CORE QUESTIONS and REPORT TEMPLATE
for
FY 2006 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2006 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2006. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at <www.inside.nsf.gov/od/oia/cov>.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions; and (2) comments on how the results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

Many of the Core Questions are derived from NSF performance goals and apply to the portfolio of activities represented in the program(s) under review. The program(s) under review may include several subactivities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the subactivities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may choose to add questions relevant to the activities under review. NSF staff should work with the COV members in advance of the meeting to provide them with the report template, organized background materials, and to identify questions/goals that apply to the program(s) under review.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the ***processes*** related to proposal review; and (B) the quality of the ***results*** of NSF's investments that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future. Discussions leading to answers for Part A of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Core Questions will involve study of non-confidential material such as results of NSF-funded projects. The reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions. For past COV reports, please see http://www.nsf.gov/od/oia/activities/cov/covs.jsp.

FY 2006 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: April 10-11, 2006
Program/Cluster/Section: Advanced Technological Education
Division: Undergraduate Education and Elementary, Secondary and Informal Education
Directorate: : Directorate: Education and Human Resources
Number of actions reviewed: Awards: 27 Declinations: 20 Prelims: 20
Total number of actions within Program/Cluster/Division during period under review: Awards: 200 Declinations: 325 Other: 5 Prelims: 600
Manner in which reviewed actions were selected: All awards and declinations and supplements in FY 2003-2005 whose proposal number ended in 7 (the number chosen by the Committee Chair) were selected. All 27 awards and supplements that ended in 7 were reviewed. There were so many declinations that every third one was selected to be reviewed. In addition, the program officers selected 8 awards that they believe led to exemplary projects.

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures.

Provide comments in the space below the question**.** Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[1]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments: ***COV members believe the merit review process is quite good. The attention paid to securing a good mix of expertise and diversity is commendable. The process is very fair and well developed. The review mechanisms and processes in place are thoroughly documented.*** ***The staff has a good understanding of the community colleges in their***	YES

[1] If "Not Applicable" please explain why in the "Comments" section.

interaction with the institutions. Site visits appear to be well designed and effective.

- Observation : Too labor and time- intensive

Recommendation: Incorporate technology processes for more effective access to the records and record keeping.

- Use technology for the review process in order to reduce manual workload, increase creativity and consistency of recordkeeping: The software in current use "FastLane" (1997) has been an improvement toward this end, however, further research into the current processes as they relate to software may bring better access to information and more efficient record keeping.
- Are there ways that information technology can be used to better process proposals, so the review process is not so labor-intensive? For example, have some initial screening criteria that PIs have to address online (separate from loading the proposal), so that proposals that do not fit certain, pre-established criteria could be rejected before ever going to the review process. The danger of this approach is that a good idea might be rejected because "the right buttons weren't pushed" in the submission process.
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Observation: Knowledge of the process is contained within individual program officer minds—in other words, the "data" is not "backed up" sufficiently.

Recommendation: Define better the process of decision making following the review panel, role of program officer in final decision.

- Training needed for new personnel, learning curve of new program officers. Technology could help in this as well.

- Observation: Site visits are very effective, but constrained by resources.

Recommendation: Implement Distance technology/video conferencing to complement the site visits program.

- We recognize the limiting factor of funding to conduct some of these visits we continue to think that they are of excellent value. Therefore, we would like to stress the importance of these site visits and encourage the incorporation of the existing technology of video conferencing to conduct these visits.

- Observation: Planning grants are used by Program officers to elicit better proposals.

It would be good to have an internal review and measurement of the effectiveness of planning grants. Measure progress in proposal development of those receiving planning grants.

- Could NSF also promote the use of the planning grant as a way of nurturing or helping those colleges (particularly community colleges) that are not as experienced with grant writing?
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Observation: As ATE is a unique program with respect to the constituency of proposers, it may be useful to examine whether the NSF proposal process of solicitation, submission, annual reports etc is appropriate overall for the objectives of the ATE program.
Are the measures of success appropriate? The number of students, expectation and fulfillment of the number of jobs, etc may be important measures for the ATE program results.

OVERALL: The review mechanisms are effective. There could be better use of information technology to screen the proposals and the PI based on NSF developed criteria. This will reduce the workload of NSF staffers..

2. Is the review process efficient and effective? YES

Comments:
Observation: Could be more efficient with pre-screening,
The preliminary proposal is not required, only recommended. For those who do submit preliminary proposals, we wonder how systematically NSF tracks the percentage of encouraged who subsequently submit, and the number of discourage who do not. Is this information anecdotal, or is it actually tracked and documented?

Observation: The review process is very effective for those proposals which ultimately are accepted. But there could be better indication of the effects of feedback on project plans.
Recommendation: In the records, indicate impact of feedback in early stages –both with pre-proposals and to the funded PIs in follow-up negotiations.

