

February 17, 2002

Draft Report
of the Subpanel on
Performance Measurement
in the Office of Science
U.S. Department of Energy

Introduction

At the request of the Acting Director of the Office of Science of the Department of Energy (DOE) a subpanel was formed to examine the approach of the Office of Science to performance measurement. The letter requesting the formation of the subpanel and the charge is found in Appendix I of this report and the membership of the subpanel is given in Appendix II.

The subpanel met in Washington on January 24-25, 2002 and heard from a number of officials from the DOE, as well as representatives from the National Science Foundation (NSF), the National Institutes of Health (NIH), the Office of Management and Budget (OMB), and the General Accounting Office (GAO) concerned with the issue of performance measurement. The meeting agenda, which included both individual presentations and three roundtable discussions, is attached as Appendix III.

Background

Concern about the issue of measuring the performance of government programs and their relevance to agency missions led to the passing of the Government Performance and Results Act (GPRA) in 1993. Appendix IV to this report contains a very brief outline of this Act. Its application to research raises the issue not just of measuring scientific progress in the abstract, but of how to measure research supported by a federal agency in the context of that agency's mission, goals, and plans.

The new Administration has reviewed the process, and has directed that it will be compatible with the President's Management Agenda; a brief summary of the relevant points in this are also included in Appendix IV.

The ways in which the processes are to be used in the annual budget process are developed by the Office of Management and Budget (OMB), and some of their guidelines are also shown in Appendix IV.

Following the passage of GPRA, its implications for research have been reviewed several times, most notably by the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academies: a brief summary of their reviews is contained in Appendix V. Their most recent report was published in 2001, under the title *Implementing The Government Performance And Results Act For Research: A Status Report*.

New knowledge that leads to a better understanding of our world is the direct product of basic scientific research. It is widely recognized that advances in basic science also underlie and propel developments in applied science and technology that are needed for national security, economic competitiveness, new sources of energy, the environment, and improved health care in the United States.

Over the past 50 years, the Department of Energy and its predecessor agencies have been a major source of support for long-range basic research programs in the United States,

especially in the physical sciences. Many of these have been and continue to be the envy of the world.

DOE is a mission-oriented agency. The Department, through its Office of Science, supports research at both its National Laboratories and at universities. As part of its mission, the DOE constructs and operates major user facilities (light sources, neutron sources, and a range of accelerators) that are essential to the research communities across a broad range of basic and applied sciences. The Subpanel received a detailed description of the range of the activities of the Office of Science from Dr. Patricia M. Dehmer, and a brief summary of this is included in Appendix VI.

Findings

- 1) COSEPUP have re-affirmed the principle that performance of research programs should be assessed in terms of (a) quality; (b) relevance; and (c) leadership. This has been the objective of the Office of Science for many years, but the new structure means that the meaning of these terms, and the ways in which they are assessed, have to be reexamined. Quality has been assessed by peer review and expert review, and this process has been examined several times over the years. COSEPUP have stated clearly in their reports that this is still the most effective means of evaluation of this aspect. Relevance has traditionally been interpreted in terms of the relevance of the research to progress in the appropriate scientific discipline, but in a mission-oriented agency it must also mean relevance to the mission of the agency; the President's Management Agenda indicates that this must, in turn, relate to the Administration's goals. Leadership means both leadership in the domestic context and in the global context; this is discussed by COSEPUP in terms of benchmarking, but this is an aspect which is yet to be fully defined. The "world-leadership" (or "world-class") metric has been implicit in many evaluations since U.S. scientific communities strive for world-class status, and it has been explicit in fields where international collaboration is common. Increasingly, a global view of progress is becoming the norm.

The quality of performance in the programs supported by the DOE has been assured by expert reviews through a combination of broadly based committees of scientists, individual reviewers, and a host of other mechanisms germane to specific projects, facilities, or programs. The diversity of activities of the Office of Science, from supporting individual scientists in universities to managing large facility construction projects, make a variety of different review mechanisms a necessity. A case in point is the excellent "Lehman Review" that is conducted of the cost and construction schedule of large scientific projects and facilities at their outset.

These mechanisms help set broad goals in terms of major commitments for facilities, they advise on priorities in choosing research options, and they judge the quality of the research product in terms of meeting goals and cost-effectiveness.

