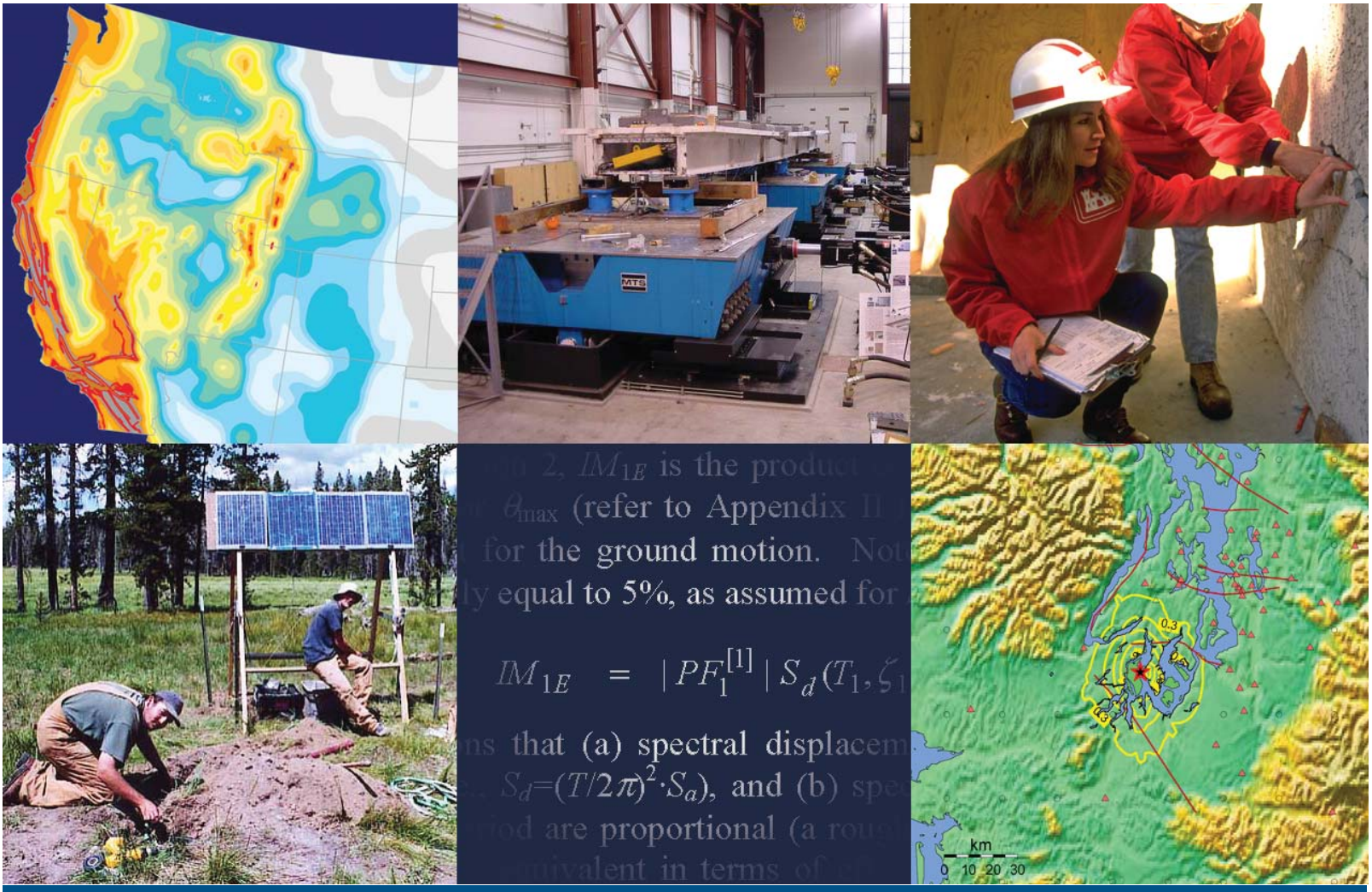

Interim Report on NEHRP Performance Measures

December 2005

FEMA

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Executive Summary

This interim report describes the work carried out by the Interagency Coordinating Committee (ICC) *Subcommittee on Performance Measures* (the Subcommittee) from December 2004 through May 2005. The objective of the Subcommittee was to develop performance measures for the ***National Earthquake Hazards Reduction Program (NEHRP).*** The four agencies participating in the NEHRP are the U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA); the National Institute of Standards and Technology (NIST); the National Science Foundation (NSF); and the United States Geological Survey (USGS).

Two primary factors shaped the work of the Subcommittee: federal requirements relating to performance measurement and congressional legislation pertaining to the NEHRP. In the years since passage of the Government Performance and Results Act of 1993 (GPRA), federal performance assessment practices have continued to evolve, and each of the NEHRP agencies has built its own performance measurement infrastructure. The NEHRP legislation has similarly evolved in the years since passage of the Earthquake Hazards Reduction Act of 1977. The most recent reauthorization of this legislation, in 2004, transferred the NEHRP lead agency responsibilities from FEMA to NIST and directed the ICC to develop a new strategic plan for the NEHRP.

The Subcommittee concluded that a multi-tiered approach to performance assessment would make the most sense for the NEHRP. Under such an approach, the performance measurement system could include short-term, quantitative measures of outputs or processes; intermediate-term measures that report on efforts in progress; and long-term measures focused on outcomes. As the foundation for this system, the Subcommittee adopted the mission statement, 4 strategic goals, and 17 strategic objectives identified in the NEHRP Strategic Plan ***(Expanding and Using Knowledge to Reduce Earthquake Losses: The National Earthquake Hazards Reduction Program Strategic Plan, 2001-2005).***

The Subcommittee agreed that NEHRP performance assessment efforts should make the greatest possible use of agencies' existing performance measures and measurement infrastructures. To evaluate the suitability of existing or new measures for the NEHRP, the Subcommittee developed a conceptual framework for performance measurement. This framework classifies and describes performance goals and measures using the following eight-level taxonomy: mission, strategic goal, strategic objective, performance segment, agency, period of performance, performance goal, and performance measure.

The performance measures proposed by the Subcommittee for the NEHRP are summarized in the table that follows, under the agencies to which they apply. More detailed specifications for each of these measures are provided in Part II of this report.

Proposed NEHRP Performance Measures

NEHRP Agency	NEHRP-Related Performance Measure
NIST	• Publication of *Standards of Seismic Safety for Existing Federally Owned or Leased Buildings* and guidance on the use of model codes and standards.
FEMA	• Number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions incorporated (this encompasses two measures, one to determine a baseline number and another to track annual increases). • The costs for publication and distribution of NEHRP resource materials (two measures, one to determine baseline costs and another to track annual cost reductions). • Number of jurisdictions with high and very high earthquake risk that are using quantitative risk analysis data, such as that developed with Hazards U.S. software, in their local planning efforts.
NSF	• Percent of Network for Earthquake Engineering Simulation (NEES) award decisions made available to applicants within 6 months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit system, as evaluated by external experts. • Percent of operational NEES facilities that kept scheduled operating time lost to less than 10%. • A qualitative assessment by external experts of whether NEES is enabling people working at the forefront of discovery to make important contributions to earthquake engineering knowledge.
USGS	• Data processing and notification costs per unit volume of input data from earthquake sensors in monitoring networks. • Number of metropolitan regions where ShakeMap is incorporated into emergency procedures. • Number of real-time earthquake sensors. • Completion of updates to the National Seismic Hazard Maps and their adoption into the NEHRP Provisions. • Number of urban areas for which detailed seismic hazard maps are completed.

The specifications presented in this report represent an initial attempt to develop performance measures that are appropriate and feasible for the NEHRP. The Subcommittee recognizes that the suitability of these or other potential measures cannot be fully gauged until the processes needed to implement and administer them can be planned. By the time that such planning can be undertaken, federal performance measurement requirements may have further evolved in ways that impact the NEHRP, and the new NEHRP strategic plan could substantially affect the appropriateness or priority of the proposed measures. Regardless of how these various developments unfold, the framework for performance assessment described in this interim report should retain substantial utility.

Part I

This interim report describes the work carried out by the Interagency Coordinating Committee (ICC) *Subcommittee on Performance Measures* (the Subcommittee) from December 2004 through May 2005. The objective of the Subcommittee was to develop performance measures for the ***National Earthquake Hazards Reduction Program (NEHRP).***

The Subcommittee comprises representatives from the four federal agencies participating in the NEHRP: the U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA); the National Institute of Standards and Technology (NIST); the National Science Foundation (NSF); and the United States Geological Survey (USGS). A roster of Subcommittee members is provided in the *Appendix* to this report.

Background

In the NEHRP Strategic Plan ***(Expanding and Using Knowledge to Reduce Earthquake Losses: The National Earthquake Hazards Reduction Program Strategic Plan, 2001–2005)***, the NEHRP ICC addressed the need to begin developing performance measures for the program.[1] After the NEHRP Strategic Plan was submitted to Congress in fiscal year (FY) 2003, the ICC established the Subcommittee to explore the development of program measures.

As chair of the Subcommittee, FEMA completed a preliminary study of NEHRP performance assessment in FY 2004, then convened the Subcommittee for a series of meetings. These meetings, held to develop performance measures for the NEHRP and to plan how to implement and administer the measures, took place on the following dates: December 9, 2004; January 18, 2005; February 18, 2005; March 16, 2005; and May 3, 2005.

Two primary factors shaped the work of the Subcommittee: federal requirements relating to performance measurement and congressional legislation pertaining to the NEHRP. These factors are discussed below.

Evolution of Federal Performance Assessment

The current era of performance measurement in federal agencies began with passage of the Government Performance and Results Act of 1993 (GPRA). This law has required that agencies develop—and submit to the President, Congress, and the Office of Management and Budget (OMB)—strategic plans, annual performance plans, and annual program performance reports.

To produce these plans and reports, agencies must develop both agency-wide strategic goals and program-specific performance goals. An agency's performance goals collectively contribute to the achievement of its strategic goals. Program performance goals, which can be short-term, intermediate, or long-term, consist of a performance measure, target, and timeframe. The performance measure is a statement identifying the performance data that is measured to determine whether the goal has been met. The target is the measurement value that must be achieved to meet the goal, and the timeframe specifies how soon the target must be reached.[2,3]

Output Measure
Number of seismic sensors installed

\+ **Target**
20 sensors

\+ **Timeframe**
by September 2007

= **Performance Goal**
Install 20 seismic sensors by September 2007

Figure 1
Components of a Hypothetical Performance Goal

Performance measures may relate to program outcomes (the intended results of a program), outputs (the products or services produced to achieve the outcomes), or efficiency (the ratio of outcomes or outputs to program inputs).[2] Figure 1 shows how a sample performance goal involving an output measure is constructed.

More information on performance goals and their components can be found in the *Appendix.*

In the years since GPRA took effect, OMB has continued to shape and build upon the law's requirements. A major focus during the current Administration has been on further integrating budgetary and performance assessment processes. OMB now requires that agencies prepare and submit annual "performance budgets" in lieu of GPRA's annual performance plans. (Performance budgets first appeared in submissions for FY 2005.) In a 2001 bulletin, OMB directed agencies to combine GPRA's annual program performance reports with their annual financial accountability reports. Consequently, agencies now submit annual performance and accountability reports (PARs) that contain the GPRA performance reports.

In 2003, OMB began using the Program Assessment Rating Tool (**PART**) to evaluate the performance of specific federal programs. The use of this tool is intended to build upon, complement, and strengthen the performance assessment efforts that continue under GPRA. The PART questionnaire has been designed to elicit and document performance information that can be used in making annual budget plans and decisions. The PART contains approximately 30 questions (the exact number depends on the type of program being assessed) grouped into 4 sections that focus on the program's purpose and design, strategic planning, management, and results and accountability. OMB has been using the PART to evaluate approximately one-fifth of all federal programs each year in conjunction with the annual budget process.

NEHRP Legislation

The NEHRP was established by the Earthquake Hazards Reduction Act of 1977 (Public Law 95–124). Over the years, Congress has reauthorized or amended this legislation on numerous occasions. The most recent reauthorization, the National Earthquake Hazards Reduction Program Reauthorization Act of 2004 (Title I of Public Law 108–360), included a number of amendments. From the point of view of the Subcommittee, the most notable change made by this reauthorization was the transfer of NEHRP lead agency responsibilities from FEMA to NIST. A summary of the Earthquake Hazards Reduction Act of 1977, as amended by Public Laws 101-614, 105-47, 106-503, and 108-360, is provided in the *Appendix*.

As the new lead agency for the NEHRP, NIST has the primary responsibility for planning and coordinating the program, and the Director of NIST serves as chairperson of the ICC. The 2004 legislation directs the ICC to develop a new strategic plan for NEHRP that contains performance goals for the program. NIST also is directed to establish an ***Advisory Committee on Earthquake Hazards Reduction*** comprising experts from "research and academic institutions, industry standards development organizations, State and local government, and financial communities."[4] The Advisory Committee is to report to NIST's Director at least biennially on how effectively the NEHRP is carrying out its activities and how the program can be improved. The ICC, in turn, is to report to Congress annually on NEHRP activities and program results."[5]

Because FEMA was the NEHRP lead agency when the Subcommittee began its work, and because the 2004 reauthorization was not enacted until late that year, FEMA continued to chair the Subcommittee from December 2004 through May 2005. Although the 2004 reauthorization assigns to NIST the lead role in matters relating to NEHRP performance assessment, FEMA and the Subcommittee decided to proceed with the development of performance measures for the NEHRP but to limit the scope of the Subcommittee's work to the issuance of this interim report.

