451	1714	Chuah	Workshop on Automated Worm/DDos Eradication System Organized Information Exchange Workshop (AWESOME), 8/8-11/05, Bethlehem, PA	Lehigh University
0540556	1714	Gomez	AISES Tapia Conference Experience for American Indians in Computing Disciplines (AISES TAPIA) 2005	American Indian Science and Engineering Society (AISES)
0544622	1714	Watkins	Pre-college Outreach in GLOBECOM 2005	University of Missouri-Rolla
0547299	1714	Garcia	Integrative Computer Education and Research in the Southwest: Preparing IT Graduates for 2010 and Beyond	University of North Texas
0548403	1714	Lee	ICER Midwest Workshop: Preparing IT Graduates for 2010 and Beyond	Ohio State University Research Foundation
0548575	1714	Ryder	Collaborative Rsch: Northeast Workshop in Integrative Computing, Education and Research (ICER)	Rutgers University New Brunswick
0548789	1714	Kurose	Northeast Workshop on Integrative Computing Education and Research (ICER)	University of Massachusetts Amherst
0548906	1714	Bernat	Workshop on Industrial Support for Broadening Participation in Computing	Computing Research Association
0549130	1714	Kim	Workshop on Networked Systems	University of California-Irvine
0549481	1714	Ladner	Mentoring Workshop for Blind Students and Professionals in Science, Mathematics, and Engineering	University of Washington
0318299	2801	Alur	WORKSHOP ON EMBEDDED SOFTWARE	University of Pennsylvania
0326223	2801	Shatz	Workshop on Software Engineering for Embedded Systems: From Requirements to Implementation	University of Illinois at Chicago
0342801	2801	Blumenthal	Sufficient Evidence? Building Certifiably Dependable Systems	National Academy of Sciences
0352152	2801	Nelson	Workshop on Critical Infrastructure Protection for SCADA and IT Systems	Adventium Labs

Proposal	Program Element Code	PI	Title	Institution
0401049	2801	Alur	Proposal for Hybrid Systems Workshop; March 25-28, 2004, Philadelphia, PA	University of Pennsylvania
0413136	2801	Krueger	Workshop: Future Generation Software Architectures in the Automotive Domain - Connected Services in Mobile Networks -1/10-1/12/04, San Diego, CA	University of California-San Diego
0413999	2801	Nelson	Workshop on Critical Infrastructure Protection for SCADA and IT Systems	Adventium Labs
0450270	2801	Brownstein	Sufficient Evidence? Building Certifiably Dependable Systems	National Academy of Sciences
0450877	2801	Anderson	Support for RTSS 2004	University of North Carolina at Chapel Hill
0522209	2801	Tilbury	Workshop on Feedback Control of Computing Systems	University of Michigan Ann Arbor
0532968	2801	Pappas	HCMDSS 2005	University of Pennsylvania
0302708	2802	Roberts	DIMACS Workshop on Software Security	Rutgers University New Brunswick
0314161	2802	Roberts	DIMACS Special Focus on Communication Security and Information Privacy	Rutgers University New Brunswick
0329220	2802	Tate	Mobile Agent Security Through Multi-Agent Protocols	University of North Texas
0335324	2802	Spafford	Exposing Grand Challenges in Information Security & Assurance	Computing Research Association
0335554	2802	Masson	Cyber Trust Point Meeting	Johns Hopkins University
0332132	2884	Hariri	NGS: Autnomic Computing Workshop (The Fifth Annual International Workshop on Active Middleware Services - AMS 2003)	University of Arizona
0432297	2884	Hariri	Support for International Conference on Autonomic Computing (ICAC 2004) & International Workshop on Challenges of Large Applications in Distributed Environments (CLADE 2004)	University of Arizona
0450061	2884	Midkiff	17th Workshop on Languages and Compilers for Parallel Processing; September 22-25, 2004; Purdue University	Purdue University
0343506	2885	Aspray	RI: Infrastructure 2002: NSF CISE/EIA RI and MII PI's Workshop	Computing Research Association
0439058	2885	Bernat	The 2004 CISE Workshop for Principal Investigators of Minority Institutions Infrastructure and Research Infrastructure Awards - July 9-11	Computing Research Association
0305876	4090	Ibarra	AMPATH Workshop: Miami, FL Jan. 2003 - Fostering Collaborations and Next Generation Infrastructure	Florida International University
0308292	4090	Luker	Workshops: Proposal for Planning and Implementing a HIGHER EDUCATION BRIDGE CERTIFICATION AUTHORITY	Educause
0310414	4090	Wallace	Workshop: Security at Line Speed: Developing Next Generation Guidelines for Network Security in the Research and Higher Education Community	University Corporation for Advanced Internet Development
0322182	4090	Khan	High Performance Network Connection (HPNC) Workshop at Marist	Marist College
0333795	4090	Klimczak	HPNC Proposal Preparation Workshop;	University of Missouri-Kansas City
0334856	4090	McLean	High Performance Network Connections 2003 HPNC Proposal Writing Workshop	University of Illinois at Urbana-Champaign
0340877	4090	Yener	Workshop for Pervasive Computing and Networking	Rensselaer Polytechnic Institute
0352767	4090	Kolodzy	Workshops: Efficient Spectrum Utilization for Wireless Networking and PI Meeting	Stevens Institute of Technology
0452423	4090	Kolodzy	Workshops: Efficient Spectrum Utilization for Wireless Networking and PI Meeting	Stevens Institute of Technology
0332249	4095	Minden	The Future of Spectrum: Technologies and Policies Workshop; May 28-29, 2003, Washington, DC	University of Kansas Center for Research Inc
0344042	4095	Minden	Workshops: Support for Wireless Networking Workshop and PI Meeting	University of Kansas Center for Research Inc
0349982	4095	Zeigler	Workshop on Modeling and Simulation for Design of Large Software-Intensive Systems: Challenges and New Research Directions; Tucson, Arizona; October 2003	University of Arizona
0350223	4095	Shenker	Workshop: The Future of Internet Research; Berkeley, CA; December, 2003	International Computer Science Institute
0308639	4097	Feigenbaum	Workshop on Scalable Cyber-Security Challenges in Large-Scale Networks: Deployment Obstacles, March 13-14, 2003, Reston, VA	Yale University

