NSF Response to the CAREER COV

The Committee of Visitors (COV) for the CAREER program met on October 18 and 19, 2006. Members included two representatives from each of the NSF Directorates as well as the Office of International Science and Engineering. The COV presented their final report to NSF on October 29, 2006.

Disciplinary COVs examine CAREER jackets, and the process for reviewing, declining and awarding them. Therefore, this COV did not examine the review process for declines.

NSF provided the COV with extensive data on the CAREER program including awards, declines, distribution by institution, ethnicity, discipline and size. The COV examined a random selection of awards looking at the review process.

The report has since been given careful consideration by NSF staff, including the CAREER Coordinating Committee and NSF senior management.

This document describes NSF's response to the recommendations made by the COV.

Overall Goals and Performance: The COV found that "The program appears to have significant impact on the careers of young faculty across the agency. The formal evaluation will help to substantiate (that CAREER) is one of the flagship programs of NSF both within directorates and across the agency as a whole." The COV found that the size and duration of the projects are appropriate in most fields, although the minimum does exceed typical research awards in some disciplinary programs. The COV found that most CAREER proposals were as high risk as regular NSF proposals. The COV felt that many of the CAREER projects were multidisciplinary, but that the degree of integration varied widely. Some Members felt that the strong focus on research placed most projects squarely with the traditional discipline. Members differed in their assessment of how well CAREER proposals reflected emergent approaches and new ideas in disciplines. Most felt, however, that coverage of disciplinary research was adequate and that CAREER PIs were given sufficient flexibility by their disciplinary programs to follow promising new directions. Women and under-represented minorities had CAREER funding rates similar to those achieved among NSF PIs as a whole, but the COV felt that it was imperative that the CAREER program should work to improve participation.

COV Recommendation 1: Increase awards to new faculty by

- **Lowering the minimum funding level of CAREER for NSF or for each Directorate**

NSF Response: The size and duration of a CAREER award is an important indicator of the NSF's commitment to the program and the prestige of the award. It also allows the

awardee to develop a long range research and education plan. However, the award size may be one factor in the relatively small number of awards made in some Directorates

The mean and median annual award size for research grants in NSF as a whole and for all the Directorates was higher than $80,000 in 2006.[1] Because of the length of the CAREER award, the minimum award size is larger than the median award size for research awards in every Directorate except BIO and EHR.

The CAREER Coordinating Committee (CCC) presented options to NSF senior management. These included:

1. Allowing Assistant Directors to set a minimum based on average award size in their Directorate[2]
2. Eliminating the minimum award size
3. Reducing the minimum size
4. Keeping the minimum award size of $400,000.

After extensive discussions, the senior management of NSF (SMaRT) concluded that the $400,000 minimum award size should be maintained as a indicator of the importance of CAREER and to allow a young researchers to implement both a research and the integration of research and education activities.

- **Developing a new research initiation award program.**

NSF Response**:** The CCC concurs that a program for research initiation awards with small annual award size and duration should be developed. Awards would be limited to Assistant Professors in their first or second year who have never had an NSF award. The program would offer extensive outreach to minority researchers, minority-serving institutions and to undergraduate and community colleges. The award would fund travel to NSF for principal investigator meetings and workshops on writing research proposals. The program might be modeled on the current "Research Initiation Grants and Career Advancement Awards to Broaden Participation in the Biological Sciences" program or could be built on previous NSF Research Initiation Awards. However, the CCC notes that developing a program like this is outside the scope of its charge.

COV Recommendation 2: E**mphasize the integration of education and research in all aspects of CAREER by**

- **Clearly defining the meaning of the integration of education and research in the different disciplines.**

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[1] NSF's Executive Information System (EIS) calculates award size for Research awards and for all awards. The latter includes conference and workshop, REU, dissertation and post-doc awards. When these are included, the annual median and mean award size is lower. In SBE, for example, the median is $60,000. As a research program, CAREER has always been compared to other research grants.

[2] If one of the options of lowering the award amount is made, NSF will also have to discuss how this affects PECASE. PECASE is currently an honorary award at NSF. Before the minimum was established, CAREER awards were increased up to $500,000 when they were converted to PECASE>

NSF Response: The CCC believes that significant progress has been made since the last COV in emphasizing and clarifying the requirements for an education plan and the integration of education and research. The current solicitation, issued in 2005, requires that the project description and project summary specifically describe the proposed research, proposed educational activities including plans to evaluate their impact, and a description of how the research and educational activities are integrated.