There may be a better role played by the NSF staff in summarizing the initial reviewer comments—as the summaries in some cases appeared to be very brief and not very integrative of the individual comments. For the proposals which were discouraged or declined, it is unclear how many of these were re-submitted and ultimately accepted as the result of the information learned in the reviewer comments. For example, in one instance (0532646) there was a discussion (raised by the reviewers and the NSF staff) concerning the PI's commitments to other activities and project. It was unclear from the jacket notes whether this was ever resolved.

On the whole, however, the process is very efficient. The time from proposal submission to informing PIs of acceptance is very efficient.

Observation: Need better indicators of achievement of objectives.
Recommendation: The review process should include an assessment of strategic indicators provided as they compare to the goals of the grant.

The review process would be enhanced if in the grant proposal there is a requirement for inclusion of specific matrix of strategic indicators for assessment of outcomes of the grant. This mechanism may provide a closer relationship between the goals specified in the proposal and the outcomes of the grant.

This documentation and validation of evidence of program (grant proposal and annual report) effectiveness along the lines of assessment of learning, skill development, and enhancement of economic development can serve as an indication of the degree of achievement and strengthen the grants proposals, yearly grant evaluations and grant reports. See comments above under #1, about use of technology for increasing efficiency and effectiveness OVERALL: The review process is effective. The program officers get the job done. However, the process is very labor intensive and still redundant in handling of correspondence, reviewing proposals, etc. **Recommendation: Indicate more clearly the impact of comments on pre-proposals so that there is cumulative wisdom on how much these help.**	
3. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments: Observation: Reviewer comments tend to show considerable dispersion in this program, **Recommendation: Give a model for reviews. Give key components and ask reviewers to address them every time.** The COV had mixed opinions on this point. Some reviewers provide very detailed information and feedback to the PI, while others do not. Least helpful are the reviews that simply summarize the proposal; most helpful are the reviews that give very specific comments about the strengths and weaknesses of the proposal. It is really important that reviewers recognize the need to provide specific recommendations for addressing concerns, perhaps more in these programs than other NSF programs because of the institutional diversity of the proposers and perhaps of the reviewers. Some COV members think the efficiency of the process could be improved by pre-screening proposals Usual NSF reviewers have reviewed lots of proposals. Community College people may not have as much experience and may require more guidance. Train using some format to reduce the variance in quality and depth of review. • The comments contained in some of the individual jackets provide useful information on the shaping of the projects. What is especially important is the pre-proposal interchange through e-mail messages. What sometimes is unclear is the specific recognition of a change in the NSF project reviewer in some of the packets. • The information provided to the COV speaks highly as to the efforts to provide sufficient information for the principal investigators through the review process.	YES

• The review process would be enhanced if in the grant proposal there is a requirement for inclusion of specific matrix of strategic indicators for assessment of outcomes of the grant. This mechanism may provide a closer relationship between the goals specified the grant and the outcomes of the grant. OVERALL: The reviewer comments were good and seem to be improving. There is variability in the degree and extent of feedback from individual reviewers.	
4. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments: Observation: Panel summaries are sometimes not full explanations of the reviewer comments. Often they only summarize a few of the key points. **Recommendation: At minimum, the panel summary should be required to be a specific format that allows for the bulleting of all the major points.** The summaries are variable, and show room for improvement. Require them to focus on the essence of the panel discussion, integrate the reviewers' comments. Positively address every concern.—do not sugar coat! Be specific in the feedback OVERALL: This is an important document, which should not repeat the individual assessments but should capture the intellectual merit and the broader impact. It should address what is right with the proposal, what is risky and what is flawed but correctable and what is completely irreparable. An attempt must be made to synthesize, not just repeat, the individual reviewer comments.	YES
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: Observation: While there is room for improvement, as discussed above, the documentation demonstrates the high integrity of the review process and the program officers' work. • The program officer should also identify any additional concerns that he or she has about the proposal. This is a really critical part of the review process. OVERALL: NSF Staff has high competence in the attention to details and does thorough work.	YES
6. Is the time to decision appropriate? Comments: Observation: The decision making process was efficient and there is good communication with the PI. The responses were extremely timely—the NSF staff answered e-mails very	YES

quickly. One possible omission—One COV member did not see any phone call summaries, and perhaps there were none for the jackets that was examined by this COV member. OVERALL: The time to decision falls within the NSF targeted cycle times. NSF ATE does a great job of responding to PI's. Customer service or personal client service practices are excellent.	
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: There is a degree of variance of approaches in reviewer comments and summaries. There may be room to help some PIs, for example, those without budget expertise. OVERALL: The process is very clear and very well followed by the staff. The specific instructions that are given to the applicants at each step seem very good. Some improvements suggested under individual points above.	