Proposal	Program Element Code	PI	Title	Institution
0328250	4097	Liebeherr	Workshop on Fundamental Research in Networking; April 2003; Warrenton, Virginia	University of Virginia Main Campus
0344881	4097	Nahrstedt	NSF Workshop on Research Challenges in Broadband Access Networks; Sept/Oct 2003; Chicago, IL	University of Illinois at Urbana-Champaign
0349407	4097	Osterman n	Networking Education: How to Educate the Educators? August 25, 2003; Karlsruhe, Germany	Ohio University
0513856	7354	Shankar	Workshop on the Program Verifier Grand Challenge, February 21-23, 2005, Menlo Park, California	SRI International
0532686	7354	Sweany	Proposed Conference Support for SCOPES 05	University of North Texas
0532985	7354	Hariri	The Second IEEE International Conference on Autonomic Computing	University of Arizona
0533041	7354	Hariri	Proposal for Support of The 2nd Annual International Conference on Pervasive Services (ICPS 2005)	University of Arizona
0535579	7359	Nahrstedt	Research Infrastructure: Intelligent Information Spaces: A Testbed to Explore and Evaluate Intelligent Devices and Augmented Realities	University of Illinois at Urbana-Champaign
0535580	7359	Nahrstedt	Research Infrastructure: Intelligent Information Spaces: A Testbed to Explore and Evaluate Intelligent Devices and Augmented Realities	University of Illinois at Urbana-Champaign
0522275	7361	Gates	Alliance of Hispanic-Serving Institutions: Request for Planning Funds	University of Texas at El Paso
0414779	7363	Bernat	Informational Meeting on Programmable Wireless Networks; February 2004; Arlington, VA	Computing Research Association
0421552	7363	Govindan	Informational Meeting for Focus Area: Networking of Sensor Systems - February 20, 2004, Marina del Ray, CA	University of Southern California
0437586	7363	Makki	Workshop: International Workshop on Research Challenges in Mobile and Wireless Networks Security and Privacy - Miami, Florida, March 13, 2005	University of Toledo
0438110	7363	Hendricks	Workshop: Focusing on Wireless as Viable One Gigabit Broadband Strategy, Washington, DC Metro Area	Corporation for Education Network Initiatives in California
0451431	7363	Camp	NSF Meetings for Networking of Sensor Systems at Colorado School of Mines, Golden, CO	Colorado School of Mines
0526997	7363	Gerla	Peer to Peer MANET Workshop - Dagstuhl, Germany (10-12 April 2005)	University of California-Los Angeles
0534685	7363	Mukherjee	US/EU Workshop on Optical Networking, June 27-28, 2005, Brussels	University of California-Davis
0535385	7363	Brown	NSF Future Spectrum Technology and Policy Workshop	University of Colorado at Boulder
0541670	7363	Fujimoto	Workshop on Future Directions in Network Modeling, Simulation, and Measurement, August 15-16, 2005, Arlington, VA	Georgia Tech Research Corporation - GA Institute of Technology
0550982	7363	Welsh	Principal Investigator and Informational Meetings on the NOSS (Networking of Sensor Systems) Focus Area	Harvard University
0553258	7363	Li	Workshop on Algorithms and Complexity in Wireless Networks, April 4 - 5, 2006, Las Vegas, USA	University of Toledo
0553353	7363	Gerla	Workshop: Networking Technology & Systems PI Meeting - Los Angeles, CA. (7-9 December 2005)	University of California-Los Angeles
0447420	7371	McGillen	Workshop: Cybertrust PI Meeting, Pittsburgh, PA- Aug 18-20, 2004	Carnegie-Mellon University
0455350	7371	Ryan	Support for US Japanese Workshop on Critical Information Infrastructure Protection, Sept. 28-29, 2004	George Washington University
0503223	7371	Ryan	Workshop: Support for U.S. - Japanese Workshop on Critical Information Infrastructure Protection; September 28-29, 2004; Arlington, VA	George Washington University
0522217	7371	Stolfo	Workshop on Resilient Financial Information Systems	Columbia University
0523450	7371	Ma	Workshop on Visualization for Computer Security	University of California-Davis
0532419	7482	Wiziecki	Workshop: Informational Meetings on Broadening Participation in Computing and General NSF Proposal Guidelines, April 13, Baltimore, MD and a Access Grid, virtual meeting, April 20	University of Illinois at Urbana-Champaign

Table 85. Workshops Funded by CNS Division: FY 2003 – FY 2005

3.2.3 Management of the programs

3.2.3.1 Responsiveness of the unit to emerging research and education trends

Annual Reports provide an overview of emerging research and education trends in each program area. The GPRA Nuggets provide prospective on trends in research and education.

Potential resources for this question that can be found on the COV web site are:

- Link to Annual reports for Programs
- Link to Final and Annual reports for individual projects (Searchable database)
- Link to selected nuggets
- Link to awards list

3.2.3.2 Planning and prioritization process (internal and external) that guided the development of the portfolio under review:

The CNS Division, like all of CISE, migrated to a "Cluster" model of program management after the CISE reorganization in FY 2003.

The *Computer Systems* cluster has three program officers: Frederica Darema, Helen Gill, and Brett Fleisch. The cluster manages the Computer Systems Research program (CSR). They introduce revised solicitation during the year, with CSR organized into four topical areas: Parallel and Distributed Operating Systems (Fleisch), Embedded and Hybrid Systems (Gill), Advanced Execution Systems (Darema), and Systems Modeling and Analysis (Darema). The program directors all participated in the CAREER competition.

Using a collaborative approach, clusters seek out projects that expand the capabilities of existing systems by exploiting the potential of new technologies as well as those that aim to develop innovative ways to use existing technologies. The clusters' mission is to support projects that strive to make significant progress on challenging, high-impact problems—as opposed to incremental progress on familiar problems—and those with a credible plan for demonstrating the utility and potential impact of the proposed work.

