

**Comments on the Report of the NSF Ad-Hoc
Subcommittee on Funding and Governance of
Future Major Multi-user Facilities**

**Presented to the
NSF B&O Advisory Committee**

**by
Thomas B.W. Kirk
Chair of the Ad hoc Subcommittee**

**Arlington, Virginia
May 17, 2011**

Ad-Hoc Subcommittee Genesis and Charge

- **NSF formed an internal NSF Organizing Committee in early 2010 to discuss the need for a B&O Subcommittee to investigate the title topic, to develop a Charge, and, later after acceptance by the B&O co-chairs, to recruit appropriate Subcommittee members during Summer 2010**
- **The need for the Subcommittee was discussed by the NSF B&O Advisory Committee at their May 2010 Meeting and it was decided to proceed with an ad-hoc Subcommittee chaired by former B&O Advisory Committee Co-Chair, Tom Kirk, and to use the NSF developed Charge for its direction**
- **NSF organized an open meeting on October 20, 21, 2010, during which the Subcommittee could interact with key members of the international scientific and science administrator communities, soliciting and discussing with them the issues that would pertain to the NSF Subcommittee Charge; 35 invitees attended the meeting and submitted written comments to document their oral remarks during the meeting**
- **The Subcommittee met in person on October 22, 2010 and later by email and telephone; the resulting report was submitted on March 17, 2011**

Ad-Hoc Subcommittee Membership

Dr. Howard Gordon – U.S. ATLAS Deputy Program Manager and Deputy Chair of the Brookhaven National Laboratory Physics Department, Brookhaven National Laboratory, Upton NY

Dr. Thomas R. Janecek – Program Director, Ocean Drilling Program, Division of Ocean Sciences, National Science Foundation, Arlington VA

Dr. Thomas B.W. Kirk (Subcommittee Chair) - Retired Associate Laboratory Director of High Energy and Nuclear Physics, Brookhaven National Laboratory, Upton NY and former Co-Chair of the NSF Business and Operations Advisory Committee

Dr. Paul Mantsch – Project Manager, Pierre Auger Observatory and Neutrino Detector subsystem manager, Long Baseline Neutrino Experiment, Fermi National Accelerator Laboratory, Batavia IL

Dr. Annick Pouquet – Director of the Geophysical Turbulence Program, National Center for Atmospheric Research, Boulder CO

Dr. Philip R. Schwartz - Distinguished Scientist, The Aerospace Corporation, Chantilly VA

NSF Organizing Committee Membership

Dr. Rodey Batiza - Section Head, Ocean Sciences Division, Arlington, VA

Dr. Mark W. Coles - Deputy Director for Large Facilities, Office of Budget, Finance and Award Management, Arlington, VA

Dr. Joseph L. Dehmer - Division Director, Physics Division, Arlington, VA

Dr. William L. Miller – Senior Analyst, Office of Budget, Finance and Award Management, Arlington, VA

Dr. Philip J. Puxley – Program Manager, Astronomical Sciences Division, Arlington, VA

Dr. Jean-Rene Roy – Large Facilities Officer, Office of Budget, Finance and Award Management, Arlington, VA

Subcommittee Charge

Specific Questions to the Subcommittee (*Italics* here are mine):

Question 1) Are current NSF funding mechanisms - and the sequence of agency-specific approval activities for planning, construction, and operation - *optimal* for facilitating the participation of US scientists in large-scale international projects in which there is no single dominant entity?

- a. This should be considered within the context of identified future projects that may, or may not be built, and that would likely involve both other federal agencies, international partners, and perhaps private foundations, and NSF's need to preserve a vibrant base program of funding to individual researchers.
- b. For example, *does the separate R&RA funding for planning, and prioritization for funding, hamper partnerships or create a disadvantage for US researchers or hamper the ability to establish, synchronize, and maintain funding partnerships during the early design and development phase?* If so, what alternatives might be recommended?

Subcommittee Charge

Specific Questions to the Subcommittee (Cont.):

Question 2) What are *lessons learned* from governance of other large-scale international initiatives that should inform NSF in negotiating the business framework for future activities?

