

Reexamining the Merit Review Process at NSF

Business and Operations Advisory Committee
November 17, 2011

The Merit Review Working
Group

In a nutshell

- Look for potential enhancements to the merit review process that:
 - Reduce the burden on the research community & NSF staff
 - Stimulate the submission of high-risk/game-changing ideas
 - Ensure that the process identifies/funds an appropriate portion of high-risk, game-changing ideas
 - Use technology to facilitate the merit review process
 - Broaden participation in the review process
 - Maintain the quality of NSF's merit review process (do no harm!)
- Develop:
 - A design for a program of pilot activities and identify programs interested in participating in pilot activities
 - A framework for evaluating past and future pilots
- Engage:
 - NSF staff & the research community in developing, testing and assessing novel methods of proposal generation & proposal review
- Merit Review Process not Merit Review Criteria

Working Group members

- Steve Meacham - OIA (co-chair)
- Candace Major - GEO (co-chair)
- Cheryl Albus - ENG (former)
- David Croson - SBE
- Jean Feldman - Policy
- Sven Koenig - CISE
- Charles Liarakos – BIO
- Maureen Miller - OIRM
- Jose Muñoz - CTO
- Sara Nerlove - ENG
- Jeffrey Rich - OIRM
- Carmen Sidbury - EHR (former)
- Henry Warchall - MPS
- Susan Winter - OCI
- Victoria Fung - OIA (admin support)
- Brendan Stephens - OIA (admin support)

Relevant trends

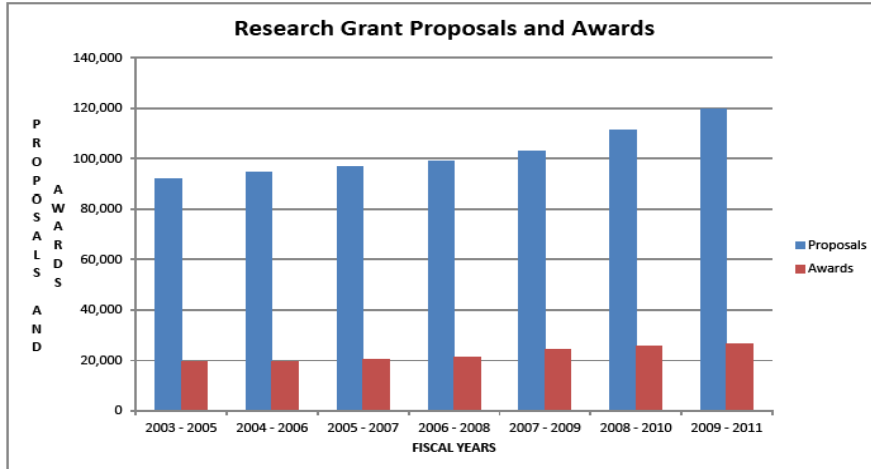
- The number of proposals submitted is up
- The number of PIs submitting proposals is up
- The number of proposals submitted per PI before an award is granted is up
- The number of proposals reviewed by panel only is up, and the use of ad hoc reviews is down
- The number of reviews returned per proposal is down

And eight years ago...

“NSF’s process and workforce design have served it well in the past. However, it is currently being challenged by a sharp increase in the volume of new proposals—from 30,000 in FY 2001 to more than 40,000 in FY 2003. To date, NSF has processed this substantial increase in workload with essentially the same number of human resources combined with technological advances. However, the award rate for new proposals has diminished from nearly 33 percent to 27 percent and the workload for program officers has risen to unprecedented levels.”

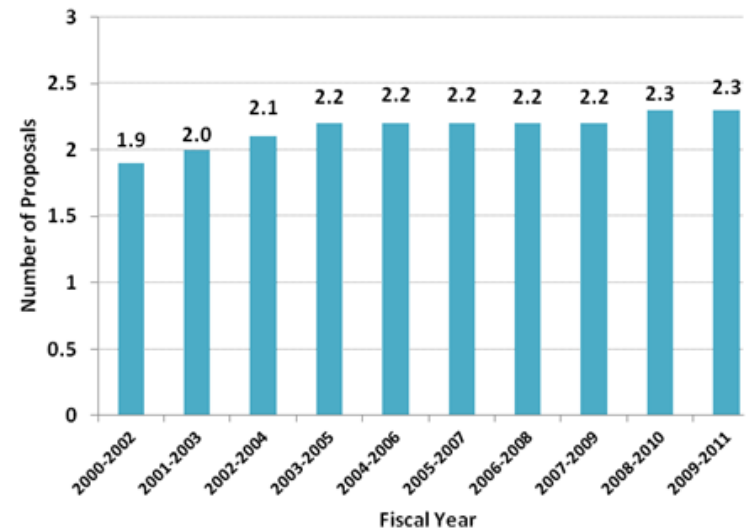
- *Report by NAPA on the National Science Foundation: Governance and Management for the Future, 2004.*