Development of NEHRP Performance Measures

The Subcommittee began the development of NEHRP performance measures by acknowledging and discussing the challenges involved. The NEHRP Strategic Plan described these challenges, in part, as follows:

> Measuring the progress of earthquake mitigation is inherently problematic. Those who seek to quantify the value of mitigation efforts face a frustrating dilemma. It's the actions that aren't taken that lead to measurable consequences, while the actions that are taken are subject to ambiguity. Did the structure survive because of retrofitting, or because the shaking intensity and duration of the earthquake were not sufficiently strong to cause damage? If the building codes had not been strengthened, what would have been the impact of an event?[6]

Among the challenges identified and considered by the Subcommittee were the following:

- The complexity of the earthquake hazard and the presence of multiple confounding variables, which make specific cause-and-effect relationships between NEHRP activities and loss reduction difficult to determine.
- The infrequency of damaging earthquakes.
- The difficulties of predicting and measuring earthquake-related scientific advances.
- The time lags involved in advancing earthquake science and in moving scientific advances into practice.

Added to these challenges was the heterogeneous, multiagency composition of the NEHRP. Each participating agency had responded in its own way to the requirements described above under *Evolution of Federal Performance Assessment.* Because their missions and programs differed, their performance goals, measures, targets, and timeframes differed. As between any agencies, these differences could extend down to the definitions of words common to their respective performance assessment systems.

The Subcommittee concluded that a multi-tiered approach to performance assessment would make the most sense for the NEHRP. Under such an approach, the performance measurement system could include short-term, quantitative measures of outputs or processes; intermediate-term measures that report on efforts in progress; and long-term measures focused on outcomes.

Existing Foundations

The NEHRP Strategic Plan identifies 4 strategic goals and 17 strategic objectives for the program. They are listed in the Strategic Plan's *Implementation Summary*, which is provided in the *Appendix* to this report. By definition, these goals and objectives describe what the program should work to achieve—they are the desired outcomes of program performance. The Subcommittee consequently determined that these elements of the Strategic Plan, along with the NEHRP mission statement found on page 7 of the Strategic Plan, should form the foundation of the NEHRP performance assessment system.

Acknowledging that each NEHRP agency already had mechanisms and measures in place for assessing its own performance, the Subcommittee unanimously agreed that NEHRP performance assessment efforts should make the greatest possible use of agencies' existing performance measures and measurement infrastructures. The Subcommittee gathered together the latest available documentation on each participating agency's existing performance measures as a first step toward evaluating their applicability to the NEHRP. The following documents were sought for each agency:

- Strategic plan
- FY 2004 performance and accountability report
- FY 2005 performance budget or annual performance plan
- PART assessment reports (excerpted from OMB's *PART Assessments* compilations)

All documents found were posted to an intranet site maintained by the FEMA contractor.

The Framework for Assessing Performance

To develop performance measures for the NEHRP, the Subcommittee needed to be able to evaluate the suitability of existing agency measures and, if necessary, of proposed new program measures. The Subcommittee recognized that it needed a conceptual framework for NEHRP performance measurement to perform such evaluations effectively, with consistency and objectivity.

The framework for assessing performance had to incorporate the multi-tiered approach that the Subcommittee had found to be appropriate, as well as the foundation of strategic goals and objectives provided in the NEHRP Strategic Plan. It also needed to (1) provide a means of grouping potential measures under these strategic goals and objectives and of assessing their applicability to the goals and objectives; and (2) specify how NEHRP measures should be classified and described.

At its meeting on February 18, 2005, the Subcommittee reviewed and revised a draft framework prepared by FEMA. Key features of the framework are summarized in Figure 2 on the next page.

Figure 2
Taxonomy of NEHRP Performance Measures

Overall Organization—The framework organizes NEHRP performance measures by means of the eight-level taxonomy illustrated in Figure 2. The top three levels comprise the mission statement, 4 strategic goals, and 17 strategic objectives contained in the NEHRP Strategic Plan. The goals describe how NEHRP is carrying out its mission and the objectives specify how each goal is being pursued.

The five remaining levels of the taxonomy were developed by the Subcommittee. Performance measures are found on the bottom level under performance goals because, as explained earlier, each performance measure is a component of a corresponding performance goal (along with a target and timeframe). For each of NEHRP's 17 strategic objectives, there can be 1 or more performance goals. Performance goals are sorted under strategic objectives by performance segment, agency, and period of performance.

Performance Segment—NEHRP performance is largely a sequential process carried out among the four participating agencies. The NEHRP Strategic Plan refers to this process as a "research-to-practice pipeline,"[7] which is illustrated in Figure 3. As indicated, NSF[8] and USGS support the basic research that produces relevant scientific advances; USGS, NIST, and FEMA incorporate these advances into applied research that contributes to the development of mitigation tools and information; and NIST and FEMA promote and facilitate use of these tools and information by those involved in implementing earthquake mitigation measures. NEHRP performance, then, has three major segments: (1) basic research, (2) applied research and development, and (3) dissemination and implementation.

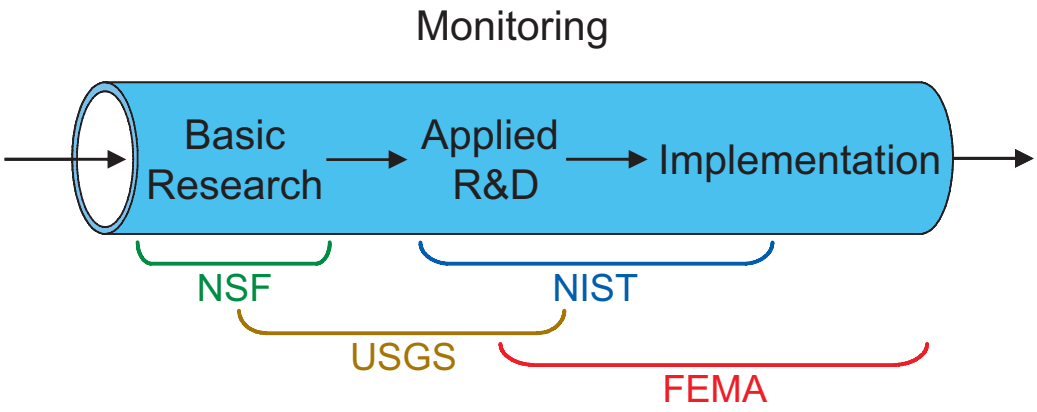


Figure 3: NEHRP Research-to-Practice Pipeline

Timeframes for Measurement—The framework sorts each performance goal and measure into one of three performance periods, based on the estimated duration of the responsible agency's performance. These periods are short-term (less than 2 years), intermediate (from 2 to 5 years), and long-term (more than 5 years). They reflect the Subcommittee's multi-tiered approach to measuring NEHRP performance, discussed earlier.

Performance Measure Specifications—Each performance measure is described using the following set of data elements:

- **Measure**—A statement identifying the performance indicator that is measured (*e.g.*, dollars expended in performing a particular activity, number of specified services performed, number of entities meeting a specified condition).

- **Definition**—Information that defines and describes this performance indicator and specifies how it is measured.

- **Data source**—Where the data needed for measurements can be obtained (*e.g.*, organization, information system, report, employee).

- **Frequency of measurement**s—How often the indicator is measured (*e.g.*, annually, quarterly, triennially, one time only).

- **Baseline measurement**—The current, latest, or beginning value of the indicator, to which the next measurement should be compared.

- **Target measurement(s) and associated timeframe(s)**—The indicator values to be achieved and how soon each should be achieved.

- **Other**—Background information or notes intended to enhance understanding of the specifications.

Development of the Measures

After finalizing the framework for NEHRP performance measurement, the Subcommittee created a form (see *Part II* of this Interim Report) that could be used to document each performance measure developed for the program. This "Performance Measure Specifications Form" documents the taxonomy of the performance measure (*i.e.*, the strategic goal, strategic objective, performance segment, agency, and period of performance to which the measure applies) as well as the specifications described above.

The form gave Subcommittee members a consistent means of evaluating the suitability of potential measures. If the form could not be completed—because, for example, the measure did not fit under any of the strategic objectives or the measure could not be clearly defined or sourced—then the suitability of the measure was suspect and the measure could be deleted from consideration.

Subcommittee members used the information that had been compiled about existing performance measures (see *Existing Foundations*, above), as well as their personal knowledge of relevant agency contacts and sources, to develop NEHRP performance measures applicable to their respective agencies. One specifications form was completed for each measure developed; these forms are provided in Part II of this report.

Future Considerations for Implementation

The specifications presented in this interim report represent an initial attempt to develop performance measures that are appropriate and feasible for NEHRP. The Subcommittee recognizes that the suitability of these or other potential measures cannot be fully gauged until the processes needed to implement and administer them can be planned. Only then can the resources required to use individual measures be accurately

assessed in relation to current and expected resource levels. By the time that such planning can be undertaken, federal performance measurement requirements may have further evolved in ways that impact NEHRP.

As discussed above, the 2004 reauthorization directs the ICC to develop a new strategic plan for NEHRP, as well as "a detailed management plan to implement such strategic plan."[9] These tasks can be expected to subordinate or subsume planning for NEHRP performance assessment. In addition, the new plans produced could substantially affect the appropriateness or priority of performance measures developed to date. The legislation also mandates development of a coordinated interagency budget targeted to goals in the new strategic plan. This may serve to advance the concept of common performance measures that apply to the program as a whole rather than to one participating agency. The Subcommittee has discussed this concept and considered establishing a common measure. The Subcommittee has not yet reached closure on this issue and believes that it is deserving of further investigation and consideration.

Regardless of how these various developments unfold, the framework for performance assessment described in this interim report should retain substantial utility. New strategic goals and objectives could easily be integrated into the top levels of the taxonomy and used to re-evaluate the suitability of existing performance measures and evaluate the fitness of potential new measures. The other levels of the taxonomy should remain useful as variables by which to sort and classify performance goals and measures, and the specifications (or a similar data set) will still be needed to document and describe performance measures. The taxonomy can accommodate additional levels (*e.g.*, priority activities under strategic objectives) as well as additional values within levels (*e.g.*, more strategic goals or objectives). If and when the framework is expanded or more fully populated, consideration should be given to transferring the taxonomy and specifications to a database management application.

Notes

1. *Expanding and Using Knowledge to Reduce Earthquake Losses: The National Earthquake Hazards Reduction Program Strategic Plan,* 2001–2005, FEMA 383, March 2003. See pages 59–60.

2. Office of Management and Budget, *Preparation and Submission of Strategic Plans, Annual Performance Plans, and Annual Program Performance Reports,* June 2005, Circular No. A–11, Part 6, section 200, http://www.whitehouse.gov/omb/circulars/a11/current_year/s200.pdf.

3. Office of Management and Budget, *Performance Measurement Challenges and Strategies,* June 18, 2003, http://www.whitehouse.gov/omb/part/challenges_strategies.pdf.

4. *National Earthquake Hazards Reduction Program Reauthorization Act of 2004,* Public Law 108–360, Title I, section 103, subsection (1)(a)(5).

5. *NEHRP Reauthorization Act of 2004,* subsection (1)(a)(4)(C).

6. *NEHRP Strategic Plan,* 59.

7. *NEHRP Strategic Plan,* 9.

8. The initial NSF performance metrics focus on the Network for Earthquake Engineering Simulation (NEES). These measures may be broadened to include additional activities in the future.

9. *NEHRP Reauthorization Act of 2004,* subsection (1)(a)(3)(D)(i)(II).

Part II

National Earthquake Hazards Reduction Program Performance Evaluation System Performance Measure Specifications Form

Performance Measure Identifier: NIST/Publication of Standards, Guidance

Taxonomy of the Performance Measure	
Strategic Goal	A. Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
Strategic Objective	4. Implement policies and practices that reduce vulnerability of Federal facilities.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☑ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Outcome Measure	Publication of *Standards of Seismic Safety for Existing Federally Owned or Leased Buildings* and guidance on the use of model codes and standards.