- 2) It is generally accepted that an important component in the planning of research programs of whatever sort is the development of a Strategic Plan. Typically, this is a longer-range planning exercise, with the understanding that it is capable of continual redirection as new factors emerge. In the case of GPRA, the concept was a five-year strategic plan, with reevaluations at not more than three year intervals: this kind of time scale is typical. Strategic Plans are of particular importance for longer-range research programs, since they allow the planning and evaluation of research to reflect the longer-range implications of the work. The recognition of the desirability of continuous review of the plan to reflect new developments allows such a plan to recognize and accommodate new discoveries. It is also generally recognized that the development of Strategic Plans should involve broad stake-holder involvement, and in the case of plans for basic research must involve representation of the appropriate research communities and the expert advisors. It has been the practice of DOE's Office of Science to use Strategic Planning as a management tool for many years.

A comprehensive strategic plan for the whole Office of Science is presently lacking, with the previous such plan no longer operative. This limits the ability to plan across fields of science and in some cases to target specific research for emphasis or to ascertain relevance.

- 3) The Subpanel was shown some of the procedures for the implementation of GPRA in the 2003 Budget Submission for the Office of Science. The Subpanel were told that it is recognized by most of the participants that it did not meet several of the GPRA requirements, including for example that the program descriptions should give a comprehensive description of the program. One of the important components in the description is an item called the annual Program Strategic Performance Goals (PSPGs); and it was clear to the Subpanel members from the Office of Science Advisory Committees that the set of these for the parts of the programs with which they are familiar distorted the aims and accomplishments of SC research programs. With PSPGs that are only representative and not at all comprehensive, the Office's programs are portrayed as significantly less than they truly are. The Budget Submission then fails as an effective communication tool, which is one of its most important roles. The Subpanel was concerned that this could even be detrimental to programs where their mis-portrayal could lead to unfortunate misunderstandings. This representative form of implementation of GPRA has the danger of seriously impeding the continued flow of first-rate research that has been the hallmark of DOE's Office of Science, and could impact its effectiveness in contributing to the goals of the Nation, particularly in the physical sciences where DOE has a dominant role in the United States. At the same time, the Subpanel recognizes that the preparation of the budget document is very demanding of DOE staff time: reconciliation of this issue clearly requires more discussions between the Office of Science and OMB, and we were told that such discussions are in progress in connection with the FY 2004 budget exercise.

While our Charge did not ask the Subpanel to address this issue, our discussions during our meeting made it clear that these problems affect the general matter of performance assessment.

Recommendations and Response to the Charge

1) The Office of Science's research program can be described in terms of four distinct categories:

- Research projects at Universities and within the National Laboratories.
- Operation of the National Laboratories for which the Office of Science is responsible, including oversight of the Contractor Operators.
- Construction of the Large User Facilities.
- Operation of the Large User Facilities.
- Operation of the Distributed Facilities.

It is clear that different methods are needed to measure the performance for each of these categories – one size does certainly not fit all. Peer Review, consistent with the criteria described in 10 CFR 605 is the preferred method for research projects, included those conducted using the Large User Facilities. Expert Review, using broader stakeholder panels, including the Advisory Committees and their Subpanels, is used for the operation of the Large User Facilities. Expert review is also the major method used for assessing the National Laboratories. The Facility Construction program involves what are known as Lehman Reviews, together with a newer quantitative assessment technique called Prima Vera. In addition, the Office routinely collects quantitative data on research output, such as publications, professional awards and so forth.

The mechanisms that are in effect for the Department of Energy's Office of Science to set goals, determine priorities, and to evaluate accomplishments and outcomes have worked well in the past and should be continued. The concept of Committees of Visitors, which are used as a review technique in some areas of the Office of Science and in other Agencies, should be considered as an additional tool.

The Subpanel recommends that "Expert review", as recommended by the National Academies' COSEPUP, should be the recognized core standard for assessment of performance in the Office of Science programs. As recommended by COSEPUP, quality should be measured by peer review and relevance should be measured by experts both in adjacent fields and in areas of application. The metrics for relevance need to be defined with more care, and a key item will be relevance to the Department's mission. This will be defined in the Strategic Plan, and reinforces the importance of preparing such a plan.

"World-Leadership", while it has been an under-recognized objective and metric, should be recognized as an explicit objective and appropriate benchmarks should be used as metrics of leadership, again using the guidelines being developed by COSEPUP.

