



National Science Foundation  
WHERE DISCOVERIES BEGIN

## National Science Foundation

### Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART) Performance Measurement Validation and Verification

FY 2006 Final Report



October 23, 2006

The IBM logo, consisting of the letters 'IBM' in a bold, sans-serif font, with horizontal stripes through the letters, set against a black rectangular background.

## 1 Executive Summary

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The National Science Foundation (NSF or the Foundation), as a federal agency, is subject to the performance reporting requirements of the Government Performance and Results Act (GPRA). In addition, NSF measures its programmatic performance using the Office of Management and Budget's Program Assessment Rating Tool (PART). These performance reporting requirements hold Federal agencies accountable for providing detailed information on their progress in meeting performance objectives. Accordingly, NSF measures itself against a series of GPRA and PART goals to help the agency achieve its mission and objectives.

Government Accountability Office (GAO) auditing standards require Federal agencies to provide confidence that the policies and procedures underlying performance reporting are complete, accurate, and consistent. As such, NSF asked IBM Global Business Services to assess the validity of the data and reported results of its performance goals and to verify the reliability of the methods used to collect, process, maintain and report data for these performance measurement goals and objectives.<sup>1</sup> In this report, we detail the results of our review of NSF's GPRA and PART processes and results for FY 2006. We conducted a preliminary review after the third quarter and the formal review after the end of the fiscal year.

NSF measures its annual performance against the four Strategic Outcome Goals of Ideas, Tools, People, and Organizational Excellence and 22 other performance goals. As of the end of FY 2006, we were able to verify the reliability of the processes and validate the accuracy of all four Strategic Outcome Goals as well as 21 of the 22 annual performance goals. Although we were able to only partially verify the reliability of the process for the remaining goal, we believe that NSF's reported outcome for this goal is consistent with the data collected.

Based on this comprehensive review, IBM has confidence in the systems, policies, and procedures used by NSF to generate the described performance measures. We strongly believe that NSF continues to take concerted steps to improve the quality of their systems and data on a yearly basis.

### 1.1 Assessment Approach

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The 26 goals fall under two main categories of review; quantitative goals under either first time review or updated review and qualitative goals receiving an update review. We describe the assessment for each category as follows:

#### 1.1.1 Review of Quantitative GPRA/PART Goals

Our review of the processes and results consisted of the following actions:

- Assessed the accuracy of NSF's performance data and reported outcomes of performance goals and indicators
- Described the reliability of the processes NSF uses to collect, process, maintain, and report data
- Reviewed the system controls to confirm that quality input results in quality output
- Created detailed process descriptions and process maps for those goals being reviewed for the first time
- Identified changes to processes and data for those goals receiving an update review

We applied GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GGD-10.1.20) to guide our review. We did not consider the appropriateness of NSF's performance goals or indicators in our assessment of the validity

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<sup>1</sup> GAO defines "verification" as a means to check or test performance data in order to reduce the risk of using data that contains significant errors. GAO defines "validation" as a way to test data to ensure that no error creates significant bias.

of NSF's reported results. Rather, our validation is based strictly on whether NSF achieved or did not achieve its performance goals based on the indicators established by NSF.

### 1.1.2 Update Review of Qualitative Strategic Outcome Goals and AC/GPA Process

A key component of NSF's assessment of its Strategic Outcome Goals (Ideas, Tools, People, and Organizational Excellence) is the Advisory Committee for GPRA Performance Assessment (AC/GPA), a group of independent experts who meet annually to review NSF's performance and advise the NSF Director on the Foundation's achievement on a series of indicators associated with the Strategic Outcome Goals.

