FY 2017 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: November 29, 2016

Program/Cluster/Section:

Division-Wide COV for the Division of Human Resource Development:

- ADVANCE (FY14-FY15)
- Alliances for Graduate Education and the Professoriate (AGEP) (FY13-FY15)
- Centers of Research Excellence in Science and Technology (CREST) (FY13-FY15)
- Historically Black Colleges and Universities - Undergraduate Program (HBCU-UP) (FY13-FY15)
- Louis Stokes Alliances for Minority Participation (LSAMP) (FY13-FY15)
- Tribal Colleges and Universities Program (TCUP) (FY13-FY15)

Division: Division of Human Resource Development (HRD)

Directorate: Directorate for Education and Human Resources (EHR)

Number of actions reviewed: 149
Awards: 106
Declinations: 43

Total number of actions within Program/Cluster/Division during period under review: 1,207
Competitive Actions: 1,139
Awards: 426
Declinations: 701
Other: 80

Manner in which reviewed actions were selected:

All actions with IDs (proposal numbers) ending in '3' were selected for the sample. If the sample size was insufficient to represent a program track or other subcategory, proposals ending in '4' and then '5' were added. In cases where the resulting sample covered only one type of institution or was skewed towards a particular institution, random sampling was carried out by drawing lots from a subset of proposals that eliminated the overrepresented institutions but still considered the different tracks within the programs.

COV Membership

	Name	Affiliation
COV Chair:	Dr. Francisco Rodriguez	Los Angeles Community College District
COV Members:	Dr. Sheila Edwards Lange Dr. Charles Isbell Dr. Mary Juhas Dr. Beth Montelone Dr. Anne-Marie Nuñez Dr. Clifton Poodry Dr. Orlando Taylor Dr. Robb Winter	Seattle Central College Georgia Tech Ohio State University Kansas State University Ohio State University Howard Hughes Medical Institute Fielding Graduate University South Dakota School of Mines & Technology

MERIT REVIEW CRITERIA

An understanding of NSF's merit review criteria is important in order to answer some of the questions on the template. Reproduced below is the information provided to proposers in the Grant Proposal Guide about the merit review criteria and the principles associated with them. Also included is a description of some examples of broader impacts, provided by the National Science Board

1. Merit Review Principles
These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.

- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These broader impacts may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.

- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities. These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria
All NSF proposals are evaluated through use of two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.(i) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit**: The Intellectual Merit criterion encompasses the potential to advance knowledge; and

- **Broader Impacts**: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to:
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

3. Examples of Broader Impacts

The National Science Board described some examples of broader impacts of research, beyond the intrinsic importance of advancing knowledge.[1] "These outcomes include (but are not limited to) increased participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education at all levels; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a globally competitive STEM workforce; increased partnerships between academia, industry, and others; increased national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education. These examples of societally relevant outcomes should not be considered either comprehensive or prescriptive. Investigators may include appropriate outcomes not covered by these examples."

[1] NSB-MR-11-22

INTEGRITY AND EFFICIENCY OF PROGRAM PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the programs' review process and management. Comments should be based on a review of proposal actions (awards, declinations, returns without review, and withdrawals) that were *completed within the fiscal years under review*. Provide comments for *each* program being reviewed and for those questions that are relevant to the programs 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 programs' use of the 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: • The review process uses a mixture of panel reviews, drawing in ad hoc reviews and site visits when needed. • The use of site visits to review and assess projects' unique components or program officers' questions/reservations about projects was appropriate. • Recommendation: We encourage the use of expert ad hoc and mail reviews for highly technical and/or very specific research proposals where appropriate. • Recommendation: In instances of ad hoc and triaged proposal reviews, we recommend that additional debriefing feedback is provided to support future successful proposal reviews. • Recommendation: We encourage expanding the use of site visits for large, comprehensive, and/or institution-wide grants, as well as for capacity-building and less senior institutions. **Data Source: EIS/Type of Review Module**	**YES**
2. Are both merit review criteria addressed a) In individual reviews? b) In panel summaries?	**YES**

c) In Program Officer review analyses? Comments: • Merit review criteria were more well-defined in panel summaries than individual reviews, which led the COV to wonder whether the review criteria and review charge are clear enough to the individual reviewers. • The panel summaries seemed to be able to draw out the distinction between the review criteria. • The influence of the PO and/or panel chair on reviewers' attentiveness to the merit review criteria was clear – some programs seemed to have prepared their reviewers very well. An experienced chair can be very supportive of novice reviewers; for instance, AGEP was a strong example of this. • Recommendation: A clearer definition and distinction is needed between broader impacts and intellectual merit – consider providing examples for how each relates both to student support programs as well as research focused programs. • Recommendation: Provide reviewers with a template that includes strengths and weaknesses under each criterion so that the reviewers are prompted and the expectations are clearer. • Recommendation: Intersectionality is a criterion outlined in some of the solicitations; therefore, more attention should be paid to intersectionality in reviews. The COV strongly encourages that intersectionality be included as an explicit review criterion to make sure that it is addressed. **Data Source: Jackets**	
3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals? Comments: • Overall, yes, strengths and weaknesses were noted; the reviews were well written and provided support for the assessment of each proposal. • Although many were very thorough, others were short and thin. • Recommendation: The COV encourages POs to do more to prepare and guide reviewers on the NSF review process, expectations, and reviewer responsibilities. • Recommendation: To ensure consistency across HRD, we recommend developing a review template and instructions, and providing examples of informative and thorough reviews that draw upon models and best practices used by successful programs. Data Source: Jackets	**YES**
4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?	**YES**