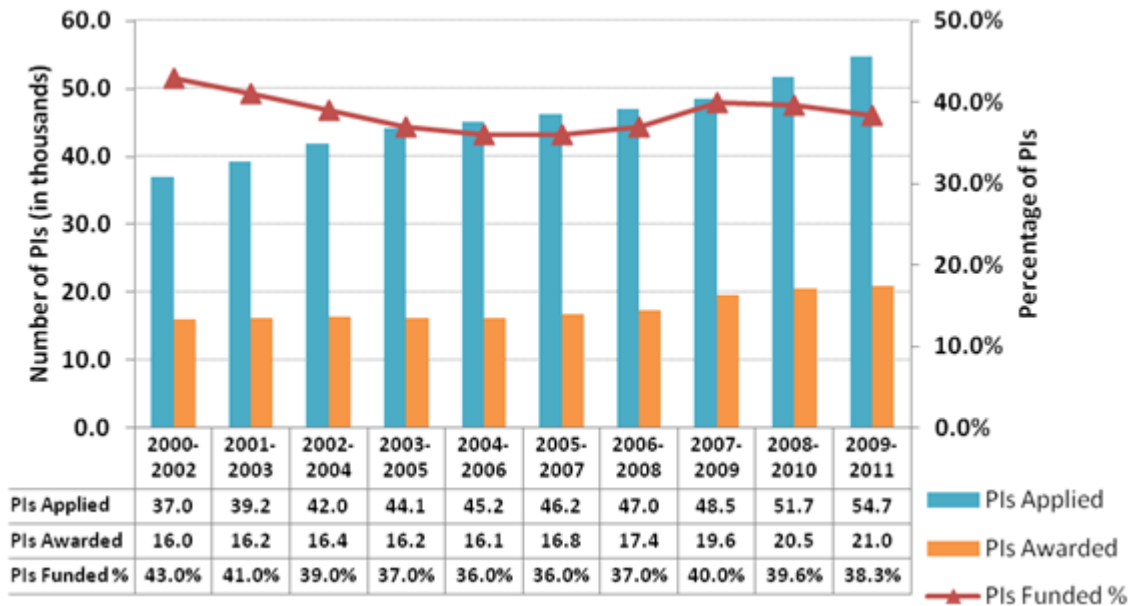
Research proposals and awards



Proposal pressure

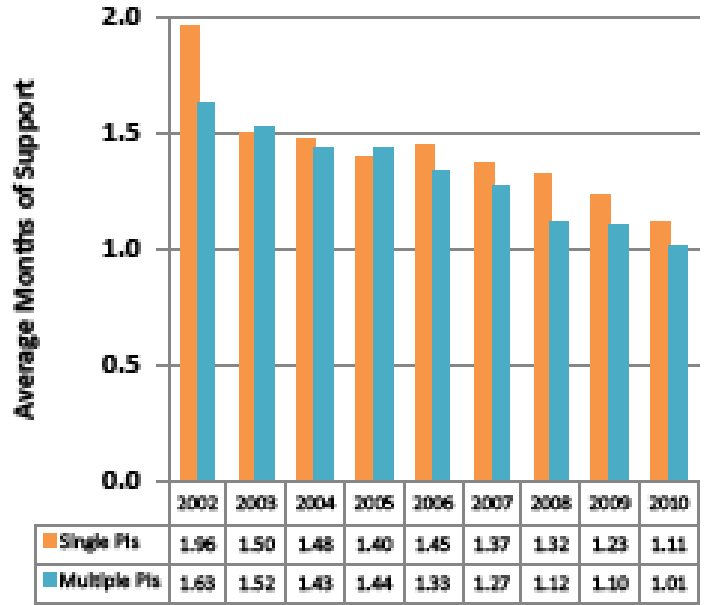
Proposals per PI per award





Over the decade -
 PIs applying: up 48%
 PIs awarded: up 31%
 PIs not funded: up 60%

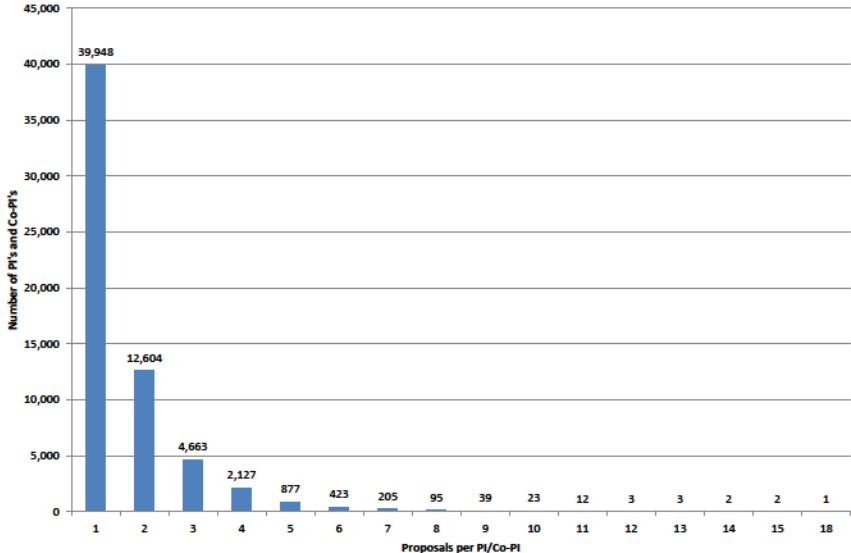
Proposal pressure



Source: NSF Enterprise Information System 10/01/10.