In our fourth year of assessing the AC/GPA process, we once again assessed and observed the process to verify and validate that the process is sufficiently reliable to yield a valid conclusion on NSF's achievement in its Strategic Outcomes. To provide for a thorough and complete assessment, NSF once again supplied us with unrestricted access to the AC/GPA meetings, performance information, NSF staff, and Committee members. Since the last AC/GPA meeting in FY 2005, NSF has implemented a number of improvements to the efficiency and quality of the process. Our assessment was based on a comprehensive review of the following actions:

- Evaluated the background information: NSF Five-Year Strategic Plan, FY 2006 NSF Budget, FY 2005 AC/GPA report, FY 2006 AC/GPA guidance and agenda, and supplemental information located on the AC/GPA website.
- Attended the Business and Operations Advisory Committee meeting.
- Attended the AC/GPA meeting: We observed the two-day AC/GPA meeting, June 22-23, 2006, including committee and subgroup sessions.
- Documented changes to the AC/GPA process: Based on our review of background information, observations of the AC/GPA meeting, and discussion with staff and committee members, we identified changes to the AC/GPA process from FY 2005.
- Assessed the AC/GPA process: We assessed the quality of the AC/GPA process, with particular focus on changes since FY 2005. Our assessment was based on a number of criteria, such as the quality of the performance information, documentation and transparency of the process, improvements made from last year, and the expertise and independence of the AC/GPA membership.
- Validated the AC/GPA performance assessment: Based on the quality of the AC/GPA processes, we reached a conclusion on the validity of the AC/GPA's assessment of NSF's performance against its Strategic Outcome Goals.

## 1.2 Results and Recommendations by Performance Goal

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At the end of FY 2006, we were able to verify the reliability of the AC/GPA process and performance data. Further, based on the strength of these processes, we validate the reasonableness of the AC/GPA's conclusion that NSF had demonstrated significant achievement in all the indicators for the Strategic Outcome Goals of Ideas, Tools, and People and the Merit Review indicator for the Organizational Excellence Goal.

Of the 22 other GPRA and PART performance goals we reviewed, we were able to verify the reliability of the processes and validate the accuracy or reasonableness of the results for 21 goals. We were able to partially verify the reliability of the process that NSF uses for the reporting of the remaining PART goal. For the majority of the reviewed goals, we can verify that NSF relies on sound business processes, system and application controls, and manual checks of system queries to produce valid and accurate results.

We summarize the results of our review for each performance goal in the following tables. In the "Process Verified" column, a "yes" indicates that we were able to verify the reliability of NSF's processes to collect, process, maintain and report data. In the "Validation" column, a "yes" indicates that we were able to validate the accuracy or

reasonableness of NSF's reported results for the corresponding performance goal. Finally, where appropriate, we also summarize any significant observations, recommendations or issues for consideration we determined through our review of each goal. The full results of our review are discussed in greater detail in the balance of this report.

Quantitative Performance Goals Reviewed for the First Time in FY 2006

Goal	Target	FY 2006 Q3 Result	FY 2006 Q4 Results	Process Verified	Results Validated	Comments
Percent of person-days planned for Antarctic research for which the program is able to provide the necessary research support.	Greater than 90%	No Results	91.1%	Yes - Partial	Yes	Mandatory submission of surveys by PIs Electronic submission of GPRA survey data into an NSF system Develop ability for NSF to recalculate/validate performance measure results
Percent of construction cost and schedule variances of major projects as monitored by Earned Value Management (EVM) for Polar facilities.	Less than 8%	No Results	13.4%	Yes	Yes	Weight the results for the three Polar projects based on a percentage of the total value
Percentage of Institutions proposals received from academic institutions not in the top 100 of NSF funding recipients.	73%	65.1%	64.8%	Yes	Yes	None
Dwell time for Institutions PART program.	70%	72.3%	74.1%	Yes	Yes	None
Percentage of Collaborations proposals received from academic institutions not in the top 100 of NSF funding recipients.	63%	57.9%	58.4%	Yes	Yes	None
Dwell time for Collaborations PART program.	70%	75%	77.7%	Yes	Yes	None
Percent of BE proposals with at least one female PI or co-PI for BE solicitation.	53%	No Results	32.5%	Yes	Yes	None
Percent of BE proposals with at least one minority PI or co-PI for BE solicitation.	17%	No Results	8.9%	Yes	Yes	None
Dwell time for BE PART program.	70%	No Results	99.3%	Yes	Yes	None