The *Networking Cluster* has four program officers: Darleen Fisher, who rejoined the NeTS cluster in December 2004, Guru Parulkar and Karl Levitt. The cluster manages its solicitation: Research in Networking Technology and Systems (NeTS) with three components: Networking Research Broadly Defined, a focus area on Networks of Sensor Systems, and a focus area on Programmable Wireless Networking.

The *Infrastructure Cluster* had two program directors: Stephen Mahaney and Rita Rodriguez. They worked with division representatives on both the Computing Research Infrastructure Program (CRI) and the Major Research Instrumentation (MRI) program. Mahaney led the effort on CRI, while Rodriguez led that of MRI.

The Education and Workforce Cluster has three program officers and one expert: Caroline Wardle, Harriet Taylor, and Jan Cuny, all full time employees; and Anita La Salle a part-time employee. The cluster managed CISE Special Projects; the CISE programs of the REU Sites competition, Graduate Teaching Fellows in K-12 Education (GK-12) competition, Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE) competition, and Ethics Education in Science and Engineering projects (ESEE) competition. In addition to these activities, the cluster managed numerous existing awards for the Information Technology Workforce program (ITWF) and Combined Research and Curriculum Development/Educational Innovation program (CRCD/EI), both of which were discontinued after the FY2004 competition.

Crosscutting Activities
CNS participates in several crosscutting activities in addition to the programs managed by each of the clusters. These include, but are not limited to, Cyber Trust, CAREER, DDDAS, Science of Design, Highly Dependable Computing and Communications Systems Research (HDCCSR), and several NSF-wide educational and workforce programs.

- The Cyber Trust Program (CT) promotes a vision of society in which computer systems are (1) more predictable, more accountable, and significantly less vulnerable to the types of abuse and attacks they face today, and which are likely to become more severe in the future; (2) developed, configured, operated and evaluated by a well-trained and diverse workforce with the tools to improve significantly their productivity; and (3) used by a public educated in their secure and ethical operation. To improve national cyber security and to achieve the Cyber Trust vision, the cluster supports a collection of

projects that, together, advance the relevant knowledge base; creatively integrate research and education for the benefit of technical specialists and the general populace; and integrate the study of technology with the policy, economic, institutional and usability factors that often determine its deployment and use. The attacks faced by today's computer systems are costly and time consuming to deal with, but the situation is likely to become exacerbated as attackers' capabilities improve and the specter of pervasive and ubiquitous computing foresees "computers and sensors everywhere".

In addition to managing the Cyber Trust competition, for the third consecutive year, the Cyber Trust program organized a Principal Investigator's Meeting this year, in Newport Beach, CA, through a subcontract with UC Irvine. The meeting was well attended (150 PIs and other scientific personnel), with sessions featuring presentations by leaders in the field from Microsoft, HP, and HHS; panels run by CNS program officers, and a poster session that offered 120 posters and was well-received. Harriet Taylor, the CNS-EWF cluster representative on the Cyber Trust team, participated in the development of the educational outreach for the PI meeting. Evaluations were submitted by 50 of the attending PIs, which will guide Cyber Trust program officers in the development of future PI meetings. In conjunction with the PI meeting, Cyber Trust helped organize panels with DHS on data sets to support security research and on the DETER/EMIST large-scale test bed to evaluate networked security solutions.

- The CAREER competition is conducted as a divisional activity. In 2005, seven panels reviewed the 150 proposals and made awards to 38 of the proposals. Brett Fleisch coordinated the competition. He and Frederica Darema ran the panel on distributed systems and compilers. Carl Landwehr evaluated Cyber Trust proposals, Helen Gill evaluated embedded systems proposals, Joe Evans evaluated wireless networking proposals, and Darleen Fisher ran a panel that considered other networking research proposals.

- The DDDAS program solicitation, announced in FY 2005, articulated the challenges of developing Dynamic Data Driven Application Systems. It built upon an NSF sponsored workshop held in March 2000 and seeding efforts enabled through the ITR (Information Technology Research) Program. The DDDAS competition was sponsored in cooperation with multiple NSF Directorates, two NIH Institutes (NLM – National Library of Medicine and NIGMS – National Institute of General Medical Sciences), NOAA, the EU-IST (European Community Information Societies Technologies), and the UK e-Sciences Programs. In response to the solicitation, NSF received 248 proposals, totaling 182 projects. The total funding requested was approximately $175M, competing for approximately $15M in initially allocated funds. A cross-Directorate and cross-agency working group was involved in the writing of the solicitation and in conducting the competition. Proposals received were multidisciplinary, in accordance with the call for proposals. The proposals were divided into six panels and reviewed in accordance with the NSF review process. A total of 32 projects were funded with 23 projects funded at a reasonable level, albeit reduced from the requested amounts, and 9 projects were given seed funding to permit the PIs to start investigating some of their proposed ideas. Funding decisions were made by selecting from the pool of the most meritorious proposals, and in cooperation and co-sponsorship that included all the NSF Directorates, the two NIH Institutes and NOAA. The total increased funding was $16M. The proposal review and decision process was completed in 3.5 months -- a much shorter timeframe than the usual 6-month cycle.

- The Broadening Participation in Computing (BPC) program aims to significantly increase the number of students receiving post secondary degrees in the computing disciplines. Initially, its emphasis is on students from communities with longstanding under-representation in computing: women, persons with disabilities, and minorities. The BPC program seeks to engage the computing community in developing and implementing innovative methods to improve recruitment and retention of these students at the undergraduate and graduate levels. Because the lack of role models in the professoriate can be a barrier to participation, the BPC program also aims to develop effective strategies for identifying and supporting members of the targeted groups who want to pursue academic careers in computing. While these efforts focus on underrepresented groups, it is expected that the resulting types of interventions will improve research and education opportunities for all computing students. Jan Cuny was the lead PD on the BPC program

- CNS organized and ran one panel in the Science of Design Competition. The Science of Design (SoD) Program at NSF solicits proposals for projects that will bring creative, scientific advances to design as it pertains to computer-based artifacts, especially software-intensive systems. The focus of this program is on the design of software-intensive systems, including, importing and adapting ideas from other design fields (engineering, urban planning, architecture, economics and the arts, for example). The objective of the program is to bring new paradigms, concepts, approaches, models, and theories into

the development of a strong intellectual foundation for software design, which will ultimately improve the processes of constructing and modifying software-intensive systems. Anita LaSalle represented CNS on the SoD coordinating committee. For FY 2005 funding, within CNS, 26 SoD proposals were processed from the submitted pool of 190. CNS made two awards.