2) The Subpanel recommends that the Office of Science, in tight partnership with its scientific community and in particular through its advisory committees, should work with the Office of Management and Budget to develop a meaningful and effective set of metrics, in terms of identifiable goals, such as the Program Strategic Performance Goals, based on the long range plans in existence for many of the areas of science supported by SC. This Plan will set the context for programs and will permit the derivation of integrated goals and the assessment of “relevance”. The Subpanel believes that one of the major benefits of the GPRA process is the development of a communication tool that allows the full scope of the Office of Science program to be clear to all, and this should be a prime requirement for the eventual document.

3) The goals of GPRA of assessing how well government agencies fulfill their goals should be implemented in ways that reflect the breadth and time scale of the areas of long-range basic research that the Office of Science supports. The cost-effectiveness of such research depends as well on the ability to reassess its course on the basis of developments. This includes developing criteria to determine when a field of research has reached a point where it should be terminated, and when new fields should be introduced. The existence of feedback loops between long-term basic and shorter-term applied research with more specific objectives should also be recognized. In many cases, the ways in which quality is assessed by peer review are themselves essentially qualitative. GPRA expressly recognizes the use of qualitative, as well as quantitative, goals; and while this offers challenges to the concept of being ‘measurable’ this should not lead to the imposition of quantitative goals. To do this would have significant negative effects on basic research, and would certainly not be consistent with the principle that application of GPRA should “do no harm”; a principle which is agreed to by all the participants in this exercise.

4) The Subpanel heard descriptions of the way that the requirements of GPRA were being dealt with by the National Science Foundation and the National Institute of Health, which are also agencies supporting considerable amounts of basic research. These appear to use annual accomplishments in the form of a selected list of major advances, seen within a multi-year framework. The justification for this appeared to be that specific important discoveries are often unforeseen in a given year, and it is a sum of such discoveries that leads to a major advance -- only the general goals could have been set out in advance, not the specific discoveries or their implications. There are important differences between these agencies and the Office of Science within the Department of Energy, notably the mission-oriented nature of DOE and, thus, its component offices. Nevertheless, in the future discussions with OMB, the similarities in that part of the Office of Science’s program which are related to longer-range basic research should be discussed in relation to the development of appropriate goals and metrics.

4) The Subpanel believes that workforce issues, including the availability of present manpower and the contributions of the program toward education and training of the researchers of the future, are important matters, and recommends that the incorporation of these into the GPRA process should be discussed with OMB.

Appendix 1: The Charge Letter to the Subpanel

Appendix 2: The Membership of the Subpanel

Eugene Bierly	<i>American Geophysical Union</i>	BER
Roscoe Giles	<i>Boston University</i>	ASCR
Fred Gillman	<i>Carnegie Mellon University</i>	HEPAP
John Roberts	<i>California Institute of Technology</i>	BES
Ned Sauthoff	<i>Princeton Plasma Physics Lab.</i>	FES
John Schiffer	Argonne National Lab and U. of Chicago	NSAC
John Stringer	<i>EPRI</i>	chair
Nicholas Vonortas	<i>George Washington University</i>	Economics

Appendix 3: The Agenda of the Meeting Held on January 24th – 25th.

Agenda Office of Science Panel on Performance Measurement

January 24 – 25, 2002
Marriott at Metro Center
775 12th Street, NW, Washington, DC 20005
202/737-2200

Purpose:

1. SC's current methods for performance measurement
2. Appropriateness/comprehensiveness of the methods
3. Effects on science programs
4. Integration of performance measures with the budget process as required by GPRA

January 24, 2002 Montreal I and II, 2nd Floor

8:00 am	Welcome and Introductions	William J. Valdez Director, Office of Planning and Analysis, DOE
8:05 am	Overview of the Office of Science and the Charge to the Panel on Performance Measurement	Dr. James F. Decker Acting Director, Office of Science, DOE
8:30 am	Performance Measurement in SC – What's Happening Now	Dr. Patricia Dehmer Associate Director, Office of Basic Energy Sciences, DOE

