FY 2014 STRATEGIC OBJECTIVE PROGRESS UPDATES

In FY 2014, the National Science Foundation conducted seven Strategic Reviews in response to the requirement of the GPRA Modernization Act 2010 Section 1116(f). This section summarizes the actions that NSF plans to take in response to the Strategic Review recommendations.

Of the 26 recommended actions, 16 are planned to be implemented in the near-term (FY 2014 - FY 2015). An additional seven recommendations may be implemented in future years. The remaining three actions were determined to not be priorities for NSF, and there are no plans to take action on these recommendations.

Strategic Objective Progress Updates

Goal 1: Transform the Frontiers of Science and Engineering.
Objective 1: Invest in fundamental research to ensure significant continuing advances across NSF science, engineering, and education.

NSF has determined that performance towards this Objective is making noteworthy progress.

The Strategic Review for Goal 1/Objective 1 focused on the question of whether NSF has adequate mechanisms to fund interdisciplinary research (IDR) and potentially transformative research (PTR). Seven "Opportunities for Action or Improvement" were highlighted in the Summary of Findings. The working group for this strategic review noted that NSF currently has effective funding mechanisms in place, but existing mechanisms might not be employed uniformly across the Foundation. The first four recommended actions involve strengthening existing mechanisms to fund IDR and PTR by encouraging program directors to use existing mechanisms and providing them with the tools to co-review interdisciplinary proposals.

1. Reinforce NSF commitment to IDR in internal and external communications to ensure that IDR is viewed positively.
2. Increase transparency in incentives, such as through venture funds for jointly funded proposals, to increase the investments in interdisciplinary research through the core programs.
3. Recognize programs and program directors for supporting IDR and PTR.
4. Modify NSF e-business systems and processes to allow for IDR complexity. (Note: This was a performance goal in FY 2013 that was unmet.)

Because these recommendations affect all directorates at NSF, the Office of Integrative Activities (OIA) will provide leadership in prioritizing actions and developing plans for implementation through either the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) working group or other cross-foundation working groups. Implementation plans will be shared with the Senior Management Round Table in FY 2015.

The other three recommended actions involve the evaluation of IDR and PTR mechanisms:

5. Assess the impact of PTR funding across NSF through formal studies.
6. Assess PTR mechanisms, such as EArly Concept Grants for Exploratory Research (EAGERs) and Ideas Labs, which have been used for several years, but have not been assessed yet. A formative evaluation for INSPIRE has been initiated.
7. Institute an external retrospective study that compares the predicted transformative potential (from reviews and panel summaries) of awards and declines from 5-10 years ago with the actual outcomes.

In addition to the formative evaluation of INSPIRE, the Evaluation and Assessment Capability (EAC) in OIA will initiate feasibility studies for the evaluation of other mechanisms in FY 2016.

Strategic Goal 1: Transform the Frontiers of Science and Engineering.
Strategic Objective 2: Integrate education and research to support development of a diverse STEM workforce with cutting-edge capabilities.

Implicit in wording of this strategic objective is the assumption that there is a shared understanding of what "integrate education and research" means and, further, that integration increases diversity and quality in science and engineering. The Strategic Review for Goal 1/Objective 2 focused on examining these assumptions to understand the implications for achieving the objective. The following "Opportunity for Action or Improvement" was highlighted in the Summary of Findings:

> Convene a symposium on "Integration of Research and Education" to synthesize evidence relevant to the proposed theories of change, identify gaps in understanding, and develop a research agenda to determine ways to most effectively develop both a diverse and excellent workforce.

To address this recommendation, NSF will host an internal workshop in Q2 of FY 2015 to explore the multiple interpretations of the phrase "integration of education and research." The Division of Undergraduate Education in the Directorate for Education and Human Resources will take the lead in planning the workshop in collaboration with the Directorate for Geosciences. AAAS fellows will assist with workshop organization and efforts to fully engage all NSF directorates in this exploration.

Strategic Goal 1: Transform the Frontiers of Science and Engineering.
Strategic Objective 3: Provide world-class research infrastructure to enable major scientific advances.

The Strategic Review of Goal 1/Objective 3 examined whether NSF has adequate mechanisms to determine if our investments in large facilities enable major scientific advances. The review also investigated whether current resources are adequate to support NSF facilities. The following "Opportunity for Action or Improvement" was highlighted in the Summary of Findings:

> Evaluate the current and future resource and structural needs within the Foundation to successfully support its facilities. The increasing level of complexity of the facility programs that the NSF funds, as well as the recognition that the Foundation is changing the overall planning for the lifecycle of facilities, point to the time being ripe for the Foundation to address this issue.