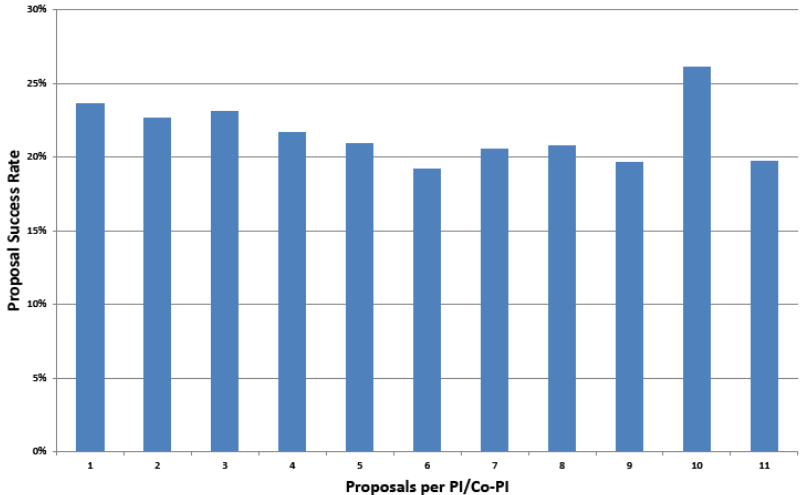
Submissions per PI/co-PI & Success Rate

Count of Number of Proposals per PI and Co-PI
FY2010



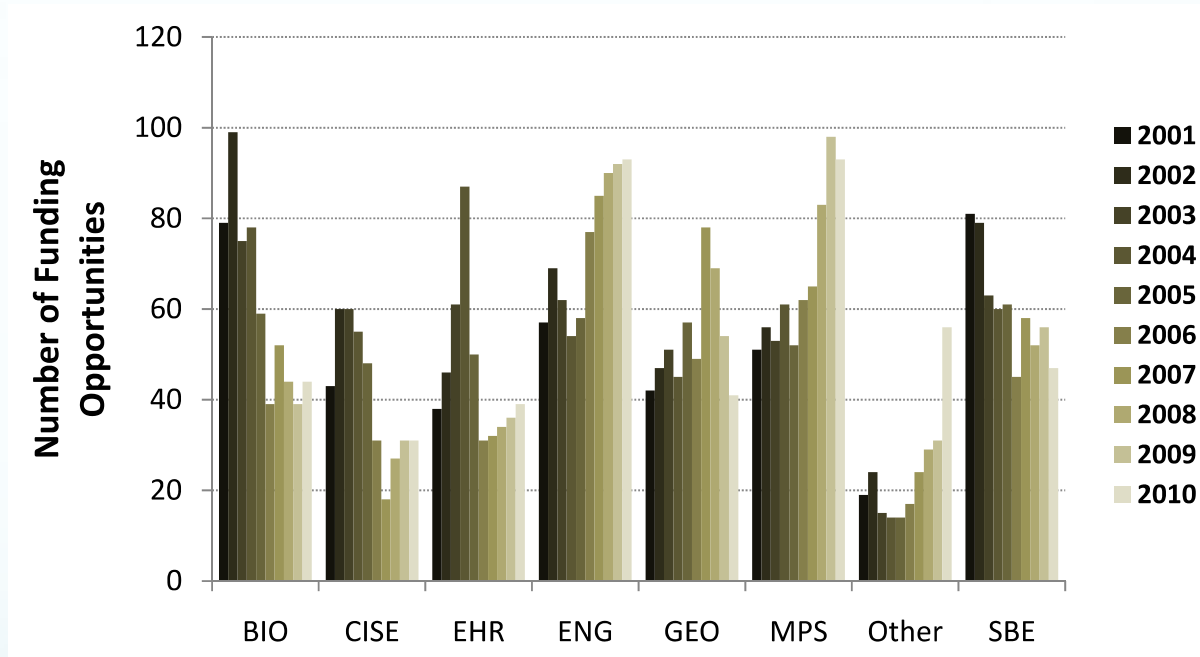
Data Source: Report Server accessed on 11.08.11 by B. Stephens.

Success Rate by Proposals per PI
FY2010

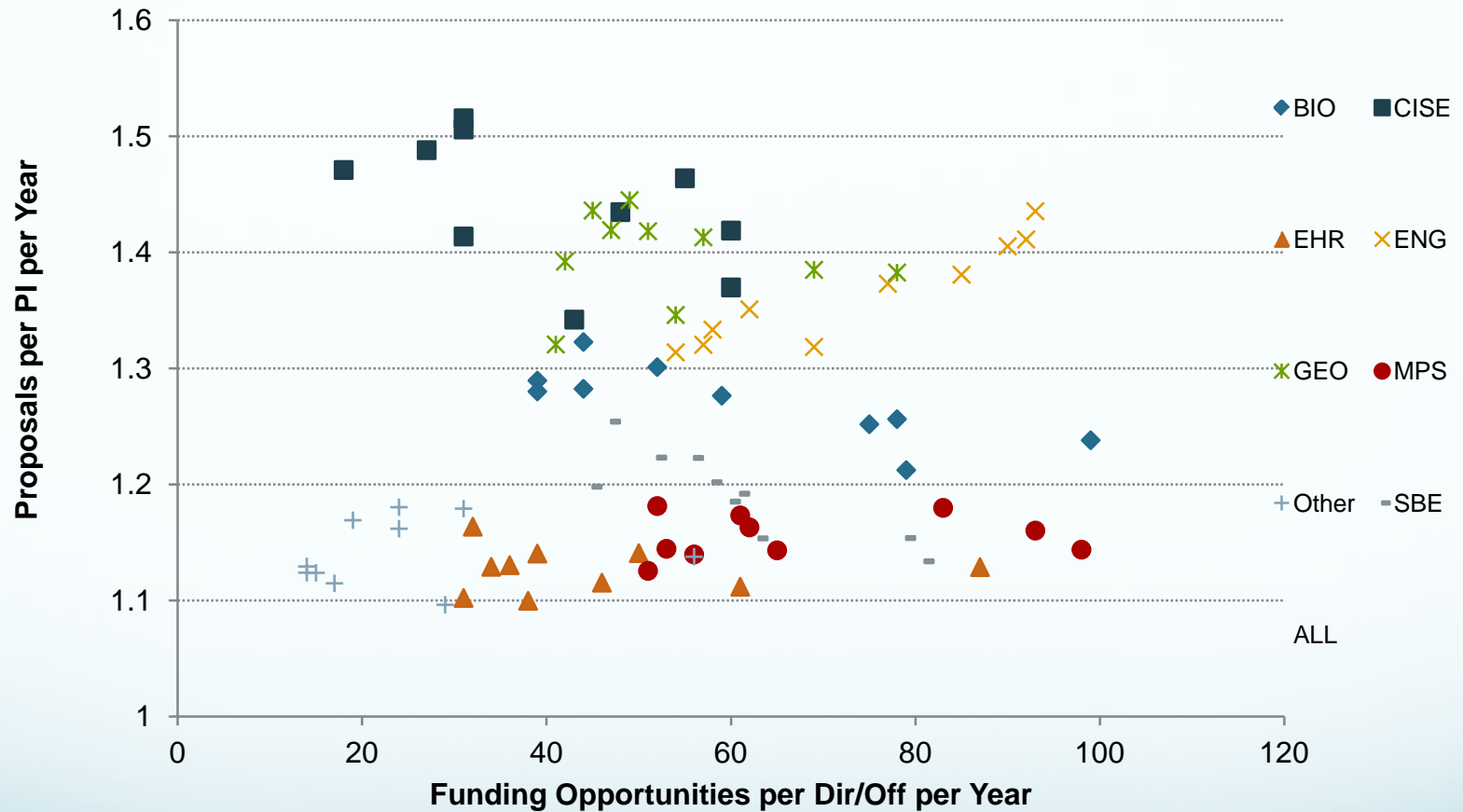


Data Source: Report Server accessed on 11.08.11 by B. Stephens.