- a. The framework should protect NSF's interests, including its ability to oversee NSF-funded activity and take remedial action when necessary, while being equitable to other partners, and provide the greatest return to US science based on NSF investment.
- b. Citing examples from prior undertakings, what *recommendations* can the subcommittee offer, recognizing that international partners on a particular project may have much different processes for funding projects and dealing with cost over-runs, schedule delays, and so forth? (The subcommittee should account for NSF's unique policy of funding an awardee institution that is responsible for accomplishing the project - this may not correspond identically to the roles and responsibilities of prospective partners.)

Activities of the Subcommittee

A Meeting With Invited Science Community Participants

- a large group of interested science-connected persons was invited
- the meeting was open to additional persons who asked to attend
- 35 outside participants attended the meeting (some from intl. orgs.) as well as numerous NSF staff and note takers; written comments were accepted for two more weeks from interested parties
- there were no prepared presentations; the meeting comprised oral discussions among the assembled attendees
- participants were encouraged to submit brief written statements reprising their oral comments (for later clarity about the content)

An Executive Meeting with NSF Officers

- transpired the day after the big meeting with participants
- agreed on the schedule for report submission in 'a few weeks'

Report Writing

- all Subcommittee members participate in producing the report

Report Submission to NSF Business & Operations Advisory Committee

- this Report was submitted March 17, 2011 for the May 2011 B&O Meeting
- the Subcommittee goal is this report *accepted and endorsed to NSF*

Participant Meeting Discussion Topics

The Meeting followed five Discussion Topics in time order:

- **Selection and Prioritization of Projects**
- **Funding Mechanisms and Pathways**
- **Planning and Implementing Partnerships**
- **Infrastructure Management and Governance Models**
- **Other Issues / Challenges to Partnership**
 1. International Traffic in Arms Regulations (ITAR)
 2. across-NSF (MREFC-like) funding for Preliminary Design Phase*
 3. Science Board involvement in MREFC program planning*
 4. Early NSF Statement of Intent on MREFC Projects (subj. to Gateways)*
 5. Open Access to Data – how soon; raw or reduced data?
 6. Large-scale, cross-discipline science projects

* These topics captured in other discussion sections of this report

Participant Meeting Discussion Topics

Selection and Prioritization of Projects – Some key points raised

- Dep. NSF Director, Dr. Cora Marrett – MREFC Projects come up from Asst. Dirs. to Office of the Director; NSF Science Board has a new Subcommittee on priorities within NSF and their potential role in program evolution
- Important role for U.S. Academy of Science [eg. Hubble Telescope]; HEPAP and other DOE advisory Committees; Decadal Survey for Astronomy; DOE's 20 Year Facilities Plan; Office of Science & Technology Policy (OSTP) role for long term scientific program evolution and its community support

Resulting Recommendation:

R1: *“The Subcommittee recommends that the National Science Board, as the highest governance body of the NSF, be made an integral part of the NSF process for prioritizing, selecting and supporting large facility projects in the NSF portfolio, both domestic and international.”*

Comment: The Subcommittee was informed that the Science Board is exploring the same issue and we felt it was important to join and reinforce this direction for the overall benefit of NSF's program coherence

Participant Meeting Discussion Topics

Funding Mechanisms and Pathways – Some key points raised

- Pre-project engineering and final engineering design stages are critical to good project cost and schedule estimation and these would benefit from a cross-agency cost support system (similar to the MREFC concept) rather than the present division-provided R&RA funding base
- Life cycle planning for large projects, including decommissioning and closeout costs and issues, need to be added to NSF's existing and effective pre-project, construction and operations analysis and cost estimation procedures

Resulting Recommendations:

R2: *“The Subcommittee recommends that NSF develop a cross-agency funding source, similar to the MREFC concept, to cover the very significant costs encountered in carrying out the Preliminary and Final Design phases of a contemplated MREFC class large facility project.”*

Comment: The NSF has for a long time supported pre-project design engineering using *division based R&RA funding* (for some good policy reasons); we felt that a gain in better cost and schedule estimates prior to a decision to construct was possible with *cross-agency funding* and such a funding mechanism would mitigate the distorting effects on divisional R&RA budgets of the current system.

Participant Meeting Discussion Topics

Resulting Recommendations (Cont.)