- The EWF cluster coordinated CISE participation in several NSF-wide education and workforce programs: ADVANCE, GK-12, Graduate Research Fellowships (GRF) and Distinguished Teaching Scholars (DTS). CNS also signed off on all IGERT awards, but this year that activity was coordinated by IIS.

  Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE): Harriet Taylor and Jan Cuny of the EWF Cluster represent CISE on the Advance Implementation Committee (AIC).

  Distinguished Teaching Scholars: (DTS) Caroline Wardle represents CISE in the DTS activities. There were no CISE DTS award recipients this year. Wardle attended a DTS Awardees workshop addressing NSF's Review Criterion 2.

  Graduate Teaching Fellows In K-12 Education (GK-12): Harriet Taylor represents CISE on the GK-12 coordinating committee. Caroline Wardle moderated the CISE GK-12 panel at the August 2004 review. The CISE allocated funds were made as needed to fund new awards and cover continuing funds. The CISE contributed funds were used to fund Engineering awards in which there was significant participation in the CISE discipline. The committee remained very active throughout the year with solicitation revision and programmatic oversight. CISE and Engineering teamed together for the 2005 solicitation competition and oversight of two panels. According to current indications, this tactic will result in 5-7 new sites covering CISE and Engineering and a significant presence of CISE graduate students and discipline content in K-12 schools across the nation.

  Graduate Research Fellowships (GRF): Caroline Wardle coordinated with EHR, CISE-related activities for GRF. CISE funded an additional 10 CISE awards to women under the WICS section of the GRF competition.

  In addition to these activities, Anita LaSalle worked with Engineering and EHR to organize a joint PI meeting with attendees invited from a pool of education-related awards from the two other directorates. Approximately 400 PIs (total, from all three Directorates) attended the PI meeting on February 15-18 in Washington, DC, and participated in poster and panel sessions. Of the 400, approximately 30 were CISE grantees.

Part B. Strategic Outcome Goals

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3.3 Part B. Strategic Outcome Goals

NSF's four performance goals are based on: People, Ideas, Tools, and Organizational Excellence.

The agency decision for NSF success for each goal is based largely on analysis of statements contained within reports received from external committees assessing NSF programs and activities. NSF staff examines ratings or statements of significant accomplishment in the reports to ensure that judgments are justified. In addition, there must be evidence or examples that support such judgments.

NSF also establishes a number of annual performance goals, usually stated in a manner that permits quantitative measurement, that are related to the strategic outcome goals. For example, NSF has goals that address the time to process a proposal, average award size and duration, and facility management. All NSF managers, staff, contractors, and grantees are expected to contribute to the achievement of NSF's performance goals.

Each year, evidence of goal achievement is solicited from divisions in the form of "Nuggets" A particular nugget may describe achievements towards one or more goals in terms of:

- Outcome Goals for People
- Outcome Goals for Ideas
- Outcome Goals for Tools

The links to an archive of annual nuggets can be found on the CNS COV website.

3.3.1 Outcome Goals for Organizational Excellence

The Division is participating in the testing of the new Electronic Jacket (EJ), which allows proposals to be processed more efficiently. When complete, the system will allow internal users to complete the entire proposal process online, from assigning a proposal to a cluster to requesting reviewers and finally DD-concurring for awards or declines.

The Division uses the Interactive Panel system to allow panelists access to proposals and to enter panel summaries. It also allows Program Officers to track panelist Conflicts of Interests and prevents these panelists from viewing confidential information. The Interactive Panel also decreases the amount of staff time needed to prepare for a panel by reducing the need for paper copies at the panel.

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Part C. Other Topics

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3.4 Part C. Other Topics

The following sections represent reflections, suggestions, grievances, and "kudos" contributed by the members of the CNS Division with respect to performance, workload, areas for improvement, and other issues related to the CNS Self-Study.

3.4.1 Areas for Improvement

We, the members of CNS team, are dedicated to our mission. We are committed to constantly evaluating our process, listening to the community, and taking actions to improve our performance. During the course of our self-study, we have identified the following areas for improvement:

- To enhance the diversity of PI and reviewer pool;
- To promote and strengthen collaborations across foundations and agencies;
- To improve staff training and standardize operational processes; and
- To assess and enhance technology tools we currently use.

We elaborate on these issues in the following sections:

3.4.2 Program Performance Issues

We should continue our efforts to enhance the diversity of the PI and reviewer pool. In particular, we need to improve methods to encourage proposal submissions from women and underrepresented minority groups and to recruit panel reviewers from these groups. Fully utilizing and leveraging the talent from these groups will play an important role in furthering the innovation that has given the Nation its current worldwide lead in science and engineering.

3.4.3 Agency and Directorate Wide Issues

Computer and network systems are critical components in many science and engineering projects. We need to further enhance our collaborations across foundations and federal agencies. We should improve the effectiveness of our program coordination. By doing so, not only will we better promote multi-disciplinary research, but we will also be more equipped to leverage our resources.

3.4.4 Workload and Workforce Issues

Given the increasing demand on our programs, our workload has accordingly increased, meaning that our staff has become overworked. We must develop better training opportunities for our program directors and staff, which should be customized to meet our division members' needs, and performance objectives. We should enhance staff award systems in order to improve productivity and promote excellence. We should assess our operational processes and standardize them in order to improve the work efficiency while maintain integrity and quality.

3.4.5 Technology Issues

Over the years, NSF has developed and/or used various information systems that assist program officials and staff in accomplishing their mission of managing proposals and grants. Some of the systems have been successful, e.g. Fastlane, which has dramatically reduced the workload and improved efficiency. However, some of the systems do not meet their expectations and should be abandoned until bugs are corrected (e.g., Fedtravler). In general, we should develop a strategy to evaluate the Foundation's information systems and consider their integration in order to further improve efficiency and maintain consistency. We also see a high risk in adaptation of Grant.gov system, as this may post serious disruptions to our PI community. We need to actively manage the transition.

