TO: Dr. Joan Ferrini-Mundy, Assistant Director, Directorate for Education and Human Resources

FROM: Dr. Willie Pearson, Jr., STEP COV Chair

DATE: February 11, 2013

RE: STEP COV Report

Executive Summary

The STEP COV reviewed select proposals (awards and declines), data, and additional support materials from a three-year period between FY2009-2011. The COV commends STEP program officers and staff for effective and efficient management and the high level of professionalism exhibited throughout all phases of the award process.

Selected Findings

The STEP merit review process is rigorous and objective from start to finish. Panel reviews consistently address NSF's intellectual merit and broader impacts criteria during proposal evaluation. STEP review panels are comprised of diverse individuals having the requisite technical expertise, qualifications, and background in a mix of disciplines representing a wide range of STEM fields and institution types. Funded projects reflect quality and diversity, and attest to STEP's responsiveness to STEM education opportunities including the creation of the "Graduate 10K+" track in cooperation with the President's Job Council and the Step Centers competition in response to a directive in America COMPETES. In 2011, two five-year $10 million grants were awarded to establish national STEP Centers based at Stanford University and Carleton College. The commitment to continual improvement is demonstrated through funding for four post-award site visits in 2011; engaging a third party to conduct a summative evaluation of STEP's scope and impacts; and planning to restructure and enhance reviewer orientation and training. In addition, efforts have been made to reach new communities and prospective investigators through education and a variety of outreach activities including the development of a comprehensive web portal; enhancements to the annual Grantees meetings; and the addition of new student populations (e.g., veterans) with potential transition into, retention and/or STEM-degree attainment issues.

Recommendations

The STEP COV offers the following key recommendations for consideration:

Planning & Evaluation

- Engage in a formal strategic planning process to document STEP program goals, objectives, metrics, and a comprehensive portfolio management plan that addresses review panel composition; institution types submitting proposals; geographic distribution of institutions; new versus established investigators; discipline types; and high-risk, potentially transformative proposals.
- Implement a student tracking requirement within the STEP program to measure students' success or lack of success as they move across years or from one institution to another.

- Focus on results and findings rather than inputs and activities when evaluating the program and individual projects. Modify the STEP Logic Model to establish baselines and include measurable objectives. Change the program solicitation to encourage measureable objectives and milestones as indicators of success.
- Examine the outcomes and data collected from funded projects to identify the extent to which they are contributing to STEP program goals. Use these results to determine whether changes to portfolio tracks are necessary to achieve new and/or revised goals and objectives.
- Put metrics in place to define/differentiate STEP's role in increased degree attainment in STEM fields when evaluating projects resulting from partnerships with other NSF undergraduate programs and activities as well as institutional efforts to increase STEM degrees.

Review Process

- Given the interrelationships between institutional types, assess the benefits of having more diverse institutional representation on panels as well as an increased private sector presence. Continue efforts to recruit diverse reviewers.
- Provide additional guidance and feedback to Principal Investigators (PIs) on how to strengthen highly-rated, yet unfunded proposals or significantly improve weaker proposals. Review award letters to determine the features and/or proposal strengths that led to affirmative funding decisions. Use these results to develop a more informative, detailed letter that will guide the unsuccessful PI on how to improve his or her proposal sufficiently to resubmit for award in subsequent years.
- Continue to emphasize during reviewer orientation and training the importance of providing substantive and specific comments to proposers about what is needed for successful proposals.

Dissemination & Replication

- Look for opportunities to further develop, refine, and disseminate best practices critical to increasing STEP program impact and sustainability over time. Actively promote the replication and dissemination of STEP models and best practices to other institutions (e.g. ADVANCE PAID and CCLI Adapt and Implement).

Outreach

- Proactively engage PIs at institutions with low success rates of funded proposals, targeted unsuccessful proposers, and others to improve the quality of future submissions and/or meet new or revised portfolio goals using a variety of outreach methods including webinars and/or workshops at targeted conferences (e.g., SACNAS, AACC, ABRCMS, and League for Innovation); a custom checklist or set of frequently asked questions (FAQs) sent with declined for funding letters; annual Grantees meetings; and planning grant competitions in partnership with other NSF programs or as a STEP-specific effort.
- Set up a mechanism to track whether PIs from institutions that submitted STEP proposals which were declined for funding decided to move forward with the projects on their own and realized improvements in STEM-related programs. .