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. **Provide comments in the space below the question. Discuss issues or concerns in the space provided.**

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[2]**
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments: Observation: There is a lack of consistency between reviewers in terms of how they appear to interpret the merit review criteria; this is a source of overall variability and so consistency in applying the merit review criteria is hard to judge. **Recommendation: Require PI to define a matrix of strategic assessment indicators to be used throughout grant processes and grant reports, This will provide an ongoing assessment component of success and effectiveness. This will provide a culture of evidence for the grant.** • There might be an impression that ATE by the very definition of the program, addresses the Broader impacts criterion. So the reviewers address this with higher variability. Even so, in the jackets and especially in the review comments, there are statements which indicate the merit review criteria were being utilized. • Once the PI defines a matrix of strategic program/grant assessment indicators, the review and evaluation step becomes easier and more consistent. NSF/ATE may consider encouraging PI's to include such a matrix and to continue assessing the success of the grant in comparison to these indicators. A similar recommendation appears in the COV report of 2000. • As a practice the review panelists are very focused on identifying and understanding the merit of the proposal. The review criteria for intellectual merit and broader impact are too general. This may be a source of confusion and this lack of uniform comprehension is reflected in the explanations of merit and impact in the proposal.	YES
2. Have the panel summaries addressed both merit review criteria? Comments: The panel summaries are good overall. There is always room to improve and reduce the variability of the write-ups as described above.	YES

[2] In "Not Applicable" please explain why in the "Comments" section.

3. Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments:	YES

4. Additional comments with respect to implementation of NSF's merit review criteria:

- While the review criteria are agency wide, and there probably is little that could be done by ATE staff, it must be pointed out how they must be interpreted by the staff and also by the community colleges to fit the reality of community colleges. Articulate clearly what these might mean in the context of ATE. There are some elaborations in the Program announcement. But a systematic use of strategic indicators of success may lead to better definition of outcomes and measurement in terms of these outcomes.

Even though NSF has attempted to provide operational definitions for the two merit criteria, the COV believes that this continues to be a confusing issue for proposal writers as well as for proposal reviewers.

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE[3]
1. Did the program make use of an adequate number of reviewers? Comments: Observation: Number of reviewers is large; but there is an under-representation of industry. There are large numbers of reviewers, but perhaps more important is the relative lack of community college reviewers and business reviewers. Perhaps NSF staff might want to identify the current companies that have long standing relationships with some of the ATE Centers or Projects—and ask management from these companies for their help in securing corporate assistance in reading the applications. This might provide a concrete means for a company to help sustain the program and bring private sector input into the process.	YES
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The expertise representation appears to be generally true. But there are several points to be noted. Observations: Because of the special nature of ATE programs with focus on workforce development, and technical education in community colleges, it is important to have industry and global viewpoints represented. Too few community college practitioners—and administrators are selected as reviewers. Given the diversity of ATE goals, the typical choice of subject matter experts needs to be tempered through the selection of individuals with management skills. It is not always evident that reviewers are familiar with the current state of the art, or existing projects already in place. **Recommendations: 1. NSF/ATE should approach corporate headquarters of industries for support of individuals in the corporation to review the grant proposals. 2. Due consideration needs to be given to reviewers from industries who are familiar with the global landscape. Technology should be considered for the implementation of both recommendations. 3. Special efforts need to be made to approach and develop reviewers from community colleges. 4. Program officers need to ensure that reviewers are familiar with the state-of the-art in the technologies under consideration.** Overall, the diversity of thought and backgrounds of panels are good.	YES

[3] If "Not Applicable" please explain why in the "Comments" section.

Special efforts need to be made to capture the input of industry representatives (See above). Maybe the program needs to look beyond the usual –mainly academic –pool of NSF reviewers. In addition, it is important to capture the global intelligence and to reach out to representation from other countries of known expertise on the relevant subject matter of the grant during the review process. This consideration will strengthen the grant proposal and will incorporate the global perspective in the review process. Familiarity of reviewers with the current state of the art or existing projects already in place is important if NSF is to fund cutting edge or non-redundant projects, It is important to have reviewers familiar with the literature and research base. If panel members are less familiar with this base, then it is critical that the NSF program officer(s) examine the project more closely through that lens.	
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[4] Comments: Observation: In addition to the balance cited here, one needs to also be concerned about the subject matter expertise of the reviewers, not just in the academic sense, but also as to the realities of the industries. Hence the balancing of these with the factors cited above on items #1 and 2 and with community college representation (See below) is also important. There are large numbers of the reviewers, but if reviewers are examined from the perspective how many are from community colleges, and how many are from the states which contain the largest number of colleges and students—there are some differences. The states with large number of ATE awards are the states, which have more reviewers. Several states, such as Illinois—which contain the fifth most community college students enrolled, are under represented in both the number of ATE center proposals and reviewers. Make a stronger effort to use reviewers from businesses and industries that are involved in the current global environment for each field. These individuals will understand the global issues surrounding employment and trends in the area. Because of this set of objectives, NSF may want to develop approximate internal goals to attain with respect to the make-up of the panel. Example. Goal for 2006: 30% minorities, 50% women, 25% from each region (NSEW), etc.	YES
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: NSF is very diligent in instructing, identifying and resolving COI issues. There were no conflicts of interest noted in the reviewers. There were some jackets in which the reviewers were from other ATE centers. This maybe be a	YES

[4] Please note that less than 35 percent of reviewers report their demographics last fiscal year, so the data may be limited.

conflict of interest from a different perspective, but it may also be a potential good use of personnel who have specific subject matter expertise	

5. Additional comments on reviewer selection:

To the extent that this program challenges the ability of the PI to manage the project and achieve goals within the community college, it may be important to add to **each** panel, one community college administrator—who from their experience can indicate the probability that the goals of the project can be realized.