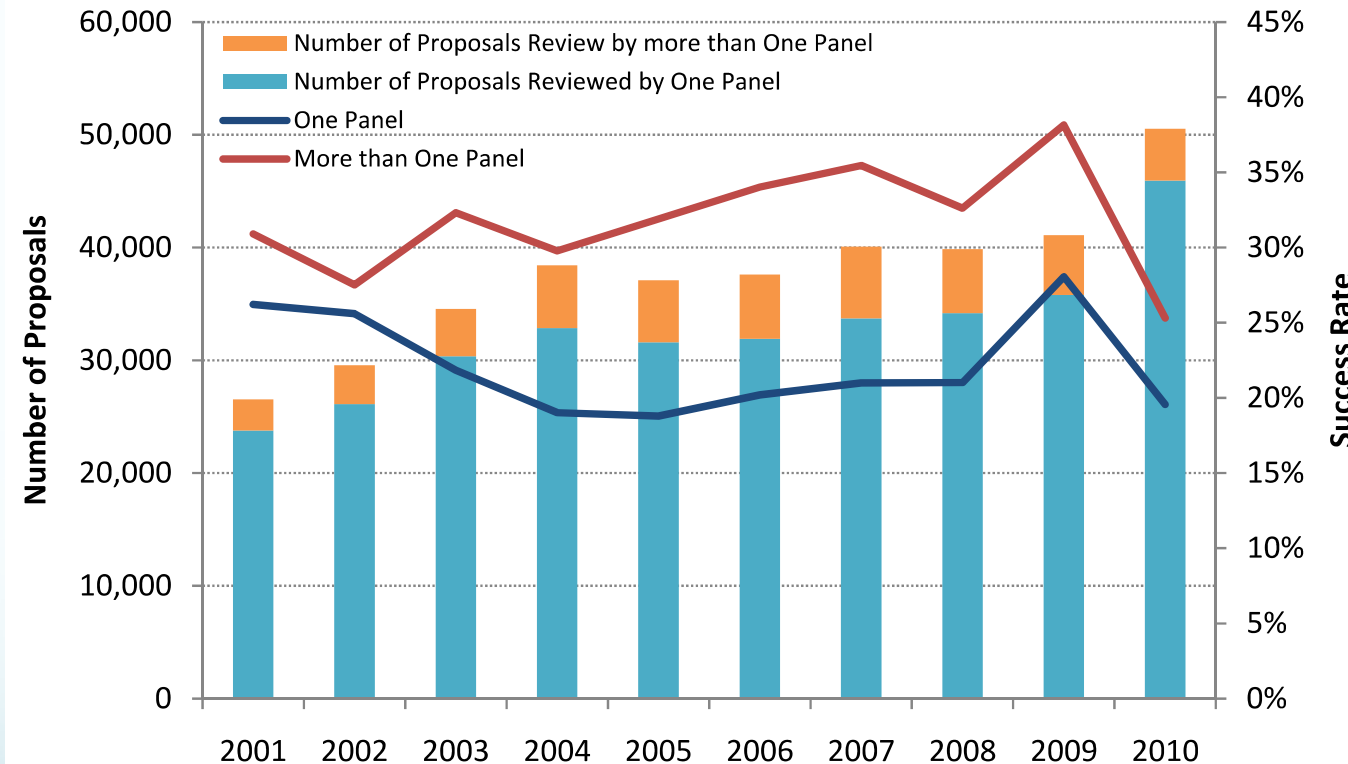
Trends in the number of funding opportunities in NSF Directorates 2001-2010



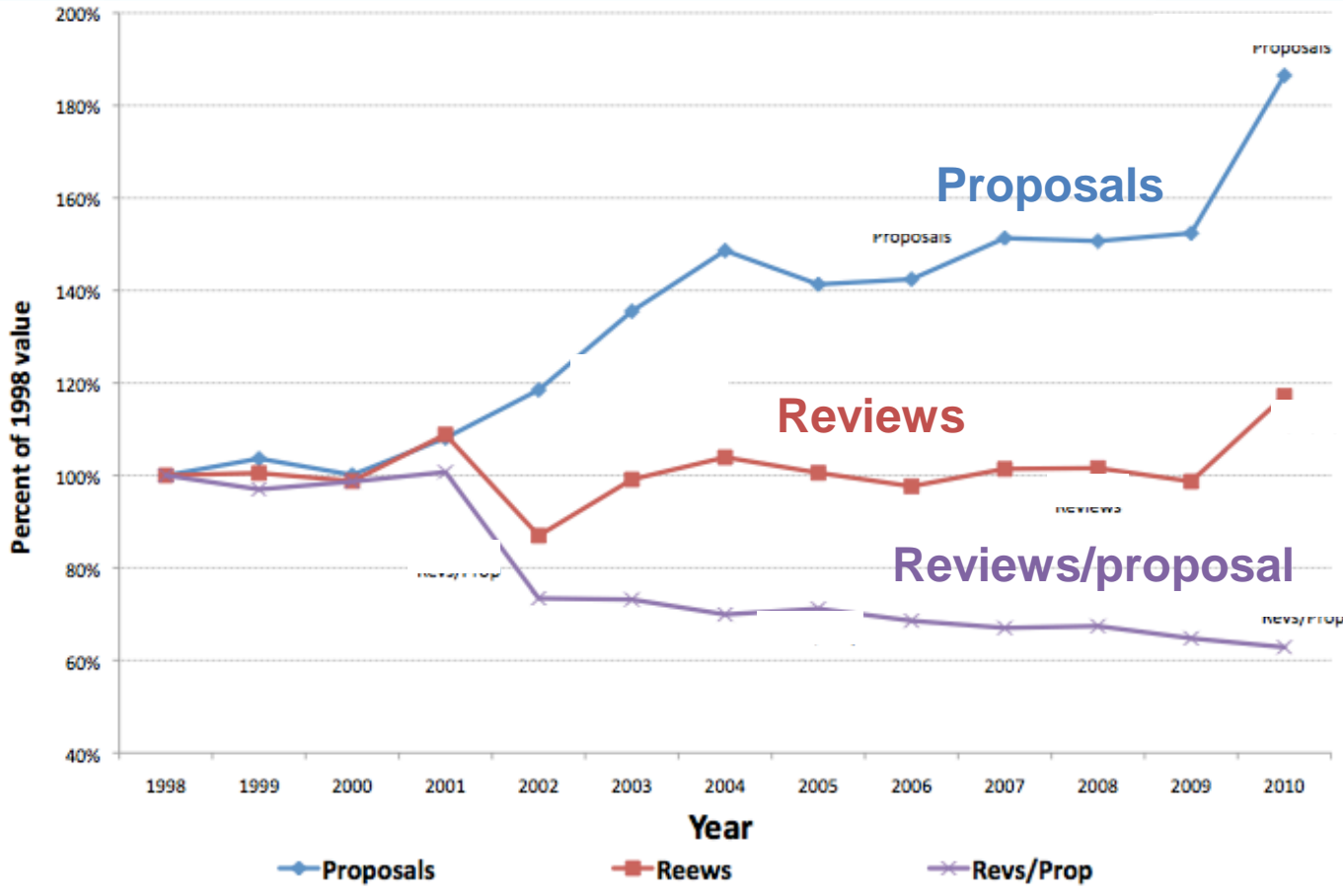
Does the number of funding opportunities drive proposal pressure?



