**MEMORANDUM**

**To:** Peter A. Freeman, Office of the Assistant Director, CISE
SMIG liaison for Information Technology Research

**From:** Suzi Iacono & Steve Meacham, ITR COV Planning Committee
Co-Chairs

**Subject:** Response to the Report on the Committee of Visitors on
Information Technology Research (2001-2003) and Demographics
of the ITR COV

On behalf of the ITR COV Planning Committee (and the former TR Coordinating Group), we would like to thank the Committee of Visitors for their thoughtful COV report. The ITR COV was held at the National Science Foundation on March 8-10, 2005. The COV members reported that "…the integrity and efficiency of the program's processes and management were viewed to be appropriate, a complement to the NSF staff, considering that the requirements of a new, interdisciplinary, cross-directorate program presented numerous process-oriented challenges" and that "many best of breed ideas were enabled by ITR."

The COV also raised a number of concerns, including sufficient staffing for cross-directorate enterprises, the need for increased oversight for large projects, diversity and broad participation of students, reviewers and PIs, and the maintenance of tools, test-beds and other products at the end of the ITR projects.

A detailed response to the COV report is attached. It includes a synopsis of the issues raised by the COV and a response from the ITR COV Planning Co-Chairs in conjunction with the OADs of all the participating Directorates in the Foundation.

# NSF Management Response to the ITR COV Report for 2001-2003
## April 21, 2005

| Topic in Executive Summary and Year Reports | NSF Response |
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| **Part A: Integrity and efficiency of the program's processes and management**<br><br>Overall the COV viewed the quality and effectiveness of the merit review procedures as appropriate and complemented the NSF staff, recognizing that the requirements of a new, interdisciplinary cross-directorate program presented numerous process-oriented challenges.<br><br>Given the sheer number of proposals submitted to IT (~2000 a year on average), combined with the lack of full-time staff working on the ITR program, there was general concern about the quality of feedback provided to PIs. The COV recommended that NSF consider the use of mail (or ad hoc) reviews in future multidisciplinary competitions, and suggested that NSF dedicate more staff to future interdisciplinary programs of comparable size. | NSF recognizes that the provision of quality feedback to PIs is a critical part of the merit review process. NSF agrees with the ITR COV that additional ad hoc reviews would have helped assure that all areas of a multidisciplinary proposal were well covered in the review of that proposal. Although the ITR program will not have any more competitions, this is a useful recommendation for large interdisciplinary programs in general.<br><br>NSF continues to address the importance of quality merit review. Program Officers send detailed email instructions to reviewers and give PowerPoint presentations to panelists emphasizing the importance of providing quality written feedback for PIs to consider.<br><br>NSF also agrees that more staff should be dedicated to large and complex programmatic endeavors like ITR. Recognizing this, NSF has been requesting funding for additional staff in recent Budget Requests to meet pressing multi-disciplinary needs. |
| The COV suggested that there might be confusion about what "broader impacts" and "high-risk/high-impact" mean and how they can be evaluated in review. | The National Science Board and NSF management purposefully articulated the "broader impacts" criterion to be broad. This criterion can be addressed in many ways (e.g., through education, training, societal impacts) depending on the scope of proposed projects, recognizing the range of project types supported by the agency. This flexibility --in appropriately aligning science and engineering research and education with its broader impacts – is important in encouraging innovation from all science and |

| | engineering communities. The agency provides representative examples of activities that might be considered "broader impacts" at http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf. It should be noted that NSF's emphasis on the importance of both merit review criteria has been growing in recent years. The impact is observed in the COV's findings: in the ITR FY 2003 activities there was more attention to "broader impacts" than in FY 2001. This increasing attention to the consideration of both the "intellectual merit" and "broader impacts" criteria continues today. |
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| | Similarly, the agency is not overly prescriptive in defining "high-risk/high impact," allowing the merit review process to guide interpretation. NSF believes that flexibility is central to the scientific endeavor. |
| The COV recommends that NSF provide more extensive oversight of ITR large and medium awards. | NSF has learned that multi-institutional, multi-disciplinary projects must include a plan to guide collaboration and communication across distances and disciplines. In the last year of ITR (FY 2004, which was not covered in this COV), coordination plans were mandated in the program solicitation. In that year, panelists were instructed to evaluate the coordination plan in each proposal and to discuss it in the panel summary. |
| | NSF is committed to providing excellent program management and oversight for larger grants. For ITR awards, a formal external review process called a "site visit" has been developed. NSF program staff conducts site visits on the larger ITR awards in the second or third year of the award. This mid-term external assessment of the scientific, educational and managerial aspects of the projects informs the subsequent funding decisions on the part of the cognizant program officers. |