National Centers have Boards of Advisors---Using them as reviewers could give the Centers backing in corporate sector.

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[5], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. Comments: The projects presented a high caliber of research and/or education projects The program support research and education quality As community college projects, the proposals, especially those funded, are exceptional in terms of clarity and relevance to overall mission of the ATE program. This is especially an important contribution of this program as many of the proposals were written and developed by community college faculty who typically are not required to perform any research or proposal writing. There may be merit to organizing themes of successful projects as clusters, and promoting interaction among them. The 2004 Report on ATE Centers Impact actually arranges the Centers into 6 areas of expertise. This is very useful. Dissemination of this report to potential PIs would be useful to see some of the best practices in technician education; and to learn about existing partnerships.	YES
2. Are awards appropriate in size and duration for the scope of the projects? Comments: Observation: It is not clear what follow-up is done on planning grants. • It would be good to document the follow up done on planning grants. • Most awards appear very adequate for the specific activities. However, there appeared a tendency for a good deal of the awards to be only the salaries or release time on individuals. NSF might consider a specific figure say 80%of the grant only for salaries.	YES
3. Does the program portfolio have an appropriate balance of: • Innovative/high-risk projects?[6] Comments: Observation: The definition of "high risk" is a bit inconsistent between the NSF staff, but it appears there are deliberate choices made to fund projects	YES

[5] If "Not Appropriate" please explain why in the "Comments" section.
[6] For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment, available at <www.nsf.gov/about/performance/acgpa/reports.jsp>.

which are either in new technologies, or with proposals, which are innovative and more difficult to achieve. Staff has argued there are no specific criteria developed, but there might be some informal guidelines agreed upon by the staff—each year, and they be transmitted to the reviewers. • Consider asking individual reviewers whether proposals are "high risk." Defining this is dependent on priorities and upon who is asked; by tapping into the collective expertise of reviewers the NSF-ATE group could maintain a better picture of what constitutes high-risk in a particular technical area. • There seems to be an acknowledgement that PIs who do not complete their projects as proposed lack skills in estimating the scope of work vs. the resources needed to complete, including the amount of time needed to complete the work. These few awards should be recognized as high risk projects and NSF should fund some, but require that the other projects complete project as proposed. • Several new and innovative technologies have been funded – Examples: o Award # 0202400 and 0532652- Center for the Advancement of Process Technology- trains technicians with general process skills useful in a range of diverse industries. o Award # 0402497- Contract Research Center in which students with research projects from companies and provides internships for high school students thus providing them with STEM pathways. o Award # 0302905- Marine Technology Education Center provides field and lab-based internship experiences in a large network of marine science and technology institutions. **Recommendation: High-risk and innovation should be better defined. This could be shown graphically as high-risk vs. Innovative, with 4 quadrants. The projects in the highest-risk vs. most innovative quad would be funded as such. This should be mapped on the grid for all projects to show the portfolio**.	
4. Does the program portfolio have an appropriate balance of: • Multidisciplinary projects? Comments: There are good efforts at multidisciplinary technical programs—in particular the integration of micro-electronic and computer-based technologies. However, what is lacking is the integration of the technical projects with other disciplines of the community college such as economics and psychology. That is, there no transfer from the research projects to community college education as a whole. For example, it would be useful for students to know that firms in various industries implement computer design technology differently, also by the size of the company. It would be useful to have a diagram (e.g. circle outside of the core circle) that	YES

shows all projects either multi-discipline vs. single discipline, differentiated by technology quadrants.	
5. Does the program portfolio have an appropriate balance of: • Funding for centers, groups and awards to individuals? Comments: There appears some overlap in the function of the national, regional and resource centers. In addition, NSF admits to a lack of clarity as to the distinctions between the three groups. In the review of one proposal for a national center, it did not appear that specific reviewer criteria for national centers were being applied to the proposal. Nor do issues such as intensity and size of industry support for a proposal appear to be different among these. **Recommendation: It is suggested that NSF clarify for itself the distinction between the different types of centers (national, regional, resource) or develop another typology.** The overall balance seems to support the vision of the infrastructure, which will support the dissemination of ATE educations materials, expertise and training.	YES
6. Does the program portfolio have an appropriate balance of: • Awards to new investigators? Comments: ATE is doing very well in this area, however, the demographics of PIs show much more intentional work may be needed to increase the numbers of new PIs from underrepresented groups. It appears like the present balance is appropriate. However, as more colleges participate in the ATE program, we should assume that the goal to involve more colleges in the process may be decreased. It maybe useful to increase the different parts of a college involved with the ATE program.	YES
7. Does the program portfolio have an appropriate balance of: • Geographical distribution of Principal Investigators? Comments: The geographic differences are more complex—Some states seem to have high numbers of ATE grants, not proportional to the number of community colleges in the region. There should be more intentional focus on colleges located in the middle of the U.S.	YES
8. Does the program portfolio have an appropriate balance of: • Institutional types? Comments: ATE has a focus on community colleges. All awards are to community colleges in lead roles. However, a broad review of the winning proposals indicates the relative absence of both rural community colleges and urban community colleges.	NO