Comments: • Overall, yes. • Intellectual Merit and Broader Impacts criteria were addressed every time, but the solicitation-specific criteria sometimes received no comments. • AGEP and ADVANCE were particularly thorough and a strong case for the panel consensus was made in the jackets reviewed. • Recommendation: In cases where the PO analysis and recommendation go beyond what can be attributed to individual reviews, there should be a clear discussion and rationale for this decision. Data Source: Jackets	
5. Does the documentation in the jacket provide the rationale for the award/decline decision? [Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.] Comments: • In general, the COV was very impressed by the ability of POs to summarize and draw conclusions from the individual reviews and panel summaries, as well as their ability to solicit appropriate additional information from the applicant, when required – such as in instances where the proposal was on the borderline between award and decline. • Documentation to declined PIs was very thorough and will be useful to support future proposals. • Post-panel review questions found in correspondence as well as responses from the applicants were quite thoughtful overall. • Recommendation: In cases where the PO has a strong and important opinion that could benefit from a second expert opinion, we encourage HRD to make use of expert ad hoc reviews. Data Source: Jackets	**YES**
6. Does the documentation to the 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 in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]	**YES**

Comments: • Yes, the documentation to the PI identified strengths and weaknesses of the proposal, which the COV thought would be useful for project implementation in the case of awards as well as future proposal submissions in the case of declines. Data Source: Jackets	
7. Additional comments on the quality and effectiveness of the Program/Division use of merit review process: • We applaud the strong leadership in the review process by program officers and encourage consistency across the Division. • Overall, very good use of the merit review process.	**YES**

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 Division make use of reviewers having appropriate expertise and/or qualifications? Comments: • HRD does a good job of finding a diverse set of well-qualified reviewers. • The COV noted the importance of balancing panels with an appropriate mix of both experienced and novice reviewers to ensure that substantive comments and feedback are provided to applicants while also making sure that there is a robust pool of new reviewers to inject fresh ideas and perspective from the field and academia into the review process. • We also noted the importance of having researchers/evaluators on panels. • Diverse fields of study were well represented among panelists. • Reviewers who had specific expertise in content/domain were speaking up on those areas in reviews, which adds credibility to the review process. • Diversity of institutions and persons on panels was impressive and appropriate for the programs. • The COV believes that inclusion of diverse and varied perspectives is important to the quality of the merit review process. The COV noted that within the HBCU-UP portfolio, the reviewers who reported their race were all African American/Black. Similarly, of the ADVANCE reviewers who reported their race, the majority were white. The COV supports inclusion and diversity across panels, including the inclusion of white males and persons with disabilities, who appear to be underrepresented. COV Recommendations: • Recommendation: While we recognize that there are two competing values – one to draw in the requisite expertise to provide high quality reviews, and another to continue to diversify and draw in novice reviewers – and we applaud NSF's efforts to continue to make strides in each of these areas, we strongly encourage NSF to find new ways to continue to improve and pull in novice reviewers from junior faculty pools to increase diversity and opportunities for mentorship. • Recommendation: Consistent with the HRD Vision – a well-prepared and competitive U.S. workforce of scientists, technologists, engineers, mathematicians, and educators that reflects the diversity of the U.S. population – we urge proactive, intentional, and continued vigilance across all HRD programs to maintain proportional demographic representation of institutions and individual reviewers.	**YES**

• Recommendation: The whole Division could benefit from pulling from reviewer pools across programs that are successful in recruiting diverse reviewers in areas of interest/need where the program has a gap (e.g., ADVANCE could pull from LSAMP). • Recommendation: Specifically with respect to ADVANCE, CREST, and HBCU-UP, include more male reviewers of all backgrounds, with a sensitivity to where they are on the diversity continuum and their understanding of the importance of capacity-building initiatives at MSIs. • Recommendation: Consider including training on cultural competency and implicit bias in panel reviewer orientation where it is not already done. • Recommendation: POs across all programs should be more intentional in selecting reviewers from diverse institution types – specifically, community colleges, tribal colleges, and other MSIs – across the Division. • Recommendation: Within programs, special effort should be made to make sure that reviewers participate in reviewing proposals for programs in which they or their institutions might not normally participate, but for which they have content/domain knowledge or a unique perspective to contribute. **Data Source: Jackets**	
2. Did the Division recognize and resolve conflicts of interest when appropriate? Comments: • Yes, in instances where an unidentified COI was found during panels, the reviewer was excused from the discussion of that proposal. **Data Source: Jackets**	**YES**
3. Additional comments on reviewer selection: • It was noted that women of color were not well represented on ADVANCE panels, which is of particular concern especially when criteria like intersectionality appear in the calls for proposals. • Diversity of reviewers is important to the integrity of the review process, yet it was difficult to assess the diversity of the reviewers due to the limited amount of demographic information reported by reviewers. The COV wondered whether NSF can do more to encourage reviewers to report this information. • Only 2.5% of the reviewers were from the 2-year college community. Given the importance of that type of institution in the pipeline, the COV felt that that this share is insufficient. When we are talking about broadening participation, we feel this institution type should be better represented.	**YES**