Quantitative Performance Goals Receiving an Update Review in FY 2006

Goal	Target	FY 2006 Q3 Result	FY 2006 Q4 Result	Process Verified	Results Validated	Comments
(Dwell Time) For 70% of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date	70%	80.8%	78.4%	Yes	Yes	None
Percent of construction acquisition and upgrade projects with negative cost and schedule variances of less than 10% of the approved project plan.	90%	No Results	73%	Yes	Yes	None
Percent of operational facilities that keep scheduled operating time lost to less than 10%	90%	No Results	95%	Yes	Yes	None
Number of applicants for GRF from groups that are underrepresented in the science and engineering workforce.	Increase from 1,014	No Results	929	Yes	Yes	None
Number of applications for CAREER awards from investigators at minority-serving institutions.	Increase from 93	110	232	Yes	Yes	None
Number of graduate students funded through fellowships or traineeships from GRF IGERT, or GK-12.	4,525	No Results	5,049	Yes	Yes	None
Dwell time for Individuals PART program.	70%	86.4%	85.5%	Yes	Yes	None
Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites.	12,500	15,401	20,374	Yes	Yes	None
Number of nodes that comprise infrastructure.	20	20	20	Yes	Yes	None
Dwell time for Nano PART program.	70%	80.6%	72.7%	Yes	Yes	None

Goal	Target	FY 2006 Q3 Result	FY 2006 Q4 Result	Process Verified	Results Validated	Comments
Percent of NS&E proposals with at least one female PI or co-PI.	25%	36.9%	36.0%	Yes	Yes	None
Percent of NS&E proposals with at least one minority PI or co-PI.	13%	13.3%	13.3%	Yes	Yes	None
Percent of NS&E proposals that are multi-investigator proposals.	75%	84.1%	84.0%	Yes	Yes	None

Strategic Outcome Goals and Indicators Receiving an Update Review in FY 2006

Goal	FY 2006 Q3 Result	FY 2006 Q4 Result	Process Verified	Results Validated	Comments
<p><b>Goal I: Ideas – Discovery across the frontier of science and engineering, connected to learning, innovation, and service to society</b></p> <ul style="list-style-type: none"> <li>▪ Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge</li> <li>▪ Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries</li> <li>▪ Foster connections between discoveries and their use in the service of society</li> <li>▪ Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities</li> <li>▪ Provide leadership in identifying and developing new research and education opportunities within and across science and engineering fields</li> <li>▪ Accelerate progress in selected science and engineering areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives</li> </ul>	Achieved	Achieved	Yes	Yes	None
<p><b>Goal T: Tools Goal – Broadly accessible, state-of-the-art science and engineering facilities, tools and other infrastructure that enable discovery, learning and innovation</b></p> <ul style="list-style-type: none"> <li>▪ Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art science and engineering facilities, tools, databases, and other infrastructure</li> <li>▪ Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms</li> <li>▪ Develop and deploy an advanced cyber-infrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation</li> <li>▪ Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation</li> <li>▪ Support research that advances instrument technology and leads to the development of next-generation research and education tools</li> </ul>	Achieved	Achieved	Yes	Yes	None

Goal	FY 2006 Q3 Result	FY 2006 Q4 Result	Process Verified	Results Validated	Comments
<p><b>Goal P: (People) – A diverse, competitive, and globally-engaging U.S. workforce of scientists, engineers, technologists and well-prepared citizens.</b></p> <ul style="list-style-type: none"> <li>▪ Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities</li> <li>▪ Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering workforce, including providing opportunities for international study, collaborations and partnerships</li> <li>▪ Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics</li> <li>▪ Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education</li> <li>▪ Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels</li> </ul>	Achieved	Achieved	Yes	Yes	None
<p><b>Goal O: Organizational Excellence Goal – An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices</b></p> <ul style="list-style-type: none"> <li>▪ Operate a credible, efficient merit review system</li> <li>▪ Utilize and sustain broad access to new and emerging technologies for business application</li> <li>▪ Develop a diverse, capable, motivated staff that operates with efficiency and integrity</li> <li>▪ Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness</li> </ul>	Achieved	Achieved	Yes	Yes	None

## 2 Introduction and Background

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In 1993, Congress passed GPRA to improve accountability and performance in the federal government. GPRA requires federal agencies to prepare five-year strategic plans that set the direction for their agencies and to develop annual performance plans that link daily managerial responsibilities to long-term strategic goals. Agencies must report annually on their success in meeting their annual performance goals. In 2002, the Office of Management and Budget (OMB) developed the PART process to provide a consistent approach to rating federal agency programs. Together, GPRA and PART serve to measure the performance of federal agencies and provide justification for annual budget requests.