| | NSF keeps a calendar of its ITR site visits and has instituted standards for managing these site visits. The agency has developed "best practice" guidelines on how to conduct site visits, and has collected information about the site visits, including agendas, reports and awardee responses. This information is kept on a shared server where NSF staff can share this information. |
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| Was there an adequate pool of reviewers used in ITR? Can NSF be more creative in using conflicted reviewers (as is done in some social science journals) through a signal+influence approach? | When convening merit review panels, NSF program directors draw upon a mix of panelists. Diversity is central in constituting panels. Many excellent panelists participated in the ITR review process over the years and included a good mix of junior and senior people, experts from many fields and subfields, from many different types of institutions, and from many geographical regions. NSF does publish a list of reviewers each year. It might be prudent in these large competitions to publish the reviewers that participate in an entire program.<br><br>The more serious conflict of interest constraints are defined by legislation, not by NSF policy alone. Thus, any requests for changes would require extensive evidence of need or of significant harm to the merit review process. We do not think that we can demonstrate that the current system is unworkable. |
| The COV expressed concern about broader participation of under-represented groups. | Broadening participation is one of the most important areas on which NSF focuses. The full participation of all groups in our society is essential to discovery, learning and innovation across all fields of science and engineering. Unfortunately, no one solicitation will ever resolve the challenge that NSF faces in developing a broad diverse scientific and engineering workforce. If we were successful at that, then we would have a pool of diverse PIs and co-PIs, students, and reviewers from which to draw. This is a |

| | national challenge. |
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| Insufficient data were available to understand the balance of reviewers considering geography, type of institution, and underrepresented groups. Insufficient data were available to understand the balance of PI participation considering underrepresented groups. | We are aware of the insufficiency of data regarding reviewers. While state data are good, racial or ethnic status and type of institution data are (mostly) missing. To avoid limiting the pool of reviewers, reviewers are not required to provide this information to NSF. However, the agency recently redesigned the web pages in the NSF reviewing system so that reviewer demographic information is requested first, before the reviews are entered. While inputting this information is still voluntary, studies of the new design have shown that more reviewers are now providing this information. Thus, we would expect that demographic data on reviewers would be better over the coming years.  The same is true for PI and co-PI data. The provision of demographic information is voluntary as mandated by law. State and gender data are good. |

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| **Part B: Results: Outputs and Outcomes of NSF Investments**<br><br>There was no question but that the "quality of the projects supported by the ITR program is outstanding." The poster presentations and open poster sessions made evident the quality and diversity of projects funded by ITR and provided for lively exchanges between NSF program officers and COV members. (See the accompanying CD with the ITR nuggets displayed in the COV poster session.) | NSF shares the COV's enthusiasm for the excellent scientific and engineering research and education that have been fostered by this program. NSF will continue to showcase the outcomes of ITR projects over the following years. |
| The COV expressed concern about diversity in students, panelists/reviewers, and project leaders. The program should define the current state and what would constitute success in this area. | We believe that the use of the Performance Assessment Rating Tool (PART) will correct this perception of a lack of metrics, as PART is designed to establish baselines on all programs as well as achievement goals for future years. For ITR, the PART assessment did examine the participation of female principal or co-principal investigators in FY2003 and FY2004. During that period, there was an increase of 1% -- from 24% to 25%. The participation of minority investigators stayed at 7 percent across the two years. The tool is not used to monitor the demographics of students who are participating in projects or reviewers. |
| The COV expressed concern about maintaining the tools and products of the ITR projects, how to measure their impacts (who uses, how many use), and how to insure broad accessibility. | In terms of accessibility, NSF plans to establish an ITR website that will be available to the public in FY 2006. One objective of this website will be to showcase ITR outcomes. The ITR COV recommended maintaining links to ITR project websites. We agree that this is an excellent idea. |
| The COV recommended that NSF capture lessons learned about running a large, interdisciplinary program like ITR. ITR initiated community building across NSF directorates and program directors. Some concerns were expressed about | NSF agrees that it is critical to capture the lessons learned over the years of the ITR Program. The ITR Program co-chairs for FY 2004 have volunteered to start a Foundation-wide committee on best practices for programs of the size and scope of ITR. All |