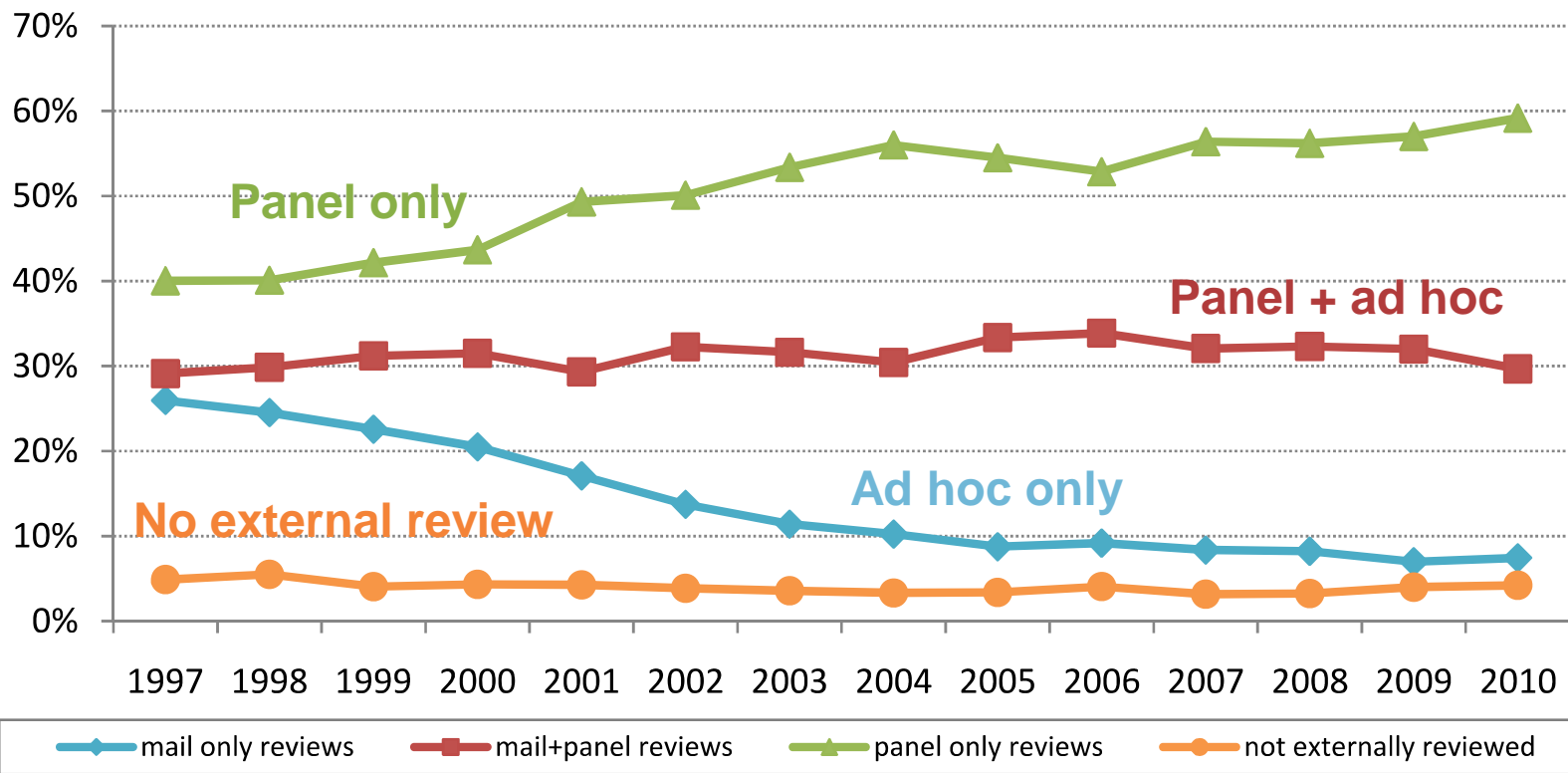
Is there a difference in success rate between multi-disciplinary and single discipline proposals?