Since NSF's mission is to fund long-term science and education research, it is impractical to link the outcome of their overall mission to their annual investment as the results may not yield an immediate return. Science and engineering research projects typically generate discoveries in an unrelated area, and it can take years to realize the impact of their discoveries. Assessing the impact of advances in science and engineering is inherently retrospective and is best performed using the qualitative judgment of experts.

NSF's goals are divided into two broad areas: overarching strategic outcome goals and annual performance goals. The long-term strategic outcome goals focus on Ideas, Tools, People, and Organizational Excellence and directly relate to the NSF Strategic Plan. Annual performance goals relate to the effectiveness of NSF activities and focus on procedures used to make awards, fund and manage capital projects, and otherwise provide services to customers.

U.S. GAO standards require a federal agency to "provide confidence that its performance information will be credible."<sup>2</sup> This report supports NSF's satisfaction of that requirement. We applied GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/GGD-10.1.20) to guide our verification and validation assessment. IBM was tasked to provide the following technical services:

- Assess whether NSF has provided sufficient information to permit an informed judgment by the reader of whether the performance data will be sufficiently free of bias and other significant error.
- Determine whether the verification and validation procedures and the data used by the agency are credible.

In this report, **Verification** entails assessing the reliability of the systems, processes and controls that underlie performance reporting. **Validation** entails recalculating or reconfirming performance results from the available data. Based on GAO guidance, we assessed whether NSF's processes to collect, process, maintain and report data meet the following criteria:

- Does the process provide for periodic review of collection, maintenance, and processing procedures to ensure they are consistently applied and continue to be adequate?
- Does the process provide for periodic sampling and review of data to ensure completeness, accuracy, and consistency?
- Does the process rely on independent audits or other established procedures for verifying and validating financial information when performance measures require the use of financial information?
- Does NSF address problems in verification and validation procedures, known to GAO or the agency?
- Does the agency recognize the potential impacts of data limitations should they exist?

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<sup>2</sup> GAO/GGD-10.1.20 Guide to Assessing Agency Annual Performance Plans

## 2.1 Scope

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Our assessment focused on specific NSF processes that support GPRA and PART reporting. This assessment was not an audit and, therefore, was not conducted in accordance with generally accepted government auditing standards. Rather, we followed GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/IGD-10.1.20) to conduct an independent verification and validation review of NSF's performance reporting processes and reported results as of the end of FY 2006. Specifically, this report:

- Defines performance goals and performance indicators.
- Assesses processes and procedures used to collect, process, maintain, and report on data used for the performance goals.
- Highlights procedural and organizational changes from FY 2005 to FY 2006.
- Describes steps management has taken to improve its processes and procedures.
- Validates the accuracy of NSF's reported results for its performance goals as of the third quarter (when available) and at the end of FY 2006.

We did not consider the appropriateness of NSF's performance goals or indicators in our assessment of the validity of NSF's reported results. Rather, our validation is based strictly on whether NSF achieved or did not achieve its performance goals based on the accuracy of the performance data and the reliability of NSF's processes. In accordance with GAO's assessment guide, we relied on previously conducted work and on agency sources to determine whether there were any known limitations with the data or data sources that would create doubt regarding the credibility of the information.