3.4.6 Responsiveness to Previous COV Recommendations

The CISE AC reviewed prior COV reports in November 2001. The AC's review covered the COV Reports of the predecessor Division of CNS, the Experimental and Integrative Activities (EIA) Division, and the Advanced Computing Research (ACR) Division.
The directorate was determined to be successful on all outcome goals, on all indicators for the outcome goals, and on the areas of emphasis. The directorate was judged successful on both the reviewer use and program director use of

both merit review criteria. CISE was deemed well positioned for the future. The following summarizes the comments of the CISE AC.

"Goal 1: People – Development of a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well prepared citizens.

The CISE Advisory Committee judges the Directorate ***successful*** *in meeting GPRA Outcome Goal 1. The AC discussed each indicator and judged the directorate successful on all four. Based on this, the AC determined that CISE was successful for the overall goal. The four areas of emphasis were discussed. Again, the AC judged CISE successful on all four areas.*

Outcome Goal and Indicators:
The two COV reports for the year were in agreement about the very strong performance for the People goal. The EIA COV report assessed performance on this goal successful and gave several examples of successful projects. The EIA report noted that some program clusters did not apply to certain indicators, they found success for every indicator by most of the program clusters.

Areas of Emphasis:
Both COV reports gave examples of successful awards that addressed the areas of emphasis. The CISE report also gave several examples. The AC assessed the CISE directorate to be successful in all areas of emphasis.

Goal 2: Enabling discovery across the frontier of science and engineering, connected to learning innovation, and service to society.

The CISE Advisory Committee judges the Directorate successful in meeting GPRA Outcome Goal 2.

Outcome Goal and Indicators:
The Advisory committee discussed all four indicators and found that CISE was successful in all. The committee determined that CISE was successful in the areas of emphasis also. The balance of high-risk, multi-disciplinary or innovative research was cited as a particular success; the examples give ample evidence of success; the awards in the ITR program position CISE for continued success on this area of emphasis.

Areas of Emphasis:
For investments in the three initiatives, the committee did not see retrospective indications of success, probably because these initiatives have just begun (e.g. ITR's first awards were in summer of 2000) so their accomplishments are not reflected in COV reports or the CISE FY 2001 GPRA Report. However, based on discussions of the portfolio of awards, particularly in ITR where the directorate is very active, the AC concludes that CISE is positioned for future success. The directorate was judged successful in the third area of emphasis (non-initiative fundamental research) based on positioning for future participation in the Mathematics Sciences Research initiative, and current, though relatively minor, participation in functional genomics and cognitive neuroscience research. The AC noted the important role if IT in these areas.

Goal 3: Tools – Providing "broadly accessible, state-of-the-art information-bases and shared research and education tools."

The CISE Advisory Committee judges the Directorate successful in meeting GPRA Outcome Goal 3.

Outcome Goal and Indicators:
The advisory committee found that CISE was successful across the three indicators; particularly notable were CISE supported activities in PACI and advanced networking. The new Terascale Facilities are well positioned to advance these areas also. Although the third indicator (information and policy analyses that contribute to the effective use of science and engineering resources) was viewed mainly as a goal for SRS, the AC commented that CISE was successful also through funded studies documented in the CISE AC report as well as CISE funded research studies.

Areas of Emphasis:
For the areas of emphasis, CISE was judged successful. The AC felt that "continue investments in S&E information/reports/databases" did not apply to the directorate significantly, though various studies funded by the directorate were successes. The Terascale awards of 2000 and 2001 were mentioned as well chosen projects for MRE and continued investments in Terascale Computing Systems. The EIA COV noted award

0079800 in the Major Research Instrumentation program; this enabled developing infrastructure for a later ITR award for proactive computing (ITR: Multimodal Human Computer Interaction: Toward a Proactive Computer, 0085980). Lastly, CISE funded research was successful at developing new types of databases and tools for using them; CISE funded research has contributed to methods to store, search, display, analyze and many other functions for data resources.

Merit Review Criteria
The CISE Advisory Committee judges the performance of the Directorate on implementation of the new NSF merit review criteria as successful.

The two COV reports cited above gave careful attention to this goal. Both concluded, after careful examination of how proposals in the Advanced Computing Research program and the EIA division were handled, that reviewers were addressing both of the merit review criteria and that program officers took the information addressing both criteria into account in making their funding recommendations. The Advisory Committee concurs that the directorate demonstrates success for the goal for reviewers. As much progress has been made as can reasonably be expected. Although more progress is expected, the AC felt that the progress underway is satisfactory at this time. The Advisory committee concurs that the directorate demonstrates success for program director use of the new merit review criteria. Both COV reports reported success with no qualifications.

How Well is CISE Positioned to Attain NSF's Outcome Goals?
As amply demonstrated in this report, CISE is actively contributing to and extremely well positioned to continue to help NSF attain its People, Ideas and Tools in the future. Additionally, much of the research supported by CISE is enabling research advancements in the other NSF disciplines (e.g., PACI centers, next generation internet, etc.).

The AC discussed several emerging arenas that may need special attention in the near future.

As noted above, the CISE directorate is well poised to participate in NSF initiatives; while there is not sufficient information at this time to look back at accomplishments in ITR, Nanoscale and BE, the directorate is well positioned for future success.

The Directorate has outlined a vision for Cyber Infrastructure. Dr. Dan Atkins, chair of the Advisory Committee for CyberInfrastructure presented an interim report on their deliberations. The CISE Advisory Committee views this as an important area of investment for the NSF. In related investments, reports on Middleware and Terascale Computing indicate strong progress in these parts of the CyberInfrastructure effort.

The Advisory Committee discussed Cyber-Trust and related issues in security. The directorate announced a new program in Trusted Computing. The Advisory Committee applauds these pro-active efforts (planning for this program was undertaken for a full year prior to the September 11 events) and encourages CISE to increase efforts in these areas. An important aspect to emphasize is to address problems of larger scale systems – not just components.

The Advisory Committee discussed staffing at CISE. The AC recommends that NSF consider innovative solutions, including a West Coast facility, use of part time program directors, or other mechanisms. While CISE continues to hire excellent program directors, the impression conveyed from the COV reports and other observations is that the existing staff have too many proposals to handle and other responsibilities to do as good a job as the field deserves."