Definition	Executive Order 12941, Seismic Safety of Existing Federally Owned or Leased Buildings, states that the Interagency Committee on Seismic Safety in Construction (ICSSC) shall update the *Standards of Safety Seismic for Existing Federally Owned or Leased Buildings (Standards)* at least every 5 years. Section 3 of Executive Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, requires that nationally recognized private sector standards and practices, *i.e.*, nationally recognized model building codes, be used, unless none is available to meet requirements. Section 3 also states that local building codes determined by the responsible agency or by the ICSSC to provide adequately for seismic safety may be used. The ICSSC issues guidance on the use of the model building codes, based on the findings of the code comparison to the NEHRP Recommended Provisions, on an as needed basis. The ICSSC has completed the comparison of the current model building codes (2003 International Building Code (IBC), 2003 International Residential Code (IRC), and 2003 National Fire Protection Association (NFPA) 5000) and American Society of Civil Engineers (ASCE) 7-02 to the 2000 NEHRP Recommended Provisions. Guidance on the use of model codes and standards will be completed in FY 2005.
Data Source	NIST, ICSSC
Frequency of Measurements	*Standards,* every 5 years; guidance on the use of model codes and standards, every 3 years or on an as needed basis.
Baseline Measurement	Standards, by the end of FY 2006; code comparison cycle, FY 2005.
Target Measurement(s) and Associated Timeframe(s)	See Frequency of Measurements above.
Other	The work is currently carried out with funding from FEMA and other federal agencies. The cycle for code comparison may change.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: FEMA/Baseline for Adoption of Building Codes

Taxonomy of the Performance Measure	
Strategic Goal	B. Improve techniques to reduce seismic vulnerabiility of facilities and systems.
Strategic Objective	3. Support efforts to improve seismic standards and codes and imporve design and constuction practices for buildings and lifelines.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☑ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☑ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☐ Long-term (> 5 years)

Specifications of the Performance Measure	
Output Measure	Number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions incorporated.

Definition	This one-time measure is to establish the baseline for assessing the targets met under the FEMA performance measure for increasing the number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions. **"High earthquake risk"** is defined as jurisdictions in those states and territories listed as having a high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Very high earthquake risk"** is defined as jurisdictions in those states and territories listed as having a very high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Jurisdiction"** is defined as all cities and counties in the relevant states and territories. **"Building codes"** are defined as (1) 2003 International Building Code (IBC); (2) 2003 International Residential Code (IRC); and (3) the 2003 National Fire Protection Association (NFPA) 5000 Code. The Insurance Service Office (ISO) can establish the baseline using its automated data collection system. The ISO monitors building code adoption through its national surveys of building code adoption and enforcement.
Data Source	ISO
Frequency of Measurements	Once, by the end of calendar year 2005.
Baseline Measurement	A baseline is not applicable to this measure.
Target Measurement(s) and Associated Timeframe(s)	See Frequency of Measurements above.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: FEMA/Adoption of Building Codes

Taxonomy of the Performance Measure	
Strategic Goal	B. Improve techniques to reduce seismic vulnerabiility of facilities and systems.
Strategic Objective	3. Support efforts to improve seismic standards and codes and imporve design and constuction practices for buildings and lifelines.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☑ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Outcome Measure	Number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions incorporated.

Definition	This long-term outcome measure tracks on an annual basis beginning in FY 2006 the number of high and very high earthquake risk jurisdictions that have adopted building codes with seismic resistant provisions. **"High earthquake risk"** is defined as jurisdictions in those states and territories listed as having a high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Very high earthquake risk**" is defined as jurisdictions in those states and territories as having a very high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Jurisdiction"** is defined as all cities and counties in the relevant states and territories. **"Building codes"** are defined as (1) 2003 International Building Code (IBC); (2) 2003 International Residential Code (IRC); and (3) the 2003 National Fire Protection Association (NFPA) 5000 Code. The Insurance Service Office (ISO) can establish the baseline by the end of calendar year 2005 using its automated data collection system. The ISO monitors building code adoption and enforcement through its national surveys of building code adoption and enforcement. By the end of FY 2006, the target is 2,000 jurisdictions. For each fiscal year thereafter, the target is an additional 50 jurisdictions.
Data Source	ISO
Frequency of Measurements	Annual; the first measurement at the end of FY 2006.
Baseline Measurement	End of calendar year 2005.

Target Measurement(s) and Associated Timeframe(s)	FY 2006: 2,000 FY 2007: +50 FY 2008: +50 FY 2009: +50 FY 2010: +50 FY 2011: +50
Other	Targets set annually, based on appropriated funding. A performance measure may be established to track the enforcement of building codes by high and very high earthquake risk jurisdictions via the survey conducted by the ISO using the Building Code Effectiveness Grading Schedule (BCEGS). The survey, which is conducted every 5 years, assesses building code effectiveness on a scale (grade) of 1-10.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: FEMA/Baseline for Printing and Distribution Costs

Taxonomy of the Performance Measure	
Strategic Goal	A. Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
Strategic Objective	1. Develop and provide information on earthquake hazards to decision-makers and the public.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☑ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☑ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☐ Long-term (> 5 years)

Specifications of the Performance Measure	
Output Measure	The costs for publication and distribution of NEHRP resource materials.

Definition	This one-time measure is to establish the baseline for FEMA's annual costs to publish and distribute NEHRP resource materials. **"Publishing and distribution costs"** are defined as all costs associated with publishing and distribution, including (1) costs of posting NEHRP resource materials on FEMA's NEHRP web site, such as converting PDF files for compliance with Section 508 of the Rehabilitation Act of 1973, as amended; (2) printing preparation costs, such as the creation of electronic print files and cover artwork; (3) printing costs, including hard copies and CD's; and (4) administrative costs associated with the preparation, maintenance, and distribution of NEHRP resource materials through the dissemination cycle. **"NEHRP resource materials"** are defined as any material that FEMA publishes and disseminates for the NEHRP. The resource materials may include, but are not limited to (1) technical manuals and related materials for building professionals and engineers; (2) publications for homeowners, schools, and communities; (3) training materials; and (4) brochures and public awareness documents.
Data Source	FEMA (Mitigation Division, Risk Assessment Branch; FEMA Distribution Center)
Frequency of Measurements	Once, by the end of FY 2006.
Baseline Measurement	A baseline is not applicable to this measure.
Target Measurement(s) and Associated Timeframe(s)	See Frequency of Measurements above.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: FEMA/Printing and Distribution Costs

Taxonomy of the Performance Measure	
Strategic Goal	A. Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
Strategic Objective	1. Develop and provide information on earthquake hazards to decision-makers and the public.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☑ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Efficiency Measure	The costs for publication and distribution of NEHRP resource materials.

Definition	The purpose of this measure is to increase efficiencies in the publication and distribution of NEHRP resource materials, increase access to the NEHRP resource materials, and maintain the quality of the materials. FEMA is moving toward a web-based and CD-ROM publication and dissemination structure for the majority of its materials. The increased use of these publication technologies should result in a 5% annual reduction each year in printing and distribution costs, adjusted for inflation, for NEHRP resource materials. **"Publishing and distribution costs"** are defined as all costs associated with publishing and distribution, including (1) costs of posting NEHRP resource materials on FEMA's NEHRP web site, such as converting PDF files for compliance with Section 508 of the Rehabilitation Act of 1973, as amended; (2) printing preparation costs, such as the creation of electronic print files and cover artwork; (3) printing costs, including hard copies and CD's; and (4) administrative costs associated with the preparation, maintenance, and distribution of NEHRP resource materials through the dissemination cycle. **"NEHRP resource materials"** are defined as any material that FEMA publishes and disseminates for the NEHRP. The resource materials may include, but are not limited to (1) technical manuals and related materials for building professionals and engineers; (2) publications for homeowners, schools, and communities; (3) training materials; and (4) brochures and public awareness documents. .
Data Source	FEMA (Mitigation Division, Risk Assessment Branch; FEMA Distribution Center)
Frequency of Measurements	Annual.
Baseline Measurement	FY 2006 printing and distribution costs for NEHRP resource materials.
Target Measurement(s) and Associated Timeframe(s)	5% annual reduction from baseline year and each fiscal year thereafter, adjusted for inflation.
Other	Targets set annually, based on appropriated funding.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: FEMA/Use of HAZUS

Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	3. Support development and use of risk and loss assessment tools.
Performance Segment	☐ Basic Research ☑ Applied Research and Development ☐ Dissemination and Implementation
Agency	☑ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☐ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Outcome Measure	Number of jurisdictions with high and very high earthquake risk that are using quantitative risk analysis data, such as that developed with HAZUS, in their local planning efforts.

Definition	This long-term outcome measure tracks on an annual basis beginning in FY 2006 the number of high and very high earthquake risk jurisdictions that are using HAZUS for local planning. **"High earthquake risk"** is defined as jurisdictions in those states and territories listed as having a high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Very high earthquake risk"** is defined as jurisdictions in those states and territories listed as having a very high earthquake hazard according to the most current USGS 10% PE in the 50 Year Map. **"Jurisdiction"** is defined as all cities and counties in the relevant states and territories. **"HAZUS"** is defined as Hazards U.S., a software program developed by FEMA with the National Institute of Building Sciences (NIBS) to help communities across the United States estimate damage and other earthquake effects and map, display, and manage the results. A baseline of 300 jurisdictions has been established for the end of FY 2005. For each year thereafter, the targets are listed below.
Data Source	HAZUS User Groups; FEMA HQ and Regions; States
Frequency of Measurements	Annual; the first measurement at the end of FY 2006.
Baseline Measurement	End of FY 2005, 300 jurisdictions with high and very high earthquake risk are using HAZUS in their local planning efforts.
Target Measurement(s) and Associated Timeframe(s)	FY 2006: +50 FY 2007: +25 FY 2008: +25 FY 2009: +15 FY 2010: +15 FY 2011: +15
Other	Targets set annually, based on appropiated funding.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: NSF/NEES Dwell Time

Taxonomy of the Performance Measure	
Strategic Goal	D. Improve the understanding of earthquakes and their effects.
Strategic Objective	5. Advance earthquake engineering knowledge of the built environment.
Performance Segment	☑ Basic Research ☐ Applied Research and Development ☐ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☑ National Science Foundation ☐ United States Geological Survey
Period of Performance	☑ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☐ Long-term (> 5 years)

Specifications of the Performance Measure	
Efficency Measure	Percent of NEES award decisions made available to applicants within 6 months of proposal receipt or deadline date, while maintaining a credible and efficient competitive merit system, as evaluated by external experts.

Definition	This measure concerns the amount of time required to process and decide whether or not to fund proposals for research to be conducted at the George E. Brown, Jr., Network for Earthquake Simulation (NEES). Proposal processing time is known within NSF as "dwell time." For each proposal, NSF (1) calculates the elapsed time between the proposal receipt date (or deadline date, whichever is later) and the date on which NSF's Division Director for Civil and Mechanical Systems (CMS) concurs on awarding or declining funding; and (2) notes whether this elapsed time is less than or equal to 6 months. The measure is then calculated as the percent of all proposals processed during the reporting period for which the elapsed time was 6 months or less. (A proposal is deemed to have been processed during the reporting period if the CMS Director concurred during the period.) NSF policy is to process all proposals as expeditiously as possible, as long as processing is accomplished through a credible, competitive merit review system. The quality of the review system used for NEES proposals is evaluated every 3 years by the CMS Committee of Visitors (see the NSF/NEES qualitative assessment performance measure).
Data Source	NSF's Enterprise Information System (EIS)
Frequency of Measurements	Annual, with the first measurement in FY 2006.
Baseline Measurement	This is a new measure. Although proposal processing time has been tracked for larger groups of proposals, it has not been tracked separately for NEES proposals. A baseline is not applicable to this measure because the target percentage is not expected to change and the goal is to meet or exceed this target each year.
Target Measurement(s) and Associated Timeframe(s)	The target for each fiscal year is 70%.
Other	Considering the increasing complexity and number of proposals coming into NSF, the goal of keeping decision time for 70% of proposals down to 6 months is ambitious. This measure is a proxy for efficiency.

National Earthquake Hazards Reduction Program Performance Evaluation System Performance Measure Specifications Form

Performance Measure Identifier: NSF/NEES Operational Time

Taxonomy of the Performance Measure	
Strategic Goal	D. Improve the understanding of earthquakes and their effects.
Strategic Objective	5. Advance earthquake engineering knowledge of the built environment.
Performance Segment	☑ Basic Research ☐ Applied Research and Development ☐ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☑ National Science Foundation ☐ United States Geological Survey
Period of Performance	☑ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☐ Long-term (> 5 years)

Specifications of the Performance Measure	
Efficency Measure	Percent of operational NEES facilities that kept scheduled operating time lost to less than 10%.
Definition	This measure relates to facilities at the 15 large-scale, experimental sites that make up the George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES).

Data Source	NSF's Enterprise Information System (EIS)
Frequency of Measurements	Annual, with the first measurement in FY 2006.
Baseline Measurement	This is a new measure. Although proposal processing time has been tracked for larger groups of proposals, it has not been tracked separately for NEES proposals. A baseline is not applicable to this measure because the target percentage is not expected to change and the goal is to meet or exceed this target each year.
Target Measurement(s) and Associated Timeframe(s)	The target for each fiscal year is 90%.
Other	NSF created NEES to give researchers the tools to learn how earthquakes and tsunami impact the buildings, bridges, utility systems, and other critical infrastructure of today's society. NEES facilities feature such advanced tools as shake tables, centrifuges that simulate earthquake effects, unique laboratories, a tsunami wave basin, and field-testing equipment. All are linked to a centralized data pool and earthquake simulation software, bridged together by high-speed Internet2 technology. By minimizing operating time lost, NEES can help to maximize the return on NSF's investment in these unique, state-of-the-art facilities.