The FY 2006 goals under our review fall under three categories:

### 2.1.1 Quantitative Performance Goals Being Reviewed for the First Time in FY 2006

- Polar Goal: Percent of person-days planned for Antarctic research for which the program is able to provide the necessary research support.
- Polar Goal: Percent of construction cost and schedule variances of major projects as monitored by Earned Value Management for Polar Facilities.
- Research Institutions Goal: Percent of Institutions proposals received from academic institutions not in the top 100 of NSF funding recipients.
- Research Institutions Goal: Dwell time for Institutions PART Program.
- Research Collaborations Goal: Percent of Collaborations proposals received from academic institutions not in the top 100 of NSF funding recipients.
- Research Collaborations Goal: Dwell time for Collaborations PART Program.
- BE Goal: Percent of Bio-Complexity in the Environment (BE) proposals with at least one female PI or co-PI for BE solicitation.
- BE Goal: Percent of Bio-Complexity in the Environment (BE) proposals with at least one minority PI or co-PI for BE solicitation.
- BE Goal: Dwell time for BE PART Program.

### 2.1.2 Quantitative Performance Goals Receiving a Limited Update Review

- NSF Goal: (Dwell Time) For 70 percent of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date, or receipt date, whichever is later.

- Facilities Goal: Percent of construction, acquisition, and upgrade projects with negative cost and schedule variances of less than 10 percent of the approved project plan.
- Facilities Goal: Percent of operational facilities that keep scheduled operating time lost to less than 10%.
- Individuals Research Goal: Number of applicants for Graduate Research Fellowships (GRF) from groups that are underrepresented in the science and engineering workforce.
- Individuals Research Goal: Number of applicants for CAREER awards from investigators at minority-serving institutions (MSIs).
- Individuals Research Goal: Number of graduate students funded through fellowships or traineeships from Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeships (IGERT), or Graduate Teaching Fellowships (GK-12).
- Individuals Research Goal: Dwell time for Individuals PART Program.
- NS&E Goal: Percent of NS&E proposals with at least one female PI or Co-PI.
- NS&E Goal: Percent of NS&E proposals with at least one minority PI or Co-PI.
- NS&E Goal: Percent of NS&E proposals that are multi-investigator proposals.
- NS&E Goal: Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites.
- NS&E Goal: Number of nodes that comprise infrastructure.
- NS&E Goal: Dwell time for Nano PART Program.

### **2.1.3 Qualitative Strategic Outcome Goals and Indicators Receiving an Update Review**

- Ideas—enabling discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.
  - Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge.
  - Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries.
  - Foster connections between discoveries and their use in the service of society.
  - Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities.
  - Provide leadership in identifying and developing new research and education opportunities within and across science and engineering fields.
  - Accelerate progress in selected science and engineering areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives.
  - Support innovative research on learning and teaching that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels.
- Tools—providing broadly accessible, state-of-the-art science and engineering facilities, tools and other infrastructure that enable discovery, learning and innovation.
  - Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art science and engineering facilities, tools, databases, and other infrastructure.

- Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms.
- Develop and deploy an advanced cyber infrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation.
- Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.
- Support research that advances instrument technology and leads to the development of next-generation research and education tools.
- People—providing a diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.
  - Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities.
  - Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering workforce, including providing opportunities for international study, collaborations and partnerships.
  - Develop the Nation’s capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics.
  - Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education.
- Organizational Excellence—providing an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.
  - Merit Review: Operate a credible, efficient merit review system.
  - Human Capital Management: Develop a diverse, capable, motivated staff that operates with efficiency and integrity.
  - Technology-enabled Business Processes: Utilize and sustain broad access to new and emerging technologies for business application.
  - Performance Assessment: Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF’s intellectual investments as well as its management effectiveness.

## 2.2 Approach

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We followed a multi-step approach to determine if NSF has sufficient processes and procedures in place to validate and verify its performance. We tailored our approach to each category of goals and treated them as three unique tasks.

### 2.2.1 New Review of FY 2006 Quantitative Goals

We assessed the processes, data and systems of nine quantitative goals<sup>3</sup>, which we reviewed for the first time in FY 2006. We performed the following steps to complete the verification and validation review:

- **Confirmed performance measure definitions.** To understand how NSF determines the outcome of its performance goals, we first confirmed specific definitions of terms used in the performance measures and indicators and the intent of the measures themselves. We documented this information in our report as a baseline to assess NSF's validation and verification procedures.
- **Documented "as-is" process.** We developed an understanding of the processes that NSF uses to compile performance measurement data. We interviewed NSF staff and read policies and procedures when available. We included both manual and electronic means of data collection in our review. We conducted our review based on four components identified by GAO as necessary to compute and report any performance measure:
  1. Collect performance data: the tasks yielding calculated and measured data.
  2. Process the measure: the tasks to derive or calculate the measure.
  3. Maintain performance results: the tasks to record and store performance measurement results.
  4. Report performance results: the tasks to report results.

