**EHR Response to the Committee of Visitors Report for the**
**Advanced Technological Education (ATE) Program**

**December 2015**

I. **Questions about the quality and effectiveness of the program's use of merit review process.**

   1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?
   2. Are both merit review criteria addressed
      a. In individual reviews?
      b. In panel summaries?
      c. In Program Officer review analyses?

COV Recommendations:

Although both merit review criteria were addressed, comments were longer for those that were awarded. Additional details are needed to enable improvements in declined proposals. Grant writers of declined proposals should, furthermore, be encouraged to re-submit future grant proposals based on documentation provided by NSF on areas for improvement.

ATE staffing is down by at least five members due to recent retirements. Although the hiring process is in effect, this affects the quality of what can be done and how quickly it can be done in the program. Swift remediation of this problem is highly recommended.

EHR Response, December 2015:

Both before and during panel meetings, program staff will continue to stress to reviewers the importance of providing substantive, high-quality feedback to PIs and will provide appropriate guidance and time during the review process. We have posted mock panel reviews for both awards and declines on the panel meeting website, and we have stressed in the pre-panel webinars the importance of providing substantive comments that will enable a PI to prepare an improved, revised proposal.

In some cases, program officers decide not to encourage the revision of a proposal, especially when the basic idea does not fit well with the aims of the ATE program. When program officers want to encourage a revised proposal, they do so in the PO Comment, which PIs can view in FastLane along with the panel summary and individual reviews of the proposal. In the PO Comment, program officers also often call attention to the most significant weaknesses that reviewers identified in the proposal, as well as other issues that ought to be considered if the PI revises the proposal. However, it is also true that program officers sometimes refer to the reviews and panel summary without summarizing particular points from them. In our internal guidance for processing proposals, we will remind program officers to read the panel summary and reviews carefully and summarize the key issues that need attention in a revised proposal if those are not clear in the written comments of the external reviewers.

The Division of Undergraduate Education (DUE) is working to replace the recently retired program officers. One permanent hire has been made, and others are in process. DUE's Division Director and

Deputy Division Director recognize the importance of filling the vacancies and are working to ensure that the hiring process moves forward as quickly as possible.

3.  Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?

COV Recommendations:

Following the 2012 COV recommendation, the COV recommends that POs provide effective guidance to review panel chairs to ensure consistency of reviewer and panel summaries and more strongly require substantive comments from panel members.

POs should continue to emphasize the importance of thorough and rigorous assessment to each reviewer and build in review milestones whenever possible to engage the reviewers.

EHR Response, December 2015:

We provide the chairs and the other reviewers with written instructions when they are given their review assignments a few weeks before the panel meeting, and we provide instructions and answer questions in pre-panel webinars as well as at the beginning of the panel meeting. On all of these occasions, we will emphasize the importance of thorough, thoughtful reviews. In our special instructions to panel chairs, we will stress the leadership role we would like them to take in promoting clear, consistent, substantive reviews and panel summaries for each proposal on their panel. Both the panel chairs and the other reviewers prepare their individual reviews within time constraints, which vary from person to person, but we believe that they generally appreciate the value that their comments can have for the PIs, and we will remind them.

4.  Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?

COV Recommendation:

The COV recommends that, in addition to providing reviewers with examples of how to review, NSF produce a weighted evaluation framework to help guide reviewers in terms of continuity and effort. No one framework will fit all situations, and this recommendation should be approached cautiously, so as not to impinge on the independent reviewer's strategy for evaluation.

EHR Response, December 2015:

Part of such a framework exists already within the ATE solicitation and NSF's *Grant Proposal Guide*, where the Merit Review Criteria of Intellectual Merit and Broader Impacts are described in both general terms and program-specific terms. We will extract the guidance there and provide it as an outline to reviewers. We do not want to suggest weights to the criteria, however, for the reasons that the COV mentioned, and because NSF policy gives individual reviewers considerable flexibility to interpret and weigh the review criteria in the context of each proposal.

5. Does the documentation in the jacket provide the rationale for the award/decline decision?

COV Recommendation:

The COV recommends expanding the rationale for declination decisions to include whether the issues of the proposal were due to infrastructure, personnel, etc., as well as how to improve for future submissions. As PO review analyses tend to have more constructive comments, the COV encourages NSF to highlight these review analyses so PIs do not overlook them.