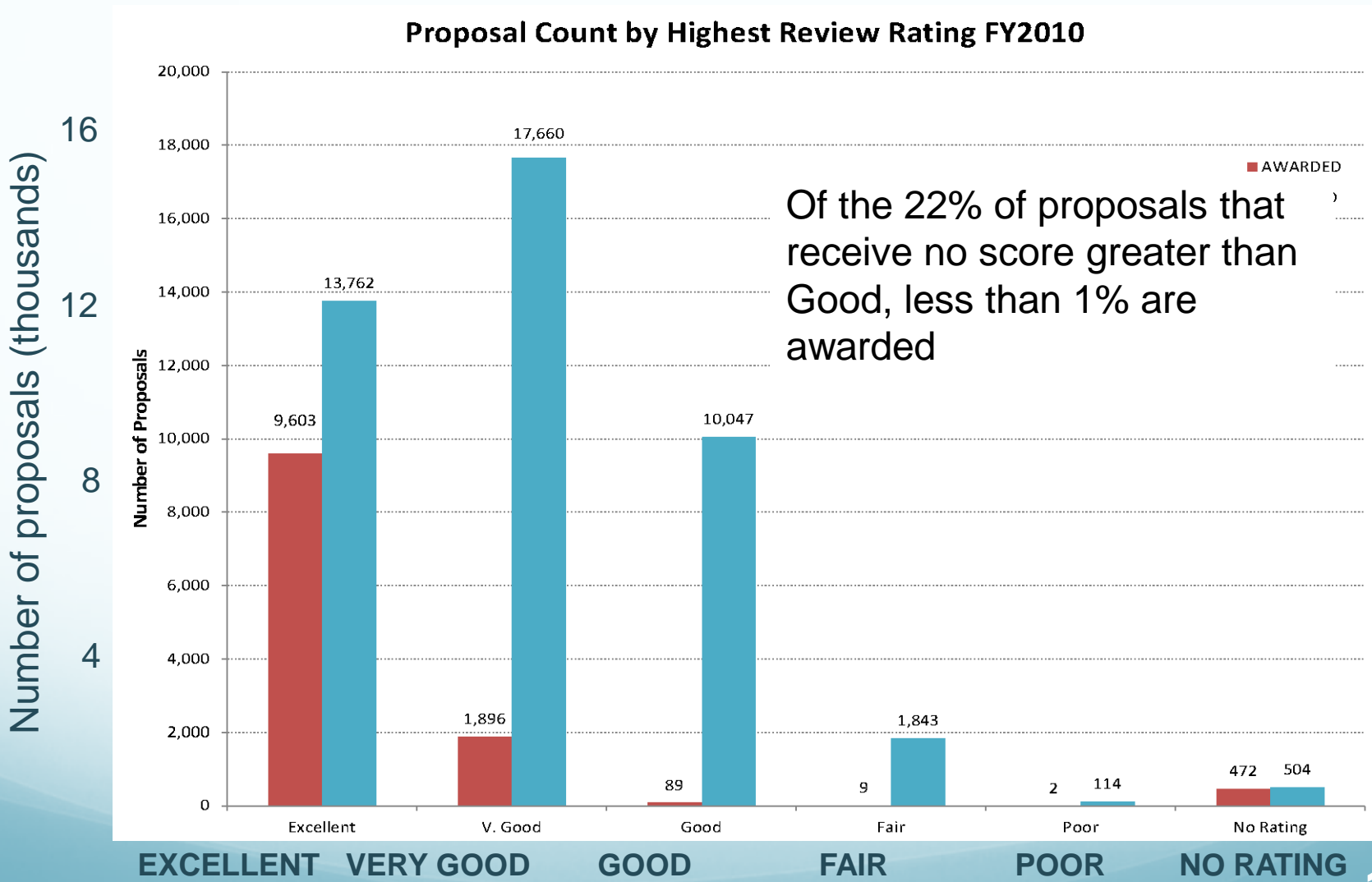
Trends in proposal numbers and review return 1998-2010



