

MERIT REVIEW PROCESS IMPROVEMENTS

Overview

The merit review process is one of NSF's critical business functions. Effective merit review recognizes high-quality research including high-risk, high-payoff or potentially transformative ideas, empowers NSF to support such proposals, and retains the confidence and trust of NSF's external stakeholders. NSF's current approach to merit review relies on NSF staff making funding recommendations advised by *ad hoc* (mail) reviews and face-to-face panels. This process is time-and resource-intensive.

NSF's merit-review programs face extraordinary pressures as proposal numbers grow. Competition for funding has increased significantly since 2000; the number of research proposals evaluated increased by 80 percent and funding rates dropped dramatically. Workload has increased for researchers, reviewers, and NSF staff. These systemic stresses may be prompting some researchers to submit fewer innovative ideas. The workload of panel reviewers and the travel time involved means that some experts are reluctant or unable to serve on review panels held at NSF. The growth in the number of review panels has led to a steady growth of 9 percent per year between FY 2007 and FY 2012 in NSF's travel-related obligations. In FY 2011, the direct cost to NSF of holding face-to-face panels, excluding salary, was over \$38.0 million. To mitigate some of the stresses on NSF's merit review system, a number of critical investments, described below, have been identified.

Total Funding for Merit Review Process Improvements

(Dollars in Millions)

FY 2012		
Enacted/		
FY 2012	Annualized	FY 2014
Actual	FY 2013 CR	Request
-	-	\$4.09

Goals

The goals of NSF's Merit Review Process Improvement activities are:

- Reduce the amount of staff time, per proposal, required to conduct merit review;
- Reduce the average time burden placed on individual reviewers;
- Increase the number of qualified individuals who participate in the review process;
- Reduce the per-proposal cost of the review process; and
- Improve the ability of institutions to submit successful proposals.

Approach

NSF looked at the merit review processes used by other research funding agencies; discussed the benefits and drawbacks of different possible approaches with researchers and university administrators on numerous NSF Advisory Committees; talked with reviewers; and consulted with the National Science Board (NSB). Based on this, significant improvements in workload and cost of could be achieved by focused investments in information and communications technology, personnel, increased use of automation, training, and outreach to institutions. In addition, the aging technologies that NSF uses to support its merit review processes constitutes a risk to one of NSF's critical lines of business. The principal components of this plan are separated into two phases, a first phase that can be pursued economically in FY 2014 and a second phase that will require a greater investment at a later date:

Phase 1

- Deployment of personnel and infrastructure to support use of virtual meeting technologies for panels;
- Outreach to individual institutions to help increase proposal success rates and reduce the submission of non-competitive proposals; and
- Assessment of impacts of improvements in merit review processes.

Phase 2

- Deployment of a more capable infrastructure to support the identification, selection, and recruitment of reviewers and to manage the receipt of reviews; and
- Increased use of automation in the preliminary processing of proposals.

The efforts to further improve NSF's merit review process are led by staff within the Office of International and Integrative Activities in collaboration with staff in the research directorates, the Office of Information and Resource Management, and the Office of Budget, Finance, and Award Management.

Use of Virtual Meeting Technologies for Merit Review

The predominant review method used has become the review panel, convened at NSF, where a set of experts assemble to evaluate proposals. The travel costs associated with review panels are an increasing budget burden. Recently, NSF has experimented with using virtual meeting technologies to hold synchronous virtual review panels including teleconferences, commercial video-conferencing technologies, and "virtual world" software. This investment expands NSF's use of virtual review panels and will restrain the growth in panel costs, broaden the range of reviewers participating in panels, and reduce the average workload of individual reviewers. The investment includes:

- Infrastructure to enable NSF to conduct a significant fraction of review panels as virtual panels;
- Development of online training for moderators and reviewers; and
- Collection of feedback from participants to continually improve the efficacy of virtual panels.

Demand Management

The rate at which submitted proposals to NSF are funded varies widely between institutions and by a factor of three among the top 100 institutions. Reducing this variation would improve the workloads of researchers submitting proposals, of reviewers, and of NSF staff. NSF plans a program of enhanced outreach that is tailored to individual institutions. The outreach will include:

- A discussion of statistics describing the institution's proposal submission rate, success rate, and participation in the merit review process; a comparison to other institutions; and an exploration of possible reasons for anomalies;
- A discussion of the institution's policies on proposal submission and impacts on proposers and reviewers; and
- Assistance in the design of mentoring programs for the faculty on proposal preparation and review.

The outreach will propagate best practices; encourage networking between institutions; and improve flow of ideas between NSF and the research community. The potential return on investment for NSF is significant; even a 1 percent reduction in overall proposal pressure corresponds to a reduction in staff workload that is similar to adding five or six new staff members. Reductions in the number of proposals that institutions must submit to support their faculty members' research programs benefits both their faculty and staff.

Assessments of Impacts of Merit Review Pilot Activities

In FY 2013 - 2014, NSF staff will undertake pilot activities to test achieving further efficiencies. NSF will engage an external party to conduct surveys of NSF reviewers; investigators and panel moderators to assess workload; the impacts of the technologies used; and the quality of feedback provided to proposers.

Merit Review Process Improvements

These will be used to assess the impacts of the pilot activities to be included in NSF's report to the NSB on the merit review process.