The bulk of the rewards are to suburban community colleges from metropolitan areas. These are the largest and most sophisticated community colleges, however, one of the goals of the ATE program is to achieve greater participation of all community colleges. **Recommendation:** develop strategies which can align rural and some urban community colleges within larger proposals with their suburban counterparts.	
9. Does the program portfolio have an appropriate balance of: • Projects that integrate research and education? Comments: A large fraction of research being done in these projects does relate to education as this is major focus of the community colleges. However, better collaboration between the projects/Centers and rest of the campus could result in innovations in education, such as increasing the multidisciplinarity and practical learning in core courses, including practical issues of industry and economics, for instance. This may be suggested under broader impact as well.	YES See comments

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10. Does the program portfolio have an appropriate balance: • Across disciplines and subdisciplines of the activity and of emerging opportunities? Comments: The ATE program encourages multi-disciplinary collaboration. There is integration between the technical disciplines but much less integration between the technical disciplines and either the STEM curriculum or the other foundation or critical thinking classes. In particular this maybe important for some of the mathematics classes which are part of the ATE programs. These tend not to be integrated within the technology courses in most of the centers. A general concern would be the lack of stand alone ATE curriculum. Rather most community colleges use the ATE curriculum, but blend that into their classes. Many innovations can be encouraged in this category: • ATE projects might explore tying more strongly into state or local economic development plans. • There might need to be a focus on Health care technologies and related disciplines. ATE program, being at NSF, does not address health, leaving that to NIH. In view of the merging of many technologies such as robotics and nanotechnology into health care, should this division be re-visited? • Efforts of Community Colleges to be relevant today can be linked more strongly into ATE projects • Making employability of students and transferability of skills as a desired outcome and a criterion for assessment. • Such emphases may change the allocation pattern of funds	YES
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments: This is a tough issue! The COV commends the NSF on its attention to broad representation among members of review panels. Unlike most other federal governmental agencies, there is a refreshing concern by the NSF in the need for minorities and women to play a role in the entire proposal process. This has resulted in some major gains in the number of these groups in the process. Still the numbers of PI's who are minority are very small. So, this continues to be an area that needs intentional strategic focus to develop ideas and approaches that work. However, based on the documentation provided to the panel, the number of PIs and Co-PIs from underrepresented groups is extremely low. To the extent that NSF-ATE is able to influence this, it should do so. Universities involved in programs like the LSAMP or AGEP may be able to	NO

play a role in recruiting and mentoring minority faculty members in Community colleges to submit more proposals. **Recommendation: The ATE program may want to have a brainstorming workshop with the above type and other schools. Also look to strongly technical community colleges to partner with those with less technical expertise to work on collaborative proposals, which may include educational technology-based solutions for expertise transfer.**	
12. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments: Philosophically, and in concept, this program is very relevant to national priorities and responds effectively to congressional mandate, and priorities such as those described by "Rising above the Gathering Storm" and other reports. It is very relevant to the interests of the national policy makers. However, it is important to pull back and examine the premises. The world has changed significantly since the original legislation was written in 1992, and what is "strategic" today is very different from what was strategic then. Furthermore, there is no way to determine what the ATE program does to be more strategically responsive. How, for example, is "high risk" defined? What are the truly emerging fields at this time? Where are the projected employment needs in the U.S. for the coming years? The program can also be made relevant to the interests of state policy makers. These individuals have not played much of a role in NSF activities, yet they are central to governance of community colleges. In the main the colleges are creatures of state systems. Moreover, increasingly states are using the community colleges in areas of economic development and targeting of emerging industries. It appears very appropriate to have the state authorities relate to the ATE programs. In some of the states where there are considerable numbers of ATE projects and centers, the States need to be made aware of the programs.	YES

13. Additional comments on the quality of the projects or the balance of the portfolio:
Need to think through what is unfolding,
We have some concern about the apparent lack of "intentionality" in the balance of the portfolio. In other words, unless there were established goals for what the balance should be, then how can you evaluate whether the *actual* balance is appropriate?
How does the program address:

- the shift of strategic priorities
- Up-skilling of technicians
- 4-year degree opportunities —articulation agreements
- required teacher preparation
- aspects of globalization in the technologies considered?