• Recommendation: To reduce the barriers that could keep some individuals from participating in the panel review process, consider making better use of remote (virtual) reviews. Consider training chairs to make sure that they know how to best include remote participants in discussions. • Recommendation: In striving to include reviewers from diverse institution types, it is important to note that the institutional culture/climate at some institutions does not support the involvement of more junior faculty on panels. We recommend that NSF consider innovative approaches to attract and support the participation of junior faculty members as well as community college faculty and administrators (e.g., providing travel stipends up front to reduce the burden on the institutions and participants, conducting outreach to presidents and other institutional leadership to garner buy-in and support, etc.). • Recommendation: The COV encourages HRD to continue its efforts to select reviewers who are representative of the applicant pool. • Recommendation: The COV encourages HRD to continue and expand representatives from various types of institutions (including MSIs and 2-year institutions) across ALL six programs. • Recommendation: While experienced reviewers are enormously valuable to review panels, it is also important to expand the diversity of perspective and opinion and to incorporate new ideas into the dialogue. HRD should be intentional about balancing panels with both experienced reviewers (who can mentor) and novice reviewers (who can interject new ideas into the discussion and review). This balance was found to be enormously beneficial to the review process where it was noted to exist. • Recommendation: To support inclusiveness and diversity, consider making better use of new awardees and competitive applicants in general as reviewers.	

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

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the Division and its programs.

Comments:

- Each program has formalized management plans and logic models that help to structure the management of each program portfolio
- The management plans address issues and concerns germane to their unique roles within the HRD portfolio.
- The COV applauds HRD for its division-wide strategic plan and accomplishments report, which responds to recommendations made by the EHR Advisory Committee. These documents are critical to ensuring a common vision for program success.
- We also applaud the programs for their clear use of their program management plans in the implementation and prioritization of program activities and initiatives.
- Some of the logic models do not appropriately account for external factors and/or are too narrowly focused. There is not always clear alignment between the problems/issues, activities, and how they will result in intended outcomes. In addition, it is not clear that the outcomes within the logic models make use of the best available science/evidence.
- We applaud the focus on external evaluations being required in grant projects.
- When reviewing the AGEP program management documentation, the COV was concerned by the reduction and uncertainty of the budget combined with the elimination of solicitation tracks and the message that this sends to the community.

- Recommendation: Develop an HRD-wide logic model which:
    - maps the program/Division goals to the outcomes
    - maps the program/Division activities to the intended short, medium and longer term outcomes
    - indicates the measures that will be used to determine the degree to which outcomes are achieved
    - provides the theory and/or the research to justify expectations that specific activities will lead to specific outcomes
    - illustrates how each program plays a role in contributing to the program/Division outcomes and meeting the program/Division overall objectives
- Recommendation: In the logic models, we recommend more explicit recognition of the role of institutional leadership in broadening participation.
- Recommendation: The COV encourages each program to make better use of program monitoring data to determine whether the programs are achieving their outcome goals as well as to inform internal interim reviews and strategic planning activities. These activities will assist HRD in making midstream corrections that support programs in meeting outcome goals and may also help HRD assess whether the data being collected is most useful to supporting the achievement of goals and objectives.
- Recommendation: Logic models should be consistent across the Division and should include clearly labeled sections – i.e., goals and assumptions.
- Recommendation: Logic models lack uniformity and clarity and could benefit from additional rigor. For instance, inputs and outcomes fail to take into consideration environment/context –

i.e., as a baseline, what would have happened without any intervention. The logic models would be more valuable if the input included baseline numbers with regard to the population being served/targeted. And the outcomes numbers should be reported in relation to the baseline numbers, also taking into account the context/environment (e.g., demographic trends). There is very rich potential here for the use of NCSES data such as the *Science & Engineering Indicators*. For instance, according to the most recent *S&E Indicators*, postdoctorates in the biological sciences have been steadily declining over the past 10 years. You could use data like this to easily provide more substantive support for the success of your postdoctoral programs. In addition, the NCSES data sets are widely regarded as very good baseline data across the federal government, and we encourage HRD to make better use of this data.

- Recommendation: Rotators comprise approximately one third of NSF's workforce. Because issues of broadening participation are historically long-term issues that require committed champions and change agents over the long term, NSF may want to consider the role of continuity in leadership to broaden participation so that "champions" and "change agents" in this area do not turn over.
- Recommendation: The COV was excited to see additional staff allocated to the LSAMP and ADVANCE programs. Across programs, as proposal volume increases, staffing should respond to this need.
- Recommendation: The COV recommends the continued use of post-award site visits as a management tool.