9:15 am	Integrating Performance Measurement and the Budget in SC	William J. Valdez
9:45 am	Break	
10:15 am	Integrating GPRA and the Budget Process – General	James Powers Director, Program Analysis and Evaluation Office of the Chief Financial Officer, DOE
10:45 am	Administration Expectations	Dr. Michael J. Holland Program Examiner, OMB
11:15 am	Congressional Expectations	Diane Raynes Senior Science Analyst, Natural Resources and Environment, GAO
11:45 am	Buffet Lunch (Montreal I and II, 2nd Floor)	
1:30 pm	1 st Roundtable: Effects of Performance Measurement on Science Programs Supported by SC <i>Discussion Leader:</i>	Dr. Milton Johnson Acting Principal Deputy Director, Office of Science, DOE
	Dr. Patricia Dehmer Associate Director, Office of Basic Energy Sciences Office of Science, DOE	Dr. Anne Davies Associate Director, Office of Fusion Energy Sciences Office of Science, DOE
	Dr. Ed Oliver Associate Director, Office of Advanced Scientific Computing Research Office of Science, DOE	Dr. Ari Patrinos Associate Director, Office of Biological and Environmental Research Office of Science, DOE
	Dr. Alan Schriesheim Director Emeritus Argonne National Laboratory	Dr. Robin Staffin Deputy Associate Director Office of High Energy and Nuclear Physics Office of Science, DOE
3:00 pm	Break	
3:30 pm	2 nd Roundtable: Effects of Performance Management on Facility Construction and Operation Supported by SC <i>Discussion Leader:</i>	James Turi Acting Deputy Director for Operations Office of Science, DOE
	Dr. Patricia Dehmer Associate Director, Office of Basic Energy Sciences Office of Science, DOE	Dr. Anne Davies Associate Director, Office of Fusion Energy Sciences Office of Science, DOE
	Dr. Ed Oliver Associate Director, Office of Advanced Scientific Computing Research Office of Science, DOE	Dr. Ari Patrinos Associate Director, Office of Biological and Environmental Research Office of Science, DOE

James A. Rispoli
Principal Deputy Director
Office of Engineering and Construction
Management, Office of the Chief
Financial Officer, DOE

Dr. Robin Staffin
Deputy Associate Director
Office of High Energy and Nuclear Physics
Office of Science, DOE

5:00 pm 3rd Roundtable: Alternative Approaches to Evaluation and Other Agency Experiences
Discussion Leader: William Valdez
Director, Office of Planning and Analysis
Office of Science, DOE

Dr. Irwin Feller
Professor of Economics
Pennsylvania State University

Dr. Gretchen B. Jordan
Principal Member of Technical Staff
Sandia National Laboratories

Dr. Nathaniel Pitts
Director, Office of Integrative Activities
National Science Foundation

Dr. Lana Skirboll
Associate Director for Science Policy
National Institute of Health

6:00 pm Adjourn

6:30 pm Dinner for all participants (**London I, Ballroom Level**)
(pay at registration)

January 25
Montreal I and II, 2nd Floor

8:30 am Panel Members Discussion and Report Drafting

12:00 pm Working Lunch

5:00 pm Adjourn

Appendix 4: A Brief Summary of Relevant Points from the Government Performance and Results Act, 1993; the President's Management Agenda, FY 2002; and Some Information from the Office of Management and Budget.

4.1 A Brief Summary of the Relevant Parts of the Government Performance and Results Act, 1993.

The original overall objective of GPRA was "to provide for the establishment of strategic planning and performance measurement in the Federal Government" and one of the purposes was to "initiate program performance reform with a series of pilot projects in setting program goals, measuring program performance against these goals, and reporting publicly on their progress". The Strategic plans included: "No later than September 30, 1997, the head of each agency shall submit to the Director of the Office of Management and Budget and to the Congress a strategic plan for program activities.....The strategic plan shall cover a period of not less than five years forward from the fiscal year in which it is submitted, and shall be updated and revised at least every three years."

The Act also modifies earlier legislation concerning performance plans, to begin with fiscal year 1999, and states that: “the Director of the Office of Management and Budget shall require each agency to prepare an annual performance plan covering each program activity set forth in the budget of such agency.” It further requires this plan to “establish performance goals to define the level of performance to be achieved by a program activity;” and “to express such goals in an objective, quantifiable, and measurable form *unless authorized to be in an alternative form under section (b)*”. (Our italics). Such an alternative form may be authorized by the Director of the Office of Management and Budget

The Act says that “an agency may aggregate, disaggregate, or consolidate program activities, except that any aggregation or consolidation may not omit or minimize the significance of any program activity constituting a major function or operation for the agency.”

“No later than March 31, 2000, and no later than March 31 of each year thereafter, the head of each agency shall prepare and submit to the President and the Congress, a report on program performance for the previous fiscal year.”