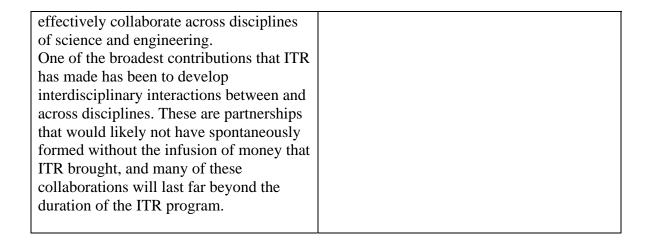| | |
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| management in the examination of the early years of ITR, but the concerns seem to have been addressed in the later years. | current chairs of priority areas, Foundation-wide programs and integrative activities will be invited to participate as well as those who have been asked to head up new interdisciplinary programs. The idea will be to share lessons learned and to develop a support structure for these large-scale endeavors.<br><br>In addition, NSF contracted with Booz Allen Hamilton to analyze and make recommendations on NSF-wide business practices. |
| Performance Assessment Rating Tool (PART) Question 1: Has the ITR Program made significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce and socio-economic impacts of IT? Yes, the ITR Program made significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce and socio-economic impacts of IT.<br><br>It has supported innovative projects that would not otherwise be supported from the disciplinary programs. The scope of the programs was broad, and has opened up new sub-fields of computer science including bio-informatics, human-robot interaction and computational medicine, for example. | NSF agrees with the COV that ITR projects have made significant contributions to software design and quality, scalable information infrastructure, high-end computing, workforce and socio-economic impacts of IT. |
| Performance Assessment Rating Tool (PART) Question 2: Has the ITR Program served an appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering?<br><br>Yes, NSF did serve an appropriate role in ensuring that grantees meaningfully and | NSF agrees with the COV that ITR projects encouraged meaningful and effective collaboration across the disciplines of science and engineering. |

| effectively collaborate across disciplines of science and engineering. One of the broadest contributions that ITR has made has been to develop interdisciplinary interactions between and across disciplines. These are partnerships that would likely not have spontaneously formed without the infusion of money that ITR brought, and many of these collaborations will last far beyond the duration of the ITR program. | |
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| **Part C: Other Topics**<br><br>The COV was impressed with the heroic efforts of NSF staff in all aspects of implementing this large, new interdisciplinary Priority Area. But since staffing levels were at the bare minimum, there was concern about possible negative impacts on post-award tracking, evaluation of outcomes, and oversight of large-scale programs. | NSF recognizes that adequate staffing is essential for effective post-award management and oversight. Over the past several years the agency has successfully built a case for additional staff, allowing for the allocation of a total of 50 new FTEs agency-wide in FYs 2004 and 2005.<br><br>While this number is not sufficient to address an increasing number of science and engineering opportunities and to manage the concomitant increase in the number of proposals submitted to the agency, it is movement in the right direction. |
| Important issues for the COV were continuing NSF investment in ITR products, tools and infrastructure and their impact on US competitiveness. | NSF agrees that information technology research outcomes are essential to US economic competitiveness, and current and future NSF investments in information technology will help maintain US leadership in this area.<br><br>As stated above, a website that showcases ITR projects and outcomes will be available to the public in FY 2006. In addition, a second ITR PI meeting may be useful in FY 2008 to coordinate across projects and to ascertain relevant outcomes.<br><br>All NSF directorates have infrastructure programs that help to harden and make more broadly accessible the important testbeds and tools developed in their research programs.<br><br>NSF supports all its scientific communities in developing the larger-scale alliances and partnerships (e.g., with international partners, industry, other government agencies, professional associations and across projects) necessary to foster and protect the most critical scientific investments over the long-term. |

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| The COV wants to insure that an appropriate balance between the size of award budgets and success rates is maintained and that the determination of budget cuts for an individual award is done with careful thought for its impact on the science objectives. | NSF pays attention to the balance between budget cuts and success rates in its current funding practices. These are difficult trade-offs. The agency continues to assess the trade-offs involved in optimizing the impact of its investments. |
| The COV recommends that knowledge management and best practices should be disseminated within NSF and with leaders of large-scale scientific projects. | As mentioned above, the ITR Program co-chairs for FY 2004 have volunteered to start a Foundation-wide committee on best practices for programs of the size and scope of ITR. All current chairs of priority areas, Foundation-wide programs and integrative activities will be included as well as those who have been asked to head up new interdisciplinary programs. The idea will be to share lessons learned and to develop a support structure for these large-scale endeavors.<br><br>The COV recommended that training opportunities be made available to PIs and co-PIs for the management of multi-institutional, multi-disciplinary large-scale projects. NSF would like to see more discussion of these kinds of issues. Perhaps the Foundation-wide committee is a place to start to incentivize program directors to set aside a part of their PI meetings to best practices in project management. |