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

Comments:

- As a whole the HRD portfolio of programs responds to important national needs and provides support to broaden participation across the STEM pipeline.
- We are seeing a shift in the demographics across institutions of higher education. There are now significant populations of URM students at predominantly white universities, not just at HBCUs, HSIs, etc. The COV wondered whether this portfolio of programs is designed to reach those students as well.
- With respect to TCUP in particular, there is an inherent tension between traditional values and culture, and innovation. This is a challenge for the program. The program could be well suited to blur traditional research boundaries, for example the Food-Energy-Water nexus, and thus address socially and culturally relevant problems/solutions that resonate with the community.
- With respect to CREST in particular, there were proposals in which the investigators were working on new frontier research. Consider adding, as a review criterion for renewal proposals, that the reviewers have to evaluate how the research being proposed will position the center for research directorate funding.

- Recommendation: Exceptional faculty who, in addition to their research expertise, also have strong teaching skills, and who are able to encourage diverse students to pursue degrees and careers in STEM fields, are critical to a robust, diverse, and well-prepared professoriate of the future. The COV recommends prioritizing training of STEM faculty with pedagogical strategies needed to effectively teach and mentor diverse populations of students.
- Recommendation: We recommend specifically targeting support to faculty from underrepresented groups, regardless of institution type. There is no program that supports faculty from groups underrepresented in STEM fields, especially women of color. While the intent is to reach them through HBCU-UP, TCUP, ADVANCE, etc., that logic assumes that the faculty at those funded institutions are in fact from underrepresented groups as well, which is not necessarily the case.

- Recommendation: We encourage AGEP to more explicitly address pedagogy and teaching skills needed to encourage and support the next generation of diverse STEM learners and teachers once they enter the professoriate. And consider adding a postdoctoral track, especially in fields where a postdoc is a necessary step to the professoriate.
- Recommendation: We encourage an increased emphasis on intersectionality as an emerging research opportunity.

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

Comments:

- The COV applauds the HRD all hands meetings and recommends using this forum to talk about cross-program initiatives and strategy and cross-pollination.
- Although disability is included as a priority in HRD's strategic plan, and since some of the work in this area has been distributed across the Foundation, there is a near absence of disability-related research or projects among the proposals reviewed.

- Recommendation: With regard to renewal proposals and experienced PIs, we encourage HRD to consider raising the review bar higher to encourage the pursuit of higher level goals and outcomes from more senior members of the broadening participation community and push for greater returns from continued investments.

4. Responsiveness of Program/Division programs to previous COV comments and recommendations.

Comments:

- Overall, yes, programs and the division did a great job at using the prior COV recommendations to make important changes – for instance, the LSAMP program addressed the staffing issue noted by the prior COV.
- However, the prior COV for the HBCU-UP program recommended an increase in staffing due to the increase in proposals. We did not see this addressed during this period under review.
- The COV also noted that the following recommendation from 2014 ADVANCE COV report was not yet acted upon: "The ADVANCE program will seek the advice of the EHR Evaluation and Monitoring Working Group and will investigate the feasibility and resources required for a sophisticated program impact evaluation of the type that the COV recommends." Program staff noted that this was currently in progress and will be funded in 2017.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the programs under review.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Does the program/Division portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity? Comments: • In general, yes. However, relatively few projects focus on the social, behavioral and economic sciences, particularly on the underrepresentation of certain minority groups in some fields, e.g., economics, geography, etc. • In regard to the balance of awards across programs, a growing population of potential underrepresented students would suggest these programs should be growing. However, budgets are generally stagnant. **Data Source: EIS/Committee of Visitors Module. From the Report View drop-down, select the Funding Rate module to see counts of proposals and awards for programs. The Proposal Count by Type Report View will also provide a summary of proposals by program.**	**APPROPRIATE**
2. Are awards appropriate in size and duration for the scope of the projects? Comments: • We commend HRD for changing the size and duration as needed to remain responsive to changing priorities and needs. • Yes, funding levels are generally appropriate in size and duration. • As always, some of these projects will need more time to reach their full potential, but if NSF can fund further requests down the line, the structural limitations for how long grants can be funded is not a problem. • The duration (3 to 5 years) is appropriate – for example allowing centers/programs to become fully operational and subsequent outcomes to be observed. A thorough review of accomplishments in later years then provides a basis for performance-based renewals. **Data Source: EIS/Committee of Visitors Module. From the Report View drop-down, select Average Award Size and Duration.**	**APPROPRIATE**
3. Does the program/Division portfolio include awards for projects that are innovative or potentially transformative? Comments:	**APPROPRIATE**