Examine and define High risk: and an approximate % willing to commit to meritorious proposals

defined as high risk.
This might also have to do with the mix of projects areas—what fraction of the ATE projects lead the way and how many follow the market? How many projects are inceremental and how many are transformational?

Emerging tech should get more funding—e.g., biotechnology; nanotechnology; alternative energy and materials, etc.

May be useful for the ATE program to undergo a planning exercise like a venture capital program. Conduct something like a Business review and environmental scan, including:

- Re-visioning in terms of globalization
- Logistics
- Role and mix of high-risk projects

(Possible reference recommended by a COV member: *Art of Possibility* Zander & Zander)

A.5 Management of the program under review. Please comment on:

1. Management of the program:
Excellent
Comments:
The program managers have an excellent knowledge of the community colleges as institutions and have developed many important strategies to deal with the dissemination of the program within the colleges.
The Management plan is a very good document. It should be reviewed and clearly understood by all the staff and used as a working document that is reviewed regularly. The format of the document could be improved to reflect what a good management plan of an awarded project should look like, i.e. provide guidelines for good project management for the awardees to use.
There did emerge a concern that the program is highly reliant on two very experienced program directors who have been leading it from the beginning.
There appears to be a need for more standardized training—"onboarding,"' to coin a business phrase—to prepare the new program officer rotators. There seem to be difference in the ways that DUE and ESIE rotators are trained, and this could be standardized. In one division there is an 11-day specific training program. This is not the case in the other division. It is suggested that both divisions undertake a similar training and/or mentoring program for the ATE program associates.
The COV binder provides a wealth of information and could serve as a mandatory training resource.
Also, when a rotator or any ATE program officer leaves, it would be helpful to require that person to prepare a written report that briefly describes the status of each report, including issues, problems, and successes. This would be very helpful to incoming program officers.

2. Responsiveness of the program to emerging research and education opportunities.
Very responsive to community; could me more proactive.
Comments:
The ATE program is responsive in the sense that it is open and attentive to the type of proposals that

are submitted. The program has tried to be responsive to the changing in technologies and the demands of market place for new forms of technicians. There has been an evolution in the mixture of technologies, which indicates responsiveness.
It appears, however, that more attention could be paid to anticipating and responding to job trends in the RFPs. For example, one report from Western Michigan University noted their finding that job availability for IT program graduates near centers and project sites was in fact low. Therefore, it would be helpful for the NSF to analyze training *needs* and to be somewhat more prescriptive about the types of projects it wishes to fund to be responsive to those needs. Proposal writers should be required to demonstrate that they have assessed job opportunities in their immediate region (rather than on a national level).

The ATE has held several workshops and funded various projects which support emerging technologies and which try to explore what these new technologies mean to technicians. ATE funding of projects which educate faculty, is commendable.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.
Comments:
The COV was provided with a copy of the "ATE at 10: Lessons Learned" document.

Recommendation: However, we discussed the value of conducting an "ATE at 20" exercise. That is, where does ATE want to be after 20 years? What are their visions for the future? Good work is being done already, but what more could be accomplished in the next 10 years? Are there strategic directions that we could pursue that will more effectively help us achieve the goals of the ATE program?
The prioritization process appears to be very much tied to available funding. The ATE seems to recognize it needs additional resources to manage the program; however, it does well in managing resources it has. A greater sense of urgency to reduce and level staff workloads is needed. A valued component of the prioritization process is the inclusion of staffers in discussion about issue and opportunities.

The staff of the program is very conscious of this need to be prioritizing proposals and there appears to be a very health level of discussion within the staff concerning proposals and the development of a portfolio.

4. Additional comments on program management:

PART B. RESULTS OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 <u>OUTCOME GOAL for PEOPLE</u>: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

The ATE program has made great strides in implementing this outcome goal. The Program is poised to play a central role in preparing people to keep the U.S. competitiveness in technology. The Center Programs show true synergy among the different groups – faculty, students, industries—in achieving this goal.

Comments:
The community colleges have much diversity of gender, ethnicity, age and backgrounds. In fact, a large fraction of minority students take their first science courses at community colleges. The ATE is important to the development of this talent.

- The COV reacted positively to the degree of articulation that is occurring between two and four-year college programs. Students are coming through Community Colleges and they are going into other fields, they are doing a good job in building the transition to a year institutions.
- The advances in the practice of technician education outlined in the Impact Report are very impressive and shows the vast difference ATE has made in focusing attention to quality education of technicians in the U.S.,
- Many of the Center projects involve diverse high school student populations in STEM fields. For example,
    - Award # 0202373, High School Initiative trains high school teachers to incorporate technology elements into the curricula, to enable students to see connections between science and technology and reaching over 20,000 students.
    - Award # 0101498 and 0445446 Northwest Center for Sustainable Resources linked ATE curriculum materials to secondary students through high school teachers.

