Appendix E: Charge to the Blue Ribbon Advisory Panel on CyberInfrastructure

Recent advances in technologies such as the Internet, digital libraries, data mining, visualization, tele-instrumentation, tele-presence, and grid computing have opened new opportunities to enhance our computational research capacity. The pace of research and innovation in these areas persuades us that NSF must draw much more aggressively on these new technology opportunities. Additionally, we must establish a setting for Terascale Research and Infrastructure that is better able to utilize new technology opportunities. With expected enhancements to computing systems, and the ability to store and transmit data, our goal now is no less than Teraflops, and Terabytes ultimately via Terabit networks.

The PACI Program, now in its fourth year, was formulated based on the recommendations of the Hayes Report issued in September 1995. The Blue Ribbon Panel is being convened to:

Goal-A) evaluate the performance of the PACI Program in meeting the needs of the scientific research and engineering community;

Goal-B) recommend new areas of emphasis for the NSF Directorate for Computer and Information Science and Engineering that will respond to the future needs of this community; and

Goal-C) recommend an implementation plan to enact those changes.

Goal-A: In assessing the impact of the PACI program the Blue Ribbon Panel should consider the following questions:

A-1 How well does the current PACI Program meet the needs of the science and engineering communities served by the NSF for providing access to high-end computational resources, information intensive resources, visualization resources and network access to those resources?

How successful has the PACI program been in the engaging new communities, e.g. social scientists, in the use of high performance computing as a tool for the conduct of their research and education activities?

A-2 In the context of the current and projected state of the technology (computer, storage, networking, etc.) are the current PACI partnerships meeting the recommendations of the Hayes Report.

A-3 How well does the current PACI Program fit within the NSF's objectives for providing the cross-Foundational infrastructure needed to enable further advances and lead to breakthroughs across all areas of science and engineering?

To what extent does the current program complement or overlap similar resources made available to academic scientists through NSF and other agencies such as NASA, DOE, DOD, etc.?

A-4 What impact have the Enabling Technologies (ET), Applications Technologies (AT), and Education, Outreach and Training (EOT) components of the PACI Program had on the scientific community both within the current PACI Partnerships, and in the larger research community?

Has support for these activities been adequate in the current program?

A-5 How successful have the current PACI Partnerships been at leveraging PACI support through interactions with other programs within the NSF, within other federal and state agencies, through partnerships with technology vendors, within partnering universities, and through industrial partners?

A-6 What are the international aspects of PACI?

Goal-B: How can NSF best take advantage of the significant changes in technology that have occurred since the issuance of the Hayes Report?

B-1 How have changes in computing, storage, and networking technology affected the methodologies, practices, and needs of the science and engineering community?

How have the continuing needs of the science drivers affected, and been realized in, areas of IT?

What impact will the availability of high performance cyber-infrastructure have on enabling cross-disciplinary research?

What societal applications (customized manufacturing, edutech, eldertech, etc.) have been impacted by these changes?

What developments are expected in the near future that will further change these needs?

What implications do these changes have for the high performance cyber-infrastructure that NSF will support?

B-2 Is the current NSF investment in computational, networking, storage, and visualization infrastructure sufficient to address the current and future high end demands of the science and engineering research community provided by NSF?

B-3 How can NSF better support computer scientists who develop tools that accelerate the efficient and effective use of high-end computing and communications infrastructure for simulation, data acquisition, storage and display, etc.?

B-4 What are the barriers that confront potential HPC users that wish to take advantage of state-of-the-art computational, storage, networking and visualization resources in their research? What can be done to remove these barriers?

B-5 What can be done to improve the education and outreach activities to broaden access to high-end computing? How can the number of scientists and others who have the knowledge and skills necessary to be able to use high-end computing be increased?

Goal C: Finally, the Blue Ribbon Panel should offer suggestions on how to implement any recommended changes:

C-1 What are the highest priority cyber-infrastructure investments NSF needs to make for high performance users?

C-2 What research "infrastructure" should be coupled with cyber-infrastructure?

C-3 What new science opportunities are likely to produce further developments in IT?

C-4 How should any new investments in infrastructure/technologies be administered? What proportion of infrastructure operating expenses needs to be planned for to assure the best utility of such infrastructure?

C-5 Should the Cooperative Agreements for the current PACI Partnerships be renewed for an additional 5 year period? With recommended changes to their current missions?

C-6 Should the current NSF infrastructure programs in high performance computing and networking be, extended or modified so that NSF is better poised to deal with the future needs of the science and engineering community?