4.2 The Strategic Plan and The President’s Management Agenda

One of the requirements of GPRA is that agencies should produce Strategic Plans, and the Department of Energy did indeed publish a Strategic Plan, which is dated September, 2000. The Subpanel were advised that this Plan is no longer regarded as acceptable because of the changes in approach of the new administration, described in *The President’s Management Agenda* dated Fiscal Year 2002, and issued by The Executive Office of the President, Office of Management and Budget. This states that: “The Administration is developing objective assessment criteria for federal R&D projects. These criteria will be used to assess the performance of research programs. A well directed R&D portfolio should demonstrate progress towards the portfolio’s strategic goals, without necessarily expecting success from each and every project.” An initial pilot program to develop performance criteria for DOE’s applied research and development programs was undertaken by DOE and OMB to guide funding for the 2003 Budget for the Department’s Solar and Renewable Energy, Nuclear Energy, Clean Coal, Fossil Energy, and Energy Conservation programs. Following this, “OMB will assist in the transfer of investment criteria to the rest of DOE, and other Departments and applicable agencies with applied R&D programs in time to assist in the formulation of the President’s 2004 Budget. OMB and the Office of Science and Technology Policy will also work with NASA, the National Science Foundation, the Department of Defense, the National Institutes of Health, and DOE to develop separate criteria, to be issued in Spring 2002, for evaluating basic research during formulation of the 2004 Budget.” The long-term results expected include the statement: “Basic research programs will better target improving the quality and relevance of their research. These investment criteria will promote our nation’s leadership in important science and technology areas.”

The following statement from Dr. Jack Marburger (January 8th, 2002; American Astronomical Society meeting) shows how this Agenda will affect the science programs funded by the Federal Government, including those in the Department of Energy::
“...this Administration strongly emphasizes good management for all Federal agencies, and The President’s Management Agenda will be applied to science as well as other federally funded operations. The Agenda includes the principle that performance is an important basis for funding allocations, which implies that measures of performance are essential ingredients in the budget process.....”

4.3 OMB Input on the Process

On January 15th, 2002, Marcus Peacock, Associate Director for Natural Resource Programs at OMB discussed the White House efforts to implement this Agenda in a presentation to a meeting on “Measuring the Return on the Federal R&D Investment” organized by the American Chemical Society. He said there are six criteria that OMB will use to review requests for applied research funding: the aim was to use these criteria for the applied R&D programs identified above in the FY 2003 cycle, but noted that OMB did not begin working with the Energy Department early enough in the budget cycle, so it was unable to fully apply the criteria. They intend to apply the six criteria to all agencies that conduct applied research as they submit their fiscal year 2004 budget requests. The experience of the applied R&D programs with the new OMB criteria during the 2003 cycle will be discussed at the February 27th COSEPUP meeting, together with the new criteria that OMB is developing for basic research funding.

The six criteria for applied research funding are:

- Is the project a presidential priority?
- Will the project clearly benefit the public in an area where the private sector does not have sufficient market incentive to sufficiently fund the research?
- Is support for applied research the best means to accomplish the federal goal?
- Is the project comprehensive, meaning it includes milestones to measure progress and guidance as to when the research should stop?
- Was the project selected in a competitive manner based on its merits?
- If the project was previously funded, did it deliver results on time and in a cost-effective manner?

While several of these do not appear to be relevant to basic research proposals, they give a view of the general philosophy of OMB in making funding decisions.

Appendix 5: COSEPUP Reviews of GPRA

COSEPUP began its review of the implications of GPRA in January 1998, remarking that “Developments of plans to implement the act has been particularly difficult for agencies

responsible for research activities supported by the federal government because of the difficulty of linking results with annual investments in research.” Their study is in three parts: the first aims to identify and analyse the most effective ways to assess the results of research, on the basis of consultation with federal agencies, oversight entities, the research community, industry, states, and agencies of other nations. The second aims to help the federal government determine how its agencies can better incorporate research activities in strategic and performance plans and improve the management and effectiveness of research programs, including a determination of what can be reliably measured and the best mechanisms for doing so, and a determination of what cannot be measured. The third part is to develop mechanisms to evaluate the effects of implementing GPRA on agency program decisions and on the practices of research. Their study began with three workshops, addressing the first two of these aims. Probably the most significant point made in their first report from the point of view of our study was this: “Because applied research programs by definition have desired outcomes directly related to agency missions, evaluating such programs can be relatively straightforward and agencies can use methods similar to those used by industry.” “It became clear, however, that substantial problems existed for agencies trying to evaluate basic research programs. Urgent concern was expressed that basic research could not be effectively evaluated in the context of GPRA and that misguided attempts to do so could cause great damage”.