The Large Facilities Office is facilitating the evaluation of the resource and structural needs within the Foundation to successfully support large, multi-user facilities through all life cycle stages. The first step will be a revision of the Large Facilities Manual (LFM) to update internal processes and procedures, clarify roles and responsibilities, and develop a standard terminology related to large facilities. Two important structural changes being implemented immediately are (1) formation of the Large Facilities Working Group (LFWG) for review of documentation and discussion of issues related to large facilities, and (2) transition to the Integrated Project Team (IPT) approach for better internal coordination of assurance and oversight responsibilities. All changes have been initiated in Q4 of FY 2014, and substantial progress is expected by mid-FY 2015.

Strategic Goal 2: Stimulate innovation and address societal needs through research and education.
Strategic Objective 1: Strengthen the links between fundamental research and societal needs through investments and partnerships.

NSF has determined that performance towards this Objective is making noteworthy progress.

The strategic review for Goal 2/Objective 1 focused on linking knowledge and practice. The review examined the current conventional wisdom for knowledge transfer, the various models and mechanisms available within NSF to link knowledge to practice, and identified gaps between what is needed and what NSF is currently doing to catalyze knowledge transfer. Three "Opportunities for Action or Improvement" were highlighted in the summary of findings:

1. Study new and emerging intellectual property (IP) practices, and disseminate the results in order to stimulate innovative thinking in IP management;
2. Study what outcome metrics would be realistic in collaborative research and licensing, and disseminate the results in order to help align the expectations between academe and industry; and
3. Convene a workshop to brainstorm how to further cultivate innovative thinking and entrepreneurship among students (building on NSF Innovation Corps (I-Corps™) successes), and what new models of education are emerging or will be appropriate. The ultimate goal is to cultivate industry-relevant skills and the mentality for technology commercialization among students.

The Directorate for Engineering will take the lead in addressing the first and third recommendations from this strategic review. In FY 2015, NSF will co-sponsor a national town hall meeting with the University-Industry Demonstration Partnership to disseminate IP best practices among universities to address the first recommendation. To address the third recommendation, NSF will convene the National Innovation Network (NIN) workshop in June of 2015. The workshop will include a review of the training, resource/tool development, and research efforts of the I-Corps™ Nodes and Sites to identify and develop promising ideas that can generate value and enhance the innovation capacity/ecosystem of the Nation. The second recommendation was determined to be beyond the scope of NSF's influence and will not be implemented.

Strategic Goal 2: Stimulate innovation and address societal needs through research and education.
Strategic Objective 2: Build the capacity of the Nation to address societal challenges using a suite of formal, informal, and broadly available STEM educational mechanisms.

The Strategic Review of Strategic Goal 2/Objective 2 examined whether NSF conveys its role in addressing societal challenges and promotes awareness of those challenges through STEM education mechanisms. It also investigated whether NSF has appropriate mechanisms to increase the capacity of STEM professionals to communicate, disseminate, and/or engage others in their research and education endeavors. The following "Opportunities for Action or Improvement" were highlighted in the Summary of Findings:

1. Develop and implement data collection on impact metrics with respect to NSF-developed communications.
2. Assess the quality of the proposal responses to the revised elements of the broader impacts criterion.
3. Conduct a cross-project, thematic evaluation of awards focused on professional development for STEM researchers to communicate, disseminate and/or engage others in their research and education endeavors.
4. Assess the impact of the "Becoming the Messenger" training and consider means to expand the program, if appropriate.
5. Consider strategies to facilitate coordinated broader impacts efforts above the project level.

Three of these recommendations were determined to be priorities in the near-term. The Office of Legislative and Public Affairs (OLPA) is in the process of identifying metrics and implementing a data collection to address the first recommendation. The EAC in OIA will lead the effort to assess the quality of the proposal responses to the revised elements of the broader impacts criterion and the actual consecution of those funded activities. The Directorate for Education and Human Resources (EHR) will address the last recommendation as part of the Improving Undergraduate STEM Education (IUSE) activity. As a first step, a portfolio analysis of the broader impacts/education and public outreach/diversity activities of a selected set of NSF-funded centers, major facilities, and infrastructure projects will be conducted to determine the range and types of activity focused on the level of undergraduate education. The third recommendation was determined to not be a priority in the near term because the number of awards that fund professional development to communicate research is too small to warrant the investment. The fourth recommendation was also deprioritized because there are no immediate plans to continue the "Becoming the Messenger" training or expand the program.