General

- Explore new and more effective ways to foster collaborations and partnerships between Type 1 and Type 2 awards.
- Encourage PIs to submit proposals that address untapped areas of emerging research (e.g., social networking, hand-held technologies, gaming, and virtual learning environments) and

education opportunities. In turn, educate STEP reviewers on the importance of funding these initiatives from both a research and practice focus.

- Consider the number of students directly impacted by a project rather than simply institution size when making STEP funding decisions or determining funding amounts.

CORE QUESTIONS and REPORT TEMPLATE
for
FY 2012 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2012 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2012. 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. Committees 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 (2) managerial matters pertaining to proposal decisions.

The program(s) under review may include several sub-activities 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 sub-activities 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.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at http://budg-eis-01/eisportal/default.aspx. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

For section IV addressing portfolio balance the program should provide the COV with a statement of the program's portfolio goals and ask specific questions about the program under review. Some suggestions regarding portfolio dimensions are given on the template. These suggestions will not be appropriate for all programs.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in the integrity and efficiency of the ***processes*** related to proposal review. 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.*** The reports generated by COVs are made available to the public.

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 2012 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: December 19-20, 2012
Program/Cluster/Section: **STEM Talent Expansion Program (STEP)**
Division: **Division of Undergraduate Education (DUE)**
Directorate: **Education and Human Resources**
Number of actions reviewed: 92 **Awards:** 31 **Declinations:** 61 **Other:** N/A
Total number of actions within Program/Cluster/Division during period under review: **Awards:** 72 **Declinations:** 563 **Other:** N/A
Manner in which reviewed actions were selected: Every fifth proposal number ending in eight (8) was selected for the declines. The same selection process applied to a smaller total number of awards made during FY 2009-2011 resulted in a very small set of awards. Consequently, the selection process was modified to include projects with award numbers ending in three (3), five (5) and eight (8). No Type 1B awards resulted from this selection. A further process was applied that selected Type 1B projects with award numbers ending in zero (0). The two STEP Centers projects were also included for review. These processes were accepted by Dr. Willie Pearson, Jr., Chair of the STEP COV.

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.

I. Questions about the quality and effectiveness of the program's use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question**.**

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE**
1. Are the review methods (for example, panel, ad hoc, site visits) appropriate? Comments: Some reviews were more extensive than others and provided more detailed feedback to proposers. In most cases, the panels included individuals from a variety of institutions who received appropriate training on the review criteria and processes. The COV noted that funding for a Special Project resulted in site visits by a former program officer who worked in the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) to review four (4) projects between February and March 2011. Post-award site visits benefit the institution and also validate aspects of the panel reviews. The Committee encourages the ongoing and prudent use of site visits. **Data Source: EIS/Type of Review Module**	**YES**
2. Are both merit review criteria addressed a) In individual reviews? Yes b) In panel summaries? Yes c) In Program Officer review analyses? Yes Comments:	**YES**

The COV examined jackets, awards, and declines. The STEP panel review process effectively and substantively addressed both intellectual merit and broader impacts criteria in individual reviews, panel summaries, and Program Officer (PO) review analyses. With respect to individual reviews, the COV noticed that some reviewers seemed to understand intellectual merit better than broader impacts, which resulted in some unevenness in their commentary. Reviewers of Type 2 grant proposals appropriately assessed the significance of the research questions and soundness of the research methodology. While both criteria were addressed in every case, some reviews were quite detailed and clearly documented the strengths and weaknesses of the proposal, while others lacked substance and detail. Some individual reviews also lacked a summary section. The panel summaries reflected the broader impacts criteria better than the individual reviews, and also incorporated information from the individual reviews. All panel summaries addressed both criteria and included a summary section. PO review analyses were sound, focused on both merit criteria, accurately represented panel discussions, and included additional information from NSF staff and other sources. At the same time, they frequently relied on boilerplate sections that were generic in nature rather than specific to individual proposals. **Data Source: Jackets**	
3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals? Comments: Guidance to panelists during orientation helps to ensure substantive reviews that address STEP program goals and indicate the basis for funding recommendations. As a result, the majority of reviewers provided comprehensive, relevant comments. The COV also found the comments were generally consistent with individual ratings. In some instances, comments from individual reviewers were non-specific and very brief compared to the panel summaries and PO review analyses particularly with respect to broader impacts. **Data Source: Jackets**	**YES**
4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)? Comments: The panel summaries—both in discussion of merit criteria and in summary	**YES**