Trends in the use of ad hoc and panel review at NSF 1997-2010

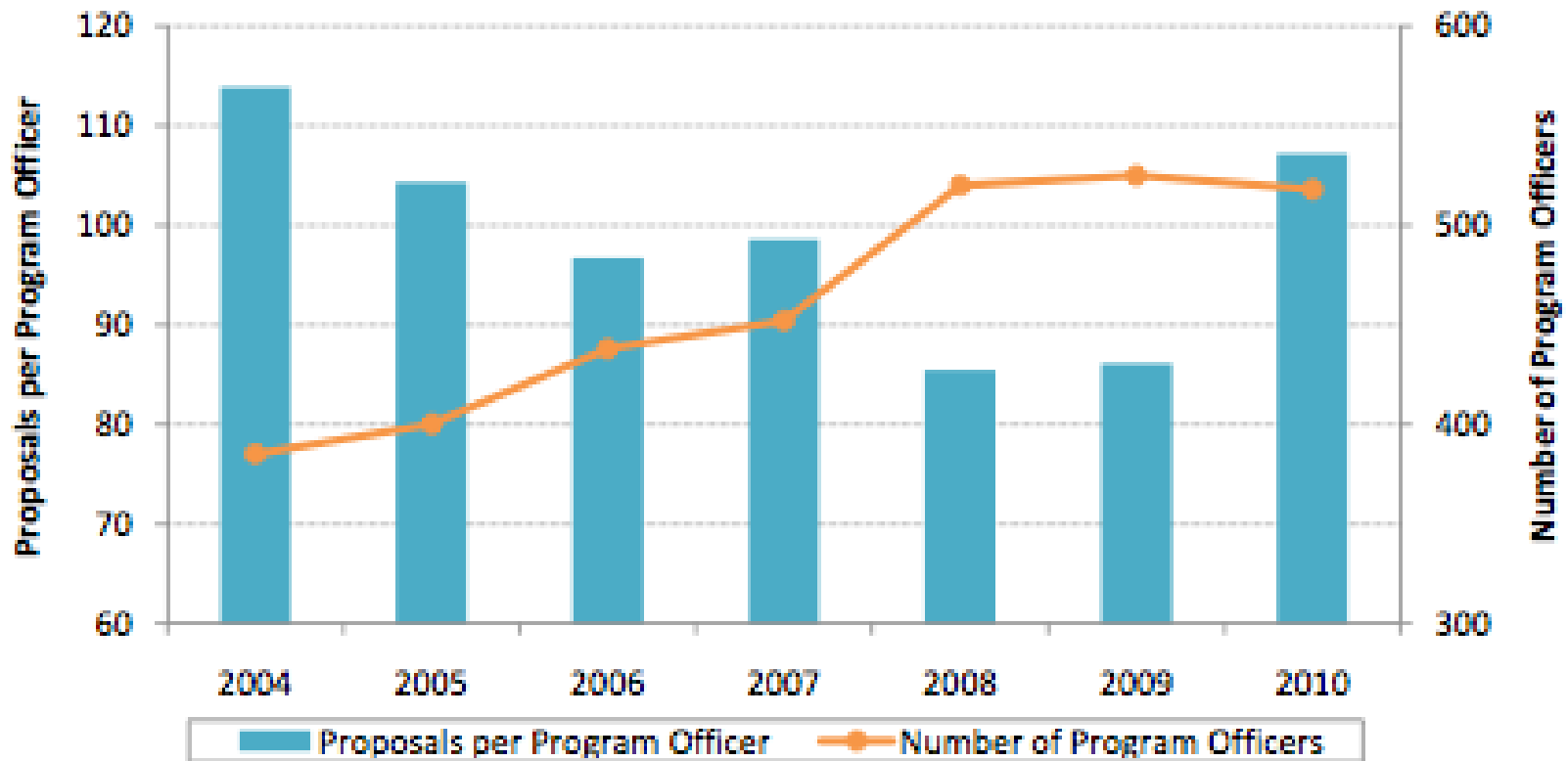


Distribution of awards and declines by highest score 2010



Program Officer Workload

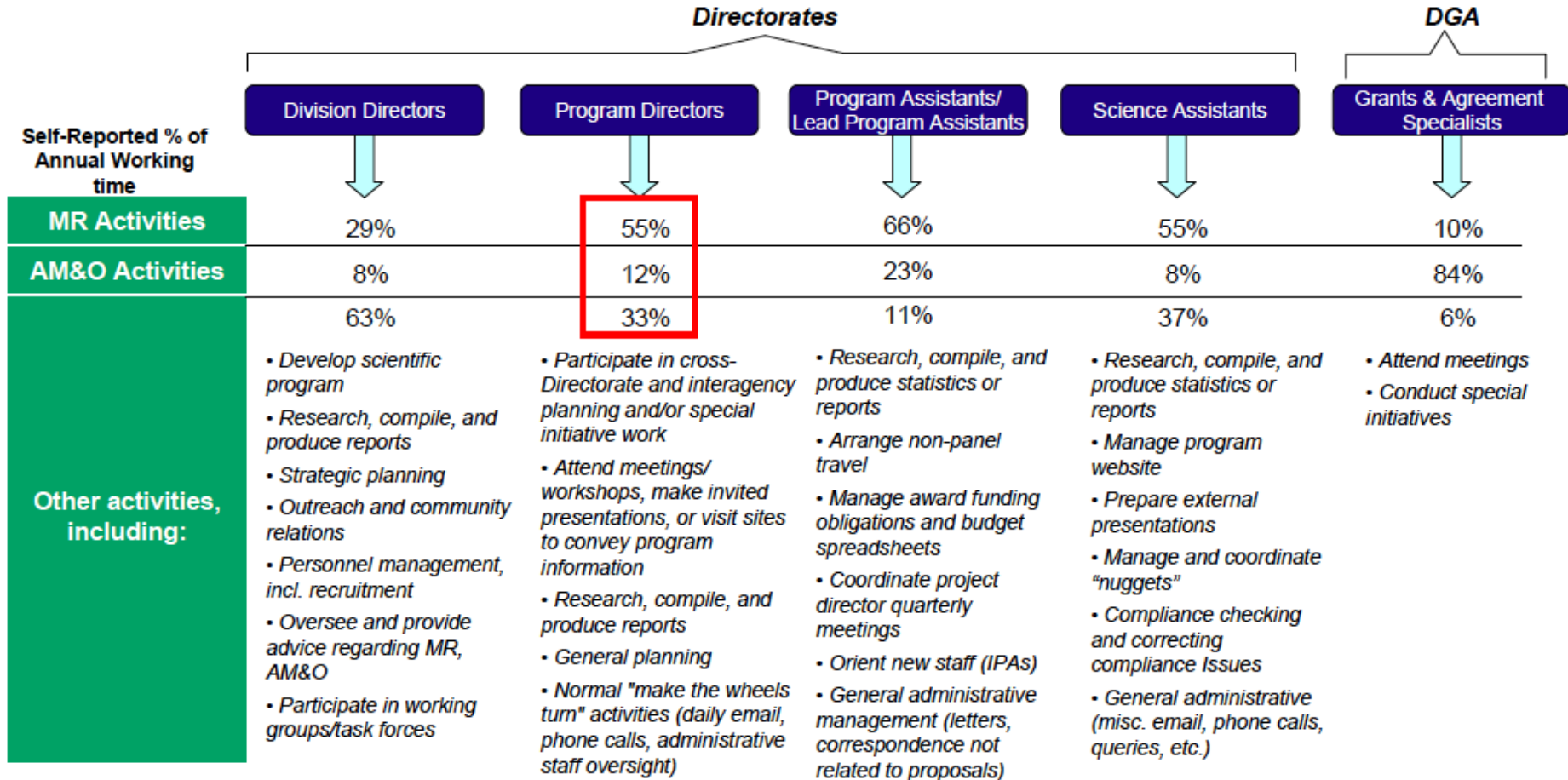
Proposals per Program Officer



Source: NSF Enterprise Information System 10/01/10.