We documented each of these phases for each of the measures. The descriptions of these processes are located in the "Process Description" section for each goal. We used process maps, which can be found in the Appendix of this report, to document the current environment.

- **Assess the quality of the policies and procedures used to develop the measures.** We assessed the policies and procedures NSF uses to compile its performance data to determine if they are sufficiently designed and implemented to yield performance measures that are free of significant errors. Specifically, we evaluated whether or not the policies and procedures:
  1. Provide for periodic review of data collection, maintenance, and processing procedures by NSF to confirm that they are consistently applied and continue to be adequate.
  2. Provide for periodic sampling and review of data to confirm completeness, accuracy, and consistency.
  3. Rely on independent audits or other established procedures for verifying and validating financial information when performance measures use financial information.
  4. Address problems in validation and verification known to NSF.

We identified and documented limitations in the process that could affect the accuracy of the data in the "Data Limitations" section for each goal. In the "Observations, Recommendations, and Conclusions" section for each

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<sup>3</sup> Three of the quantitative goals contained a qualitative component, related to the effectiveness of NSF's merit review system, which was evaluated separately by the AC/GPA. We validated the results for this qualitative component as part of our review of the AC/GPA process and Strategic Outcome Goals.

goal, we document any internal controls NSF has instituted to assure data accuracy and, if applicable, opportunities for improvement. We also document our final assessment of each goal under review based on the NSF defined performance indicators.

- **Reviewed system aspects of data quality.** We reviewed information system controls to confirm data quality. We reviewed system algorithms that were used to calculate the measures and the procedures NSF used to confirm that the data in the system was current. We include our review in the “System Aspects of Data Quality” section.
- **Validated and verified FY 2006 measures.** After we documented the processes, we assessed whether the policies and procedures are sufficient to yield valid and verifiable results. When possible, we recalculated NSF’s performance results for accuracy.<sup>4</sup> In other cases, we sampled data to determine whether internal processes are reliable to yield accurate numbers. We used both methods where possible. We included the results of our verification and validation in the “Verification and Validation Results” section for each goal.

## 2.2.2 Update Review of FY 2006 Quantitative Goals

In FY 2006, there were 13 quantitative goals<sup>5</sup> which involved data sources, systems and processes that we had reviewed in prior years. For these goals, NSF requested a limited “update” review to identify changes and improvements to the data and/or processes since our last review. We assessed the inputs, computations and outputs and recalculated or reconfirmed the results. Specifically, our review consisted of:

- **Documentation of changes:** We documented changes to the definitions, processes, data and/or calculations for each performance measure. We interviewed NSF staff and reviewed relevant background documentation. As a result of these interviews and analyses, we documented any actions that management has taken to strengthen the data and processes used to report performance results.
- **Review of system and other internal controls:** Building upon the initial interviews and background analysis, we identified changes to the system algorithms that were used to calculate the measures and the procedures used by NSF to derive the data. To assess the integrity of data inputs, we then verified that the system data is drawn from current and updated databases, files, and interfaces.
- **Process verification:** We verified the reliability of the processes used to collect, process, maintain, and report accurate data and results.
- **Results validation:** After we verified data quality, we recalculated or reconfirmed the results that NSF reported.<sup>6</sup> This recalculation provides a closer look at the algorithms and results for each measure.

## 2.2.3 Update Review of Strategic Outcome Goals and AC/GPA Process

NSF measures its overall performance as a Foundation using four Strategic Outcome Goals: Ideas, Tools, People, and Organizational Excellence. A key component of NSF’s performance assessment in these areas is the AC/GPA, a group of independent experts who offer advice and recommendations to the NSF Director on NSF’s achievement on a series of performance indicators related to these Strategic Outcome Goals.