R3: *“The Subcommittee recommends that NSF evolve towards a project planning system in which decommissioning and closing costs for large facilities, in which NSF is an operations partner, are considered along with project planning steps that NSF already considers for the construction and operations phases of such facilities.”*

Comment: NSF has already implemented, for many years, rigorous and effective requirements for analysis of the pre-construction and construction period cost estimates prior to the approval and start of an MREFC construction project. In recent years, estimates of facility operating costs have also been added to the MREFC requirements. The Subcommittee feels that the addition of estimates for decommissioning and closing costs will further improve the NSF management of the MREFC program and provide effective ways of forecasting future obligations and costs for closing an operating facility.

Participant Meeting Discussion Topics

Planning and Implementing Partnerships – Some key points raised

- need for NSF Statements of Intent after successful completion of a CDR; (with appropriate qualifications that the project continue to perform successfully)
- the importance of informing potential partner agencies early in the process

Resulting Recommendations:

R4: *“The Subcommittee recommends that NSF publicly release a qualified Statement of Intent to support the scientific goals, the anticipated project partnership and the technical development of large new international science projects after successful completion of the Conceptual Design in order to facilitate the formation of the partnership, and provided the agency plans to continue with the next step leading to construction.”*

Comment: The NSF has followed a policy of not formally declaring support for MREFC projects until they have become approved construction projects. This has left MREFC projects during their conceptual and engineering phases with the uncertain status of supported but not officially approved projects. This, in turn, has undercut the process of forming collaborations (especially international ones). The recommendation for a *Statement of Intent* early on will improve the process of forming partnerships with other potential supporters, domestic and international.

Participant Meeting Discussion Topics

Resulting Recommendations (Cont.):

R5: *“The Subcommittee recommends that early contact with government officials responsible for science policy, project priority and project funding, both domestic and international, be established by science agency program managers and project proponents as soon as a contemplated new facility project successfully passes the Conceptual Design review stage.”*

Comment: All of the participants from international science agencies and ministries emphasized the importance, during the open meeting, *of being informed as early as possible* (preferably in the conceptual stage) of new project concepts and their standing in national road mapping and prioritization activities. Such early notification will greatly abet cooperation in the planning of the largest facilities, especially those that will be unique in their field and that will likely require a multi-national construction effort. The Subcommittee agreed with this sentiment and supports it with its recommendation.

Participant Meeting Discussion Topics

Infrastructure Management and Governance Models

- Advocates were heard for joint governance by partners of comparable size and investments
- Advocates were heard for a strong central managing partner independent of the nature of the overall collaborating partners (once the scope and schedule are set)
- NSF's J. Dehmer outlined the Cooperative Stewardship Model of DUSEL
- Collaboration by accretion was noted as an alternative to fixed partners from the start
- this discussion comprised a useful 'lessons learned' venue in the meeting

Resulting Recommendation:

(No specific recommendations were made in this topical area)

Participant Meeting Discussion Topics

Other Issues / Challenges to Partnership

1. Large-scale, cross-discipline science projects
2. International Traffic in Arms Regulations (ITAR)
3. Open data policy and minority partner participation

Resulting Recommendation:

R6: *“NSF and other US agencies, in concert with international consortia as the need may arise, are urged to consider the sponsorship and funding of large, multi-disciplinary science campaigns over long periods of time. Such cross-discipline projects would be comparable to traditional MREFC projects in single fields of science.”*

Comment: The new type of multi-science project infrastructure discussed by the Subcommittee is not novel in its aspect of organizing scientific effort across disciplines, but the large (and likely international) scale suggested here is a new level of application of the cross-discipline concept. In the new kind of project, the key transformational aspect for the science would be its potential for particularly productive advances resulting from the long-term and cross-disciplinary nature of the collaborative scientific projects undertaken. Climate research is an example of the type of global-scale research that could offer a productive scientific focus.

Request to the B&O Advisory Committee

The Subcommittee members have unanimously concurred in the contents of the report submitted to the full B&O Committee.

We request that the full Committee receive and endorse the report to NSF management

We further ask the full Committee to request that the report be made available for public distribution if it is accepted and endorsed

Questions?