EHR Response, December 2015:

We will remind program officers to ensure that constructive comments from their Review Analysis, which is an internal document, are also relayed in their PO Comment, which PIs can view in FastLane. As mentioned above, we agree with the COV that it is important to take every opportunity to communicate advice for improving declined proposals. We will stress to PIs that the PO Comment is available along with the reviews and the panel summary. We will also remind program officers to call attention to infrastructure, personnel, etc., when those are key factors in the declination decision.

6. Does the documentation to the PI provide the rationale for the award/decline decision?

COV Recommendation:

The COV recommends that a line of communication be strengthened and emphasized for PIs (and their institutions) with declined proposals as an opportunity to better enhance future submissions or to provide resources that allow PIs to gather more knowledge.

EHR Response, December 2015:

We will attempt to expand, and advertise better, several strategies that we already use for communication with PIs who want to strengthen their proposal ideas. Many program officers include language in their PO Comment that encourages the PI to contact them with questions about the reviews and panel summary. In addition, many program officers invite prospective PIs to e-mail a one- or two-page synopsis of their project idea so that the program officer can provide suggestions for improving the idea. Program officers also conduct mock ATE panel reviews at various meetings so that prospective PIs may familiarize themselves with the merit review process at NSF.

## II. Questions concerning the selection of reviewers.

1. Did the program make use of reviewers having appropriate expertise and/or qualifications?

COV Recommendations:

The COV recommends using reviewers from a wider range of expertise such as academic deans in order to understand programmatic changes that need to be made on an institutional level as well as federal employees who may hire students serviced by ATE programs in the future. The COV reiterates a well-understood concept at NSF – diversity of perspective and experience will lend itself to a balanced and informed evaluation process.

The COV recommends that in order to continue filling the pool of reviewers, NSF should provide novice reviewers a chance to participate in the review process. Novice reviewers may be granted a "no vote" status during their initial participation so they can familiarize themselves on the process in a no-risk manner.

The COV recommends having a larger panel of reviewers to allow for a variety of expertise within a panel and additional sector representation.

EHR Response, December 2015:

For each panel meeting, program staff spend a great deal of time and thought trying to identify and recruit a diverse set of reviewers who collectively have the expertise to review the submitted proposals. Generally, ATE program officers carefully consider the scope of the proposals on each individual panel and attempt to invite reviewers who are best-qualified to review that set of proposals. For example, a panel of proposals dealing with teacher and faculty professional development in a particular discipline, and including bridge programs from high school into the community college, would need reviewers from high school and community college in that discipline, and possibly an administrator. In addition to those characteristics, the program officer would look to balance the panel for gender and race/ethnicity. Program officers also try to obtain a mix of experienced and new reviewers on each panel; this practice expands the pool of reviewers for the program and allows experienced reviewers to mentor the new reviewers. Unfortunately, invited reviewers may decline due to the scheduling of the panels, conflicts of interest, or other reasons. Sometimes program officers cannot achieve an ideal balance, despite earnest efforts.

The idea of granting novice reviewers a "no vote" status is an interesting idea; however, NSF policies concerning both confidentiality and financial reimbursement would not permit implementation of such an approach.

As the COV recommends, we will pay special attention to the sector representation on panels, focusing, in particular, on academic deans, Federal employees, and novice reviewers. However, it is not likely that we can increase the size of panels in general. In recent years, we have faced budgetary pressures on our operational expenses (such as review panels), and we have also realized that our review process generates a significant workload for the community. We have committed to take account of both of those factors as we conduct our review process for each program.

COV Recommendation:

The COV recommends that the selection of reviewers balance the needed areas of expertise and qualifications. In evaluating proposals that focus on early college and dual enrollment initiatives, the COV believes it would be helpful to recruit reviewers from secondary education who have significant expertise and insight.

EHR Response, December 2015:

Please see the response above with regard to the general issue of achieving well-balanced, well-qualified panels. We agree that it is usually desirable to have some reviewers from secondary education on panels that consider proposals focusing on early college and dual-enrollment initiatives. In practice, it is often difficult to get secondary school teachers and administrators to agree to serve. We will step up our efforts for the panels that would benefit from this expertise.

**III. Questions concerning the management of the program under review**.

1.   Management of the program.

COV Recommendation:

The COV recommends a stronger emphasis on the mission of ATE, which is to support the creation of new technical programs or the enhancement of older technical programs. This is of particular concern due to budget considerations and the increasing number of applications on STEM enhancements. It should be noted that, while the COV recognizes that ATE and STEM are not mutually exclusive initiatives, providing funding for innovative programmatic and pedagogical strategies related to applied fields must be the primary focus.