National Earthquake Hazards Reduction Program Performance Evaluation System Performance Measure Specifications Form

Performance Measure Identifier: NSF/NEES Qualitative Assessment

Taxonomy of the Performance Measure	
Strategic Goal	D. Improve the understanding of earthquakes and their effects.
Strategic Objective	5. Advance earthquake engineering knowledge of the built environment.
Performance Segment	☑ Basic Research ☐ Applied Research and Development ☐ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☑ National Science Foundation ☐ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☑ Intermediate (2–5 years) ☐ Long-term (> 5 years)

Specifications of the Performance Measure	
Qualitative Measure	A qualitative assessment by external experts of whether NEES is enabling people working at the forefront of discovery to make important contributions to earthquake engineering knowledge.
Definition	The Committee of Visitors (CoV) for NSF's Division of Civil and Mechanical Systems (CMS) is the mechanism for determining that NEES is enabling people working at the forefront of discovery to make important contributions to earthquake engineering knowledge.

Data Source	CMS CoV report
Frequency of Measurements	Every 3 years, with the first measurement in FY 2007.
Baseline Measurement	This is a new measure. (The last CMS CoV report was prepared in FY 2004, and NEES began operating in FY 2005.) A baseline is not applicable to this measure because the target is an affirmative finding by the CMS CoV and the goal is to meet this target every 3 years.
Target Measurement(s) and Associated Timeframe(s)	The target is an affirmative finding documented in the next CMS CoV report.
Other	Targets set annually, based on appropriated funding.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: USGS/Operational Costs

Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	C.1. Provide rapid, reliable information about earthquakes and earthquake-induced damage.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☑ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Efficiency Measure	Data processing and notification costs per unit volume of input data from earthquake sensors in monitoring networks.

Definition	This measure concerns the efficiency of the earthquake notification system maintained by the National Earthquake Information Center (NEIC). Through this system, NEIC receives real-time data on earthquake activity from networks of monitoring sensors, processes these data as they are received, and sends notifications of earthquake activity to the appropriate civil authorities in the regions affected. The measure is calculated as NEIC's annual spending for earthquake notification divided by the number of gigabytes (Gb) of sensor data received from real-time earthquake monitoring networks. This measure is an existing USGS PART efficiency measure.
Data Source	USGS, National Earthquake Information Center
Frequency of Measurements	Annual.
Baseline Measurement	$0.90/Gb in FY 2004, adjusted for inflation.
Target Measurement(s) and Associated Timeframe(s)	No more than $0.90/Gb for each year.
Other	Targets set annually, based on appropriated funding.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: USGS/Incorporation of ShakeMap

Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	C.1. Provide rapid, reliable information about earthquakes and earthquake-induced damage.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☑ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Outcome Measure	Number of metropolitan regions where ShakeMap is incorporated into emergency procedures.

Definition	This measure tracks, on a cumulative basis, the introduction of USGS ShakeMap technology into urban emergency-response capabilities across the United States. ShakeMap is a system for automatically generating, within minutes of an earthquake, maps of areas subjected to strong shaking. USGS has identified 26 U.S. metropolitan areas with moderate to high seismic risk that are suitable candidates for ShakeMap. Incorporating ShakeMap into an area's emergency procedures involves providing the seismic instrumentation, hazard mapping, and training that are required to generate and use these maps. This measure is an existing USGS PART outcome measure.
Data Source	USGS, National Earthquake Information Center
Frequency of Measurements	Annual.
Baseline Measurement	By the end of FY 2004, 5 of the 26 targeted metropolitan areas had incorporated ShakeMap.
Target Measurement(s) and Associated Timeframe(s)	Annual, incremental targets are also set based on appropriated funding available for ShakeMap expansion.
Other	ShakeMap requires data from modern seismic networks with digital strong-motion recording capabilities and real-time telecommunications feeds. The 26 targeted metropolitan areas have received or are scheduled for detailed hazard mapping and dense Advanced National Seismic System (ANSS) instrumentation. The maps generated by the ShakeMap system can be delivered in 10 minutes or less and, consequently, can guide emergency response by cities, states, federal agencies, and lifeline operators.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: USGS/Expansion of ANSS Stations

Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	C.1. Provide rapid, reliable information about earthquakes and earthquake-induced damage.
Performance Segment	☐ Basic Research ☐ Applied Research and Development ☑ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☑ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Output Measure	Number of real-time earthquake sensors.

Definition	This measure tracks the growth of the Advanced National Seismic System (ANSS), a nationwide network of earthquake monitoring sensors (referred to as ANSS stations). With sensors placed on the ground and in buildings, bridges, and other structures, ANSS is intended to provide real-time data on earthquake activity as well as information about the performance of buildings and lifelines in earthquakes. The measure is defined as the cumulative number of ANSS stations in operation (the number of real-time sensors that meet ANSS specifications and are operated either by USGS or an ANSS regional network operator). This measure is an existing USGS PART output measure.
Data Source	USGS, National Earthquake Information Center
Frequency of Measurements	Quarterly.
Baseline Measurement	There were 531 ANSS stations in operation at the end of FY 2004.
Target Measurement(s) and Associated Timeframe(s)	The long-term target, documented in the ANSS plan (USGS Circular 1188), is for the network to comprise 7,100 stations. (Annual expansion targets are set based on appropriated funding.)
Other	ANSS stations are being placed primarily in seismically active urban areas. Consequently, the expansion of ANSS will facilitate dispersion of ShakeMap (see the USGS ShakeMap performance measure) and other real-time earthquake products that require the sophisticated, urban seismic measurements generated by ANSS.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: USGS/Updates to the National Hazards Maps

Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	C.2. Improve seismic hazard characterization and mapping.
Performance Segment	☐ Basic Research ☑ Applied Research and Development ☐ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☑ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☐ Intermediate (2–5 years) ☑ Long-term (> 5 years)

Specifications of the Performance Measure	
Outcome Measure	Completion of updates to the National Seismic Hazard Maps and their adoption into the NEHRP Provisions

Definition	Every 5 years, USGS updates its national mapping of seismic hazards. These maps are essential input into the updating of the NEHRP Provisions, upon which building codes are based. This measure is an existing USGS PART outcome measure.
Data Source	USGS
Frequency of Measurements	Annual (progress report).
Baseline Measurement	Maps last completed in 2002 and adopted in 2003.
Target Measurement(s) and Associated Timeframe(s)	Completion by end of FY 2007 for adoption in FY 2008.
Other	Targets set annually, based on appropriated funding.

National Earthquake Hazards Reduction Program Performance Evaluation System
Performance Measure Specifications Form

Performance Measure Identifier: USGS/Completion of Seismic Hazard Maps

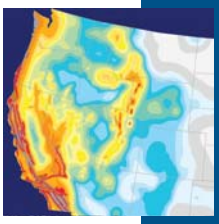
Taxonomy of the Performance Measure	
Strategic Goal	C. Improve seismic hazards identification and risk assessment methods and their use.
Strategic Objective	C.2. Improve seismic hazard characterization and mapping.
Performance Segment	☐ Basic Research ☑ Applied Research and Development ☐ Dissemination and Implementation
Agency	☐ Federal Emergency Management Agency ☐ National Institute of Standards and Technology ☐ National Science Foundation ☑ United States Geological Survey
Period of Performance	☐ Short-term (< 2 years) ☑ Intermediate (2–5 years) ☐ Long-term (> 5 years)

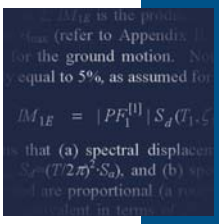
Specifications of the Performance Measure	
Output Measure	Number of urban areas for which detailed seismic hazard maps are completed.

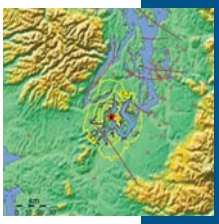
Definition	Number of urban areas, of 26 large metropolitan regions identified as having moderate to high seismic hazard, for which urban seismic hazard maps are completed. This is an existing USGS PART output measure.
Data Source	USGS
Frequency of Measurements	Annual.
Baseline Measurement	FY 2003: 1 completed FY 2004: 2 (1 completed this year) FY 2005: 3 targeted (cumulative)
Target Measurement(s) and Associated Timeframe(s)	26 (per USGS Earthquake Hazards 5-Year Plan).
Other	Targets set annually, based on appropriated funding.

Interim Report on NEHRP Performance Measures

Appendix







NEHRP Interagency Coordinating Council
Subcommittee on Performance Measures (December 2004)

Stephen A. Cauffman
Leader, Structures Group
National Institute of Standards and Technology
Building and Fire Research Laboratory
Structures Division
100 Bureau Drive, Stop 8611
Gaithersburg, Maryland 20899-8611
(301) 975-6051
stephen.cauffman@nist.gov

Jo Culbertson
Staff Associate for Planning and Evaluation
Office of the Assistant Director
for Engineering
National Science Foundation
4201 Wilson Boulevard, Room 505
Arlington, Virginia 22230
(703) 292-4602
jculbert@nsf.gov

FEMA Project Officer

Cathleen M. Carlisle
Program Specialist, Building Science &
Technology Section
Risk Assessment Branch
Mitigation Division
U.S. Dept. of Homeland Security
FEMA
500 C Street, S.W., Room 416
Washington, D.C. 20472
(202) 646-2810
cathleen.carlisle@dhs.gov

Edward Laatsch
Chief, Multi-Hazard Engineering Services Section
Risk Assessment Branch, Mitigation Division
U.S. Dept. of Homeland Security
FEMA
500 C Street, S.W., Room 416
Washington, D.C. 20472
(202) 646-3885
ed.laatsch@dhs.gov

William Leith
Coordinator
Advanced National Seismic System
Associate Coordinator for Earthquake Hazards
Geomagnetic Hazards and
Global Seismograph Network
U.S. Geological Survey
905 National Center
Reston, Virginia 20192
(703) 648-6786
wleith@usgs.gov

Project Consultant

Francoise Arsenault
BRI Consulting Group
1111 14th Street, N.W., Suite 900
Washington, D.C. 20005
(202) 638-2420
(301) 933-9062
farsena166@aol.com
farsenault@briconsultingroup.com

Earthquake Hazards Reduction Act of 1977, As Amended

[Note: The following is a summary of the Earthquake Hazards Reduction Act of 1977 (Public Law 95-124, 42 U.S.C. 7701 et. seq.), as amended by Public Laws 101-614, 105-47, 106-503, and 108-360.]

SECTION 1. SHORT TITLE. [New Section 101 in Public Law 108-360]

This title may be cited as the `National Earthquake Hazards Reduction Program Reauthorization Act of 2004'.

SECTION 2. FINDINGS.

The Congress finds and declares the following:
(1) All 50 States are vulnerable to the hazards of earthquakes, and at least 39 of them are subject to major or moderate seismic risk, including Alaska, California, Hawaii, Illinois, Massachusetts, Missouri, Montana, Nevada, New Jersey, New York, South Carolina, Utah, and Washington. A large portion of the population of the United States lives in areas vulnerable to earthquake hazards.
(2) Earthquakes have caused, and can cause in the future, enormous loss of life, injury, destruction of property, and economic and social disruption. With respect to future earthquakes, such loss, destruction, and disruption can be substantially reduced through the development and implementation of earthquake hazards reduction measures, including (A) improved design and construction methods and practices, (B) land-use controls and redevelopment, (C) prediction techniques and early-warning systems, (D) coordinated emergency preparedness plans, and (E) public education and involvement programs.
(3) An expertly staffed and adequately financed earthquake hazards reduction programs, based on Federal, State, local, and private research, planning, decisionmaking, and contributions would reduce the risk of such loss, destruction, and disruption in seismic areas by an amount far greater than the cost of such program.
(4) A well-funded seismological research program in earthquake prediction could provide data adequate for the design of an operational system that could predict accurately the time, place, magnitude, and physical effects of earthquakes in selected areas of the United States.
(5) The geological study of active faults and features can reveal how recently and how frequently major earthquakes have occurred on those faults and how much risk they pose. Such long-term seismic risk assessments are needed in virtually every aspect of earthquake hazards management, whether emergency planning, public regulation, detailed building design, insurance rating, or investment decision.
(6) The vulnerability of buildings, lifelines, public works, and industrial and emergency facilities can be reduced through proper earthquake-resistant design and construction practices. The economy and efficacy of such procedures can be substantially increased through research and development.
(7) Programs and practices of departments and agencies of the United States are important to the communities they serve; some functions, such as emergency communications and national defense, and lifelines, such as dams, bridges, and public works, must remain in service during and after an earthquake. Federally owned, operated, and influenced structures and lifelines should serve as models for how to replace and minimize hazards to the community.
(8) The implementation of earthquake hazards reduction measures would, as an added benefit, also reduce the risk of loss, destruction, and disruption from other natural hazards and manmade hazards, including hurricane, tornadoes, accidents, explosions, landslides, building and structural cave-ins, and fires.
(9) Reduction of loss, destruction, and disruption from earthquakes will depend on the actions of individuals and organizations in the private sector and governmental units at Federal, State, and local levels. The current capability to transfer knowledge and information to these sectors is insufficient. Improved mechanisms are needed to translate existing information and research findings into reasonable and usable specifications, criteria, and practices so that individuals, organizations, and governmental units may

make informed decisions and take appropriate actions.
(10) Severe earthquakes are a worldwide problem. Since damaging earthquakes occur infrequently in any one nation, international cooperation is desirable for mutual learning from limited experiences.
(11) An effective Federal program in earthquake hazards reduction will require input from and review by persons outside the Federal Government expert in the sciences of earthquake hazards reduction and in the practical application of earthquake hazards reduction measures.