statements—were generally well done and provided sufficient information for understanding the rationale for consensus. When there was no consensus, the differing points of view were expressed in the panel summary. The COV noted that panel summaries for some of the weakest proposals tended to be shorter and less informative. **Data Source: Jackets**	
5. Does the documentation in the jacket provide the rationale for the award/decline decision? (Note: Documentation in jacket usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.) Comments: The eJackets contained substantial documentation to support award and decline decisions. PO rationales were clearly stated and for the most part, consistent with the reviews and panel summaries. Additionally, follow-up correspondence with Principal Investigators (PI) to clarify concerns related to project goals, budgets, resources, etc., reflected thoughtful due diligence by the POs. **Data Source: Jackets**	**YES**
6. Does the documentation to PI provide the rationale for the award/decline decision? (Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written or telephoned with diary note in jacket) of the basis for a declination.) Comments: While the documentation provided to PIs conveyed the rationale for both "recommended for award" and "declined for funding" decisions, the level of feedback was at times, inconsistent in scope and level of detail. This was especially true for declined proposals. The COV recommends that reviewers provide specific guidance and feedback to PIs who submit weaker proposals that are declined or to individuals whose proposals are highly rated, yet fall just short of being funded. Program staff is encouraged to review award letters and to identify the features and/or proposal strengths that led to affirmative funding decisions. Use these results to develop a more informative, detailed letter that will guide the unsuccessful PI on how to improve his or her proposal sufficiently to resubmit for award in subsequent years. For example, if a proposal lacks a	**YES**

comprehensive evaluation plan using an external reviewer that is common to most, if not all, funded proposals, it would be helpful to communicate this information to the would-be PI. A checklist or set of frequently asked questions (FAQs) that offers PIs successful "how to" proposal development advice also merits consideration. **Data Source: Jackets**	
7. Additional comments on the quality and effectiveness of the program's use of merit review process: The STEP merit review process is generally effective and provides appropriate and useful feedback to PIs, especially those whose proposals are recommended for award. The COV recommends the STEP program continue to emphasize during reviewer orientation and training the value of constructive and specific feedback to all proposers, including those declined for funding. The COV supports the program's decision to restructure the reviewer orientation from a single, hour-long webinar to a collection of short video segments using a targeted, Khan Academy-like approach. While the majority of panels were diverse and comprised a broad range of institution types, some proposals were reviewed by panels with members from institutions that were more similar than diverse. Representatives from the private sector occasionally served on panels. Given the interrelationships between institution types, the COV encourages the STEP program to assess the benefits of having more diverse institutional representation on panels as well as an increased private sector presence.	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question**.**

SELECTION OF REVIEWERS	**YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE**
1. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: STEP panels were comprised of reviewers with the appropriate expertise and qualifications to evaluate the assigned proposals. Reviewers also represented a sound mix of disciplines covering a wide range of STEM fields and institutions that the program impacts. The COV noted that along with the requisite technical expertise, an effort has been made to address institutional and STEM workforce needs in the selection of reviewers. For example, the majority of proposals submitted by two-year colleges and four-year historically black colleges and universities (HBCUs) had at least one reviewer or panelist from these respective institution types. The COV supports the program's ongoing commitment to achieve more diversity among reviewers. **Data Source: Jackets**	**YES**
2. Did the program recognize and resolve conflicts of interest when appropriate? Comments: All conflicts of interest (COI) cases reviewed by the COV were appropriately resolved and well documented. **Data Source: Jackets**	**YES**
Additional comments on reviewer selection:	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

The COV commends the STEP program staff for its effective and efficient management practices and for the high level of professionalism across all phases of the award process. In addition, the Committee lauds the staff's commitment to making continual improvements to STEP in the three years since the last COV. Especially noteworthy are a number of actions that support and enhance the post-award process. In Spring 2009, the program funded a Special Project to foster and sustain a community of STEP projects through the development of the technical program and logistical management of activities for the annual grantee meeting.

In 2010, the program funded a Special Project to develop a web portal to increase communication among members of the STEP community and to make their work more accessible to the general public. Resources such as information about STEP projects and related materials, articles, descriptions of conference events, and videos focused on implementation strategies to improve the recruitment, retention and graduation of STEM students are available to less experienced faculty involved in the implementation of STEP projects and the public. The website is updated on a regular basis.

Additionally, the COV acknowledges the STEP program staff for securing Special Project funding to implement four post-award site visits in 2011 and committing to additional site visits moving forward.

