



National Science Foundation

Government Performance and Results Act (GPRA) and  
Program Assessment Rating Tool (PART)

Performance Measurement Validation and Verification

FY 2005 Final Report

October 2005

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

# 1 Executive Summary

---

For the sixth consecutive year, IBM Business Consulting Services (IBM) is pleased to present the results of our verification and validation review of the National Science Foundation's annual performance goals. Once again, we have assessed the Foundation's data, processes, and results reported under the Government Performance and Results Act (GPRA) and Office of Management and Budget's Program Assessment Rating Tool (PART). In this report, we present the results of our FY 2005 review, which took place after the third quarter and after the end of the fiscal year.

The Government Accountability Office (GAO) requires Federal agencies to provide confidence that the policies and procedures underlying performance reporting are complete, accurate, and consistent. As such, NSF asked IBM 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.<sup>1</sup> We did not consider the appropriateness of NSF's performance goals or indicators in our assessment. 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.

NSF measures its annual performance against four Strategic Outcome Goals of People, Ideas, Tools and Organizational Excellence and 17 other performance goals. As of the end of FY 2005, NSF reported achieving all four of its Strategic Outcome Goals and 14 out of the 17 other performance goals. For each of these goals, we were able to verify the reliability of the processes used to collect, process, maintain and report data and validate the accuracy or reasonableness of the results.

Overall, we conclude that NSF continues to make a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. NSF relies on sound business policies, internal controls, and manual checks of system queries to report performance and maintains adequate documentation of processes and data for an effective verification and validation review.

## 1.1 Assessment Approach

---

The goals we assessed fall under three categories of review:

- Two qualitative performance goals being reviewed for the first time in FY 2005
- Fifteen quantitative performance goals receiving an update review
- Four qualitative Strategic Outcome Goals receiving an update review

We describe our assessment approach for each category as follows:

### 1.1.1 Qualitative Performance Goals Receiving First Review in FY 2005

The two goals being reviewed for the first time this year are related to the Information Technology Research (ITR) Program. Because these goals are qualitative, the results are determined by the ITR Committee of Visitors (COV), a group of external science experts who met in FY 2005 to assess the ITR program's performance over the three-year period from FY 2001-2003.

In our review, we analyzed performance data given to the COV; held discussions with NSF staff and COV members; documented and assessed the COV process; and validated the ITR COV's conclusions based on a series of criteria. These criteria included the effectiveness of the COV meeting coordination; the quality of the performance data; the

---

<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.

expertise of the COV membership; the independence of the COV from NSF influence; the standards used by the COV to reach its conclusions; and the documentation and transparency of the overall process.

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

Fifteen of the goals under review are quantitative<sup>2</sup> and involve data sources, systems and processes that we reviewed in prior years. For these goals, NSF requested a limited update review, focusing on changes since our last assessment. Also, because these goals are quantitative, our review focused on the data, systems, and algorithms associated with determining the goals' results. Specifically, we:

- Documented any changes to processes or data since our last review<sup>3</sup>.
- Reviewed system and other internal controls to confirm that quality input results in quality output.
- Verified the reliability of the processes NSF used to collect, process, maintain, and report data.
- Validated the accuracy of NSF's performance data and reported outcomes of performance goals and indicators.

We applied GAO's *Guide to Assessing Agency Annual Performance Plans* (GAO/IGD-10.1.20) to guide our review. Based on this 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?

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

A key component of NSF's assessment of its Strategic Outcome Goals (People, Ideas, Tools, 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.

FY 2005 is the third year that we have observed and assessed the AC/GPA process. Our purpose is to verify and validate the reliability of the AC/GPA's assessment based on the strength of the review process and the performance information used to support the Committee's conclusions. To conduct our review, we reviewed background and performance information; attended the AC/GPA meeting; documented and assessed the review process focusing on changes since FY 2004; and validated the AC/GPA conclusions.

Our assessment of the AC/GPA process was based on a series of criteria that we have used in prior year reviews. These criteria include the effectiveness of the meeting preparation; the scope of review; the expertise of the committee membership; quality of the performance information; independence of the committee; the AC/GPA's

---

<sup>2</sup> Two of the quantitative goals (O3 and O4) contained a qualitative component, related to the effectiveness of NSF's merit review system, which was evaluated separately by the Advisory Committee for GPRA Performance Assessment (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>3</sup> Detailed process descriptions and process maps can be found in the Appendix to this report.

determination of achievement; documentation and transparency of the process; and NSF's response to the AC/GPA's prior-year recommendations.

## 1.2 Assessment Results by Performance Goal

---

Based on our review, we verified the adequacy of the processes and data to yield valid and reliable results for all 21 goals under review. 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 "Result Validated" column, a "yes" indicates that we were able to validate the accuracy or reasonableness of NSF's reported results for the corresponding performance goal. In the "Comments" column, we summarize any significant issues concerning the goal that we feel NSF should address for next year. The full results of our review are discussed in greater detail in the balance of this report.