SECTION 3. PURPOSE.

It is the purpose of the Congress in this Act to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. The objectives of such program shall include:
(1) the education of the public, including State and local officials, as to earthquake phenomena, the identification of locations and structures which are especially susceptible to earthquake damage, ways to reduce the adverse consequences of an earthquake, and related matters;
(2) the development of technologically and economically feasible design and construction methods and procedures to make new and existing structures, in areas of seismic risk, earthquake resistant, giving priority to the development of such methods and procedures for power generating plants, dams, hospitals, schools, public utilities and other lifelines, public safety structures, high occupancy buildings, and other structures which are especially needed in time of disaster;
(3) the implementation, to the greatest extent practicable, in all areas of high or moderate seismic risk, of a system (including personnel, technology, and procedures) for predicting damaging earthquakes and for identifying, evaluating, and accurately characterizing seismic hazards;
(4) the development, publication, and promotion, in conjunction with State and local officials and professional organizations, of model building codes and other means to encourage consideration of information about seismic risk in making decisions about land-use policy and construction activity;
(5) the development, in areas of seismic risk, of improved understanding of, and capability with respect to, earthquake-related issues, including methods of mitigating the risks from earthquakes, planning to prevent such risks, disseminating warnings of earthquakes, organizing emergency services, and planning for reconstruction and redevelopment after an earthquake;
(6) the development of ways to increase the use of existing scientific and engineering knowledge to mitigate earthquake hazards; and
(7) the development of ways to assure the availability of affordable earthquake insurance.

SECTION 4. DEFINITIONS. [New Section 102 in Public Law 108-360]

As used in this Act, unless the context otherwise requires:
(1) The term "includes" and variants thereof should be read as if the phrase "but is not limited to" were also set forth.
(2) The term "Program" means the National Earthquake Hazards Reduction Program established under section 5.
(3) The term "seismic" and variants thereof mean having to do with, or caused by, earthquakes.
(4) The term "State" means each of the States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Mariana Islands, and any other territory or possession of the United States.
(5) The term "United States" means, when used in a geographical sense, all of the States as defined in section 4(4).
(6) The term "lifelines" means public works and utilities, including transportation facilities and infrastructure, oil and gas pipelines, electrical power and communication facilities, and water supply and sewage treatment facilities.

(7) The term “Program agencies” means the Federal Emergency Management Agency, the United States Geological Survey, the National Science Foundation, and the National Institute of Standards and Technology.
(8) The term “Interagency Coordinating Committee” means the Interagency Coordinating Committee on Earthquake Hazards Reduction established under section 5(a).
(9) The term “Advisory Committee” means the Advisory Committee established under section 5(a)(5).

SECTION 5. EARTHQUAKE HAZARDS REDUCTION PROGRAM.
[New Section 103 in Public Law 108-360]

(a) ESTABLISHMENT-
(1) IN GENERAL- There is established the National Earthquake Hazards Reduction Program.
(2) PROGRAM ACTIVITIES- The activities of the Program shall be designed to--
(A) develop effective measures for earthquake hazards reduction;
(B) promote the adoption of earthquake hazards reduction measures by Federal, State, and local governments, national standards and model code organizations, architects and engineers, building owners, and others with a role in planning and constructing buildings, structures, and lifelines through--
(i) grants, contracts, cooperative agreements, and technical assistance;
(ii) development of standards, guidelines, and voluntary consensus codes for earthquake hazards reduction for buildings, structures, and lifelines;
(iii) development and maintenance of a repository of information, including technical data, on seismic risk and hazards reduction; and
(C) improve the understanding of earthquakes and their effects on communities, buildings, structures, and lifelines, through interdisciplinary research that involves engineering, natural sciences, and social, economic, and decisions sciences; and
(D) develop, operate, and maintain an Advanced National Seismic Research and Monitoring System established under section 13 of the Earthquake Hazards Reduction Act of 1977 (42 U.S.C. 7707), the George E. Brown, Jr. Network for Earthquake Engineering Simulation established under section 14 of that Act (42 U.S.C. 7708), and the Global Seismographic Network.
(3) INTERAGENCY COORDINATING COMMITTEE ON EARTHQUAKE HAZARDS REDUCTION-
(A) IN GENERAL- There is established an Interagency Coordinating Committee on Earthquake Hazards Reduction chaired by the Director of the National Institute of Standards and Technology (referred to in this subsection as the `Director').
(B) MEMBERSHIP- The committee shall be composed of the directors of--
(i) the Federal Emergency Management Agency;
(ii) the United States Geological Survey;
(iii) the National Science Foundation;
(iv) the Office of Science and Technology Policy; and
(v) the Office of Management and Budget.
(C) MEETINGS- The Committee shall meet not less than 3 times a year at the call of the Director.
(D) PURPOSE AND DUTIES- The Interagency Coordinating Committee shall oversee the planning, management, and coordination of the Program. The Interagency Coordinating Committee shall--
(i) develop, not later than 6 months after the date of enactment of the National Earthquake Hazards Reduction Program Reauthorization Act of 2004 and update periodically--
(I) a strategic plan that establishes goals and priorities for the Program activities described under subsection (a)(2); and
(II) a detailed management plan to implement such strategic plan; and
(ii) develop a coordinated interagency budget for the Program that will ensure appropriate balance among the Program activities described under subsection (a)(2), and, in accordance with the plans developed under clause (i), submit such budget to the Director of the Office of Management and Budget at the time designated by that office for agencies to submit annual budgets.

(4) ANNUAL REPORT- The Interagency Coordinating Committee shall transmit, at the time of the President's budget request to Congress, an annual report to the Committee on Science and the Committee on Resources of the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate. Such report shall include--
(A) the Program budget for the current fiscal year for each agency that participates in the Program, and for each major goal established for the Program activities under subparagraph (3)(A);
(B) the proposed Program budget for the next fiscal year for each agency that participates in the Program, and for each major goal established for the Program activities under subparagraph (3)(A);
(C) a description of the activities and results of the Program during the previous year, including an assessment of the effectiveness of the Program in furthering the goals established in the strategic plan under (3)(A);
(D) a description of the extent to which the Program has incorporated the recommendations of the Advisory Committee;
(E) a description of activities, including budgets for the current fiscal year and proposed budgets for the next fiscal year, that are carried out by Program agencies and contribute to the Program, but are not included in the Program; and
(F) a description of the activities, including budgets for the current fiscal year and proposed budgets for the following fiscal year, related to the grant program carried out under subsection (b)(2)(A)(i).
(5) ADVISORY COMMITTEE-
(A) IN GENERAL- The Director shall establish an Advisory Committee on Earthquake Hazards Reduction of at least 11 members, none of whom may be an employee (as defined in subparagraphs (A) through (F) of section 7342(a)(1) of title 5, United States Code, including representatives of research and academic institutions, industry standards development organizations, State and local government, and financial communities who are qualified to provide advice on earthquake hazards reduction and represent all related scientific, architectural, and engineering disciplines. The recommendations of the Advisory Committee shall be considered by Federal agencies in implementing the Program.
(B) ASSESSMENT- The Advisory Committee shall assess--
(i) trends and developments in the science and engineering of earthquake hazards reduction;
(ii) effectiveness of the Program in carrying out the activities under (a)(2);
(iii) the need to revise the Program; and
(iv) the management, coordination, implementation, and activities of the Program.
(C) REPORT- Not later than 1 year after the date of enactment of the National Earthquake Hazards Reduction Program Reauthorization Act of 2004 and at least once every 2 years thereafter, the Advisory Committee shall report to the Director on its findings of the assessment carried out under subparagraph (B) and its recommendations for ways to improve the Program. In developing recommendations, the Committee shall consider the recommendations of the United States Geological Survey Scientific Earthquake Studies Advisory Committee.
(D) FEDERAL ADVISORY COMMITTEE ACT APPLICATION- Section 14 of the Federal Advisory Committee Act (5 App. U.S.C. 14) shall not apply to the Advisory Committee.
(b) RESPONSIBILITIES OF PROGRAM AGENCIES-
(1) Lead Agency-The National Institute of Standards and Technology shall have the primary responsibility for planning and coordinating the Program. In carrying out this paragraph, the Director of the Institute shall-
(A) prepare, in conjunction with other Program agencies, an annual budget for the Program to be submitted to the Office of Management and Budget;
(B) support the development of performance-based seismic engineering tools, and work with appropriate groups to promote the commercial application of such tools, through earthquake-related building codes, standards, and construction practices;
(C) prepare, in conjunction with other Program agencies, a biennial report, to be submitted to the Congress within 90 days after the end of each even-numbered fiscal year, which shall describe the activities and achievements of the Program during the preceding two fiscal years; and

(D) request the assistance of Federal agencies other than the Program agencies, as necessary to assist in carrying out this Act.
(2) Department of Homeland Security; Federal Emergency Management Agency-
(A) PROGRAM RESPONSIBILITIES- The Under Secretary of Homeland Security for Emergency Preparedness and Response (the Director of the Federal Emergency Management Agency)--
(i) shall work closely with national standards and model building code organizations, in conjunction with the National Institute of Standards and Technology, to promote the implementation of research results;
(ii) shall promote better building practices within the building design and construction industry including architects, engineers, contractors, builders, and inspectors;
(iii) shall operate a program of grants and assistance to enable States to develop mitigation, preparedness, and response plans, prepare inventories and conduct seismic safety inspections of critical structures and lifelines, update building and zoning codes and ordinances to enhance seismic safety, increase earthquake awareness and education, and encourage the development of multi-State groups for such purposes;
(iv) shall support the implementation of a comprehensive earthquake education and public awareness program, including development of materials and their wide dissemination to all appropriate audiences and support public access to locality-specific information that may assist the public in preparing for, mitigating against, responding to and recovering from earthquakes and related disasters;
(v) shall assist the National Institute of Standards and Technology, other Federal agencies, and private sector groups, in the preparation, maintenance, and wide dissemination of seismic resistant design guidance and related information on building codes, standards, and practices for new and existing buildings, structures, and lifelines, and aid in the development of performance-based design guidelines and methodologies supporting model codes for buildings, structures, and lifelines that are cost effective and affordable;
(vi) shall develop, coordinate, and execute the National Response Plan when required following an earthquake, and support the development of specific State and local plans for each high risk area to ensure the availability of adequate emergency medical resources, search and rescue personnel and equipment, and emergency broadcast capability;
(vii) shall develop approaches to combine measures for earthquake hazards reduction with measures for reduction of other natural and technological hazards including performance-based design approaches;
(viii) shall provide preparedness, response, and mitigation recommendations to communities after an earthquake prediction has been made under paragraph (3)(D); and
(ix) may enter into cooperative agreements or contracts with States and local jurisdictions and other Federal agencies to establish demonstration projects on earthquake hazard mitigation, to link earthquake research and mitigation efforts with emergency management programs, or to prepare educational materials for national distribution.
(B) STATE ASSISTANCE PROGRAM CRITERIA-In order to qualify for assistance under subparagraph (A)(i), a State must-
(i) demonstrate that the assistance will result in enhanced seismic safety in the State;
(ii) provide a share of the costs of the activities for which assistance is being given, in accordance with subparagraph (C); and
(iii) meet such other requirements as the Director of the Agency shall prescribe.
(C) NON-FEDERAL COST SHARING-
(i) In the case of any State which has received, before October 1, 1990, a grant from the Agency for activities under this Act which included a requirement for cost sharing by matching such grant, any grant obtained from the Agency for activities under subparagraph (A)(i) after such date shall not include a requirement for cost sharing in an amount greater than 50 percent of the cost of the project for which the grant is made.
(ii) In the case of any State which has received, before October 1, 1990, a grant from the Agency for activities under this Act which included a requirement for cost sharing by matching such grant, any grant obtained from the Agency for activities under subparagraph (A)(i) after such date-
(I) shall not include a requirement for cost sharing for the first fiscal year of such a grant;