3.4.7 "Anomalies" in Current Report

The following addresses some issues relating to the data that supports the self-study:

Dwell-Time data: Dwell time data may not be completely representative of the Division's actual response time to submissions. For example, during the COV period, there were instances where program funding was intentionally deferred to another fiscal year because of budgetary issues. This results in an artificially inflated dwell time beyond the NSF six-month threshold.

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4 Appendix B – CNS COV 2006 Agenda

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NATIONAL SCIENCE FOUNDATION
Directorate for Computer and Information Science and Engineering (CISE)
Division of Computer and Network Systems (CNS)

4201 Wilson Boulevard
Arlington, VA 22230

Committee of Visitors (COV) Meeting
Tuesday, March 28, 2006 through Friday, March 31, 2006

COV Members

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Cluster I. Computer Systems
Includes:

Computer Systems Research (CSR)
Distributed Systems (DS)
Embedded and Hybrid Systems (EHS)
Next Generation Software (NGS)
Operating Systems and Compilers (OSC)
Dynamic Data Driven Application Systems (DDDAS)
Science of Design (SoD)
Information Technology Research for Nat'l Priorities (ITR-'04)

(8-10)

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Cluster II. Network Systems
Includes:

Networking Technology and Systems (NeTS)
Network Technology Systems (NTS)
Networking Research Testbeds (NRT)
Experimental Infrastructure Network (EIN)
Special Projects in Networking Research (SPN)
Networking Research Program (NR)
Strategic Technologies for the Internet
NSF Middleware Initiative (NMI)
Cyber Trust (CT)
Trusted Computing (TC)
(13-15)

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Guru Parulkar
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III. Research Infrastructure
Includes:

Computing Research Infrastructure (CRI)
Minority Institutions Infrastructure (MII)
Research Resources (RR)
Research Infrastructure (RI)

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IV. Education and Workforce
Includes:

Information Technology Workforce (ITWF)
Research Experiences for Undergraduates (REU)
CISE Combined Research and Curriculum Development and
Educational Innovation Program (CRCD/EI)
Research Experience for Teachers (RET)
3-4 Faculty Early Career Development (CAREER)

Presidential Early Career Awards for
Scientists and Engineers (PECASE)
Broadening Participation in Computing (BPC)
Ethics Education in Science and Engineering
Special Projects

Chair IV. Cluster
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Darleen Fisher
Brett Fleisch
Harriet Taylor
Caroline Wardle

COV AGENDA

Tuesday, March 28, 2006 -- Evening Arrival

Wednesday, March 29, 2006 – All Visitors, Cluster Chairs, COV Chair

Time	Activity	Location	Staff
8:00 - 8:30 AM	Continental Breakfast	Room 595, Stafford II	
8:30 - 8:40 AM	Greetings	Room 595, Stafford II	Deborah Crawford Office of Director
8:40 - 10:00 AM	Introduction, Purpose, Plan, Expectations, Logistics, COI and Confidentiality Overview, Program Data, Report Generation	Room 595, Stafford II	Satish Tripathi, Chair COV Wei Zhao, DD, CNS Anita La Salle, PM, CNS Kristin Oberright, IIS
10:00 – 11:00 AM	Introduction to CNS and its Clusters: 10 min. for reports from NSF Resource Program Officers with Q/A	Room 595, Stafford II	Frederica Darema – Cluster I Darleen Fisher – Cluster II Rita Rodriguez – Cluster III Caroline Wardle – Cluster IV
11:00 – 11:15 AM	BREAK	Room 595, Stafford II	
11:15 - 12:30 AM	Review Data and Jackets: Clusters Devise Plan for producing Cluster Reports and begin reviewing COV materials Cluster I Computer Systems (CSR) Cluster II Network Systems (NeTS) Cluster III Infrastructure Cluster IV Education & Workforce(EWF)	 Room 390, Stafford I Room 380, Stafford I Room 370, Stafford I Room 365, Stafford I	
	[COV Headquarters Room	Room 595, Stafford II]	
12:30 - 1:45 PM	WORKING LUNCH with Q/A: All Visitors and NSF staff reconvene for reality-check and feedback session.	Room 595, Stafford II	
1:45 - 3:15 PM	Continue to Review Data and Jackets	Cluster breakout rooms	
3:15 – 3:30 PM	BREAK	Room 595, Stafford II	
3:30 – 4:30 PM	Prepare reports on Process and begin Outcomes discussions	Cluster breakout rooms	
4:30 – 5:00 PM	Executive Session with Assistant Director, Peter Freeman, and Division Director, Wei Zhao.	Room 595, Stafford II	

6:30 -- … DINNER [Optional] at Dan and Brad's, Arlington Hilton, adjacent to NSF.
From NSF: Take North Elevators to 2nd floor. Exit NSF through glass doors. Turn left and follow the sky-walk towards the Ballston Metro. At the top of the escalator, bear left, follow the hallway past the elevators. Entrance is on your left inside the glass doors.
From street level: Enter building at Ballston Metro entrance or through the entrance at Starbuck's.
Take elevator, stairs or escalator to 2nd floor. Follow signs for Dan and Brad's.

Thursday, March 30, 2006 – All Visitors, Cluster Chairs, COV Chair

Time	Activity	Location	Staff
8:30 - 8:45 AM	Refreshments	Room 555 Stafford II	
8:45 - 10:30 AM	Prepare Reports on Outcomes	Clusters in same breakout rooms as Wed.	
10:30 –10:45 AM	Break	Room 555 Stafford II	
10:45 - Noon	Cluster Meetings to Prepare Composite Cluster Reports	Clusters in same breakout rooms as Wed.	
12:00 - 1:30 PM	WORKING LUNCH Cluster Reports (5 minutes each)	Room 555 Stafford II	
1:30 - 2:30 PM	Full COV -- Discussion of Findings for Composite Final Report	Room 555 Stafford II	
2:30 - 3:00 PM	Full COV -- Discussion of Future Directions Full COV -- Discussion of logistics of report Completion	Room 555 Stafford II	

Visitors depart. Cluster Chairs and COV Chair remain.