Strategic Goal 3: Excel as a Federal Science Agency.
Strategic Objective 1: Build an increasingly diverse, engaged, and high performing workforce by fostering excellence in recruitment, training, leadership, and management of human capital.

NSF has highlighted this Objective as a focus area for improvement.

The strategic review for Goal 3/Objective 1 addressed the following four questions:

- What are the recruitment, training, leadership, and management strategies to build the diverse, engaged, and high performing workforce needed to excel as a scientific agency?
- How do we realize the full benefits of synergy among diversity, inclusion, and engagement in nurturing a high performing workforce?
- How does NSF's workforce structure influence NSF's pursuit of a high performing organization that is diverse and engaged?
- What actions within agency control will have greatest positive impact on a diverse, engaged, and high performing workforce during and after the transition to Alexandria?

Five "Opportunities for Action or Improvement" were highlighted in the Summary of Findings:

1. Create the underlying logic models for how strategies related to recruitment, training, leadership, and human capital management influence building an increasingly diverse, engaged, and high performing workforce, with particular attention to interdependencies of strategies and outcomes.
2. Identify indicators of progress for a "diverse, engaged, and high performing" workforce and the data sources for establishing baselines and measuring progress.
3. Structure the developing human capital dashboard to make data and information on key indicators accessible to decision makers at a glance and enable deep dives for targeted action.
4. Use short "pulse" surveys, focus groups, and other mechanisms to understand what it will take to retain at least 70 percent of NSF's current permanent staff through the transition to Alexandria. Prioritize actions and strategies based on the result.
5. Create explicit strategies to replace both the rotator population and retirements anticipated between now and 2016.

The Division of Human Resources has focused near-term activities on actions two through five. The developing human capital dashboard mentioned in action 3 is being built around key issues of immediate importance (relevant to actions 4 and 5) as well as indicators of diversity, engagement, workforce

performance, recruitment/hiring, training and professional development, leadership, and broad initiatives in human capital management.

The implementation of a set of high-priority explicit strategies to retain at least 70 percent of NSF's current permanent staff through the transition to a new headquarters location, and to replace both the rotator population and retirements anticipated between now and then will address recommendations four and five. These strategies will be largely developed through the use of short "pulse" surveys, focus groups, and other mechanisms during FY 2016. Strategies to be developed will include a mix of workforce planning; recruitment and hiring, and retention strategies, such as action planning and implementation for employee engagement and diversity and inclusion; and improvements to performance management systems.

Strategic Goal 3: Excel as a Scientific Federal Agency.
Strategic Objective 2: Use effective methods and innovative solutions to achieve excellence in accomplishing the agency's mission.

The Strategic Review of Goal 3/Objective 2 examined the following four questions:

- What can organizational theory tell us about the strengths and weaknesses of NSF's structure and culture?
- What is the NSF management model and how does it affect our ability to use effective business methods and innovative solutions to achieve excellence in accomplishing the agency's mission?
- Is there evidence that our culture results in efficiency or inefficiency?
- What can we learn from similar organizations that achieve organizational excellence?

The following "Opportunities for Action or Improvement" were highlighted in the Summary of Findings:

1. Implement a cultural assessment, using evidence-based survey tools, with the goal of identifying our organizational strengths and opportunities for improvement. The results of the cultural assessment will be reviewed in the context of the results of the Federal Employee Viewpoint Survey to describe actionable objectives towards agency excellence.
2. Institutionalize an assessment process with the goal of identifying strategic issues and potential solutions. An effective, but minimally burdensome approach could be to identify actions through the cultural assessment and representative case studies and then use a Strengths Weaknesses Opportunities & Threats (SWOT) analysis with stakeholders from across the Foundation.
3. Assess NSF's approach to the use of working groups against the academic literature to determine if it is using a governance model with an unambiguous decision structure that fully leverages the strength and flexibility of these collaborative teams.
4. Identify other agencies who achieve their mission though the award of grants to determine: what, if any self-analysis they may have done; what strategic challenges they identified; if their strategic challenges are consistent with NSF's; and if NSF can leverage their experiences and opportunities for improvement.

