

**NSF Staff Response to the
Committee of Visitors (COV) Report for the
STEM Talent Expansion Program (STEP)**

Date of COV: December 19–20, 2012

The program staff wishes to thank the COV members for the many commendations, as well as the recommendations and questions, that they offered during the review of the program. NSF's budget request to Congress for FY 2014 has proposed a new program, Catalyzing Advances in Undergraduate STEM Education (CAUSE), to replace and consolidate STEP and several other current NSF programs. If this plan proceeds, we will incorporate the observations of the STEP COV into the design and management of the new program, which is also expected to address the key issues that have motivated STEP.

I. QUALITY AND EFFECTIVENESS OF THE MERIT REVIEW PROCESS

I.1. COV Recommendation: “The Committee encourages the ongoing and prudent use of site visits.”

Response: The program intends to continue the use of site visits, as resources allow.

I.6. COV Recommendation: “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 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.”

Response: The program staff recognizes the COV's particular concern with providing feedback to PIs of proposals that are at the two “ends of the spectrum” of those that are declined. Program officers will take up this idea of capturing a core set of characteristics of funded projects to use as the basis of a document that can complement the program officer's individual communication to the PI regarding the decision to decline. We will also continue to make it clear that responding to any of the suggestions will not necessarily guarantee funding upon resubmission. The program staff agrees that a document providing advice on proposal development could also be useful. We believe that the slides and handouts used in the Division's proposal writing workshops, which are

posted on STEP Central, already serve this function, and we will direct the PIs of declined proposals to these materials more consistently.

I.7. COV Recommendation (a): “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.”

Response: During its orientation for reviewers, the program intends to continue to emphasize to panelists that they provide constructive and specific comments to all proposers. The program has already beta-tested the use of shorter video snippets for portions of its reviewer orientation during its recent late January 2013 panel meeting. Informal feedback from reviewers has been overwhelmingly supportive of splitting up the orientation in this manner and offering these segments as a complement to the full hour-long webinar. A consistent comment has been an appreciation that such video segments make it easy to return to them for further viewing and reinforcement of the content.

I.7. COV Recommendation (b): “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.”

Response: Program staff will continue to strive to attain diverse institutional representation on panels. For example, during the recent January 2013 panel review meeting, 13 of the 16 panels reviewing Type 1 proposals had at least one representative from each of the four Carnegie classifications: doctoral, master’s, baccalaureate, and two-year college sectors. All of the 16 panels had a reviewer from three of the four Carnegie sectors. Program officers recognize the value of increasing the involvement of representatives from the private sector. The program will reach out to colleagues both within NSF who have industrial connections (e.g., program officers connected with the SBIR and I-Corps programs), and outside of NSF (e.g., the Government-University-Industry Research Roundtable managed by colleagues at the National Academies), and begin to assemble a pool of potential reviewers.

II. SELECTION OF REVIEWERS

II.1. COV Recommendation: “The COV supports the program’s ongoing commitment to achieve more diversity among reviewers.”

Response: The program intends to maintain this commitment to diversity, not just with respect to race, ethnicity, gender, and disability, but also with respect to institutional characteristics, disciplines, and geography. In addition, as noted above in

recommendation I.7, the program intends to enlarge its pool of potential reviewers representing the perspectives of the private sector.

III. MANAGEMENT OF THE PROGRAM

III.1. COV Recommendation: “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.”

Response: The program team will carry out a strategic planning process, as recommended. As the COV report notes, all three of these bulleted recommendations are covered in greater detail elsewhere. See the responses below for items III.3; IV (a) and (b); V.1 (a) and (c); V.2 (a), (b), and (c); V.3 (b); and V.4 (b), (c), and (d).

III.2. COV Recommendation (a): “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.”

Response: The program staff agrees that these emerging trends are important ones affecting the overall STEM undergraduate education enterprise. The program will seek ways to underscore for potential PIs that STEP welcomes proposals that consider ways in which these emerging technologies can be exploited to help increase access to higher education, leading particularly to greater STEM degree attainment. The program also sees an opportunity to work through STEP Central to highlight community engagement and discussion around these potential influences. The periodic revision of the STEP solicitation also provides an opportunity to draw attention to emerging trends. Finally, the program staff will include discussion of these issues with reviewers to the extent they are present in proposals.

III.2. COV Recommendation (b): “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.”