Friday, March 31, 2006 – Cluster Chairs, COV Chair

(Closed Meetings) **9:00 – 10:30**	Cluster Chairs and COV Chair integrate Cluster Reports, outline Executive Summary, and outline Report to CISE Advisory Committee	Room 380 Stafford I
10:30 – 11:30	Exit interview with Peter Freeman, AD, and Deborah Crawford, OD.	
11:30 – Noon	Complete Report	

COV Coordination:
Wei Zhao, Anita La Salle, Gwen Hardenbergh, Joan Goetzinger, Lisa Jones

NSF CNS -- COV Representatives

(Note: All NSF CNS representatives can be reached at: **Main (703) 292-8950/ Fax (703) 292- 9010**)

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Xerox Room	CNS	1175.25	292-8446
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FastLane Help Desk		325.01 S	292-8142
FastLane Help Desk-toll free			1-800-673-6188
Guard Desk		N Elevator	292-5070
Health Unit		265 S	292-8124
Help Desk		205 N	292-5040
Hot/Cold		295 N	292-8110
Information Center		Lobby	292-5111
Koss, Joe -- CISE/IT Support		1111 N	7860
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SATO Travel-Visitors			1-800-817-5257

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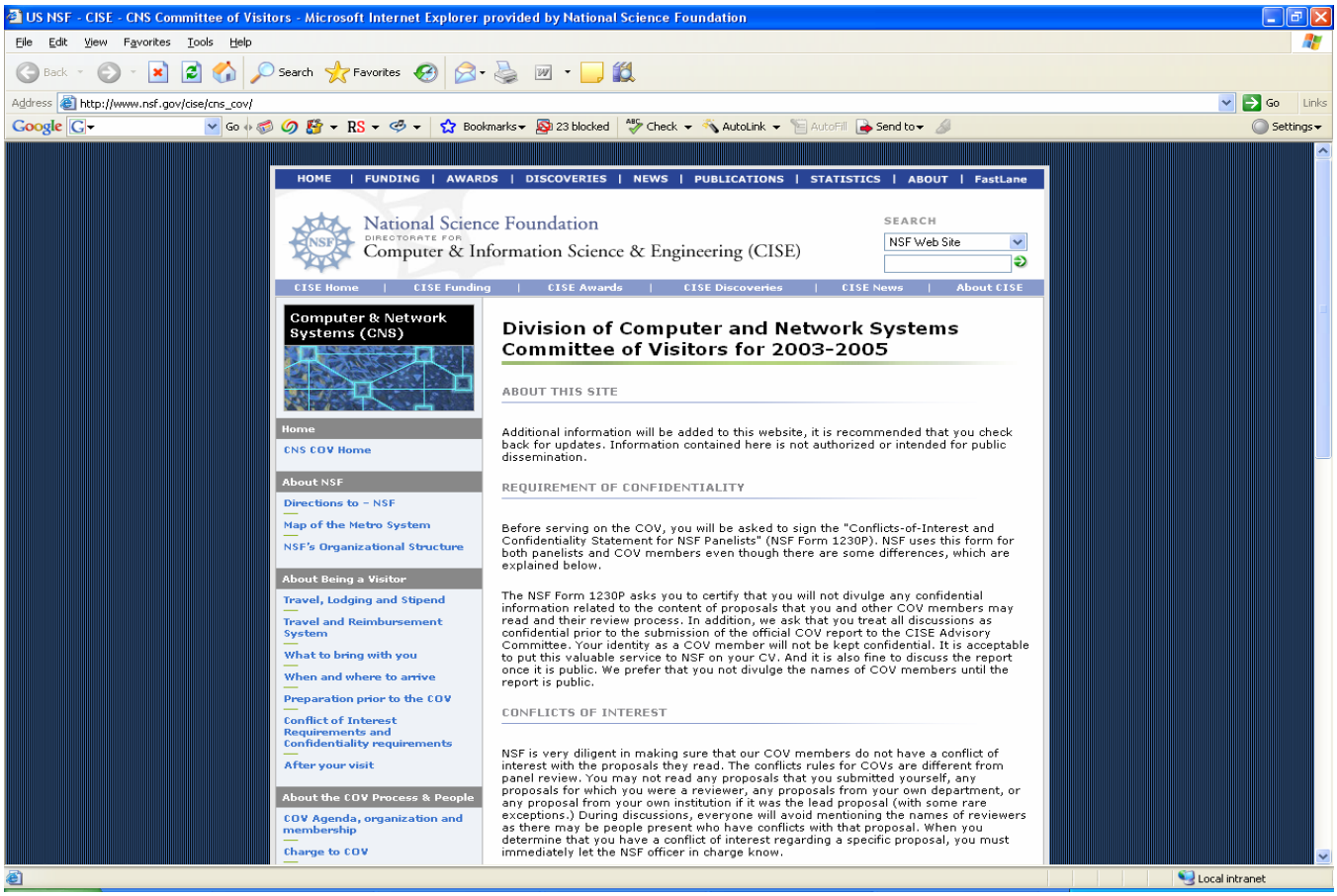
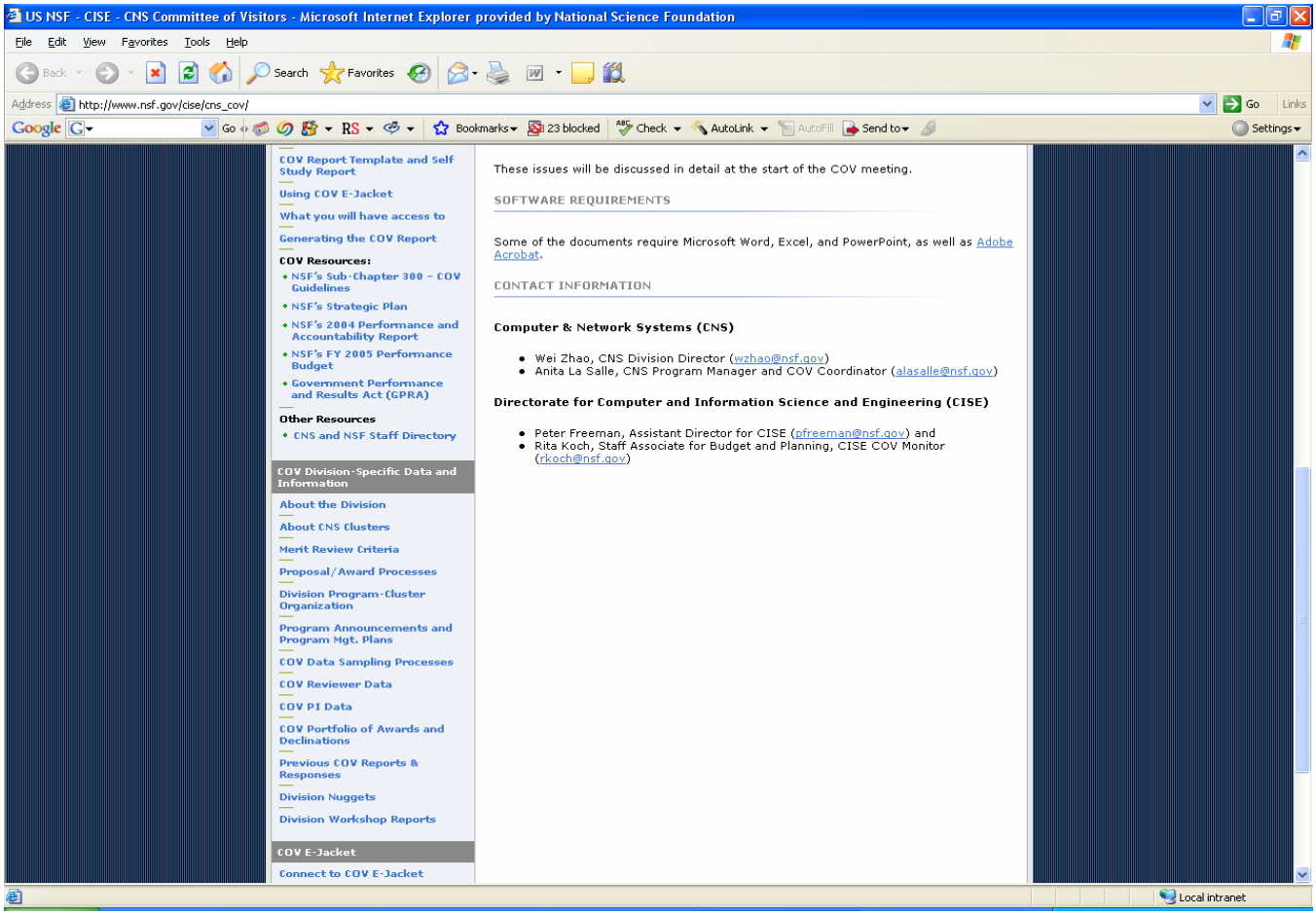
5 CISE/CNS COV Website