The current solicitation also lists a range of possible educational activities. It should be noted that the COV reviewed proposals mainly from the solicitation issued in 2002 and not from the solicitation issued in 2005 which did not have examples.

The CCC does agree that more could be done. The CCC is considering various strategies to identify more complete descriptions of educational activities and the integration of education and research. The CCC will request funds to hold a meeting of selected PECASE and CAREER awardees to identify "best practices" in the integration of education and research in all the Directorates.

- **Holding separate CAREER panels.**

NSF Response: While this is the practice in many divisions and programs, some NSF programs include CAREER in regular panels to ensure greater integration with the program. This variation is consistent with the distributed nature of CAREER. NSF does not feel that separate panels should be mandated. NSF does agree that CAREER proposals should be compared to each other, whether within a larger panel or in a separate CAREER panel.

- **Requiring an education specialist on CAREER panels.**

NSF Response**:** CAREER reviewers are selected based on their qualifications to assess both the proposed research and education plans and their integration.

- **Ensuring reviewers address the integration of education and research in reviews and panel summaries.**

NSF Response: Significant progress has been made since the last COV in ensuring that all reviewers address the two merit review criteria. However, as the COV pointed out, not all reviewers discuss the integration of education and research, nor do all Program Directors comment on it in their review analyses. The CCC has prepared special instructions to reviewers that should be included in requests for mail review and for instructions at panels addressing this requirement. CCC members will remind Program Directors of these materials and that panelists should be briefed prior to the panel deliberations on the need for the panelists to discuss the educational component in the reviews and in the panel summary.

- **Ensuring the Program Directors and other NSF officials emphasize both the research and education in CAREER documents.**

NSF Response: The CCC agrees that it is the responsibility of Program Directors to address research and educational plans of CAREER proposals. Therefore, the CCC will remind Program Directors that the plans for integration of education and research should be addressed in their proposal recommendation documentation, for both declinations and awards, and in all award abstracts.

- **Requiring that awardees address progress in the integration of education and research in reports.**

NSF Response: In response to the previous COV, the current solicitation includes language about the annual and final reports emphasizing this requirement:

> "The annual and final reports should summarize progress in both research and education, and indicate how well these activities are being integrated. In addition, all annual reports must include a note from the PI's department head or equivalent, indicating the department's continued commitment to mentoring the PI and supporting his/her efforts to integrate research and educational activities. This note must be signed by the PI's department head or equivalent and uploaded into the annual report as a PDF file."

The CCC also prepared an FAQ posted on the NSF web page with specific instructions for preparing CAREER annual and final reports that emphasizes the need to show results of the education and the integration of education and research.

The CCC will work with the Division of Grants and Agreements and with FastLane to incorporate a special paragraph about this requirement in the award letter. The CCC has begun discussions with FastLane to identify a section of the annual report template for CAREER awards that specifically asks for information on the integration of education and research. The CCC will remind Program Directors to return annual reports that do not address both the research and the integration of education and research as well as any that do not include the reaffirmation by the department on the continued commitment to mentoring/supporting the CAREER PI.

- **Automatically notifying awardees 90 days in advance of annual report deadlines.**

NSF Response: NSF has implemented a procedure in FastLane to send out reminders to all awardees 90 days in advance.

- **Providing feedback to CAREER awardees about progress.**

NSF Response: NSF agrees that it is important for Program Directors to provide advice and feedback to CAREER grantees on their annual reports. Most programs fund CAREER awards as continuing grants as a means of providing additional oversight.

Program Directors are encouraged to give particular attention to reports in the third year and to send responses, documented in eJacket, to the awardee. NSF has recently implemented an electronic letter system that allows Program Directors to include comments after reviewing a report. The CCC will encourage Program Directors to use this feature to comment on the research and educational activities. In addition, the CCC will remind Program Directors to review annual reports for progress in both research and the integration of research and education.

COV Recommendation 3: **The COV recognized that the success rate of minorities in CAREER was similar to that of NSF awardees, found this to be unacceptably low for a program for new investigators and recommend that NSF increase its support for these minority researchers before and after submission of proposals.**

NSF Response**:** NSF concurs that continued efforts must be made to increase the success of minority researchers and researchers from minority-serving institutions in the CAREER program.

The CCC will request funds for expanded pre-award workshops for which NSF does pay costs of travel and per diem for eligible participants. Following recommendations of the previous COV, NSF awarded a grant to Quality Education for Minorities (QEM) to conduct seven, two-day workshops for minority researchers and researchers at minority institutions. Over 500 persons attended these workshops from almost all HBCUs, HSIs and Tribal Colleges. One mark of success of these workshops was that two of the 2006 PECASE awardees were "graduates" of the workshop. For one workshop, attendees from previous workshops who applied for but did not get an award were invited for an intensive, one day review of their proposal.