• Yes. Again, the COV has identified areas and opportunities for growth, but overall, the level of transformative potential is high. • Awards reflect innovations in both the research and policy domains. They also have the potential to transform practices in colleges and universities that have the critical role of workforce development. In this regard, both ADVANCE and HBCU-UP have been particularly important in advancing innovations and transformative actions to broaden participation. In both programs, the COV identified several examples of projects that have been transformative at the institutional level. • Many awards are innovative at the individual and institutional level in terms of creating new strategies or applying existing strategies to increase URM participation and success. • Recommendation: The COV noted some instances where scaling or replication of best practices is warranted. We encourage HRD to solicit and support more projects engaged in these types of efforts. **Data Source: Jackets**	
4. Does the Program/Division portfolio include inter- and multi-disciplinary projects? Comments: • Yes. For example, there is evidence of HRD co-funding from and to the research directorates. • The vast majority of proposals reviewed were interdisciplinary. • Recommendation: We encourage expanded intra-division and cross-directorate co-funding activities with HRD programs. • Recommendation: The COV was surprised that LSAMP did not receive any co-funding from other directorates. We encourage additional outreach to secure co-funding for this important multi-disciplinary program. • Recommendation: We encourage HRD and the research directorates to more proactively support CREST with increased co-funding **Data Source: If co-funding is a desired proxy for measuring inter- and multi-disciplinary projects, the Co-Funding from Contributing Orgs and Co-Funding Contributed to Recipient Orgs reports can be obtained using the EIS/Committee of Visitors Module. They are available as selections on the Report View drop-down.**	**APPROPRIATE**
5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators? Comments: • Compared to NSF as a whole, yes. This is a strength of HRD, and there appear to be proposals from and grants to institutions across the U.S. However, the data, as presented in the module, do not allow an assessment of whether or not within a particular community (Tribal	**APPROPRIATE**

Colleges, HBCUs, HSIs, etc.) there is a broad representation or whether only a few primary institutions are contributing to the bulk of awards. • Different programs seem to be more heavily weighted toward the East or West. For instance, CREST seems to be weighted more toward the East, which may not appropriately account for the growing number of HSIs in the West. • In other programs, awards are disproportionately concentrated in certain jurisdictions – e.g., DC has 50% more awards than CA and 11 jurisdictions have no current HRD awards. • Despite scarce resources, HRD awards are more geographically and institutionally diverse than those in other divisions in NSF, and on this measure, HRD can serve as a model for other divisions. • Recommendation: Consider comparing the geographical distribution of awards in HRD with the distribution in EHR and the research directorates (R&RAs). • Recommendation: HRD should provide the percentage of each type of MSI that is funded and an assessment of how well the funded institutions within each type represent the whole population within that type. **Data Source: EIS/Committee of Visitors Module. Select Proposals by State from the Report View drop-down.**	
6. Does the Program/Division portfolio have an appropriate balance of awards to different types of institutions? Comments: • Overall, the balance of awards seems reflective of the higher education landscape in that some were to public, private, large, small, comprehensive, and baccalaureate institutions. • The overall demographics of the U.S. are becoming more diverse in general and in higher education in particular. Therefore, the portfolio of awards should continue to seek full representation of institution types as a way of addressing URM students in each institution type (e.g., Predominantly White Institutions, HBCUs, HSIs, TCUs, community colleges). • While different types of institutions are funded, the community college sector is underrepresented, especially considering its critical importance to enhancing the pipeline of future students, faculty, and the workforce, particularly for underrepresented minorities. • The COV also noted that there were a limited number of ADVANCE proposals from MSIs. • Recommendation: Given the large number of URM students enrolled in community colleges, HRD is encouraged to continue to reach out to and engage community colleges, and to increase proposal submissions as well as awards to those institutions. • Recommendation: Conduct outreach to MSIs on opportunities within the ADVANCE program, and consider adding MSIs as a targeted priority in future solicitations.	**APPROPRIATE**

• Recommendation: Consider broadening the base of institutions in the CREST portfolio, i.e., adding "emerging" institutions with respect to their research capacity. • Recommendation: Several areas for increased program attention have been identified and could be addressed: community college engagement, support for students and faculty with disabilities, and the advancement of URM faculty in different institution types. **Data Source: EIS/Committee of Visitors Module. Select Proposals by Institution Type from the Report View drop-down. Also, the Obligations by Institution Type will provide information on the funding to institutions by type.**	
7. Does the program/Division portfolio have an appropriate balance of awards to new and early-career investigators? NOTE: A new investigator is an individual who has not served as the PI or Co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or post-doctoral fellowships, research planning grants, or conferences, symposia and workshop grants.) An early-career investigator is defined as someone within seven years of receiving his or her last degree at the time of the award. Comments: • We applaud HRD's efforts in this area. • The portfolio included 21% early career, 26% midcareer, and 52% late career PIs. • Many of the first-time PIs partnered with an experienced investigator. **Data Source: EIS/Committee of Visitors Module. Select Funding Rate from the Report View drop-down. After this report is run, use the Category Filter button to select New PI for the PI Status filter or New Involvement (PIs & coPIs) = Yes.**	**APPROPRIATE**
8. Does the Program/Division portfolio include projects that integrate research and education? Comments: • Yes. Significant integration of research and education is reflected in several projects. • This is especially true in some of the programs – e.g., CREST, where new research equipment is used for student projects or even lab courses. • The COV liked the fact that the "Broadening Participation Research" tracks across solicitations encourage work, and research, on the science and social science of broadening participation. **Data Source: Jackets**	**APPROPRIATE**