EHR Response, December 2015:

In publications (such as the ATE solicitation) and in outreach by program officers, we will take care to emphasize the ATE program's focus on education to build the technician workforce, and we will differentiate the ATE program from other NSF programs that could better support projects focusing on STEM more generally.

The mission of the ATE program is to educate a highly qualified, entry-level technical workforce for the industries that keep the United States globally competitive. To accomplish that mission, the program supports projects that, in partnership with industry, develop new curricula and programs, update existing ones, provide professional development for college faculty and secondary school teachers, develop career pathways from secondary school to community college and from community college to four-year institutions, and other activities. ATE program officers view the industry–education partnerships as a critical component of all projects—a component that keeps the ATE mission at the forefront.

Employers in many technical fields want students to have a strong general STEM background, and particular STEM courses are often required for entry into technician education programs. In many projects, the ATE program supports activities related to STEM courses that are required for the particular area of technology on which the project focuses. Otherwise, program officers suggest that prospective PIs consider broader programs, such as Improving Undergraduate STEM Education (IUSE).

2.   Responsiveness of the program to emerging research and education opportunities.

COV Recommendation:

The COV recommends that institutions of higher education be encouraged to explore more grant opportunities related to dual enrollment and early college initiatives in technological education. Additionally, NSF must create awareness for, and potentially fund, ancillary educational strategies such as credit for prior learning (e.g., military credit equivalencies) and continuing education to curriculum credit crosswalks. As higher education performance metrics continue to emphasize persistence and completion and as industry begins to recognize alternative means for acquiring skill and proficiency, so should NSF by encouraging institutions to pursue these measures.

The ATE program officers agree that dual enrollment and early college initiatives are worthwhile avenues to support in the ATE program. We will consider encouraging more of these efforts by calling for proposals that specifically address them when we next revise the ATE solicitation.

A growing number of ATE centers and projects are addressing the role of industry-validated certifications in technician education programs, and we expect to continue to receive proposals addressing this issue, as well as the credit for prior learning and acknowledgement of skills and competencies by educational institutions.

The current ATE solicitation welcomes proposals that focus on emerging technologies, and the review process often singles out such proposals as innovative and worthy of funding. However, when we revise the solicitation, we will highlight the desirability of proposals that focus on emerging areas.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

COV Recommendations:

As part of program planning, the ATE program should look within its portfolio of awards to identify design principles and determine best practices and project/program impacts. These design principles would be used to inform future solicitations, provide guidance to review panels and proposal writers, and provide models for the ATE/STEM community.

The COV recommends establishing a Clearinghouse-type department where NSF information can be easily attained and understandable. Social media outlets like Twitter (where NSF has over half a million followers) could be leveraged to provide broader communications about ATE and other programs to the public.

EHR Response, December 2015:

The ATE program staff strives to identify emerging trends and best practices within the portfolio of awards and to use these analyses to inform future solicitations. Industry–education partnerships also drive the ATE portfolio. Industry has become more aggressive in pursuing partnerships with two-year colleges as a means to ensure the availability of a highly qualified workforce. In establishing these partnerships, industry pushes the members of the ATE community to be responsive and agile in their educational programs, and this in turn drives innovation in the ATE portfolio.

The ATE program supports ATE Central (https://atecentral.net/) as the digital clearinghouse for the ATE community. ATE grantees are required to archive any materials developed at ATE Central. This digital library directs users to a range of high-impact ATE resources, including curricula, learning objects, podcasts, and videos. The portal also aggregates information about the materials developed by ATE centers and projects, and organizes them using subject taxonomies, keywords, and other digital cataloging techniques.

Through EHR's communications officer and liaison to NSF's Office of Legislative and Public Affairs (OLPA), ATE program staff will explore opportunities for increasing the use of social media as an outreach mechanism for the program.

4. Responsiveness of program to previous COV comments and recommendations.

EHR Comment, December 2015:

The COV did not express any new recommendations in this section, but did ask about outreach to disabled populations. The ATE program is supporting Award DUE-1406757, "People with Disabilities Achieving Career Employment (PACE)" (University of Pittsburgh; PI: Rory Cooper), which targets veterans with disabilities. Other projects also have a focus on students with disabilities (including veterans)—for example: Award DUE-1400422, "Preparing Vehicle Technicians for Advanced Transportation Fuels" (Kentucky Community & Technical College System; PI: Michael Rogers); Award DUE-1304004, "Richland College Digital Forensics Program: Program Development and Improvement" (Richland College; PI: Martha Hogan); and Award DUE-1303935, "SpaceTEC National Resource Center" (Eastern Florida State College; PI: Steven Kane).