Program Staff Workload (2003)

Of the staff that support MR and AM&O, the percentage of time that staff spent in each of these activities varies, with Program Directors spending 55 percent on MR and 12 percent on AM&O



Source: MR/AM&O Process Workload Analysis, March 14, 2003, Booz Allen Hamilton Analysis



Outreach activities

- **Ad hoc Advisory Committee for the Merit Review Process Working Group (MRP-AC)**
 - 12 members selected by Directorates from their ACs
 - 2 meetings so far
- **Other Advisory Committees**
 - AC-ERE, AC-GEO, CEOSE, AC-ENG, AC-CISE, AC-EHR, AC-MPS
 - (to come) AC-SBE, AC-B&O, AC-BIO
- **Review panels**
 - GEO, BIO (in person and virtual)
 - Yours?
- **Others**
 - Regional Grants Conference, NSF Day, Federal Demonstration Partnership and an EPSCoR workshop

Feedback from Advisory Committees

- PI response to review prior to decision
- Return of non-competitive proposals
- Wiki-based reviews
- Increased use of virtual panels
- Increased use of preliminary proposals
- Increased use of ad hoc reviews
- Double-blind review
- Prizes
- Shadow panels
- Increased use of Accomplishment-based renewals
- Limiting proposal submissions per PI
- Machine-based learning tools for proposal analysis

AC Feedback

- Enthusiastic that NSF is looking into these issues and possible solutions
- Focused on ideas that would have largest impacts on the research community
- Identified strengths and weaknesses of a variety of approaches. No easy solutions.
- Different groups identified different approaches as most and least promising

Inreach activities

- IdeaShare campaigns
 - Phase 1
 - Phase 2
- Town Hall meeting
- Sharepoint site: <http://sharepoint07.nsf.gov/sites/mrwg>
- Informal

IdeaShare & Town Hall

- NSF eBusiness improvements (e.g.: compliance checking built into FastLane; more comprehensive, searchable reviewer database) could result in significant time savings
- Social Science research should inform the review process
- Broaden the reviewer and PI pool
- Training of Program Officers and reviewers can be an important mitigating step for several of the possible pilot ideas
- Return non-competitive proposals after limited review
- Pro forma review analysis and decline letter for proposals with no scores above Very Good
- Increased use of virtual panels
- Expanded use of preliminary proposals

Merit Review Process Working Group Milestones

- **Preliminary Report (completed August 31, 2011)**
 - Background (motivation for assessment, current practices)
 - Statistics on merit review at NSF
 - Social Science research relevant to merit review
 - Past and current experiments with the merit review process
 - NSF eBusiness systems supporting the merit review process
 - Considerations for virtual panels
 - Plan for engaging stakeholders inside and outside NSF
 - Preliminary list and assessment of possible pilot activities
- **Interim Report (due December 31, 2011)**
 - Additional data analysis
 - Summary of stakeholder input (internal NSF, Advisory Committees, review panels)
 - Development of pilot activities
 - Evaluation framework
 - Initial recommendations
- **Final report (Due March 31, 2012)**
 - Description and evaluation of pilot activities undertaken
 - Updates to Preliminary and Interim assessments
 - Additional recommendations

From the Hearing on the Merit Review Process, July 2011

“In 1994, the National Academies touted [NSF’s merit review process] as being among ‘the best procedures known for insuring the technical excellence of research projects that receive public support,’ but the process has changed since then, and we need to make sure that is still the case.”

Mo Brooks (R-AL)

Chairman, House Subcommittee on
Research and Science Education

“I agree with the statements of all of the witnesses here today that NSF’s merit review system remains the gold standard for the world. At the same time, I recognize that there are challenges in any system for allocating limited research dollars. I agree with Chairman Brooks that it is our job, on this subcommittee, to hold hearings such as this one to discuss these challenges and collectively imagine how we might continue to make NSF, and the merit-review system that it manages, even stronger. Particularly in this tight budgetary environment, it is incumbent upon us all to make sure that the system for funding excellent science is as efficient and effective as possible.”

Dan Lipinski (D-IL)

Ranking member, House Subcommittee on
Research and Science Education

Examples of potential new experiments

- ***IT-BASED***
 - Increased use of virtual panels
 - Expanded use of ad hoc reviews
 - Machine-learning tool to flag potentially uncompetitive proposals
 - FastLane screening tool to ensure submitted proposals are compliant
 - Searchable database of reviewers
 - College of ad hoc reviewers
- ***PI/PO/REVIEW BASED***
 - PI response to reviews prior to decision
 - Wiki-based, asynchronous review panels
 - Shadow panels
 - Provision of PO comments
 - Accomplishment-based awards
 - Short-form proposals
 - Double-blind review
- ***WORKFLOW BASED***
 - Expanded use of preliminary proposals or LOIs
 - Return of non-competitive proposals based on PO review
 - Return of non-competitive proposals based on limited external review
 - Demand management
 - Eliminate proposal deadlines
 - Pro forma decline letter for proposals with no scores above Very Good
- ***OTHER***
 - *Prizes*

Examples of demand management

- Limiting the number of proposals submitted by a PI per year
- Requiring a waiting period after a string of declines.
- PIs more than 10 years past PhD may not submit more than a limited number of proposals per year.
- Limit resubmissions (e.g. to zero or one) or resubmission only by invitation.
- Encourage academic institutions to remove implicit or explicit policies requiring faculty to submit frequent proposals
- Encourage academic institutions to provide greater mentoring in proposal preparation (fewer, stronger proposals)
- Things to avoid:
 - **Reduction in innovation**
 - **Impediments to collaborative and/or interdisciplinary research**
 - **Disadvantaging young investigators, under-represented groups**

Questions for BOAC

- Any comments or suggestions on the approach to outreach to the organizations who submit proposals to the NSF and to the researchers who write them?
- What are the significant benefits and drawbacks of some of the suggestions for enhancements to NSF's merit review process?
- How might pilot activities be designed to test the impacts and resource requirements of the suggested enhancements to the merit review process?
- Any other input?

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Thank you

Trends

