



**Statement of Dr. José-Marie Griffiths  
Chairman, Subcommittee on Facilities  
Committee on Strategy and Budget  
National Science Board  
to the  
Subcommittee on Research and Science Education  
Committee on Science, Space and Technology  
United States House of Representatives  
on**

**NSF Major Research Equipment and Facilities Management:  
Ensuring Fiscal Responsibility and Accountability  
March 8, 2012  
10:00 a.m.**

Chairman Brooks, Ranking Member Lipinski, and Members of the Subcommittee, I appreciate the opportunity to testify before you today regarding the role of the National Science Board in guidance and oversight of facility investments at the National Science Foundation (NSF). I am José-Marie Griffiths, a member of the National Science Board (Board), and Chairman of the Subcommittee on Facilities (SCF). I am also Vice President for Academic Affairs and University Professor at Bryant University in Smithfield, Rhode Island. In 2006, I was nominated to the Board by President Bush and confirmed by the Senate.

In my experience on the Board during these past six years, I have been consistently impressed with the quality of research supported, the long reach of NSF activities, and by the dedication and expertise of the agency's staff. In addition, the working relationship that has developed between the Board and NSF management during this time has been especially rewarding. This collaborative relationship has served the Nation well.

## **Introduction**

On behalf of the entire Board, I would like to thank the Members of this Subcommittee for your long-standing commitment to the NSF and its investments in a broad portfolio of research and education in science, technology, engineering, and mathematics (STEM). NSF is the primary funding source for academic basic research across non-biomedical science and engineering (S&E) disciplines. NSF funds cutting-edge research at the frontiers of knowledge, and also supports scientific facilities and activities in STEM education. Over its history, NSF's broad portfolio of investments has underwritten a wealth of research that has directly and indirectly benefitted the American economy and the general public.

When Congress established NSF in 1950, it defined dual responsibilities for the National Science Board. First, the Board was to oversee the activities of, and establish the policies for, the National Science Foundation. Second, the Board was to serve as an advisory body to the President and Congress on national policy issues related to science and engineering and education in science and engineering. For today's testimony, I'd like to focus on our first responsibility, that of oversight of NSF, and more specifically, the Board's role in management of the facilities portfolio.

Leading-edge research infrastructure, including facilities and instrumentation, is essential to researchers working at the frontier of science and engineering, and is critical to maintaining U.S. leadership in science and engineering. Entire fields of research now depend upon access to new generations of research facilities, most of which are large and complex with a significant information technology component.

## **Board MREFC Review**

The Board's oversight of the Major Research Equipment and Facilities Construction (MREFC) account involves approval of NSF-proposed projects for inclusion in future budget requests to Congress, approval of the funding priority list for previously approved MREFC projects that have not yet been funded by Congress, and approval for release of congressionally-appropriated MREFC funds to an NSF awardee. Each of the three projects that are testifying with us today,

the Ocean Observatories Initiative, the National Ecological Observatory Network, and IceCube all received Board scrutiny and approval.

MREFC projects are high profile, high cost activities that are unique, meaning that they require considerable research and development in the design stage. In my time on the Board, the agency has made great strides in overseeing both the design and construction of these critical facilities. Since these types of projects often require significant taxpayer funds, the Board and the Foundation invest substantial efforts to review scientific needs, construction costs, and operations and maintenance costs in the MREFC process.

While construction of major facilities is supported through NSF's MREFC appropriations account, NSF funds the pre-construction design and operational activities predominantly from its Research and Related Activities account (R&RA). Pre-construction planning and design phases for developing MREFC projects usually require significant levels of funding from the R&RA account. This R&RA commitment helps to ensure community involvement in and support for the proposed facility.

As part of congressional guidance to NSF to strengthen its management of facility activities, in 2002 Congress requested Board oversight for the MREFC appropriations account. NSF was also instructed to limit its use of the MREFC account to the acquisition, construction, and commissioning of large scale research facilities. Planning, design, operations, and maintenance costs were to be funded from the R&RA appropriations account.

Subsequent reports from the National Academy of Sciences and the National Science Board in 2004 and 2005 respectively provided guidance to NSF on prioritization of facility projects after Congress became concerned about a backlog of Board-approved MREFC projects that had not received funding. The Board's report in particular committed NSF and the Board to specific criteria for approving and prioritizing large facility projects.

Additional policies for funding MREFC projects were approved by the Board in 2005. Those policies specify that the Board is to concur on the readiness of projects to proceed to the final design phase. As a matter of practice, the Board had often been provided with information on the status of candidate MREFC projects during their planning and pre-construction design phase. The most recent enhancement to this policy is the timeline for the Board's MREFC Process, which was approved by the Board in February 2010. As the part of this timeline, the Board now receives this information in association with its annual facilities portfolio review.

Also feeding into the current oversight process was a 2008 Board report to Congress required by the 2007 America COMPETES Act. COMPETES directed the Board to evaluate the appropriateness of NSF's policies for preconstruction funding and maintenance and operations costs for major research equipment and facilities. The report concluded that the Board should be more formally engaged in reviewing all post initial proposal stages for MREFC projects.