IV. **Questions about Portfolio.**

1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?

COV Recommendations:

The COV recommends that ATE focus on disciplines with low proposal submissions in order to increase the balance of awards across disciplines and sub-disciplines.

The COV also recommends that, within each discipline, there be greater specificity in focus (e.g., an engineering-based ATE grant on additive manufacturing) so as to inform institutions about trends in funding. For example, if NSF reports that, of eight awarded computer science ATE grants, six emphasized cybersecurity, institutions might consider:
   1) responding to RFPs on a different aspect of cybersecurity or
   2) determining alternative computing trends on which to base their efforts (e.g., considering industry support)

EHR Response, December 2015:

Although the ATE program staff does pay attention to proposal pressure in different areas and subareas of technology, the industry–education partnerships tend to drive proposal submissions. Because the ATE program's mission is to provide a highly qualified, entry-level technical workforce, the portfolio of awards tends to reflect industry needs for entry-level technicians in particular fields, as well as industry location in those fields. Attempting to balance the award portfolio with respect to the various fields may not reflect industry needs. If workforce needs are to be met, it might be the case that, for example, cybersecurity proposals and awards are more abundant than information technology proposals and awards at one point in time; and this trend might persist over time or might reverse if industry needs shift to some other area or information technology or to an emerging interdisciplinary area such as data analytics.

ATE program officers conduct outreach to inform potential PIs about the ATE program in an effort to increase proposal submissions. During those presentations and conversations, they note the most

recent proposal trends in particular areas of technology, and they call attention to what they perceive as gaps or emerging needs that new proposals could fill.

[Questions 2, 3, and 4 had no "COV Recommendation."]

5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?

COV Recommendation:

There should be additional outreach to yellow states (low awarded states) and coordination with EPSCoR as a method of increasing outreach.

EHR Response, December 2015:

Within the constraints of travel budgets, ATE program officers will continue to conduct outreach to inform potential PIs about the program and how to write competitive proposals. We will pay special attention to opportunities for reaching potential PIs in the states with few ATE awards. We will also explore coordinating with the EPSCoR program to further broaden outreach efforts. Program officers' outreach events are usually well-attended and generate proposals for the program.

[Question 6 had no "COV Recommendation."]

7. Does the program portfolio have an appropriate balance of awards to new investigators?

COV Recommendation:

It would be useful to differentiate between experienced PIs who are new to ATE and PIs who are both new to ATE and who have never managed a large-scale federal grant.

EHR Response, December 2015:

From NSF's PI database, we can easily determine whether a PI on a new proposal has applied to NSF before and whether he or she has received an NSF grant. But our database does not reveal whether a PI has ever managed a large-scale grant from another Federal agency. Sometimes such information is presented in PIs' biographical sketches in proposals, but that information is not systematic and cannot easily be compiled and analyzed. We will explore the feasibility of methods of collecting data on the level of PI experience outside NSF involvement.

8. Does the program portfolio include projects that integrate research and education?

COV Recommendation:

The COV recommends increasing the focus on applied research on the community college level. Teachers at this level will have the opportunity to integrate research into education (e.g., theory to practice/action).

The ATE solicitation's track for "Targeted Research on Technician Education" has recently been expanded, and program officers are conducting outreach efforts to increase proposal submissions to this track. We agree that results of these applied research projects have the potential to increase the integration of research into education.

9. Does the program portfolio have appropriate participation of underrepresented groups?

COV Recommendations:

The COV encourages NSF to continue its efforts to increase the participation of underrepresented groups in STEM initiatives for both PIs and project participants by identifying demographics beyond the data given to include age, disability, and industry sector. NSF should encourage involvement of all underrepresented groups.

Additionally, NSF should recommend that institutions collect data about students' completion of grant-funded programs and job placement outcomes, disaggregated by demographics, to determine if the ATE program truly impacts and augments workplace diversity.