While STEP is a mature program, opportunities to strengthen and improve management practices remain. One area of serious concern is the lack of a formal, strategic planning process. Accordingly, the COV recommends that STEP focus attention on the following:

- Engage in a formal strategic planning process to document program goals, objectives, metrics and a plan for portfolio management.
- Focus on results and findings rather than inputs and activities when evaluating the program. Establish baselines and develop measurable objectives to quantify/qualify success at the project and program/portfolio levels.
- Look for opportunities to further develop, refine and disseminate best practices critical to increasing STEP program impact and sustainability over time.

Each recommendation is addressed more fully elsewhere in the STEP COV Report.

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

Comments:

The COV acknowledges the program's response to STEM education opportunities related to two government initiatives since the previous COV. First, in cooperation with the President's Council on Jobs and Competitiveness (Jobs Council) High Tech Education working group led by GE and Intel, STEP created the "Graduate 10K+" track. This special funding focus aims to help increase the annual number of new B.S. graduates in engineering and computer science by 10,000. The program also responded to a directive in the America COMPETES Act H.R. 2272 by establishing the STEP Centers competition for a group of faculty to address a national challenge or opportunity in undergraduate STEM education through a comprehensive and coordinated set of activities. The initial competition sought proposals related to the biological sciences, engineering, or the geological sciences. Two five-year $10 million grants were awarded in 2011: (1) a national STEP Center based at Stanford University for teaching innovation and entrepreneurship in engineering; and (2) a national STEP Center (InTeGrate) based at Carleton College for improving geoscience education and integrate the geosciences across other academic disciplines.

The COV also commends the program for adding veterans to the list of student populations who may face transition into, retention, and/or STEM-degree attainment issues at a college or university.

During its assessment of STEP's responsiveness to emerging research, the COV was surprised by the absence of proposals involving social networking, hand-held technologies, and gaming. The COV recommends that the program find ways to encourage PIs to consider these subjects, along with virtual learning environments such as flipping the classroom and MOOCs (Massive Open Online Courses) when looking for emerging research and/or educational opportunities. The program should also educate reviewers on the importance of funding projects of this nature from both a research and a practice focus.

While Type 2 awards provide the opportunity to identify and support emerging research and education opportunities, this is not an area that is particularly emphasized in the current STEP program solicitation. The COV encourages the program to explore new and more effective ways to foster collaborations and partnerships between Type 1 and Type 2 awards. For example, look for opportunities to encourage the use of data from Type 1 awards in Type 2 research. This, in turn, could potentially lead to the creation of a new Type 3 award based on Type 2 findings.

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

Comments:

The COV finds that the STEP program has been responsive to funding and national priorities set by the administration, the NSF mission, relevant fields, and other constituent needs.

In *Section III.1 Management of the program*, the Committee noted that STEP lacks a formal planning process to inform and guide future decision making. Up to this point, funded projects have emphasized the first two years and discrete interventions. Are these areas of focus sufficient for the future or are changes needed? As part of a to-be-implemented formal planning process, the COV recommends the program examine the outcomes and data collected from funded projects to identify the extent to which they are contributing to STEP program goals. Use these results to determine whether changes to portfolio tracks are necessary to achieve goals and objectives.

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

Comments:

The Committee reviewed the initial Staff Response to the December 2009 COV Report and the recently released Update to Staff Response to the COV Report (2012). While the original response lacked specificity with regard to how the program would address certain issues raised by the previous COV (e.g. A.1.1. Post-award site visits; C.1: Shared funding through public/private sector funding to increase impact and sustainability; C.4. Size of grants determined by Institution size vs. student impact), the update provided details about actions taken and conveyed the staff's commitment to continual improvement. The COV was pleased to see that a number of recommendations from the previous COV have been implemented or are in the works including Special Project funding to conduct a limited number of post-award site visits, the creation of the "Graduate 10K+" (collaboration between NSF/STEP and the President's Jobs Council) funding track; and plans to restructure and enhance reviewer orientation and training.

IV. Portfolio Review. Please provide comments on whether the program's portfolio goals are appropriate and whether the program has achieved its goals for portfolio balance.