### **Overview of Board Involvement in Facilities**

Board oversight of facilities supported by NSF continues to evolve. For individual projects that will be funded through the MREFC, Board review and approval is mandated by statute. The Board's Committee on Program and Plans (CPP) has jurisdiction over these individual project awards. In order to ensure balance across the Foundation, the Board has recently instituted an annual facilities portfolio review which is conducted each May. This function, which reviews both MREFC projects and smaller multi-user facilities, is part of the responsibilities of the Committee on Strategy and Budget's Subcommittee on Facilities (SCF).

When considering a facility project for approval, the Board reviews the need for such a facility, the research that will be enabled, the readiness of plans for construction and operation, construction budget estimates, and operations budget estimates. Prior to formal Board consideration, however, NSF supports substantial planning efforts by the scientific community. These potential facilities are often subject to years of research and development planning and preparation before they are ready for inclusion in a funding request to Congress.

## **Outline of NSF Process for MREFC**

For MREFC projects, NSF designates four project evolution phases of this planning and preparation: (1) conceptual design, (2) preliminary design, (3) final design (readiness), and (4) construction. As previously mentioned, Board involvement in each of these phases has evolved over the past several years. It now includes approval of each individual project at the final design phase and reviewing the facilities portfolio as a whole.

The conceptual design phase involves the formulation of science questions, defining requirements, and identifying enabling technologies and high risk factors. During the conceptual design phase, NSF may award funds to academic institutions to organize one or more workshops to solicit essential input from the user community and other stakeholders. Top down cost, contingency, and risk analyses are included in this phase, which concludes with an initial proposal submission to NSF.

Budgeting for contingency includes planning, risk identification, analysis, response planning and monitoring and control of project resources, including contingency funds. Currently, NSF senior management and the agency's Office of the Inspector General are working closely on resolving differing interpretations of contingency cost standards. The Board, through its Audit and Oversight Committee, receives updates on these negotiations at each meeting and we are pleased with the progress made to date.

The subsequent phases for MREFC projects, preliminary design, final design, and construction, also involve NSF awards for the preparation of the more detailed designs. Multiple design awards may be made, particularly in the preliminary design phase, so that competing approaches can be evaluated through NSF's Merit Review process. After NSF has identified projects that warrant progression from the preliminary design phase to the final design phase, the Board approves the project before it is included in a future budget request. This is done initially by CPP and then the full Board in the late spring of each year. The Board's Committee on Strategy and Budget (CSB) then meets in the summer to review and approve NSF's budget submission to OMB. This submission also requires full Board approval.

### **Board oversight of Facilities and Research Infrastructure**

Another concern identified in the Board's 2008 report to Congress was the growing cost of operations and maintenance (O&M) of existing and planned major-user research facilities. The issue was that the rising O&M costs, if not carefully managed, could eventually crowd out investments in core research activities, especially in those disciplines where facility funding was dominant.

As a result of these findings, the Board established the Subcommittee on Facilities in February 2009 to oversee the Foundation's portfolio of facilities projects. This Subcommittee provides guidance to the Board on strategic planning for the NSF funded research equipment and facilities portfolio. The subcommittee's activities include an annual review of existing MREFC and R&RA large and mid-size research facilities and infrastructure, and their impact on long-term budgets within the Foundation.

The SCF reviews all phases of a facility – design, development, construction, operations, and retirement. As part of its review of facilities, the Board conducts a joint meeting of CPP/CSB in February to hear details of the NSF Facilities Plan for projects anticipated in the next year. The plan, an overview of the portfolio of NSF large multi-user facilities across all life-cycle stages, contains information about the planning and budgeting process for facilities under construction and planning and a brief status reports on the projects in construction funded through MREFC account. This year's Plan included information about the portfolio of operating facilities: Divisional considerations for balancing investments and research with operating support for infrastructure, interrelationships among the portfolio of facilities, life-cycle considerations, and sunseting provisions.

After the Facility Plan discussion, the Board conducts an annual portfolio review of projects at its May meeting. The objectives of this review are to examine the interrelationships between the proposed facility development and other activities across the Foundation to help guide the appropriate balance of investment in infrastructure and research. The review also examines the

budgetary consequences, operations costs and future liabilities of further development, and guides NSF in managing risk and being able to respond to opportunities. It also can guide policies and recommend specific action for the coordination and optimization of partnerships between NSF and other agencies, private foundations, and foreign entities.

An important aspect of this review involves recompetition of facilities. In 2008, the Board endorsed the principle that all expiring awards are to be recompeted. For major facility awards, the Board concluded that after construction is completed and an appropriate time period is implemented to bring the facility to sustainable operations, full and open competition of the operations award will be required. NSF is working to implement this policy through its Business and Operations Advisory Committee and continues to update the Board on the progress.

### **Closing Remarks**

NSF's major multi-user facilities and its MREFC program are integral to the NSF investment portfolio, enabling access to and construction of facilities to perform research on new frontiers. Selecting the best projects, providing adequate program management, as well as oversight for the operations of such facilities, are all substantial challenges. However, an equally important challenge is that by supporting these essential facilities we not sacrifice our ability also to provide adequate support for the individual researcher proposals that for potentially transformative research.

On behalf of the National Science Board and the S&E research and education communities, I would like to thank the Members of the Subcommittee for your long-term recognition of and commitment to support for the National Science Foundation. We look forward to continuing our productive working relationship with you in service to the Nation.