EHR Response, December 2015:

The ATE program staff will continue to work on increasing the participation of underrepresented groups in the technical fields served by the program. We agree with the COV that this issue is very important, and it can transcend the most common demographic categories for which we have traditionally collected data. It is important to note that providing demographic information is voluntary for PIs, students, and other project participants. Asking for additional information from them may not produce a meaningful response. We can recommend that institutions collect data, and many institutions are collecting such data already as a means of supporting their own completion agendas. The ATE community is grappling with ways to track students as they enter and transition between jobs. Many PIs are attempting to use social media as a way to follow students, and some are establishing ATE alumni groups. ATE program staff will continue to monitor these efforts as one means of looking at the impact on workplace diversity.

[Question 10 had no "COV Recommendation."]

11. Additional comments on the quality of the projects or the balance of the portfolio:

COV Recommendation:

The ATE program should continue its efforts to increase the number of technicians working in emerging technology fields. The COV encourages the ATE program to find ways to be responsive to business and industry as well as find ways to encourage participation of diverse populations (e.g., adult learners, immigrants, and other groups).

The ATE program staff agrees with the COV recommendation and will continue to encourage and support projects that focus on emerging technology fields. Best practices from the ATE community on working with industry partners will be collected and disseminated.

Program officers will look for additional opportunities for outreach to different diverse populations and will strengthen connections with NSF's programs that specifically target underrepresented groups. The current ATE solicitation explicitly encourages "proposals from all types of Minority Serving Institutions (including Hispanic Serving Institutions, Historically Black Colleges and Universities, Tribal Colleges and Universities, and Alaska Native and Native Hawaiian Serving Institutions) where the proportion of underrepresented students interested in advanced technology careers is growing," and it mentions that "the ATE program is particularly interested in projects addressing issues in rural technician education and projects that broaden the diversity of the entry-level technical workforce, including strategies to recruit veterans into technician education programs." Program officers take advantage of opportunities to conduct outreach to Minority Serving Institutions and will try to identify additional opportunities that include leveraging collaborations that other DUE programs, such as the Robert Noyce Teacher Scholarship Program, have had with organizations such as the Quality Education for Minorities (QEM) Network.

**OTHER TOPICS**

[Questions 1 and 2 had no explicit "COV Recommendation." The COV's comments reiterated issues that were mentioned in other recommendations in the report—namely, adhering more strongly to the mission of the ATE program, increasing the diversity of the PIs, filling the ATE program officer vacancies created by recent retirements, strengthening prospective PIs' ability to write successful proposals, and increasing international collaborations. We have responded to these issues under each related "COV Recommendation."]

**3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.**

COV Recommendations:

The COV recommends increasing efforts on global issues. Water and global warming are issues other countries are tackling, and this is a good opportunity for ATE program to work on a global level.

The COV recommends developing a recruitment day/event for staff and faculty members in the community colleges; this would provide a chance for participants to review projects and give a centered point of view on the programmatic changes addressed in ATE projects. It is also important for institutions to be aware of the differences between a funded proposal and a non-funded proposal and the weaknesses seen in the latter that constrained the agency from awarding monies.

The ATE community is already learning from and influencing technician education on the global level. For example, ATE-supported faculty and students have visited and worked on renewable energy projects in Australia, Denmark, and Germany; information technology projects in France; and advanced manufacturing projects in Spain. The ATE program also has a portfolio of awards that focus on water.

ATE program staff will encourage projects that involve global issues, as well as international collaborations, when they are relevant to technicians in the U.S. workforce.

ATE program officers participate in NSF Community College Outreach Days across the country. The agenda usually includes a mock panel review, in which participants review a "sanitized," awarded proposal. (NSF is not able to provide a declined proposal for review, because information about declined proposals remains confidential by NSF policy.) Participants in the mock panel reviews typically remark that the awarded proposals have flaws, and this is an important part of the learning experience in this process.

With regard to declined proposals, we agree that the reviews, panel summary, and PO Comments should adequately communicate to applicants the main weaknesses that set the declined proposals apart from the awarded ones. As mentioned earlier, we will strive to improve these communications from both the reviewer angle and the program officer angle.

[Questions 4, 5, 6, and 7 had no explicit "COV Recommendation." The COV's comments reiterated issues that were mentioned in other recommendations in the report—namely, encouraging more early college and dual credit opportunities, improving communications to the PIs of declined proposals, helping prospective PIs to write more effective proposals, including language in the ATE solicitation to point PIs to other appropriate NSF programs when their project idea is not well-aligned with the ATE program's technician-focused mission, analyzing the portfolio of awards to determine trends in funding (of fields and subfields) and best practices, and telling the story of the ATE program's impacts. We have responded to these issues under each related "COV Recommendation."]