(II) shall not include a requirement for cost sharing in an amount greater than 25 percent of the cost of the project for which the grant is made for the second fiscal year of such grant, and any cost sharing requirement may be satisfied through in-kind contributions; (III) shall not include a requirement for cost sharing in an amount greater than 35 percent of the cost of the project for which the grant is made for the third fiscal year of such grant, and any cost sharing requirement may be satisfied through in-kind contributions; and
(IV) shall not include a requirement for cost sharing in an amount greater than 50 percent of the cost of the project for which the grant is made for the fourth and subsequent fiscal year of such grant.
(3) UNITED STATES GEOLOGICAL SURVEY-The United States Geological Survey shall conduct research and other activities necessary to characterize and identify earthquake hazards; assess earthquake risks, monitor seismic activity, and improve earthquake predictions. In carrying out this paragraph, the Director of the United States Geological Survey shall:
(A) conduct a systematic assessment of the seismic risks in each region of the Nation prone to earthquakes, including, where appropriate, the establishment and operation of intensive monitoring projects on hazardous faults, seismic microzonation studies in urban and other developed areas where earthquake risk is determined to be significant, and engineering seismology studies;
(B) work with officials of state and local governments to ensure that they are knowledgeable about the specific seismic risks in their areas;
(C) develop standard procedures, in consultation with the Director of the Federal Emergency Management Agency and the Director of the National Institute for Standards and Technology, for issuing earthquake predictions, including aftershock advisories;
(D) issue when necessary, and notify the Director of the Federal Emergency Management Agency and the Director of the National Institute of Standards and Technology, of an earthquake prediction or other earthquake advisory, which may be evaluated by the National Earthquake Prediction Evaluation Council;
(E) operate, using the National Earthquake Information Center, a forum for the international exchange of earthquake information which shall;
(i) promote the exchange of information on earthquake research and earthquake preparedness between the United States and other nations;
(ii) maintain a library containing selected reports, research papers, and data produced through the Program;
(iii) answer requests from other nations for information on United States earthquake research and earthquake preparedness programs; and
(iv) direct foreign requests to the agency involved in the Program which is best able to respond to the request;
(F) operate a National Seismic System;
(G) support regional seismic networks, which shall complement the National Seismic System;
(H) work with the National Science Foundation, the Federal Emergency Management Agency, and the National Institute of Standards and Technology to develop a comprehensive plan for earthquake engineering research to effectively use existing testing facilities and laboratories (in existence at the time of the development of the plan), upgrade facilities and equipment as needed, and integrate new, innovative testing approaches to the research infrastructure in a systematic manner.
(I) work with other Program agencies to coordinate Program activities with similar earthquake hazards reduction efforts in other countries, to ensure that the Program benefits from relevant information and advances in those countries;
(J) maintain suitable seismic hazard maps in support of building codes for structures and lifelines, including additional maps needed for performance-based design approaches.
(4) NATIONAL SCIENCE FOUNDATION-The National Science Foundation shall be responsible for funding research on earth science to improve the understanding of the causes and behavior of earthquakes, on earthquake engineering, and on human response to earthquakes. In carrying out this paragraph, the Director of the National Science Foundation shall-

(A) encourage prompt dissemination of significant findings, sharing of data, samples, physical collections, and other supporting materials, and development of intellectual property so research results can be used by appropriate organizations to mitigate earthquake damage;
(B) in addition to supporting individual investigators, support university research consortia and centers for research in geosciences and in earthquake engineering;
(C) work closely with the United States Geological Survey to identify geographic regions of national concern that should be the focus of targeted solicitations for earthquake-related research proposals;
(D) support research that improves the safety and performance of buildings, structures, and lifeline systems using large-scale experimental and computational facilities of the George E. Brown Jr. Network for Earthquake Engineering Simulation and other institutions engaged in research and the implementation of the National Earthquake Hazards Reduction Program;
(E) emphasize, in earthquake engineering research, development of economically feasible methods to retrofit existing buildings and to protect lifelines to mitigate earthquake damage;
(F) support research that studies the political, economic, and social factors that influence the implementation of hazard reduction measures;
(G) include to the maximum extent practicable diverse institutions, including Historically Black Colleges and Universities and those serving large proportions of Hispanics, Native Americans, Asian-Pacific Americans, and other underrepresented populations; and
(H) develop, in conjunction with the Federal Emergency Management Agency, the National Institute of Standards and Technology, and the United States Geological Survey, a comprehensive plan for earthquake engineering research to effectively use existing testing facilities and laboratories (in existence at the time of the development of the plan), upgrade facilities and equipment as needed, and integrate new, innovative testing approaches to the research infrastructure in a systematic manner.
(5) NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY-In addition to the lead agency responsibilities described under paragraph (1), the National Institute of Standards and Technology shall be responsible for carrying out research and development to improve building codes and standards and practices for structures and lifelines. In carrying out this paragraph, the Director of the National Institute of Standards and Technology shall-
(A) work closely with national standards and model building code organizations, in conjunction with the Director of Federal Emergency Management Agency, to promote the implementation of research results;
(B) promote better building practices among architects and engineers;
(C) work closely with national standards organizations to develop seismic safety standards and practices for new and existing lifelines; and
(D) support the development and commercial application of cost effective and affordable performance-based seismic engineering by providing technical support for seismic engineering practices and related building code, standards, and practices development; and
(E) work with the National Science Foundation, the Federal Emergency Management Agency, and the United States Geological Survey to develop a comprehensive plan for earthquake engineering research to effectively use existing testing facilities and laboratories (in existence at the time of the development of the plan), upgrade facilities and equipment as needed, and integrate new, innovative testing approaches to the research infrastructure in a systematic manner.

SECTION 6. OFFICE OF SCIENCE AND TECHNOLOGY POLICY REPORT.
[Repealed by Public Law 105-47, October 1, 1997]

SECTION 7. ADVISORY COMMITTEE. [Repealed by Public Law 105-47, October 1, 1997]

SECTION 8. SEISMIC STANDARDS.

(a) Buildings
(1) Adoption of standards
The President shall adopt, not later than December 1, 1994, standards for assessing and enhancing the seismic safety of existing buildings constructed for or leased by the Federal Government which were designed and constructed without adequate seismic design and construction standards. Such standards shall be developed by the Interagency Committee on Seismic Safety in Construction, whose chairman is the Director of the National Institute of Standards and Technology or his designee, and which shall work in consultation with appropriate private sector organizations.
(2) Report to Congress
The President shall report to the Congress, not later than December 1, 1994, on how the standards adopted under paragraph (1) could be applied with respect to buildings—
(A) for which Federal financial assistance has been obtained through grants, loans, financing guarantees, or loan or mortgage insurance programs; or
(B) the structural safety of which is regulated by a Federal agency.
(3) Regulations
The President shall ensure the issuance, before February 1, 1993, by all Federal agencies of final regulations required by section 4(b) of Executive Order numbered 12699, issued January 5, 1990.
(b) Lifelines
The Director of the Agency, in consultation with the Director of the National Institute of Standards and Technology, shall submit to the Congress, not later than June 30, 1992, a plan, including precise timetables and budget estimates, for developing and adopting, in consultation with appropriate private sector organizations, design and construction standards for lifelines. The plan shall include recommendations of ways Federal regulatory authority could be used to expedite the implementation of such standards.

SECTION 9. ACCEPTANCE OF GIFTS.

(a) Authority
In furtherance of the purposes of this chapter, the Director of the Agency may accept and use bequests, gifts, or donations of services, money, or property, notwithstanding section 1342 of title 31.
(b) Criteria
The Director of the Agency shall establish by regulation criteria for determining whether to accept bequests, gifts, or donations of services, money, or property. Such criteria shall take into consideration whether the acceptance of the bequest, gift, or donation would reflect unfavorably on the Director's ability to carry out his responsibilities in a fair and objective manner, or would compromise the integrity of, or the appearance of the integrity of, the Program or any official involved in administering the Program.

SECTION 10. NON-FEDERAL COST SHARING FOR SUPPLEMENTAL FUNDS.
[Repealed by Public Law 106-503, November 13, 2000]

SECTION 11. POST-EARTHQUAKE INVESTIGATIONS.

There is established within the United States Geological Survey a post-earthquake investigations program, the purpose of which is to investigate major earthquakes, so as to learn lessons which can be applied to reduce the loss of lives and property in future earthquakes. The United States Geological Survey, in consultation with each Program agency, shall organize investigations to study the implications of the earthquake in the areas of responsibility of each Program agency. The investigations shall begin as rapidly as possible and may be conducted by grantees and contractors. The Program agencies shall ensure that the results of investigations are disseminated widely. The Director of the Survey is authorized to utilize earthquake expertise from the Agency, the National Science Foundation, the National Institute

of Standards and Technology, other Federal agencies, and private contractors, on a reimbursable basis, in the conduct of such earthquake investigations. At a minimum, investigations under this section shall include—
(1) analysis by the National Science Foundation and the United States Geological Survey of the causes of the earthquake and the nature of the resulting ground motion;
(2) analysis by the National Science Foundation and the National Institute of Standards and Technology of the behavior of structures and lifelines, both those that were damaged and those that were undamaged; and
(3) analysis by each of the Program agencies of the effectiveness of the earthquake hazards mitigation programs and actions relating to its area of responsibility under the Program, and how those programs and actions could be strengthened.

SECTION 12. AUTHORIZATION OF APPROPRIATIONS.
[New Section 104 in Public Law 108-360]

(a) General authorization for program
(1) There are authorized to be appropriated to the President to carry out the provisions of sections 7704 and 7705 of this title (in addition to any authorizations for similar purposes included in other Acts and the authorizations set forth in subsections (b) and (c) of this section), not to exceed $1,000,000 for the fiscal year ending September 30, 1978, not to exceed $2,000,000 for the fiscal year ending September 30, 1979, and not to exceed $2,000,000 for the fiscal year ending September 30, 1980.
(2) There are authorized to be appropriated to the Director to carry out the provisions of sections 7704 and 7705 of this title for the fiscal year ending September 30, 1981—
(A) $1,000,000 for continuation of the Interagency Committee on Seismic Safety in Construction and the Building Seismic Safety Council programs,
(B) $1,500,000 for plans and preparedness for earthquake disasters,
(C) $500,000 for prediction response planning,
(D) $600,000 for architectural and engineering planning and practice programs,
(E) $1,000,000 for development and application of a public education program,
(F) $3,000,000 for use by the National Science Foundation in addition to the amount authorized to be appropriated under subsection (c) of this section, which amount includes $2,400,000 for earthquake policy research and $600,000 for the strong ground motion element of the siting program, and
(G) $1,000,000 for use by the Center for Building Technology, National Institute of Standards and Technology in addition to the amount authorized to be appropriated under subsection (d) of this section for earthquake activities in the Center.
(3) There are authorized to be appropriated to the Director for the fiscal year ending September 30, 1982, $2,000,000 to carry out the provisions of sections 7704 and 7705 of this title.
(4) There are authorized to be appropriated to the Director, to carry out the provisions of sections 7704 and 7705 of this title, $1,281,000 for the fiscal year ending September 30, 1983.
(5) There are authorized to be appropriated to the Director, to carry out the provisions of sections 7704 and 7705 of this title, for the fiscal year ending September 30, 1984, $3,705,000, and for the fiscal year ending September 30, 1985, $6,096,000.
(6) There are authorized to be appropriated to the Director, to carry out the provisions of sections 7704 and 7705 of this title, for the fiscal year ending September 30, 1986, $5,596,000, and for the fiscal year ending September 30, 1987, $5,848,000.
(7) There are authorized to be appropriated to the Director of the Agency, to carry out this chapter, $5,778,000 for the fiscal year ending September 30, 1988, $5,788,000 for the fiscal year ending September 30, 1989, $8,798,000 for the fiscal year ending September 30, 1990, $14,750,000 for the fiscal year ending September 30, 1991, $19,000,000 for the fiscal year ending September 30, 1992, $22,000,000 for the fiscal year ending September 30, 1993, $25,000,000 for the fiscal year ending September 30, 1995, $25,750,000 for the fiscal year ending September 30, 1996, $20,900,000 for the fis-