NSF will also continue workshops and other outreach activities for CAREER supported by individual Directorates. For example, the Engineering Directorate held two workshops in 2005 and 2006 for new researchers. Of the 45 attendees, 21 received NSF awards including 7 CAREER awards.

The CCC agrees that a pool of successful proposals would be useful to persons preparing proposals. However, it is important that the potential applicants recognize that these are not necessarily models. At the workshops, the CCC will make available these proposals and conduct "mock review panels," a process that has been highly successful in other programs.

Pending funds availability, the CCC will sponsor a workshop for minority awardees and awardees from minority institutions.

NSF also agrees that information about CAREER should be an integral part of NSF's on-going outreach activities. The CCC will prepare slides for presentations by Program Directors as they do other outreach. Members will continue to participate in workshops and outreach meetings, in particular those that are aimed at minority-serving institutions. For example, this year, CAREER was a featured presentation at the NSF/NASA forum.

The CCC will update information packets for Program Directors to distribute at professional meetings and other outreach activities.

In response to a recommendation by the previous CAREER COV, in January 2004, NSF sponsored a very successful CAREER PI Mentoring and Networking Workshop. The Workshop involved approximately 60 CAREER awardees from Non-Research I institutions, various senior mentors from academe, some university administrators, NSF Program Directors, NSF Senior Management, and the CCC.

NSF will consider ways of expanding mentoring for Assistant Professors who are from under-represented groups or who are at minority-serving institutions. The CCC will request funding for a meeting of selected CAREER awardees in their third or fourth year.

COV Recommendation 4: **NSF should investigate possible perceptions about possible negative long-term impact of CAREER awards on PIs.**

NSF Response**:** NSF agrees. The current evaluation is examining several perceptions about CAREER including the possibility that CAREER, with its dual emphasis on research and education, might have unintended negative consequences. The draft evaluation does not support this impression, however.

COV Recommendation 5: Enhance the evaluation of CAREER

- **Obtaining feedback about awardees from peers and students**

NSF Response: The evaluation does not plan to obtain feedback from students and colleagues of CAREER and non-CAREER awardees. This might be perceived as an evaluation of an individual or an individual project rather than an overall evaluation of the impact of the program. It would be an interesting research study to examine whether awardees who focus on education are more or less effective researchers.

The evaluation does include several measures of research productivity for both CAREER awardees and the comparison group, including an extensive analysis of citations, awards from NSF and other agencies, and teaching awards. These will be used to understand program impact.

- **Interpreting findings within the limitations of the study.**

NSF Response: NSF appreciates the careful consideration the COV gave to the on-going evaluation. The CCC agrees that any conclusions drawn from the evaluation must be explained within the context and limitations of the study. The evaluation does use a comparison group as one way of understanding the specific effects of CAREER. The comparison group is a sample of those CAREER applicants who did not get a CAREER award but did get an NSF research award within three years of applying for CAREER. Because of the impossibility of a random assignment, the study will not be able to draw

conclusions about causal relationships, but should be able to make valid comparisons between the groups.

- **Including personal interviews with CAREER and non-CAREER awardees**

NSF Response: The CCC agrees that interviews with CAREER awardees would add value to the study, but cost and time constraints did not allow for this in the study design. The inclusion of some site visits to a select group of awardee institutions will provide some opportunity for face-to-face interviews with some awardees, but not enough for a full analysis. The response rate for the surveys of both CAREER and non-CAREER awardees is above 70% which is generally considered more than ample to draw valid conclusions about awardees in each group and subgroup represented.

The evaluation includes ten site visits. In selecting these sites, the evaluator varied types of institutions, departments, geographical location and other factors. The purpose was to identify the potential impact of CAREER awards on the institution. It was not, therefore, appropriate for this study to look at why some institutions have such a low applicant rate. However, the CCC does recognize that this is an important question and will request funds for an additional study on this topic.

COV Recommendations 6: Enhance the eJacket system for reviewing jackets including the distribution of CDs of award documents.

Response: NSF is continuing enhancements to the system. The CCC agrees that providing access to the eJacket system several weeks in advance would have made possible more extensive reviews of the proposals and we will take this into consideration for future COVs. Given the large and varied documents that are available on eJacket, it might be technically difficult to provide a CD with all the information.