The recommendation that was considered to be the highest priority and a necessary first step is the implementation of a formal cultural assessment to document NSF's organizational culture, identify the culture's impact on the agency's business methods, and provide insight into opportunities for improved business operations. The results of the assessment may also serve as a means to address issues described in the Federal Employee Viewpoint Survey. The following actions, some predicate to initiating the cultural assessment and others subsequent to its completion, will be undertaken so that the results can be fully leveraged:

- Develop an "ideal" agency cultural profile using input from NSF senior leadership and peer-to-peer benchmarking with one or more federal science agencies.
- Mine the results of the most recent Federal Employee Viewpoint Survey for a fuller agency perspective on agency current state and opportunities for improvement.
- Compare the results of the NSF cultural assessment against the ideal agency cultural profile; identify opportunities for greater alignment with the ideal; and, develop a corresponding action plan to achieve alignment.
- Institutionalize a recurring process to assess NSF progress toward alignment against the ideal benchmark.

The Office of Budget, Finance, and Award Management (BFA) in collaboration with the Directorate for Social, Behavioral and Economic Sciences (SBE) will lead the effort.

Implementation of the remaining recommendations will be considered in FY 2016 following the cultural assessment. The third recommendation, to assess the use of working groups, is considered to be a high priority action that could significantly improve efficiency of work flow at NSF.

Summary table of actions to be taken.

Strategic Goal/Obj.	Action	Status of Proposed Action	Lead Org.
G1/01	Reinforce NSF commitment to IDR in internal and external communications to ensure that IDR is viewed positively.	OIA will lead efforts to prioritize actions and determine what steps should be taken in the near term to implement those that are determined to be priorities.	OD/OIA
G1/01	Increase transparency in incentives, such as through venture funds for jointly funded proposals, to increase the investments in interdisciplinary research through the core programs.		
G1/01	Recognize programs and program directors for supporting IDR and PTR.		
G1/01	Modify NSF e-business systems and processes to allow for IDR complexity.	Planning is underway in the INSPIRE working group.	OD/OIA CPIC, DIS
G1/01	Assess the impact of PTR funding across NSF through formal studies.	The Evaluation and Assessment Capability (EAC) will initiate an external evaluation of the impact achieved by different funding mechanisms used to identify and fund interdisciplinary and potentially transformative research, including core programs.	OD/OIA
G1/01	Assess PTR mechanisms, such as EAGERs and Ideas Labs, which have been used for several years, but have not been assessed yet. A formative evaluation for INSPIRE has been initiated.		
G1/01	Institute an external retrospective study that compares the predicted transformative potential (from reviews and panel summaries) of awards and declines from 5-10 years ago with the actual outcomes.		
G1/02	Convene a symposium on "Integration of Research and Education" to synthesize evidence relevant to the proposed theories of change, identify gaps in understanding, and develop a research agenda to determine ways to most effectively develop both a diverse and excellent workforce.	NSF will host an internal workshop in Q2 of FY 2015 to explore the multiple interpretations of the phrase "integration of education and research."	EHR/DUE with GEO

Strategic Goal/Obj.	Action	Status of Proposed Action	Lead Org.
G1/03	Evaluate the current and future resource and structural needs within the Foundation to successfully support its facilities. The increasing level of complexity of the facility programs that the NSF funds, as well as the recognition that the Foundation is changing the overall planning for the lifecycle of facilities, point to the time being ripe for the Foundation to address this issue.	The Large Facilities Office (LFO) will play a key role in implementing this reco-mmendation through a revision of the Large Facilities Manual, the formation of a "Large Facilities Working Group", and the transition to the "Integrated Project Team" approach for better internal coordination of assurance and oversight responsibilities.	BFA/LFO
G2/01	Study new and emerging IP practices, and disseminate the results in order to stimulate innovative thinking in IP management.	In FY 2015 NSF will co-sponsor a national town hall meeting with the University-Industry Demonstration Partnership to disseminate IP best practices among universities.	ENG
G2/01	Study what outcome metrics would be realistic in collaborative research and licensing, and disseminate the results in order to help align the expectations between academe and industry.	This recommendation has been determined to be beyond the scope of NSF's influence.	ENG
G2/01	Convene a workshop to brainstorm how to further cultivate innovative thinking and entrepreneurship among students (building on NSF I-Corps™ successes), and what new models of education are emerging or will be appropriate. The ultimate goal is to cultivate industry-relevant skills and the mentality for technology comm-ercialization among students.	NSF will convene the National Innovation Network (NIN) workshop in June of 2015. The workshop will include a review of the training, resource/tool development, and research efforts of the I-Corps™ Nodes and Sites to identify and develop promising ideas that can generate value and enhance the innovation capacity and ecosystem of the Nation.	ENG
G2/02	Develop and implement data collection on impact metrics with respect to NSF-developed communications.	Efforts are underway to identify metrics and implement a data collection.	OLPA
G2/02	Assess the quality of the proposal responses to the revised elements of the broader impacts criterion.	OIA will conduct an assessment of the quality of the proposal responses to the revised elements of the broader impacts criterion and the actual consecution of those funded activities.	OD/OIA