cal year ending September 30, 1998, $21,500,000 for the fiscal year ending September 30, 1999; $19,861,000 for the fiscal year ending September 30, 2001, of which $450,000 is for National Earthquake Hazard Reduction Program-eligible efforts of an established multi-state consortium to reduce the unacceptable threat of earthquake damages in the New Madrid seismic region through efforts to enhance preparedness, response, recovery, and mitigation; $20,705,000 for the fiscal year ending September 30, 2002; and $21,585,000 for the fiscal year ending September 30, 2003.
(8) There are authorized to be appropriated to the Federal Emergency Management Agency for carrying out this title--
(A) $21,000,000 for fiscal year 2005,
(B) $21,630,000 for fiscal year 2006,
(C) $22,280,000 for fiscal year 2007,
(D) $22,950,000 for fiscal year 2008, and
(E) $23,640,000 for fiscal year 2009,
of which not less than 10 percent of available program funds actually appropriated shall be made available each such fiscal year for supporting the development of performance-based, cost-effective, and affordable design guidelines and methodologies in codes for buildings, structures, and lifelines.
(b) United States Geological Survey
(1) There are authorized to be appropriated to the Secretary of the Interior for purposes for carrying out, through the Director of the United States Geological Survey, the responsibilities that may be assigned to the Director under this chapter not to exceed $27,500,000 for the fiscal year ending September 30, 1978; not to exceed $35,000,000 for the fiscal year ending September 30, 1979; not to exceed $40,000,000 for the fiscal year ending September 30, 1980; $32,484,000 for the fiscal year ending September 30, 1981; $34,425,000 for the fiscal year ending September 30, 1982; $31,843,000 for the fiscal year ending September 30, 1983; $35,524,000 for the fiscal year ending September 30, 1984; $37,300,200 for the fiscal year ending September 30, 1985 $35,578,000 for the fiscal year ending September 30, 1986; $37,179,000 for the fiscal year ending September 30, 1987; $38,540,000 for the fiscal year ending September 30, 1988; $41,819,000 for the fiscal year ending September 30, 1989; $55,283,000 for the fiscal year ending September 30, 1990, of which $8,000,000 shall be for earthquake investigations under section 7705e of this title; $50,000,000 for the fiscal year ending September 30, 1991; $54,500,000 for the fiscal year ending September 30, 1992; $62,500,000 for the fiscal year ending September 30, 1993; $49,200,000 for the fiscal year ending September 30, 1995; $50,676,000 for the fiscal year ending September 30, 1996; $52,565,000 for the fiscal year ending September 30, 1998, of which $3,800,000 shall be used for the Global Seismic Network operated by the Agency; and $54,052,000 for the fiscal year ending September 30, 1999, of which $3,800,000 shall be used for the Global Seismic Network operated by the Agency. There are authorized to be appropriated to the Secretary of the Interior for purposes of carrying out, through the Director of the United States Geological Survey, the responsibilities that may be assigned to the Director under this chapter $48,360,000 for fiscal year 2001, of which $3,500,000 is for the Global Seismic Network and $100,000 is for the Scientific Earthquake Studies Advisory Committee established under section 7709 of this title; $50,415,000 for fiscal year 2002, of which $3,600,000 is for the Global Seismic Network and $100,000 is for the Scientific Earthquake Studies Advisory Committee; and $52,558,000 for fiscal year 2003, of which $3,700,000 is for the Global Seismic Network and $100,000 is for the Scientific Earthquake Studies Advisory Committee. Of the amounts authorized to be appropriated under this paragraph, at least—
(A) $8,000,000 of the amount authorized to be appropriated for the fiscal year ending September 30, 1998;
(B) $8,250,000 of the amount authorized for the fiscal year ending September 30, 1999;
(C) $9,000,000 of the amount authorized to be appropriated for fiscal year 2001;
(D) $9,250,000 of the amount authorized to be appropriated for fiscal year 2002; and
(E) $9,500,000 of the amount authorized to be appropriated for fiscal year 2003,
shall be used for carrying out a competitive, peer-reviewed program under which the Director, in close coordination with and as a complement to related activities of the United States Geological Survey,

awards grants to, or enters into cooperative agreements with, State and local governments and persons or entities from the academic community and the private sector.
(2) There are authorized to be appropriated to the United States Geological Survey for carrying out this title--
(A) $77,000,000 for fiscal year 2005, of which not less than $30,000,000 shall be made available for completion of the Advanced National Seismic Research and Monitoring System established under section 13;
(B) $84,410,000 for fiscal year 2006, of which not less than $36,000,000 shall be made available for completion of the Advanced National Seismic Research and Monitoring System established under section 13;
(C) $85,860,000 for fiscal year 2007, of which not less than $36,000,000 shall be made available for completion of the Advanced National Seismic Research and Monitoring System established under section 13;
(D) $87,360,000 for fiscal year 2008, of which not less than $36,000,000 shall be made available for completion of the Advanced National Seismic Research and Monitoring System established under section 13; and
(E) $88,900,000 for fiscal year 2009, of which not less than $36,000,000 shall be made available for completion of the Advanced National Seismic Research and Monitoring System established under section 13.
(c) National Science Foundation
(1) To enable the Foundation to carry out responsibilities that may be assigned to it under this chapter, there are authorized to be appropriated to the Foundation not to exceed $27,500,000 for the fiscal year ending September 30, 1978; not to exceed $35,000,000 for the fiscal year ending September 30, 1979; not to exceed $40,000,000 for the fiscal year ending September 30, 1980; $26,600,000 for the fiscal year ending September 30, 1981; $27,150,000 for the fiscal year ending September 30, 1982; $25,000,000 for the fiscal year ending September 30, 1983; $25,800,000 for the fiscal year ending September 30, 1984; $28,665,000 for the fiscal year ending September 30, 1985 $27,760,000 for the fiscal year ending September 30, 1986; $29,009,000 for the fiscal year ending September 30, 1987; $28,235,000 for the fiscal year ending September 30, 1988; $31,634,000 for the fiscal year ending September 30, 1989; $38,454,000 for the fiscal year ending September 30, 1990. Of the amounts authorized for Engineering under section 101(d)(1)(B) of the National Science Foundation Authorization Act of 1988, $24,000,000 is authorized for carrying out this chapter for the fiscal year ending September 30, 1991, and of the amounts authorized for Geosciences under section 101(d)(1)(D) of the National Science Foundation Authorization Act of 1988, $13,000,000 is authorized for carrying out this chapter for the fiscal year ending September 30, 1991. Of the amounts authorized for Research and Related Activities under section 101(e)(1) of the National Science Foundation Authorization Act of 1988, $29,000,000 is authorized for engineering research under this chapter, and $14,750,000 is authorized for geosciences research under this chapter, for the fiscal year ending September 30, 1992. Of the amounts authorized for Research and Related Activities under section 101(f)(1) of the National Science Foundation Authorization Act of 1988, $34,500,000 is authorized for engineering research under this chapter, and $17,500,000 is authorized for geosciences research under this chapter, for the fiscal year ending September 30, 1993. There are authorized to be appropriated, out of funds otherwise authorized to be appropriated to the National Science Foundation:
(1) $16,200,000 for engineering research and $10,900,000 for geosciences research for the fiscal year ending September 30, 1995,
(2) $16,686,000 for engineering research and $11,227,000 for geosciences research for the fiscal year ending September 30, 1996,
(3) $18,450,000 for engineering research and $11,920,000 for geosciences research for the fiscal year ending September 30, 1998,
(4) $19,000,000 for engineering research and $12,280,000 for geosciences research for the fiscal year ending September 30, 1999. There are authorized to be appropriated to the National Science Foundation $19,000,000 for engineering research and $11,900,000 for geosciences research for fiscal year 2001; $19,808,000 for engineering research and $12,406,000 for geosciences research for fiscal year 2002; and $20,650,000 for engineering research and $12,933,000 for geosciences research for fiscal year 2003.
(2) There are authorized to be appropriated to the National Science Foundation for carrying out this title--
(A) $38,000,000 for fiscal year 2005;

(B) $39,140,000 for fiscal year 2006;
(C) $40,310,000 for fiscal year 2007;
(D) $41,520,000 for fiscal year 2008; and
(E) $42,770,000 for fiscal year 2009.
(d) National Institute of Standards and Technology
(1) To enable the National Institute of Standards and Technology to carry out responsibilities that may be assigned to it under this chapter, there are authorized to be appropriated $425,000 for the fiscal year ending September 30, 1981; $425,000 for the fiscal year ending September 30, 1982; $475,000 for the fiscal year ending September 30, 1983; $475,000 for the fiscal year ending September 30, 1984; $498,750 for the fiscal year ending September 30, 1985 $499,000 for the fiscal year ending September 30, 1986; $521,000 for the fiscal year ending September 30, 1987; $525,000 for the fiscal year ending September 30, 1988; $525,000 for the fiscal year ending September 30, 1989; $2,525,000 for the fiscal year ending September 30, 1990; $1,000,000 for the fiscal year ending September 30, 1991; $3,000,000 for the fiscal year ending September 30, 1992; and $4,750,000 for the fiscal year ending September 30, 1993. There are authorized to be appropriated, out of funds otherwise authorized to be appropriated to the National Institute of Standards and Technology, $1,900,000 for the fiscal year ending September 30, 1995, $1,957,000 for the fiscal year ending September 30, 1996, $2,000,000 for the fiscal year ending September 30, 1998, $2,060,000 for the fiscal year ending September 30, 1999, $2,332,000 for fiscal year 2001, $2,431,000 for fiscal year 2002, and $2,534,300 for fiscal year 2003.
(2) There are authorized to be appropriated to the National Institute of Standards and Technology for carrying out this title--
(A) $10,000,000 for fiscal year 2005,
(B) $11,000,000 for fiscal year 2006,
(C) $12,100,000 for fiscal year 2007,
(D) $13,310,000 for fiscal year 2008, and
(E) $14,640,000 for fiscal year 2009,
of which $2,000,000 shall be made available each such fiscal year for supporting the development of performance-based, cost-effective, and affordable codes for buildings, structures, and lifelines.

SECTION 13. ADVANCED NATIONAL SEISMIC RESEARCH AND MONITORING SYSTEM.

(a) Establishment
The Director of the United States Geological Survey shall establish and operate an Advanced National Seismic Research and Monitoring System. The purpose of such system shall be to organize, modernize, standardize, and stabilize the national, regional, and urban seismic monitoring systems in the United States, including sensors, recorders, and data analysis centers, into a coordinated system that will measure and record the full range of frequencies and amplitudes exhibited by seismic waves, in order to enhance earthquake research and warning capabilities.
(b) Management plan
Not later than 90 days after November 13, 2000, the Director of the United States Geological Survey shall transmit to the Congress a 5-year management plan for establishing and operating the Advanced National Seismic Research and Monitoring System. The plan shall include annual cost estimates for both modernization and operation, milestones, standards, and performance goals, as well as plans for securing the participation of all existing networks in the Advanced National Seismic Research and Monitoring System and for establishing new, or enhancing existing, partnerships to leverage resources.

SECTION 14. NETWORK FOR EARTHQUAKE ENGINEERING SIMULATION.

(a) Establishment
The Director of the National Science Foundation shall establish the George E. Brown, Jr. Network for

Earthquake Engineering Simulation that will upgrade, link, and integrate a system of geographically distributed experimental facilities for earthquake engineering testing of full-sized structures and their components and partial-scale physical models. The system shall be integrated through networking software so that integrated models and databases can be used to create model-based simulation, and the components of the system shall be interconnected with a computer network and allow for remote access, information sharing, and collaborative research.
(b) Authorization of appropriations
In addition to amounts appropriated under section 7706 (c) of this title, there are authorized to be appropriated to the National Science Foundation for the George E. Brown, Jr. Network for Earthquake Engineering Simulation—
(1) $28,200,000 for fiscal year 2001;
(2) $24,400,000 for fiscal year 2002;
(3) $4,500,000 for fiscal year 2003;
(4) $17,000,000 for fiscal year 2004;
(5) $20,000,000 for fiscal year 2005, all of which shall be available for operations and maintenance;
(6) $20,400,000 for fiscal year 2006, all of which shall be available for operations and maintenance;
(7) $20,870,000 for fiscal year 2007, all of which shall be available for operations and maintenance;
(8) $21,390,000 for fiscal year 2008, all of which shall be available for operations and maintenance; and
(9) $21,930,000 for fiscal year 2009, all of which shall be available for operations and maintenance.

SCIENTIFIC EARTHQUAKE STUDIES ADVISORY COMMITTEE
(Public Law 106-503, Title II, Section 210, 42 U.S.C. Section 7709)

(a) Establishment
The Director of the United States Geological Survey shall establish a Scientific Earthquake Studies Advisory Committee.
(b) Organization
The Director shall establish procedures for selection of individuals not employed by the Federal Government who are qualified in the seismic sciences and other appropriate fields and may, pursuant to such procedures, select up to 10 individuals, one of whom shall be designated Chairman, to serve on the Advisory Committee. Selection of individuals for the Advisory Committee shall be based solely on established records of distinguished service, and the Director shall ensure that a reasonable cross-section of views and expertise is represented. In selecting individuals to serve on the Advisory Committee, the Director shall seek and give due consideration to recommendations from the National Academy of Sciences, professional societies, and other appropriate organizations.
(c) Meetings
The Advisory Committee shall meet at such times and places as may be designated by the Chairman in consultation with the Director.
(d) Duties
The Advisory Committee shall advise the Director on matters relating to the United States Geological Survey's participation in the National Earthquake Hazards Reduction Program, including the United States Geological Survey's roles, goals, and objectives within that Program, its capabilities and research needs, guidance on achieving major objectives, and establishing and measuring performance goals. The Advisory Committee shall issue an annual report to the Director for submission to Congress on or before September 30 of each year. The report shall describe the Advisory Committee's activities and address policy issues or matters that affect the United States Geological Survey's participation in the National Earthquake Hazards Reduction Program.

NEHRP STRATEGIC PLAN: STRATEGIC GOALS AND OBJECTIVES

Goal A. Develop Effective Practices and Policies for Earthquake Loss-Reduction and Accelerate Their Implementation

- Objective 1: Develop and provide information on earthquake hazards and loss-reduction measures to decision makers and the public.
- Objective 2: Promote incentives for pubic and private sector loss reduction actions.
- Objective 3: Advocate state and local government practices and policies that reduce losses in the public and private sectors.
- Objective 4: Implement policies and practices that reduce vulnerability of federal facilities.
- Objective 5: Develop the Nation's human resource base in the earthquake field.