In the conclusions to their first report, published in February 1999, COSEPUP states that “The most effective means of evaluating federally funded research programs is expert review. Expert review – which includes quality review, relevance review, and benchmarking – should be used to assess both basic research and applied research programs.” (Their Conclusion 3.)

“Federally supported programs of basic and applied research should be evaluated regularly through expert review, using the performance indicators of quality, relevance, and, where appropriate, leadership.” This last point refers to the assessment of the research in a global context; it is thought that U.S. research should be among the leaders in all fields, and the clear leader in some.

Following this report, Dr. Neal Lane, then the Director of the White House Office of Science and Technology Policy (OSTP), asked the Academies in April 5th, 1999, to undertake a more in-depth study of the actual application of GPRA to research programs as the agencies were shortly to release their first performance reports under GPRA (March 2000). However, the COSEPUP panel determined that it was not possible to respond to this request, and instead decided instead to focus on the general methods and approaches of the agencies. They decided to select the five agencies that provide most financial support for federal research programs: the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Defence (DOD), the Department of Energy, and the National Aeronautics and Space Administration (NASA).

The report repeats the earlier conclusion that the most effective technique for evaluating research programs is review by panels of experts.

Appendix 6: The Office of Science View of its Role

The Subpanel received two detailed reviews from senior staff at the Office of Science: Dr. Patricia M. Dehmer, Associate Science Director for Basic Energy Sciences, and Mr. William Valdez, Director of Planning and Analysis.

Dr. Dehmer's presentation included the following information.

There are four functions for the Office:

- Support of basic research that underpins DOE missions
- Supports basic research in important fields of science essential to the Nation's research infrastructure
- Construction and operation of large scientific facilities for the U.S. scientific community
- Providing infrastructure support for the ten SC laboratories

DOE's Office of Science contains six program areas: Advanced Scientific Computing, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics. Each of these has an Advisory Committee of recognized experts, which is a significant part of the external review process.

Very approximately, the budgets for these programs in FY 2001 were:

ASC	\$161M
BES	\$974M
BER	\$514M
FES	\$242M
HEP	\$696M
NP	\$352M

Overall, and again approximately, 27% of the funding went to the Major User Facilities, 25% to the Research Laboratories, 23% to Universities, 10% to Construction, 7% to Capital Equipment, 4.5% to Program Direction, and the remainder to small items.

The Office of Science is a major source for funding basic research in the U.S., in a number of fields, and the largest source for two major areas:

Following the GAO report *Federal Research – Peer Review Practices at Federal Science Agencies Vary* (GAO/RCED-99-99) the House Committee on Science requested a

follow-up study at DOE, which included an audit of the peer review procedures of BES, which covered a sampling of research projects funded in FY 1998. The resulting report *Federal Research is Providing Independent Review of the Scientific Merit of Its Research* (GAO/RCED-00-109, April 2000) notes, in part, that OBES was following the merit review procedures that they had established, are selecting reviewers with the requisite knowledge, are requiring those reviewers to apply appropriate criteria in making their evaluations; and are using the merit review evaluations in making award decisions.

The review procedures for the University-based research, that at the National Laboratories, and the operation of the Major Facilities are summarized in two documents: the first is the *Office of Science Merit Review System*, published in March, 1991; it was amended in August, 1999 to reflect the change in name of the former Office of Energy Research to the Office of Science. This describes the Office of Science Merit Review System, in its entirety. The second document is Regulation 10 CFR 605, which is a more formal specification of the requirements for awarding research contracts.

In addition to the peer review and expert review processes, quantitative techniques, such as counting publications in distinguished archival journals, identifying major awards for research, citation indices, and so forth are conducted.

Mr. Valdez's presentation was concerned with the measurement processes that will be needed by the GPRA process, and included the following points.

Principles for the Performance Measurement process:

- Simple, Elegant and Defensible Approach
- A Balanced Portfolio of Performance Measures
- An Open and Participatory Process
- Respect for Practitioners – “Do No Harm”
- Emphasis on the Future, Informed by the Past
- Supportive of Science Excellence and Appropriate Risk Taking

SC, on the basis of COSEPUP's guidance, argues for an approach to corporate measures which will combine qualitative and quantitative measures. The elements to be assessed are:

- Excellence
- Relevance
- Science Leadership
- Science Infrastructure Stewardship
- Management and Operational Excellence