Programs should provide materials to the COV regarding portfolio goals and can insert specific targeted questions about their portfolios. *(Some dimensions of portfolio balance to consider include: balance across disciplines and sub-disciplines, award size and duration, awards to new investigators, geographical distribution of awards, awards to different types of institutions, innovative/potentially transformative projects, projects with elements of risk, inter- and multi-disciplinary projects, projects that integrate research and education, and projects that are relevant to agency mission or national priorities).*

When considering the appropriateness of the program's portfolio goals, the COV drew a distinction between two distinct sets of goals—one related to project evaluation and the other to portfolio management (or program evaluation). Both sets of goals contribute to the overall success of the STEP program. The COV commends the program for developing the framework for a STEP Logic Model (Item 8.1a in the COV eJacket). In its current form, the logic model seems better suited to evaluate individual projects than to assess portfolio balance. At the same time, it fails to specify measurable objectives that would be indicators of success at the individual project level, let alone guide evaluation and management of the portfolio. For example, the STEP Logic Model uses "increased number of students retained in STEM programs" as an outcome indicator. This metric lacks specifics related to the baseline, the magnitude of the increase, and a comparison group of students that is not part of the program, all of which would make evaluation of success possible. The COV recommends modifying the logic model to include measurable objectives and changing the STEP program solicitation to encourage measurable objectives and milestones as indicators of success.

Many of the dimensions identified as the basis for evaluating portfolio balance were represented in the proposals reviewed by the current COV. One aspect that was especially evident was the number of proposals involving two-year colleges. However, the COV did not find evidence of a documented plan for portfolio (balance) management. The absence of a plan makes it virtually impossible to determine whether the program has achieved its goals for portfolio balance or whether the portfolio tracks are the right ones to achieve program goals and objectives. To address these issues, the COV strongly urges the program to develop a portfolio management plan that addresses the following goals: 1) Review panel composition; 2) Types of institutions submitting proposals; 3) Geographic distribution of institutions; 4) New versus established investigators; 5) Discipline types; and 6) High-risk, potentially transformative proposals.

Once the program articulates specific goals for portfolio balance, strategies can be put in place to achieve them. For example, if STEP aims to increase representation from Minority Serving Institutions (MSIs) in its portfolio, then one strategy might be for the PO to call PIs from these institutions as they may be less likely to reach out to the NSF after receiving a decline notice than investigators from more research-intensive institutions. Portfolio management efforts could also address goals common to mature programs like STEP. In this case, disseminating best practices may be a higher priority going forward than it was earlier in the program's life cycle.

OTHER TOPICS

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

The program's decision to engage a third party to conduct a summative evaluation of its scope and impacts brings the need to measurable goals and objectives to the forefront. The COV recommends that the evaluation plan include metrics of success and impacts of STEP independent of and in relation to other NSF undergraduate programs and activities as well as institutional efforts to increase STEM degrees.

The COV recommends that the program implement a tracking requirement to measure students' success or lack of success as they move across years or from one institution to another. While the COV acknowledges that longitudinal measures are challenging and expensive, they are essential for understanding the effectiveness and impact of STEP.

When evaluating projects resulting from partnerships with programs such as S-STEM (Scholarships in Science, Technology, Engineering, and Mathematics) and EPSCOR, put measures in place to differentiate the role that the STEP played in increased degree attainment in STEM fields.

The COV recognizes the program's efforts to educate the community and broaden participation among first-time PIs or institutions without NSF relationships/history/structure. That said, the COV finds that more effort is warranted given the increasing number of STEM undergraduate degrees originating from community colleges, tribal colleges, HBCUs, and MSIs. Proactively engage PIs at institutions with low success rates of funded proposals that aim to improve the quality of future submissions and/or meet portfolio goals. The program could use one or more of the following outreach methods including but not limited to webinars and/or workshops at targeted conferences (e.g., The Society for Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS), American Association of Community Colleges (AACC), Annual Biomedical Research Conference for Minority Students (ABRCMS), and League for Innovation); frequently asked questions (FAQs) distributed with declined proposals; annual grantee/PI meetings; and planning grant competitions. These efforts could be STEP-specific or in partnership with other NSF programs.

STEP is a mature program and there is a lot to be learned from successful projects. The COV urges the program to consider actively promoting the replication and dissemination of models and best practices to other institutions. This strategy could be particularly helpful in engaging significant numbers of small institutions in STEM undergraduate reform. ADVANCE PAID and CCLI Adapt and Implement are just a few of the mechanisms that could be used in this effort.

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.

While the STEP program has a general goal to "increase the number of students (U.S. citizens or permanent residents) receiving associate or baccalaureate degrees in established or emerging fields" in STEM, the COV finds the link between that goal and the STEP portfolio and metrics is not well documented. As noted in *Section IV. Portfolio Review*, the draft STEP logic model is a good initial framework for developing measurable objectives at the individual project level; however it does not address inputs, outputs, and impact at the program level.