Technological Support for the Management of Reviewers and Reviews

This future investment aims to reduce the NSF staff time used in identifying potential reviewers and communicating with reviewers, and to improve the return rate for *ad hoc* reviews. It involves the following set of enhancements to NSF's eBusiness:

- Replace outdated and expensive client-server technology with modern, web-based technology;
- Develop and deploy a more sophisticated database of reviewers with enhanced search features;
- Enhance Research.gov so that researchers and other experts can volunteer online to serve as reviewers;
- Enhance tools to identify possible reviewers to include automatic suggestions of potential reviewers based on matching key criteria such as proposal topics, reviewer expertise, and review history;
- Deploy an automated tool that flags potential conflicts of interest; and
- Add an eBusiness system module that tracks review requests and responses, and that automatically sends reminders about outstanding requests to reviewers and NSF staff.

Increased Automation of the Preliminary Processing of Proposals

Although NSF's current online submission system performs some automatic checks of the structure and content of submitted proposals, many of the proposal preparation requirements are not automatically checked. NSF staff manually checks proposals for compliance, detracting from the time available for other parts of the merit review process. In the future, NSF will ameliorate this situation by deploying an enhanced automated compliance checker based on a relatively general rules engine. This will involve:

- Revision of proposal preparation criteria to simplify implementation as business rules in an automated, rule-based compliance checking system;
- Enhancements to FastLane to check for compliance with high-value business rules;
- Requirements definition, development, testing, and initial deployment of the expanded compliance checking functionality in the online proposal submission system; and
- Ongoing maintenance of the expanded compliance checking system.

Investment Framework

Merit Review Process Improvements Funding Estimates (Dollars in Millions)

Activity	FY 2012		
	FY 2012 Actual	Enacted/ Annualized FY 2013 CR	FY 2014 Request
Virtual Meeting Technologies	-	-	\$3.79
Impact Assessment	-	-	0.30
Total	-	-	\$4.09

Totals may not add due to rounding.

Demand Management-related activities, primarily staff costs and travel, are funded by the Agency Operations and Award Management (AOAM) account. For information on associated staffing and travel costs, see the AOAM chapter.

FY 2012 – FY 2013

Use of Virtual Meeting Technologies for Merit Review

In FY 2012 NSF initiated an assessment of several technological and organizational approaches to virtual meetings and began developing training modules for NSF staff and reviewers. In FY 2013 NSF will: conduct a pilot activity with a goal of at least 5 percent of review panels being wholly virtual; conduct a smaller scale pilot activity using asynchronous virtual panel technology; develop online training tools; and assess the impacts of the use of virtual panels. The FY 2013 investment includes a modest scale-up of NSF's network infrastructure, enhanced desktop equipment, and cloud-based virtual meeting services.

Demand management

In FY 2013, a pilot activity with outreach to ten institutions will be conducted using existing staff.

Assessments of Impacts of Merit Review Pilot Activities

In FY 2013, a baseline survey of reviewers, investigators, and panel moderators will be conducted.

Increased automation of the preliminary processing of proposals

Using existing staff resources in FY 2013, NSF will revise its proposal preparation criteria to simplify implementation in an automated rule-based compliance checking system; enhance FastLane to implement additional high priority business rules; and begin planning for a more robust business rules system.

FY 2014 Request

Use of virtual meeting technologies for merit review

Use of virtual panels at scale with at least 15 percent of review panels being virtual panels. The funds requested will support spending on infrastructure (including cloud services) and contract services to provide user support to NSF staff and reviewers. A more functional, semi-automated system will be created to support asynchronous virtual panels. The activities supported by FY 2014 funding include the continued scale up of NSF's in-house network infrastructure, conference room upgrades, enhanced desktop equipment, and cloud-based virtual meeting services.

Demand Management

Undertake a program of targeted outreach to approximately 100 different institutions per year.

Assessments of Impacts of Merit Review Pilot Activities

In FY 2014, a follow-on survey of reviewers, investigators, and panel moderators will be conducted.

FY 2015 and Beyond

Use of virtual meeting technologies for merit review

Support for virtual panels will continue with a target that at least 25 percent of panels are virtual.

Demand management

Continue a program of targeted outreach to approximately 100 different institutions per year.

Assessments of Impacts of Merit Review Pilot Activities

In FY 2015, a follow-on survey of reviewers, investigators, and panel moderators will be conducted.

Merit Review Process Improvements

Technological support for the management of reviewers and reviews

In FY 2015, begin requirements definition, development, testing, and initial deployment of a modernization of NSF eBusiness systems to support streamlined management of the review process. In FY 2016 - FY 2017, complete deployment of the modifications to NSF eBusiness systems.

Increased automation of the preliminary processing of proposals

In FY 2015, begin requirements definition, development and initial testing of an automated proposal compliance checking system with an estimated FY 2016 deployment.

Evaluation Framework

Use of virtual meeting technologies for merit review

NSF will track the number, size, duration and cost of virtual panels. It will compare per-proposal review costs of virtual and in-person panels, and collect feedback from virtual panel participants and moderators. This feedback will be discussed with Advisory Committees. NSF will make agency-wide statistical comparisons of merit review indicators for virtual and in-person panels, including statistics on the success rates of demographic groups of investigators and the various classes of proposing institutions. NSF will examine trends in the number of individual panelists used and their average workload.

Demand management

NSF will solicit feedback from institutions visited and will examine the rate of submissions and proposal funding in years following outreach and compare with baseline data.

Assessments of Impacts of Merit Review Pilot Activities

Surveys will be used to assess the impacts of Merit Review pilot activities undertaken by NSF.

Technological support for the management of reviewers and reviews

NSF will collect data on the staff time spent identifying, selecting, recruiting, and obtaining reviews from reviewers. Pre- and post-deployment data will be compared.

Increased automation of the preliminary processing of proposals

NSF will collect feedback from NSF staff on early prototypes and after the initial deployment. Feedback from submitting institutions will be collected during a pilot deployment. The feedback will be used as input to the final stages of development and deployment, and help determine efficacy and accuracy.