Qualitative Performance Goals Reviewed for the First Time in FY 2005

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT	Achieved	No results	Achieved	Yes	Yes	We recommend that NSF revise the COV report template to include a section for PART assessments when appropriate.
Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering	Achieved	No results	Achieved	Yes	Yes	We recommend that NSF revise the COV report template to include a section for PART assessments when appropriate.

## Quantitative Performance Goals Receiving an Update Review in FY 2005

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal P2: Number of U.S. students receiving fellowships through Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeships (IGERT) and Graduate Teaching Fellows in K-12 Education (GK-12)	Increase from 3,681	No results	Achieved 4,648	Yes	Yes	NSF should consider instituting a standard procedure for contractors to provide Q3 and Q4 snapshots of GRF, IGERT and GK-12 data, including a list of all students, funding duration, and any supporting award information for verification and validation purposes.
Goal P3: Number of applicants for Graduate Research Fellowships from groups that are underrepresented in the science and engineering workforce	Increase from 1,009	1013	Achieved 1,013	Yes	Yes	None
Goal P4: Number of applicants for Faculty Early Career Development Program (CAREER) awards from investigators at minority-serving institutions	Increase from 82	89	Achieved 92	Yes	Yes	None
Goal P5: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female principal investigator (PI) or co-principal investigator (co-PI)	25%	30%	Achieved 31%	Yes	Yes	None
Goal P6: Percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority PI or co-PI	13%	12%	Not Achieved 12.9%	Yes	Yes	None
Goal I2: NSF will increase the average annualized award size for research grants to \$140,000	\$140,000	\$127,343	Achieved \$144,000	Yes	Yes	None
Goal I3: The average duration of awards for research grants will be 3.0 years	3.0	3.09	Not Achieved 2.96	Yes	Yes	None
Goal I4: Percent of NS&E proposals that are multi-investigator proposals	75%	82%	Achieved 84%	Yes	Yes	None
Goal T2: 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	Not Achieved 79%	Yes	Yes	None

Goal	Target	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
Goal T3: Percent of operational facilities that keep scheduled operating time lost to less than 10%	90%	No Results	Achieved 100%	Yes	Yes	None
Goal T4: Number of users accessing National Nanofabrication Users Network/National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) sites	4000	10,110	Achieved 12,462	Yes	Yes	None
Goal T5: Number of nodes that comprise infrastructure	14	20	Achieved 20	Yes	Yes	None
Goal O2: 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%	Achieved 76%	Yes	Yes	None
Goal O3: For 70% of nanoscale proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external reviewers	70%	87%	Achieved 73%	Yes	Yes	None
Goal O4: For 70% of proposals for the Individuals program, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt or deadline date, while maintaining a credible and efficient competitive merit review system, as evaluated by external reviewers	70%	79%	Achieved 78%	Yes	Yes	None

Strategic Outcome Goals and Indicators Receiving an Update Review in FY 2005

Goal	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
<p><b>Goal P1: People – A diverse, competitive, and globally-engaged 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 I1: 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

Goal	FY 2005 Q3 Result	FY 2005 Q4 Result	Process Verified	Results Validated	Comments
<p><b>Goal T1: 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
<p><b>Goal O1: 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

---

In 1993, Congress passed the Government Performance and Results Act (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 addition to GPRA, the Office of Management and Budget (OMB) developed the Program Assessment Rating Tool (PART) process in 2002 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.

U.S. Government Accountability Office (GAO) standards require a federal agency to “provide confidence that its performance information will be credible.”<sup>4</sup> This report constitutes NSF’s satisfaction of that requirement. We applied GAO’s *Guide to Assessing Agency Annual Performance Plans* (GAO/IGD-10.1.20) to guide our verification and validation assessment. Our responsibility was to:

- 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?

### 2.1 Scope

---

Our assessment was a focused review of selected 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 third quarter and at the end of FY 2005. 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 2004 to FY 2005.

---

<sup>4</sup> GAO/IGD-10.1.20 Guide to Assessing Agency Annual Performance Plans

- 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).

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 2005 goals under our review fall under three categories:

### **2.1.1 Qualitative Performance Goals Being Review for the First Time in FY 2005**

- Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (ITR COV).
- Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT.

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

- Goal P2: NSF will increase from 3681 the number of graduate students funded through fellowships or traineeships from Graduate Research Fellowships (GRF), Integrative Graduate Education and Research Traineeship (IGERT), and Graduate Teaching Fellows in K-12 Education (GK-12).
- Goal P3: NSF will increase from a baseline of 1009 the number of applicants for Graduate Research Fellowships (GRFs) from groups that are underrepresented in the science and engineering workforce.
- Goal P4: NSF will increase from baseline of 82 the number of applicants for Faculty Early Career Development program (CAREER) awards from investigators at minority-serving institutions (MSIs).
- Goal P5: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals with at least one female Principal Investigator (PI) or Co-PI to 25 percent.
- Goal P6: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals with at least one minority PI or Co-PI to 13 percent.
- Goal I2: NSF will increase the average annualized award size for research grants to a level of \$140,000.
- Goal I3: NSF will maintain the FY 2004 goal for 3.0 years for the average duration of awards for research grants.
- Goal I4: NSF will increase the percent of Nanoscale Science and Engineering (NS&E) proposals that are multi-investigator to 75 percent.
- Goal T2: For 90 percent of construction, acquisition, and upgrade projects, keep any negative cost and schedule variances to less than 10 percent of the approved project plan.
- Goal T3: For 90 percent of operational facilities, keep scheduled operating time lost to less than 10 percent.
- Goal T4: NSF will increase the number of users accessing the National Nanofabrication User Network/ National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) facility sites to 4000 registered users totaled from both networks.