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<sup>4</sup> For our third quarter review, NSF did not have complete data or results for some goals. For these goals, as of the third quarter of FY 2006, we were unable to conduct a complete verification and validation review.

<sup>5</sup> Two of the quantitative goals contained a qualitative component, related to the effectiveness of NSF’s merit review system, which was evaluated separately by the AC/GPA. We validated the results for this qualitative component as part of our review of the AC/GPA process and Strategic Outcome Goals.

<sup>6</sup> For our third quarter review, NSF did not have complete data or results for some goals. For these goals, as of the third quarter of FY 2006, we were unable to conduct a complete verification and validation review.

We first assessed the AC/GPA process in FY 2003 with the purpose of verifying the reliability of the process and performance data and the validity of the AC/GPA's conclusions based on the strength of these processes. In FY 2006, NSF asked us to conduct an updated review, focusing on changes to the AC/GPA process since FY 2005. Our methodology consisted of:

- **Review of background information:** Including the NSF Five-Year Strategic Plan, FY 2005 AC/GPA report, AC/GPA guidance and agenda, and supplemental information located on the AC/GPA website.
- **Attendance at the AC/GPA meeting:** We observed the two-day AC/GPA meeting, held June 22-23, 2006, including committee and subgroup sessions.
- **Attendance at the Committee for Business and Operations (AC/B&O) meeting:** We attended the May 18-19, 2006 meetings of the AC/B&O, which is responsible for assessing three out of four indicators for Organizational Excellence.
- **Discussions with NSF staff and AC/GPA members:** We spoke with NSF staff and committee members to learn about the process and their first-hand experiences coordinating and participating in the AC/GPA.
- **Documentation of the AC/GPA process with emphasis on changes from FY 2005:** Based on our review of background information, observations of the AC/GPA meeting, and discussion with staff and committee members, we documented the FY 2006 AC/GPA process focusing on changes in the past year.
- **Assessment of the AC/GPA process:** We assessed the quality of the AC/GPA process based on a series of criteria, including:
  - *AC/GPA meeting coordination/planning:* Quality of NSF planning and preliminary review activities to maximize the effectiveness of the AC/GPA meeting and quality of the AC/GPA assessment.
  - *AC/GPA scope of review:* Expectations and extensiveness of the AC/GPA's review and assessment of NSF's performance.
  - *Membership:* Expertise, independence, and level of knowledge of the AC/GPA membership.
  - *Performance information:* Quality, timeliness, impartiality, and relevance of the information available to the AC/GPA to reach its conclusions.
  - *Independence:* Confidence that the Committee's judgment is objective and free from NSF influence.
  - *Determination of achievement:* The Committee's determination of "significant achievement" with respect to the annual performance indicators and Foundation-level comments.
  - *Documentation and transparency:* Extent to which the AC/GPA process and results are clear, visible and open to review and scrutiny.
  - *NSF's response to AC/GPA recommendation:* How NSF responded to the Committee's recommendations in its FY 2005 AC/GPA report to NSF.
- **Validation of the AC/GPA performance assessment:** Based on the quality of the AC/GPA processes, IBM reached a conclusion on the validity of the AC/GPA's assessment of NSF's performance against its Strategic Outcome Goals, as referenced in Section 6 of this report.

#### 2.2.4 Limited System Aspects of Data Quality Review

We reviewed NSF's information systems - used in the collection, processing or maintenance of quantitative performance data - to evaluate whether adequate controls are in place to produce reliable data. Our assessment was a limited review based on discussions with NSF staff, as opposed to a full applications review.

Pursuant to GAO guidelines, we relied on previously conducted work and on departmental sources to determine whether there were any known problems with the data or data sources that would cast doubt on the credibility of the

information. Because we performed our initial review of these systems in prior years, our current review focused only on changes to the systems since our last assessment. The NSF systems and applications we reviewed were:

- Award
- Enterprise Information System (EIS)
- Financial Accounting System (FAS)
- FastLane (FL)
- Program Information Management System (PIMS)
- Proposal, PI, Panel, Budget and Reviewer System (PARS)