Strategic Goal/Obj.	Action	Status of Proposed Action	Lead Org.
G2/02	Conduct a cross-project, thematic evaluation of awards focused on professional development for STEM researchers to comm-unicate, disseminate, and/or engage others in their research and education endeavors.	This recommendation has been de-prioritized because the number of awards that fund professional development to communicate research is too small to warrant the investment in an evaluation.	N/A
G2/02	Assess the impact of the "Becoming the Messenger" training and consider means to expand the program, if appropriate.	This recommendation was deprioritized because OLPA will not be continuing "Becoming the Messenger" in the near-term.	OLPA
G2/02	Consider strategies to facilitate coordinated broader impacts efforts above the project level.	In FY 2015- FY 2016, as part of the IUSE activity, NSF will conduct a portfolio analysis of all of the broader impacts/education and public outreach/diversity ac-tivities of a selected set of NSF-funded centers, major facilities, and infrastructure projects to determine the range and types of activity focused at the level of undergraduates or undergraduate education.	EHR, IUSE working group
G3/01	Create the underlying logic models for how strategies related to recruitment, training, leadership, and human capital management influence building an increasingly diverse, engaged, and high performing workforce, with particular attention to inter-dependencies of strategies and outcomes.	These actions are expected to be taken in FY 2015 and FY 2016 following strategy development.	OIRM/HRM
G3/01	Identify indicators of progress for a "diverse, engaged, and high performing" workforce and the data sources for establishing baselines and measuring progress.		

Strategic Goal/Obj.	Action	Status of Proposed Action	Lead Org.
G3/01	Structure the developing human capital dashboard to make data and information on key indicators accessible to decision makers at a glance and enable deep dives for targeted action.	Actions associated with this recommendation are underway. A mock-up for the dashboard structure is complete as a static presentation. Current efforts are targeted at making the dashboard more interactive and adding additional information, such as Employee Viewpoint Survey data.	OIRM/HRM
G3/01	Use short "pulse" surveys, focus groups, and other mechanisms to understand what it will take to retain at least 70 percent of NSF's current permanent staff through the transition to Alexandria. Prioritize actions and strategies based on the result.	Outreach activities have begun to identify specific actions and strategies. Strategies to be developed will include a mix of workforce planning, recruitment, hiring and retention strategies (action planning for employee engagement, diversity and inclusion) and improvements to performance management systems.	OIRM/HRM
G3/01	Create explicit strategies to replace both the rotator population and retirements anticipated between now and 2016.		
G3/02	Implement a cultural assessment, using evidence-based survey tools, with the goal of identifying our organizational strengths and opportunities for improvement. The results of the cultural assessment will be reviewed in the context of the results of the Federal Employee Viewpoint Survey to describe actionable objectives towards agency excellence.	NSF will contract for services to support this undertaking.	SBE/BFA
G3/02	Institutionalize an assessment process with the goal of identifying strategic issues and potential solutions. An effective, but minimally burdensome approach could be to identify actions through the cultural assessment and representative case studies and then use a Strengths Weaknesses Opportunities & Threats (SWOT) analysis with stakeholders from across the Foundation.	Implementation in FY 2016 contingent on the results of the cultural assessment and the working group assessment.	BFA

Strategic Goal/Obj.	Action	Status of Proposed Action	Lead Org.
G3/02	Assess NSF's approach to the use of working groups against the academic literature to determine if it is using a governance model with an unambiguous decision structure that fully leverages the strength and flexibility of these collaborative teams.	Implementation in FY 2016 following the analysis of the cultural assessment.	SBE/BFA
G3/02	Identify other agencies who achieve their mission through the awarding of grants. The objectives would be to determine: what, if any self-analysis they may have done; what strategic challenges they identified; if their strategic challenges are consistent with NSF's; and if NSF can leverage their experiences and opportunities for improvement.	Implementation in FY 2016 contingent on the results of the cultural assessment and the working group assessment.	BFA