- Goal T5: NSF will increase the number of nodes that comprise the infrastructure of the National Nanofabrication User Network/ National Nanotechnology Infrastructure Network (NNUN/NNIN) and Network for Computational Nanotechnology (NCN) to 14.
- Goal O2: For 70 percent of proposals, be able to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt.
- Goal O3: NSF will increase to 70 the percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system (for Nanoscale Science and Engineering Program).
- Goal O4: NSF will increase to 70 the percent of award decisions made available to applicants within six months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit review system (for Individuals Program).

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

- Goal P1: 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.
  - Support innovative research on learning, teaching and mentoring that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels.
- Goal I1: 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.
- Goal T1: 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 cyberinfrastructure 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.
- Goal O1: 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

---

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

### 2.2.1 New Review of FY 2005 Qualitative Goals

In FY 2005, NSF introduced two new qualitative goals evaluated by the Information Technical Research (ITR) Committee of Visitors (COV), an external committee which offers an independent opinion on NSF's achievement in its ITR programs. These goals are:

- Goal I5: Qualitative assessment by external experts that the program is serving the appropriate role in ensuring that grantees meaningfully and effectively collaborate across disciplines of science and engineering (ITR COV).
- Goal T6: Qualitative assessment by external experts that there have been significant research contributions to software design and quality, scalable information infrastructure, high-end computing, workforce, and socio-economic impacts of IT.

Our purpose in this review was to verify that NSF has reliable processes in place to provide accurate and timely information to the ITR COV to allow the Committee to reach a valid and reasonable judgment of NSF's performance. We note that while the COV examined a range of issues related to the ITR program, we focused our review specifically on the COV's assessment of the two aforementioned PART goals. Specifically, we conducted the following:

- **Review of background and performance information:** This included the NSF performance plans, guidance provided to the COV, performance data given to the COV for review, and background on the ITR program.
- **Attendance at the ITR COV meeting:** We observed the ITR COV meeting, held March 8-10, 2005, including large and small group meetings.
- **Discussions with NSF staff and ITR COV members:** We spoke with NSF staff and COV members to learn about the process and their first-hand experiences coordinating and participating in the ITR COV.
- **Documentation of the ITR COV process:** Based on our review of background information, observations of the ITR COV meeting, and discussion with staff and committee members, we documented the ITR COV process.
- **Assessment of the ITR COV process:** We assessed the quality of the ITR COV process based on a number of criteria, including:
  - Organization and overall effectiveness of the COV meeting
  - Quality, timeliness, impartiality, and relevance of the data and performance information available to the ITR COV
  - Expertise, independence and level of knowledge of the ITR COV membership
  - Independence of the COV's judgment from NSF influence
  - Standards by which the COV reached its conclusions on NSF's performance
  - Documentation and transparency of the ITR COV process and results
- **Validation of the ITR COV performance assessment:** Based on the quality of the ITR COV processes, we reached a conclusion on the validity of the COV's assessment of NSF's performance in its qualitative ITR goals.

### 2.2.2 Update Review of FY 2005 Quantitative Goals

In FY 2005, there were 15 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.

---

<sup>5</sup> Two of the quantitative goals (O3 and O4) contained a qualitative component, related to the effectiveness of NSF's merit review system, which was evaluated separately by the Advisory Committee for GPRA Performance Assessment (AC/GPA). We validated the results for this qualitative component as part of our review of the AC/GPA process and Strategic Outcome Goals.

- **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: People, Ideas, Tools, and Organizational Excellence. A key component of NSF's performance assessment in these areas is the Advisory Committee for GPRA Performance Assessment (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.

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 2005, NSF asked us to conduct an updated review, focusing on changes to the AC/GPA process since FY 2004. Our methodology consisted of:

- **Review of background information:** Including the NSF Five-Year Strategic Plan, FY 2004 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 16-17, 2005, including committee and subgroup sessions.
- **Attendance at the Committee for Business and Operations (AC/B&O) meeting:** We attended the May 5-6, 2005 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 2004:** Based on our review of background information, observations of the AC/GPA meeting, and discussion with staff and committee members, we documented the FY 2005 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.

---

<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 2005, we were unable to conduct a complete verification and validation review.

- *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 2004 AC/GPA report to NSF.
- **Validation of 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.

#### 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
- Program Information Management System (PIMS)
- Proposal, PI, Panel, Budget and Reviewer System (PARS)