9. Does the program portfolio have appropriate participation of underrepresented groups[2]? Comments: • For the most part; however, there may be concern about a limited number of PIs from underrepresented racial/ethnic groups in several HRD programs. • Although disability is included as a priority in HRD's strategic plan, it is not clear that the portfolio of awards reflects this priority. • A specific focus on faculty of color is lacking. • Recommendation: HRD is encouraged to accelerate its work on the intersectionality of race/ethnicity and gender, as well as other intersectionalities, particularly in the ADVANCE program. • Recommendation: HRD is also encouraged to expand participation of persons with disabilities. • Recommendation: There should be a more explicit focus on faculty of color, especially female faculty of color, across program areas. **Data Source: EIS/Committee of Visitors Module. Select Funding Rate from the Report View drop-down. After this report is run, use the Category Filter button to select Women Involvement = Yes or Minority Involvement = Yes to apply the appropriate filters.**	**APPROPRIATE**
10. Is the program/Division relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports. Comments: • The HRD Vision states that "HRD envisions a well-prepared and competitive U.S. workforce of scientists, technologists, engineers, mathematicians, and educators that reflects the diversity of the U.S. population." Furthermore, "HRD's mission is to grow the innovative and competitive U.S. science, technology, engineering and mathematics (STEM) workforce that is vital for sustaining and advancing the Nation's prosperity by supporting the broader participation and success of individuals currently underrepresented in STEM and the institutions that serve them." • The Division's programs strongly reflect the priority of developing the U.S. workforce – a critical national priority and 21st century challenge. The anticipated population demographics of the future indicate that this workforce development must focus on segments of the population that are underrepresented in the STEM disciplines. Thus programs that support inclusiveness, like the HRD programs, are relevant to the national priorities and the agency mission to sustain a world class workforce in STEM.	**APPROPRIATE**

[2] NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

- The COV feels very strongly that the programs of HRD have made huge strides in broadening the participation of underrepresented groups in the sciences. Our enthusiasm is based on the composite of our prior experiences as well as the data provided for this specific COV. However, the HRD-wide COV should not be a substitute for activities that attempt to establish progress, impact, efficacy, and potential weaknesses of these outstanding programs. We were struck by the slim amount of material for our review that dealt with program impact or evaluation of any kind. As much as we love the programs, it seems that data ought to be available that can demonstrate efficacy and value to NSF and to the nation.
- The portfolio is attentive to numerous recent national reports that cite the need to advance diversity in the STEM workforce:
    - Johnson, D.R. (2011). "Women of Color in Science, Technology, Engineering, and Mathematics (STEM)." *New Directions for Institutional Research*, 2011(152), 75-85.
    - Moon, N.W., Todd, R.L., Morton, D.L., and Ivey, E. (2012). *Accommodating Students with Disabilities in Science, Technology, Engineering, and Mathematics (STEM)*. Atlanta, GA: Center for Assistive Technology and Environmental Access, College of Architecture, Georgia Institute of Technology.
    - National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2007). *Rising Above the Gathering Storm*. Washington, DC: The National Academies Press.
    - National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2010). *Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5*. Washington, DC: The National Academies Press.
    - National Research Council (2011). *Assessing 21st Century Skills: Summary of a Workshop*. Washington, DC: The National Academies Press.
    - National Research Council (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Washington, DC: The National Academies Press.
    - Rothwell, J. (2013). *The Hidden STEM Economy*. Washington, DC: Brookings Institution Metropolitan Policy Program.
    - Rutledge, J.C., Carter-Veale, W.Y., and Tull, R.G. (2011). "Successful PhD Pathways to Advanced STEM Careers for Black Women." In H.T. Frierson and W.F. Tate (Eds.), *Beyond Stock Stories and Folktales: African Americans' Paths to STEM Fields* (pp. 165-209). Bingley, UK: Emerald Group Publishing Limited.
    - *Excelencia* in Education and the United Negro College Fund (2014). *Black and Brown: Institutions of Higher Education*. Washington, DC.
    - Santiago, D. (2012). *Finding Your Workforce: The Top 25 Institutions Graduating Latinos in Science, Technology, Engineering, and Math (STEM) By Academic Level 2009-2010*. Washington, DC: *Excelencia* in Education.

- Corbett, C., and Hill, C. (2015). *Solving the Equation: The Variables for Women's Success in Engineering and Computing*. Washington, DC: American Association of University Women.
- National Academy of Engineering and National Research Council (2012). *Community Colleges in the Evolving STEM Education Landscape: Summary of a Summit*. Washington, DC: The National Academies Press.
- Annual reports of the Congressionally mandated Committee on Equal Opportunity in Science and Engineering (CEOSE).
- Committee on STEM Education, National Science and Technology Council (2013). *Federal STEM Education 5-Year Strategic Plan*.
- Thomas, N.R., Poole, D.J., and Herbers, J.M. (2015). "Gender in Science and Engineering Faculties: Demographic Inertia Revisited." *PLoS ONE* 10(10).
- Jaggars, S.S., Fink, J., Fletcher, J., and Dundar, A. (2016). *A Longitudinal Analysis of Community College Pathways to Computer Science Bachelor's Degrees*. Mountain View, CA: Google Inc. Retrieved from http://goo.gl/Eiz33G.
- Harmon, N. (2012). *The Role of Minority-Serving Institutions in National College Completion Goals*. Washington, DC: Institute for Higher Education Policy.
- Google Inc. and Gallup Inc. (2016). *Diversity Gaps in Computer Science: Exploring the Underrepresentation of Girls, Blacks and Hispanics*. Retrieved from http://goo.gl/PG34aH.