With regard to the national effort to produce 10,000 new graduates per year in computer science

and engineering (“Graduate 10K+”), it is unclear to the COV what role STEP plays in achieving that goal or what the metrics are for other STEM areas. Toward that end, it would be useful for STEP to identify the STEM fields they intend to influence and to review the program portfolio to assess alignment and impact within and across fields.

The STEP program functions with a mandate to report the number of students served by funded programs. The COV recommends that the program expand this metric to include longitudinal analysis of attrition and attainment beyond undergraduate and into employment or graduate study. STEP Type 2 awards could potentially be used to undertake a longitudinal analysis of program participants.

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

There appears to be a lack of institutional memory with respect to COV recommendations as program officers and staff move on to other posts and responsibilities. Is there any evidence that staff career transitions and/or turnover have an adverse effect on or delay the implementation of recommended actions to improve program performance? If yes, what steps can be taken to mitigate the potential loss of COV-related institutional memory?

The COV suggests that the program continue to look for opportunities to develop strategies that encourage greater collaboration between the Division of Undergraduate Education (DUE) and the other directorates to help build buy-in for STEP. “Graduate 10K+” and STEP Centers are excellent first steps.

If the NSF truly values programmatic evaluation (versus individual project evaluation) as well as outreach to encourage new investigators, then funding should be made available to support these activities.

In addition, the COV recommends that the NSF clarify and provide more cohesive planning and instructions for PIs on the connections between various programs related to undergraduate STEM education including STEP, TUES (Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics), REESE (Research and Evaluation on Education in Science and Engineering), S-STEM (Scholarships in Science, Technology, Engineering, and Mathematics), and WIDER (Widening Implementation and Demonstration of Evidence-based Reforms).

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

The COV discussed the pros and cons of tying the size of the grant that an institution receives to the size of the organization rather than the number of students directly impacted by a particular project. Funding decisions based solely on institution size are potentially short-sighted. The COV suggests that decision-makers factor in the number of students potentially impacted by a STEP project when determining how funds are allocated rather than basing funding on institution size alone.

In addition, the COV believes that the program would benefit from an analysis of current projects and their outcomes to identify the extent to which funded projects are successfully contributing to the achievement of STEP program goals and objectives. Use the results to tweak or modify current portfolio tracks or create one or more new tracks if appropriate.

The COV also suggests the program attempt to find out whether any institutions that submitted STEP proposals that were declined for funding made the decision to move forward on their own and

realized improvements in STEM-related programs. In other words, does the thought process and work involved in creating a STEP proposal serve as a catalyst for the institution to implement certain aspects of or the entire project even without funding from the NSF?

The Committee also discussed outreach activities—including ways to disseminate information about successful STEP project outcomes and best practices. Opening up the annual Grantee meetings to aspiring PIs with highly-rated proposals that narrowly missed the mark and others with the potential to help meet new or revised STEP portfolio goals is one approach that merits serious consideration.

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

The COV acknowledges and thanks NSF leadership and staff and the STEP program officers and staff for their hospitality and responsiveness to the group's information needs and questions throughout the two-day meeting. The working lunch option enabled the COV to work efficiently and maximize our time.

The COV recommends that the eJackets and other materials related to the upcoming COV should be posted and available to panelists earlier—preferably two weeks in advance. The pre-COV webinar would be an ideal time for members to become familiar with the information contained in the eJackets and other support documents. This would also make it easier for the Chair to assign pre-work to group members. Given that this COV did not have timely access to STEP eJackets and related materials ahead of the meeting, it would have been helpful for a program staff member to provide a more thorough overview of the documentation on the morning of Day 1.

The eJacket system facilitated electronic access to STEP proposals (both awards and declines) and related information and was easy to use. Several COV members suggested that links to relevant documents be embedded directly into the report template to expedite the review process.

The streamlined COV Core Questions and Report Template adopted by the NSF were easier to work with than previous versions. It helped guide and focus the review process, kept the team on track, and allowed the group to produce a working draft of the COV Report at the end of the two-day session. The COV encourages the NSF to continue to fine-tune the template to eliminate redundancies.

To ensure continuity from one COV to the next, the Committee recommends that future STEP COVs include at least one person who participated in the previous COV. Lastly, as a standard NSF practice, COVs should always have a technical writer available—preferably someone with experience in the process.

SIGNATURE BLOCK:

For the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)
Willie Pearson, Jr.
Chair