US NSF - CISE - CNS Committee of Visitors - Microsoft Internet Explorer provided by National Science Foundation
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.nsf.gov/cise/cns_cov/
Go Links
Google Go Bookmarks 23 blocked Check AutoLink AutoFill Send to Settings
COV Report Template and Self Study Report
Using COV E-Jacket
What you will have access to
Generating the COV Report
COV Resources:
NSF's Sub-Chapter 300 - COV Guidelines
NSF's Strategic Plan
NSF's 2004 Performance and Accountability Report
NSF's FY 2005 Performance Budget
Government Performance and Results Act (GPRA)
Other Resources
CNS and NSF Staff Directory
COV Division-Specific Data and Information
About the Division
About CNS Clusters
Merit Review Criteria
Proposal/Award Processes
Division Program-Cluster Organization
Program Announcements and Program Mgt. Plans
COV Data Sampling Processes
COV Reviewer Data
COV PI Data
COV Portfolio of Awards and Declinations
Previous COV Reports & Responses
Division Nuggets
Division Workshop Reports
COV E-Jacket
Connect to COV E-Jacket
These issues will be discussed in detail at the start of the COV meeting.
SOFTWARE REQUIREMENTS
Some of the documents require Microsoft Word, Excel, and PowerPoint, as well as Adobe Acrobat.
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TO: Deborah Crawford
Acting AD/CISE

FROM: Suzi Iacono
Acting Division Director, Computer and Network Systems Division

DATE: March 12, 2007

SUBJECT: Report on Diversity, Independence, Balance, and Resolution of Conflicts for the CNS Committee of Visitors

This is my report to you on the diversity, independence, balance, and resolution of conflicts of the Committee of Visitors (COV) for the Division of Computer and Network Systems (CNS) held from March 29 to March 31, 2006.

The COV, which was assembled to review the CNS Division, and whose report was presented to the CISE Advisory Committee on October 20, 2006, consisted of thirty (30) members, of whom twenty four (24) are male and six (6) are female. One of the members of the committee is African American, and one is Hispanic.

Twenty four (24) of the COV members are from academia, one (1) from a National laboratory and six (6) are from industry. The members' expertise reflects the research areas of CNS's clusters, i.e., computer systems, network systems, research infrastructure, and education and workforce. All invited COV members attended the meeting.

The Chair of the COV, Satish Tripathi, is the Provost at the State University of New York. All the committee members from academia are full or associate professors. Three (3) members are Deans or Associate Deans. Three (3) are Department Chairs and three (3) hold "Chaired" Professorships. The National Laboratory member is a Laboratory Fellow. Industry members' titles include: Director, Senior Manager, and Senior Researcher.

Seven (7) COV members are individuals who at the time of the meeting had not been applicants to CISE in the past five years (the CNS Division was in existence for only 2 ½ years prior to the COV meeting) and did not at the time of the meeting serve on any NSF Advisory Committee. Most COV members are familiar with CNS from having served on the CISE Advisory Committee or review panels, or are former or current grantees. None had proposals pending with CNS during the COV meeting. A conflict of interest briefing

was held on the first day of the COV meeting. All COV members were required to complete the NSF Conflict of Interest form.

All academic members of the COV were barred from seeing proposals from their home institutions, and all noted conflicts were resolved by barring members from seeing specific proposals with which they had conflicts. No real or apparent conflicts arose during the course of the meeting.