Response: The program agrees with the COV that exploration of ways to foster collaboration among Type 1 and Type 2 projects would be useful to encourage. The program already has one example in the form of a special Type 2 project funded at the end of FY 2011 to a team at the University of Texas–Austin and the University of Minnesota (Awards 1141563/1141549). The investigators are working with a set of Type 1 awardees to empirically test the feasibility and utility of collecting, analyzing, and sharing a common set of data to evaluate the impact of activities at the individual project level and to assess the effectiveness and impact of a suite of proven practices across that set of institutions for comparison purposes. The project pairs an interrupted time series design with a case control design to identify relevant distinctions between the experiences of students who are participating in project activities and the experiences of students who are not participants. The research integrates institutional administrative data with survey data from student participants to examine the effectiveness and impact of first-year experiences on student success. The project is developing and providing a set of strategies and data resources from which institutions with similar characteristics can draw to assess the impact of their STEP program on baccalaureate degree attainment. Working closely with the STEP Type 1 projects in the study, this effort holds promise to develop strategies for the design and execution of evaluation efforts across multiple institutions; provide project level data for project improvement and documentation of successes; provide information on project challenges and opportunities; provide strong evidence for project impact; and provide high quality data resources for other researchers interested in student retention in STEM disciplines.

Also, as noted in the staff response to the recommendation directly preceding this one, the program’s consideration of future revisions to the solicitation presents another potential opportunity to “codify” a call to support this type of relationship among STEP’s projects. Finally, relevant outcomes from the strategic planning process for the program will also bear on the nature of these inter-project connections and how the program might bring them about.

III.3. COV Recommendation: “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.”

Response: The program will incorporate such an examination into its strategic planning process, which will also include consideration of how to use the program solicitation to effect any changes needed.

IV. PORTFOLIO REVIEW

IV. COV Recommendation (a): “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.”

Response: As part of a strategic planning process, program staff will consider modifications to the program’s logic model to include relevant measurable objectives. As noted above, the strategic planning process will also consider changes to the program solicitation, such as those suggested.

IV. COV Recommendation (b): “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.”

Response: The program staff agrees that the six dimensions laid out above are important ones to frame the program’s overall portfolio balance. We will examine these as part of the strategic planning process.

V. OTHER TOPICS

V.1. COV Recommendation (a): “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.”

Response: NSF is in the process of competing a contract for program evaluation of STEP. The Statement of Work for that contract is nearing completion, and the program will incorporate the COV’s recommendation. In addition, the program is participating in a larger coordinated portfolio analysis of four related programs in the Division of Undergraduate Education and the Division of Human Resource Development. The other programs involved are the Advanced Technological Education (ATE) program, the Transforming Undergraduate Education in STEM (TUES) program, and the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP). Based on STEP’s planned strategic planning efforts, the program staff also expects to consider improvements to the STEP Project Monitoring system to allow it to gather data regarding metrics of success and impacts of the individual STEP projects.

V.1. COV Recommendation (b): “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.”

Response: The program staff recognizes that tracking measures of the kind the COV recommends can help in observing STEP outcomes and ascertaining the effectiveness of the program. The program also appreciates, as the COV noted, that implementing such longitudinal studies is expensive. The program will explore mechanisms for pursuing this recommendation within available resources, either in concert with other programs at NSF or through means external to the Foundation. Another informative approach may be to institute exit interviews with students who leave STEP projects. These interviews could include a common set of questions drawn from validated surveys and a common rubric for analyzing answers to free response items.

V.1. COV Recommendation (c): “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.”

Response: As the COV suggests, this need for outreach applies to a range of NSF programs that aim to improve the infrastructure of undergraduate STEM education. Program staff will explore all of the suggested venues and approaches for increasing participation by novice PIs and institutions with little or no prior experience with NSF. The Division of Undergraduate Education and the Division of Human Resource Development are already exploring how to collaborate in reaching and supporting communities from minority serving institutions. These efforts involve enhancing existing mechanisms for outreach, as well as developing approaches that draw on the use of new technologies.

V.2. COV Recommendation (a): “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.”

Response: Program staff will identify and promote natural synergies that exist with the new WIDER program and other programs, for example, relevant ones in DUE’s sister Division of Human Resource Development. The goal of these programs is the wider implementation of successful practices to support student success, and they are therefore ideal venues to promote the adaptation of successful strategies developed through STEP. (Note that the CCLI program, including the “Adaptation and Implementation” track that it offered during its early years, has been replaced by the TUES program.)

V.2. COV Recommendation (b): “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.”

Response: STEP is designed to support all disciplines served by NSF. The STEP “Graduate 10K+” Special Funding Focus is a partnership with the Intel Foundation and the GE Foundation to support STEP projects that use a range of strategies to specifically support and increase the retention of students in engineering and computer science. Each awardee institution has established specific metrics to determine whether or not, as a result of the STEP interventions, it achieves the goal of increased retention and graduation of engineers or computer scientists. The program staff will consider the COV’s recommendation—which is in the same spirit as other recommendations calling for identification of measurable objectives and modifications to the program’s logic model—as part of the program’s strategic planning process.

V.2. COV Recommendation (c): “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.”