- Recommendation: With more URM students and faculty attending and teaching at non-MSIs, additional attention and resources should be paid to finding creative ways to impact URM populations at non-MSIs.
- Recommendation: A focal point and driver for the agency should be supporting translational and transformative research on the participation of underrepresented groups in STEM – students, leaders, researchers, etc. – and how to encourage the use of research-based best practices across fields/sectors in innovative ways and new contexts. Specific attention should be paid to the research supporting groups and institutions facing barriers to participation with federal STEM research and education programs.
- Recommendation: HRD should expand its focus on institutionalization and institutional change (specifically faculty retention) to build and sustain leaders who are willing to invest in the sustainability of projects and programs – for example, ADVANCE at the University of Michigan, University of Washington, Montana State University, University of Wisconsin, Louisiana State University, and Jackson State University.

Data Source: Jackets

11. Additional comments on the quality of the projects or the balance of the portfolio: • It is important that HRD continue to lead broadening participation initiatives for the Foundation. However, if the nation is to achieve its goals in building a competitive workforce of the future, every directorate must be involved as a partner. • Our perception is that there are many well-intentioned dominant groups that seek guidance to broaden participation. A successful example of this is the ADVANCE Partnerships for Learning and Adaptation Networks (PLAN) track awardee "Advocates and Allies" at North Dakota State University, who are moving the needle. The dissemination grants are invaluable. • Recommendation: In order to expand the programs' portfolios, we encourage HRD to intensify outreach and technical assistance on the proposal preparation and review process to institutions and PIs who have not historically been successful in securing funding from NSF. One strategy might be to hold NSF Days at institutions that have not historically been well-funded. • Recommendation: In a previous COV report, there was a suggestion that CREST institutions be paired with Engineering Research Center (ERC) proposers. The COV encourages HRD to move forward with this recommendation. • Recommendation: Internally, POs should conduct outreach across the Foundation so that POs in the research directorates know more about how they might collaborate and co-fund HRD programs and broadening participation projects in general. • Recommendation: Institutions with emerging research capacity, which show promise of becoming competitive, might benefit from an ADVANCE Catalyst-like track within CREST to build additional capacity.	**APPROPRIATE**

OTHER TOPICS

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

    - Areas for improvement include: additional attention to persons with disabilities within HRD portfolios; intersectionality; HBCUs, HSIs, and Tribal Colleges in the ADVANCE portfolio; HBCUs and HSIs in the AGEP portfolio; men faculty of color; SBE sciences in areas where men and women of color are underrepresented; and community colleges across all HRD programs.
    - Women of color, in particular, inadvertently become invisible when programs focus exclusively on women or minorities. Consider paying close attention to this group.
    - NSF needs to be careful to disaggregate historically underrepresented populations of interest appropriately and to monitor the extent to which proposals target specific underrepresented demographic groups (e.g., address variation of ethnicity within racial groups), in order to ensure that multiple demographic groups are reached by its programs.

2. Please provide comments as appropriate on the performance of the Division and its programs in meeting goals and objectives that are not covered by the above questions.

    - Goals and objectives for each program can be confusing/inconsistent or thin – going through each new announcement left us wondering, "What are you trying to do and what are the outcomes?"

    - Recommendation: Recognizing that logic models are still under construction, the COV strongly recommends that work continue on these models in such a way that they reflect a level of consistency across programs and a careful alignment among problems, activities, and outcomes. External advice and consultation may be helpful in this regard, including input from the EHR Advisory Committee.
    - Recommendation: Critical self-reflection is very important to the planning and management of programs and to strengthening the clarity and transparency of outcomes. We encourage HRD to continue to engage in critical self-reflection.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the performance of the Division or its programs.

    - We applaud the efforts of HRD – including the huge impact programs such as LSAMP and ADVANCE have had on broadening participation.
    - HRD has been a resource for NSF-wide programs, and we applaud that HRD provides broadening participation expertise to other divisions, provides suggestions for reviewers with appropriate expertise, and provides opportunities for joint funding across NSF and other agencies, both inside and outside the government.
    - The proportion of the population from minority groups is expected to grow, while the total population of working-age adults does not continue to grow. The success of minority groups in STEM will be central to our success as a nation. Therefore, we will soon face challenges as a nation to conduct, apply, and implement research on how to best educate and employ historically underrepresented demographic groups. It cannot be overemphasized that the time for investment in research, policy, and practice about broadening participation is now. This is because the demographic change is taking place quickly, yet making the necessary structural transformations to respond to this change is likely to take longer.