There might be more thought given to how globalization of the program can continue, especially in light of changes in the world economy over the past decade. More emphasis may be needed on the development of technology overseas by companies, and more appreciation of the global nature of major multinational companies. It might also be useful for NSF to continue great collaboration with technology agencies from other industrial countries. However, the staff is very conscious of implementing this goal, and the program in general reflects this priority

B.2 OUTCOME GOAL for IDEAS: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

Comments:
We have to recognize the fact that we are importing scientific intelligence from other countries. we need to be cognizance of this fact in the award of grants. Perhaps the instituting a global intelligence of reviewers will strengthen.

The ATE program has had a clear impact on the culture of the community colleges where projects and centers are housed. This is a very positive outcome. One COV member noted that although research on learning in science and mathematics has become well established in four-year colleges, by and large technological education takes place at two-year colleges, and research on the process of teaching and learning is not well established. The two-year college can play an important role here. This is part of a larger problem of technological education being, for the most part, ignored by other academic fields, and of technology educators remaining somewhat insulated on their campuses. We feel it would be advantageous for Centers, in particular, to encourage multidisciplinary approaches to technological education. For example, a biotechnology center should be interacting with economists, with CIS departments, with biologists, and so on.

The COV has been provided with a copy of the "ATE at 10: Lessons Learned" document. Partly based on this, we discussed the value of conducting an "ATE at 20" exercise. That is, where does ATE want to be after 20 years? What are their visions for the future? Good work is being done already, but what more could be accomplished in the next 10 years? Are there strategic directions that we could pursue that will more effectively help us achieve the goals of the ATE program?

It would be good to see NSF ATE participate in an exercise of envisioning their future, e.g. ATE at 20. The idea is that the ATE organization staffers would imagine if they were completed satisfied with the program at the age of 20 years. What would it look like?

This goal is being realized very well. In particular the emphasis upon new learning theories and greater emphasis upon teaching and learning has made the ATE a very rich program which all parts of the community college can draw upon. The program has evolved into one, which is producing major institutional changes within the institutions. In the future, it is hoped that more of the general knowledge gained by the ATE program be diffused within a broad audience of the community colleges.

B.3 <u>OUTCOME GOAL for TOOLS:</u> Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

Comments:
One observation made by a COV member is that much of the funding for projects seems to be spent on project staffing. Although we appreciate the fact that cost sharing is not required on ATE projects, a fact that makes the program accessible to community college-based PIs, we think that there may be ways to use ATE funding to help leverage funding from outside entities, that could be used to purchase equipments or capital improvements to create "state of the art S&E facilities."

This could be addressed by requiring center proposals to show how they have attempted to engage external partners for this type of leveraging, whether it be from industry partners, state departments, or other governmental agencies. This could also play an important role in enhancing the sustainability of centers projects.

The work being done at Western Michigan University, where evaluation activities on a variety of fronts, is commendable. However, it is not clear to what extent the findings of these evaluations are being used to change the organizational climate of the ATE program and processes. For example, the March 2005 "Evaluation of the ATE Program: Impact and Effectiveness of Professional Development Efforts" executive summary highlights several observations about the type, and impact, of professional development efforts at ATE-funded sites. Specific recommendations have been made to address the problems observed. Have these recommendations been implemented? If not, why not? One senses that the NSF is "doing the right things" in terms of ATE program evaluation, but that the recommendations that result are literally sitting on shelves, unaddressed. We recognize that disseminating information about best practices is a big job, but efforts should be made to make the entire ATE community more aware of these best practices and, in so doing, raise the bar
The infrastructure of National, regional and resource center are good ideas for the dissemination of ATE education materials, expertise and faculty development.

A review of the proposals indicates that this goal is being articulated. However, most of the funding for the project is not being utilized for equipment. Many of the proposals are for staff development projects and staff time and the institution is often matching that with equipment purposes. The level of awards is not great enough to compensate for the purchases of equipment.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[7]

The ATE program is an exemplary model for a governmental unit that is efficient and effective with a small staff that is very committed to the program. The unit is a model of organizational excellence and as a result has a significant impact upon community colleges.

Through the ATE program, NSF has catalyzed institutional change. 10 years have brought about a lot of change in technician education and community college faculty development including faculty community formation at the PI meeting. The program has elevated the standard of technological education.

Comments:
One example is the Biotechnology Contract Research Organization model (0402497), which represents a very innovative partnership between a state school and regional businesses. This project is an example of how ATE grantees are being responsive to the "customer base, " just as the ATE program is to its own customer base.

The document "Managing for Success: The Insider's Guide to NSF Project Management" was written by the PI on a project housed at Sinclair Community College. This document is specific to the IT-focused project grant housed at Sinclair; however, it contains management suggestions that could be useful to other ATE project managers. Although many documents of this type have been produced over the years, it's not clear to what extent these have been distilled and disseminated to other grantees. For example, the key management suggestions made by David Siefert at Sinclair could be turned into a pamphlet or booklet that is distributed to all ATE principal investigators and Co-PIs. Attempts to clearly communicate expectations and suggestions to PIs (and to new program officers) in a *streamlined fashion* can help to achieve desired program results.
One COV member felt that ATE is less familiar with business practices and could usefully explore business tools which would improve organizational practices.
NSF/ATE is very customer-oriented and provides avenues for innovative academic state of the art business practices.