Response: As mentioned in the response above to item V.1 (b), the program recognizes the important role that longitudinal studies have to play in understanding the effectiveness of STEP. As part of its strategic planning process, the program will consider how the Type 2 track may be used to stimulate at least a pilot study that focuses on a subset of related projects, for example those from the new “Graduate 10K+” special funding focus. Decisions will, of course, also need to take into account the availability of resources. STEP will also draw on the findings of a current feasibility study on the tracking of participants in NSF Research Experiences for Undergraduates (REU) Sites to inform its consideration of how such longitudinal studies may be employed.

V.3. COV Recommendation (a): “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.”

Response: The program staff will continue to identify such opportunities for collaboration. Regarding the “Graduate 10K+” Special Funding Focus, the internal discussion and planning for the management of this Special Funding Focus involved DUE program officers and staff from EHR’s Office of the Assistant Director, working closely with colleagues from ENG and CISE. Upon release of the solicitation, program officers from ENG and CISE were involved in reviewer recruitment and panel management during the late January review meeting. Since then these program officers have continued to be engaged in all aspects of post-panel reading of proposals and decision-making.

V.3. COV Recommendation (b): “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.”

Response: As noted in item V.1 (a) above, the program is in the process of establishing a contract to support a program evaluation, and will ensure that management of that activity will inform, and be informed by, the program’s strategic planning process. The program will also use its strategic planning process to establish priorities with respect to outreach to prospective new PIs; see item V.1 (c) above.

V.3. COV Recommendation (c): “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).”

Response: The program staff will work with colleagues within DUE and allied divisions around NSF to clarify the interrelationship of these programs. One idea that has already been discussed, although only informally to date, is the possibility of hosting joint grantee meetings involving PIs from multiple programs that have natural synergies. While the Division’s outreach activities for prospective PIs generally address a suite of programs, STEP program staff will refine STEP-specific outreach materials to emphasize explicit coverage of funding opportunities in allied programs.

V.4. COV Recommendation (a): “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.”

Response: As a part of the program’s strategic planning process, staff will revisit the different funding ranges laid out in the solicitation. Those ranges are currently associated with the size of the submitting institution’s enrollment. While final recommendations for funding take into account many factors regarding a proposed project’s intellectual merit and broader impacts, program staff appreciate that marginal cost per additional graduate is an additional important factor to consider.

V.4. COV Recommendation (b): “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.”

Response: This recommendation is in the same spirit as the COV’s earlier call for identification of measurable objectives to guide portfolio management, with corresponding modifications of the program’s logic model. As noted above, the program staff will address this recommendation in the context of a strategic planning process and the program evaluation.

V.4. COV Recommendation (c): “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?”

Response: The program staff is keen to pursue this question and appreciates the COV’s suggestion. The program has begun to explore the possibility of including a requirement in the solicitation for institutions to provide data in their proposals about current enrollment, retention, and graduation rates in a standard format. If policy concerns can be addressed to enable implementation of this requirement, it will provide a baseline of data from which to compare activity over time between institutions that receive awards and those that do not receive awards. This common set of data would provide a foundation for both program monitoring and program evaluation. Except for requiring information in new proposals, NSF does not have the authority to require reporting from institutions that do not receive NSF funding.

V.4. COV Recommendation (d): “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.”

Response: The program staff will consider a variety of outreach activities as part of the overall strategic planning process. As suggested, strategies may include engaging

aspiring PIs in events such as the annual grantee meeting or other presentations and workshops hosted online at STEP Central.

V.5. COV Recommendation (a): “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.”

Response: We agree that the COV members should have access to jackets and other materials at least two weeks before the meeting, and we are sorry that we did not provide timely access in this case. We are correcting our procedures for the future. In the next pre-COV webinar, the program staff will also include more detailed coverage of the documentation, as well as more detailed instructions about how to navigate through the materials.

V.5. COV Recommendation (b): “Several COV members suggested that links to relevant documents be embedded directly into the report template to expedite the review process.”

Response: Because of the login requirements of the systems in which the relevant documents are stored, there is no way to ensure that embedded links would work consistently as desired. We will explore the extent to which they might work well for some documents. We realize that COV members must examine a number of documents in order to answer the prescribed questions, and we will give additional attention to methods of organizing the documentation so that the COV’s work can proceed quickly and efficiently.

V.5. COV Recommendation (c): “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.”

Response: The program staff will report these comments to the coordinating office for NSF COVs.

V.5. COV Recommendation (d): “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.”

Response: The program will continue this practice.

V.5. COV Recommendation (e): “Lastly, as a standard NSF practice, COVs should always have a technical writer available—preferably someone with experience in the process.”

Response: COVs have uniformly commented that an experienced external technical writer enables their discussions and report-writing to proceed smoothly and efficiently. We intend to continue to provide this service.