- Recommendation: There is concern that budgets are flat but the number of Minority-Serving Institutions that are eligible for programs such as CREST is increasing. There needs to be general and broad recognition that the growth of the Latino sector of our population is huge and that engaging that sector in STEM is a national imperative.
- Recommendation: NSF needs to intensify and accelerate broadening participation as a priority across all divisions, with HRD underscoring its leadership role, developing and validating new models and strategies, and moving things forward.
- Recommendation: The agency is strongly encouraged to stay up-to-date and ensure consistency across the Foundation regarding appropriate terminology in reference to various social identities. For example, indigenous people of Alaska are called Alaska Natives, not Alaskan Natives, and this particular terminology was noted incorrectly across eJacket, the eJacket COV Module, forms, and solicitation documents – with the exception of the TCUP, CREST, and AGEP solicitations.
- Recommendation: NSF should better articulate the focus on the role of and intersectionality between multiple identities in STEM success, including the identities of race and disability, as well as gender. We believe that it is important to make sure that the inclusion of particular dimensions does not get "lost" when it is assumed that these dimensions are embedded in different programs.
- Recommendation: The other directorates should be encouraged to propose strategies to achieve the inclusive participation that NSF advocates.
- Recommendation: Provide incentives for program officers to be more involved in proposal development – perhaps webinars devoted to sharing information on successes of other efforts, best practices that may be adapted to proposed projects, and resources to assist in proposal implementation.
- Recommendation: Perhaps each of the program solicitations should require plans for institutionalization and sustainability of projects – next steps – so that a project would not be a one-time, short-term activity of an individual investigator.

4. Please provide comments about major gaps or significant overlaps among the programs in the Division.

    - We did not find any overlaps; although we did identify areas/gaps that should be strengthened, particularly: community college engagement, support for students and faculty with disabilities, and the advancement of URM faculty of color, especially women, in different institution types, including Minority-Serving and Predominantly White Institutions.

5. Please provide suggestions and comments on the approach and methods (presented during the overview of programs) for assessing the impacts of HRD programs using CREST as a pilot for the study.

    - Both HRD and NSF as a whole need to continue and accelerate the use of analytics to research the impact of programs and demonstrate the results of investments; we applaud the "Deep Dive" effort.
    - The CREST pilot is a good start at mining the extensive data that NSF has collected in years of annual and final reports from projects funded via these programs.
    - We feel that understanding the participation of MSIs in multiple programs is of particular importance. For example, one could ask: If an institution develops a successful undergraduate program, is it more likely to then go on to develop a graduate program?

    - Recommendation: We recommend making data sets more available to the public.
    - Recommendation: Let conceptualization of goals drive data collection and analysis and subsequent assessment of progress toward goals.

- Recommendation: Be explicit about how knowledge is transferred across programs and projects, as well as across the Foundation. We encourage NSF to continue to generate data and disseminate information broadly to show results and drive knowledge generation and sharing initiatives.
- Recommendation: Ensure a careful linkage between ongoing data analytics efforts, division goals, and anticipated outcomes.
- Recommendation: Take steps to align logic models and program monitoring data systems – ensuring that measurable outputs and outcomes are clearly articulated in each and that there is a careful alignment of identified problems/situations with activities and outcomes.
- Recommendation: Take steps to improve grantee compliance with changes to data monitoring systems by being more explicit in solicitations regarding what is expected from a data collection standard point and by making sure to follow up on the data management plans included within the proposals.

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

- HRD personnel have done a tremendous job maximizing the impact of each program's budget, despite inadequate budgets and heavy workloads.
- The COV commends HRD for its pilot study because we are at a critical time where we need to identify what has been accomplished to date and what has worked well, for whom, and in what context. That data is critical to these questions and scaling up efforts that work.

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

- This COV supports the use of division-wide rather than program-specific COVs, as division-wide COVs enable the review of individual programs and also allow the review of the portfolio of programs across the entire division, build coherence, and provide the opportunity to align individual programs more directly to the strategic objectives of EHR and the Foundation at large. The advantage of the HRD-wide COV is the overall picture it gives us and the synergies, themes and holes that are identified. However, a downside of the HRD-wide COV is the limited attention that can be paid to the individual programs and the dependence of the COV on the previous experience individual COV members have with each of the individual programs.
- All of the materials provided were very useful, especially the management plans and cheat sheet.
    - Consider presenting data and information in a more user-friendly format.
    - The table "Define the need – address the challenge" was very helpful – we could imagine this being much more detailed to assist COV members in visualizing the coverage of the different programs.
- It was very difficult to find data and information required to answer some of the questions. The data sources noted for individual questions within the annotated COV Report Template did not always match the data file names. We recommend that the guidance in the template be revised to reflect the locations and names of documents in the eJacket COV Module.
- The step-by-step instructions regarding what to read first, second, etc., were extremely helpful.
- It would be helpful to receive a 5 or 10 minute overview of each of the programs up front.
- Ensure that each COV has a member of the target group on the committee to represent that group (maybe a professional society committee chair, vendor, think tank or the like) and to learn more about the attractiveness of the programs to the targeted group.

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SIGNATURE BLOCK:

Francisco C. Rodriguez
Chair

For the Committee of Visitors for the Division of Human Resource Development