[7] For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.

PART C. OTHER TOPICS

C.1 Please comment on any program areas in need of improvement or gaps (if any) within program areas.

ATE staffers are effective at understanding the community colleges and faculty. Staffers are apparent empathetic to the needs of faculty and students. Development of new staffers is critical to continuing the effective personal approach that helps this program be so successful. A book that may help reinforce this helping culture is The Skilled Helper by Gerard Egan.

As the program grows there needs to be means by which ATE relates to the state agencies, which govern the community colleges. Community colleges are local institutions whose behaviors are stipulated by state policies—including state economic development and workforce development policies. The ATE program can be of great assistance in their efforts to develop capacities to education technicians in some of the new technologies. Most of these individuals have access to funding which could disseminate ATE curriculum from an ATE project at other institutions in the same state.

C.2 Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

The ATE has a far-reaching impact beyond just training technicians. NSF should consider measuring the impact of local economies by the influx of monies spent with the community colleges and universities. For example, a study might show that $1 of NSF funding produces $4 of economic impact.

The program fits within a larger issue of institutional change at community colleges, and thus, efforts need to make to relate the lessons learned in the program to larger questions involving community colleges. This would include leadership training of future presidents, active participation in the AACC Workforce Development Institute and establishing national relationships with organizations of community college administrators such as the National Council for Workforce Education and the National Council for Continuing Education and Training.

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

The issue of intellectual merit and broader impact is still a source of non-conformance for NSF, particularly as presented in the solicitations. PIs do not seem to be clear on how to respond to these questions. Merit and impact are important but these are discussed in the very back of the solicitations. Bringing this to the front of the solicitation may raise the emphasis.

There needs to be a relationship established for ATE with the other technical units of NSF to deal with the organizational and implementation issues associated with new technologies. The introduction of the ATE program over 10 years ago into NSF is somewhat similar to the introduction of new technologies into an existing set of practices. It would be good to look into possible synergies and integration with other programs..

C.4 Please provide comments on any other issues the COV feels are relevant.

The COV feels that ATE needs additional resources that will allow time to vision the future of the program, discuss and implement improvement to organizational practices and process ongoing.

C.5 NSF would appreciate your comments on how to improve the COV review process, format and report template.

The appropriate size of a COV group is about 6 or 7 people, from academia (content), industry, non-profit, government and non-technical discipline experts like Marketing, Project Management, etc.

The COV process is good but could be improved by a more prolific overview of the process.

1. Metrics review: what are the measurable goals and objectives and the outcomes (NSF ATE reports review)
2. Process map: what are the critical steps of the process
3. Resources: who does what
4. Process deviations review.
5. Examples: review of the process, jackets, etc.
6. COV team discussions
7. COV report writing
8. COV review with NSF ATE

It would be helpful to provide COV members with a *brief* list of expectations as part of a small "Handbook for COV Members" that could be used agency-wide. (The *NVC Handbook* published in 2003 is a good example) In this way, COV members would understand ahead of time the scope and nature of their work, and also be informed about the types of recommendations that would be helpful to the ATE staff.

SIGNATURE BLOCK:

_____Indira Nair_____

MEMORANDUM

DATE: December 31, 2006

TO: Bernice Anderson**,** Senior Program Director for Evaluation
Directorate for Education and Human Resources

FROM: Gerhard L. Salinger and Elizabeth J. Teles, Co-Lead Program Officers

SUBJECT: COV for Advanced Technological Education
COI and Diversity Memo

The Committee of Visitors report for the Advanced Technological Education Program was approved at the EHR Advisory Committee meeting held at NSF on November 1, 2006. The COV consisted of seven members selected for their expertise related to the goals of the program. They provided a balance with respect to the type of institutions supported through the program, gender, and representation from underrepresented groups. The following table shows the main features of the COV's diversity.

Category of COV Membership	**No. of COV Members in Category**
Member of EHR Advisory Committee……	……1……..
Institution Type:	
❑ University……	……2…….
❑ Four-year College……	…….
❑ Two-year College……	……3…….
❑ K-12 School or LEA……	…….
❑ Industry……..	……2…….
❑ Federal Agency……	…….
Location	
❑ East……..	……3……
❑ Midwest/North ……	……1……
❑ West……	…….
❑ South……	……3……
Gender	
❑ Female……	……3……
❑ Male……	……4……
Race/Ethnicity	
❑ White……	……4……
❑ Black……	……1……
❑ Hispanic……..	……1……
❑ Asian……	……1……
❑ Pacific Islander……..	…….

The COV was briefed on Conflict of Interest issues and each COV member completed a COI form. COV members had no conflicts with any of the proposals or files. (or, if they did, use 'Proposals and files were not available to COV members in those cases where the member had a COI and members were not allowed to participate in discussions of actions with which they had conflicts.')