Goal B. Improve Techniques to Reduce Seismic Vulnerability of Facilities and Systems

- Objective 1: Facilitate technology transfer among standards organizations, state and local governments, and private-sector professionals.
- Objective 2: Improve earthquake loss-reduction knowledge and the quality of practice.
- Objective 3: Support efforts to improve seismic standards and codes and improve design and construction practices for buildings and lifelines.

Goal C. Improve Seismic Hazard Identification and Risk Assessment Methods, and Their Use

- Objective 1: Provide rapid, reliable information about earthquakes and earthquake-induced damage.
- Objective 2: Improve seismic hazard characterization and mapping.
- Objective 3: Support development and use of risk and loss assessment tools.

Goal D. Improve the Understanding of Earthquakes and Their Effects

- Objective 1: Improve monitoring of earthquakes and earthquake-generating processes.
- Objective 2: Improve understanding of earthquake occurrence and potential.
- Objective 3: Improve earthquake hazards assessments and develop earthquake-potential estimates as planning scenarios.
- Objective 4: Improve fundamental knowledge of earthquake effects.
- Objective 5: Advance earthquake engineering knowledge of the built environment.
- Objective 6: Advance understanding of the social and economic implications of earthquakes.

The following questions and answers are from the Office of Management Budget, PART Frequently Asked Questions.

What are outcomes and outputs?
An **outcome** refers to the events or conditions of direct importance to the public/beneficiary that are external to the program. An outcome answers the question "What is the program's goal or purpose?" For example, the goal of a job training program is to give someone the skills to find a job, as opposed to giving out a grant. An outcome measure may be the number and
percent of people employed within six months of completing the job training program.

An **output** refers to the **internal** activities of a program (e.g., the products or services
delivered). The output answers the question "What does the program do to achieve its goal or purpose?" For example, a job training program may provide a class to teach someone the skills necessary to find a job. An output measure may be the number of people who complete a job training program.

Together, outcome, output, and efficiency measures should tell a comprehensive story of
program performance. For more information, please see PART guidance pp. 6-10 and "Performance Measurement Challenges and Strategies"
(http:///www.whitehouse.gov/omb/part/challenges_strategies.html).

What is an acceptable efficiency measure?
An acceptable efficiency measure captures a program's ability to implement its activities and achieve results (an outcome or output), relative to resources (an input such as cost and/or time). The best kind of efficiency measure addresses the cost of achieving a unit of outcome. Efficiency measures must be useful, relevant to program purpose, and help improve program performance. (see PART Guidance, pp. 6-10 and for examples of efficiency measures, please see
www.whitehouse.gov/omb/part/performance_measure_examples.pdf)

Do we have to have an efficiency measure for every program?
Yes, every program should have an efficiency measure or be in the process of developing one. Programs are required to have an annual efficiency measure to receive credit on the PART (question 2.3). Programs can receive credit for efficiency measures that are under development and may also receive credit for efficiency measures that are longer-term in scope. Although not required, programs are encouraged to develop outcome-based efficiency measures. (See PART Guidance, pp. 6-10 and PART guidance on PART questions 2.1 and 2.3, pp. 18-22.)

Performance Measurement Challenges and Strategies
(June 18, 2003)

I. Introduction

This document provides practical strategies for addressing common performance measurement challenges. It grew out of the workshop on performance measurement organized by the Office of Management and Budget (OMB) and the Council for Excellence in Government which was held on April 22, 2003.

The document is meant to complement the Program Assessment Rating Tool (PART) guidance document (www.omb.gov/PART), which also addresses performance measurement. Following this introduction, Section II discusses basic performance measurement definitions and concepts. Section III then discusses six common performance measurement problems that were the subject of break-out sections at the workshop. Many of the performance measurement issues that Federal program managers face are extremely difficult, and this document offers no easy solutions. Rather, this paper suggests some potentially useful strategies for addressing these issues. Suggestions on additional challenges, strategies, and examples are welcome, so that this document can evolve. Suggestions may be sent to performance@omb.eop.gov or to any member of OMB's Performance Evaluation Team.

Performance measurement indicates what a program is accomplishing and whether results are being achieved. It helps managers by providing them information on how resources and efforts should be allocated to ensure effectiveness. It keeps program partners focused on the key goals of a program. And, it supports development and justification of budget proposals by indicating how taxpayers and others benefit. However, information provided by performance measurement is just part of the information that managers and policy officials need to make decisions. Performance measurement must often be coupled with evaluation data to increase our understanding of why results occur and what value a program adds. Performance measurement cannot replace data on program costs, political judgments about priorities, creativity about solutions, or common sense. A major purpose of performance measurement is to raise fundamental questions; the measures seldom, by themselves, provide definitive answers. Because performance measurement keeps a focus on results, it has been a central aspect both of the Government Results and Performance Act (GPRA) and of the PART. One goal of the PART is to try to ensure that the most relevant performance information is readily accessible to policy makers.

The PART seeks to answer whether a program is demonstrating value to the taxpayer. In doing so, the PART sets a standard for performance information that is high but also basic and compelling. Ideally, it seeks to demonstrate that a program 1) has a track record of results and 2) warrants continued or additional resources.

We are far from having the data and ability to do such analysis on the full range of Federal programs. But, the identification of adequate performance measures is a necessary step in integrating performance information and budget decisions.

II. Key Definitions and Concepts

1. Definitions used in the PART

Strategic goals are statements of purpose or mission that agencies may include in a strategic plan.

Strategic goals might not be easily measurable. For example, a strategic goal for a weather program might be protecting life and property, and promoting commerce and the quality of life, through accurate forecasts. To the greatest extent reasonable, the PART encourages agencies to use their strategic goals to develop specific, operational performance goals.
Performance goals are the target levels of performance expressed as a measurable objective, against which actual achievement can be compared. Performance goals can be stated as either outcomes or outputs, but to be complete they should incorporate targets and timeframes into a performance measure.

- **Performance measures** are the indicators or metrics that are used to gauge program performance. Performance measures can be either outcome or output measures. Using again the example of a weather program, a measure might be average advance warning time for tornadoes. Performance measures correspond with questions 2.1 and 2.3 in the PART.

- **Targets** are the quantifiable or otherwise measurable characteristics that tell how well a program must accomplish a performance measure. The target for tornado warning time, for example, might be an average of 20 minutes by the year 2008. Targets correspond with questions 2.2 and 2.4 in the PART.

In summary, together with the performance measure, the targets and timeframes establish a performance goal. For the weather program example, the performance goal would be an average tornado warning time of 20 minutes by 2008.
The PART requires two types of performance goals:

- **long-term performance goals** address performance that is generally several years or more in the future. There are two basic types of long-term goals: 1) an annual performance goal in the future, (e.g., tornado warning times in 2008, or unit costs of an activity in 2010); and 2) the cumulative effect of annual activities (e.g., development of an AIDS vaccine by 2010). Long-term program goals are required under both GPRA (termed "general goals") and the PART (questions 2.1 and 2.2).
- **annual performance goals** should be stated in yearly increments (questions 2.3 and 2.4). For the weather program example, an annual performance goal might include the same performance measure (advance warning time), but a less ambitious target (e.g., 15 minutes average warning time in 2005) due to less widespread use of advanced technologies.

2. Outcomes, Outputs, and Inputs

Outcomes describe the intended result or consequence that will occur from carrying out a program or activity. Outcomes are of direct importance to beneficiaries and the public generally. While performance measures should distinguish between outcomes and outputs, there should be a logical connection between them, with outputs supporting outcomes in a logical fashion. The PART strongly encourages the use of outcomes because they are much more meaningful to the public than outputs, which tend to be more process-oriented or means to an end. Outcomes may relate to society as a whole or to the specific beneficiaries of programs, depending on the size and reach of the program.
Example *(see 2004 PART for Maternal and Child Health Block Grants (MCHBG)):*

- *Long-term measure: National rate of maternal deaths per 100,000 live births in 2008.*
- *Annual measure: National rate of illnesses and complications due to pregnancy per 100 deliveries in 2004.*

It is sometimes not possible to measure outcomes annually. In these cases, it is likely that output goals will be used for annual measurement.

Example: *An outcome goal for a space program might be to determine whether there is life on Mars by 2011; annual goals, however, might relate to accomplishing steps toward developing the exploration vehicle and systems.*

Outputs are the goods and services produced by a program or organization and provided to the public or others. They include a description of the characteristics and attributes (e.g., timeliness) established as standards.

Example (see 2004 MCHBG PART):

- *Number of Medicaid-eligible children who receive MCHBG services.*

Managers are more likely to manage against outputs rather than outcomes. This is because output data is collected and reported more frequently, and outputs more typically correspond to activities and functions being directly controlled, as opposed to focusing on results. Nevertheless, outputs should help track a program's progress toward reaching its outcomes.

Outputs can include process measures (e.g., paper flow, adjudication), attribute measures (e.g., timeliness, accuracy, customer satisfaction), and measures of efficiency. They may be measured either as the total quantity of a good or service produced, or may be limited to those goods or services having certain attributes (e.g., number of timely and accurate benefit payments). Typically, outputs are measured at least annually.

Inputs are resources, often measured in dollars, used to produce outputs and outcomes. Performance measures may include consideration of inputs, particularly in the context ofcost-efficiency or unit costs. Programs are encouraged to consider the most meaningful level of such input measures. For example, cost-efficiency measures based on outputs per dollar will typically be more useful than measures of output per unit of personnel (such as Full Time Equivalents). Similarly, social costs may be more meaningful than Federal budget costs when evaluating effectiveness of regulatory programs. Inputs from State and local partners may be relevant in assessing the effectiveness of some programs matched by Federal assistance.

3. Characteristics of good performance goals

The key to assessing program effectiveness is measuring the right things. Performance measures should capture the most important aspects of a program's mission and priorities. Appropriate performance goals should: 1) include both performance measures and targets; 2) focus on outcomes, but use outputs when necessary; and 3) include both annual and long-term measures and targets.

Characteristics of good performance goals include:

- Quality over quantity. Performance goals should be relevant to the core mission of the program and to the result the program is intended to achieve. This generally argues for quality over quantity, with a focus on a few good measures. However, programs should not feel compelled to collapse complex activities to a single measure, particularly if that measure is a proxy for the true objective.
- Importance to budget decisions. Performance goals included in the PART should provide information that helps make budget decisions. Agencies can maintain additional performance goals to improve the management of the program, but they do not need to be included in the PART.
- Public clarity. Performance goals should be understandable to the users of what is being measured. Publicize (internally and externally) what you are measuring. This also helps program partners understand what is expected from the program.
- Feasibility. Performance goals should be feasible, but not the path of least resistance. Choose performance goals based on the relevancy of the outcomes and not for other reasons -- not because you have good data on a less relevant measure, for example. If necessary, terminate less useful data collections to help fund more useful ones.
- Collaboration. Agencies and their partners (e.g., States, contractors) need to work together and not worry about "turf" – the outcome is what is important.

4. Getting Started

Defining the right performance measures can sometimes be like talking to a four-year-old child – whatever you say, the response is always "Why? Why? Why?" Similarly, getting to a good measure can often grow out of asking why a certain activity, input, or output is important and what it is really trying to achieve that matters to the public. This kind of drilling down to get to the right outcome measure might look like this for a job training program:

Example: Possible Measures for Job Training Programs

o Dollars appropriated to the program o Number and size of grants *Why do these matter? What do they buy?*	Inputs: Funding (Federal and perhaps State and local)
o Number of classes attended by program participants o Number of people trained *Why do these matter? What result do they produce?*	Outputs: Products (e.g., classes taught, service delivered, participants serviced) o Number of people with useful skills
o Number of people who get a job after leaving the program *Why do these matter? Is this the result the public is seeking?*	Intermediate outcomes: (e.g., new knowledge, increased skills, changed behavior)
o Number of program participants who remain employed for a specified time and increase their earnings o Number of people who are self-sufficient	Program outcome Societal outcome

Considering the scope of a program is also key to identifying proper performance measures. For example, output goals were used in the 2004 PART for the U.S. Fish and Wildlife Service (USFWS) National Fish Hatchery System (NFHS) because of the difficulties in attributing success in achieving species conservation goals – a higher level outcome – based solely on propagation of hatchery fish. Success at the outcome goal of species conservation would be better assessed by considering a broader scope, such as the USFWS Fisheries Program, which includes both the hatchery (NFHS) and habitat improvement aspects of species conservation. In addition, while external factors such as other stakeholders' actions and drought also affect species conservation, the Fisheries Program can take these into account as it develops its goals and carries out its activities.

III. Common Performance Measurement Issues

Based on the April 22nd workshop and follow-up discussions, this portion of the document outlines six common performance measurement issues and offers possible strategies for addressing them. The issues address programs that: 1) have outcomes that are extremely difficult to measure; 2) are among many contributors to a desired outcome; 3) have results that will not be achieved for many years; 4) relate to deterrence or prevention of specific behaviors; 5) have multiple purposes and funding that can be used for a range of activities; and 6) are administrative or process oriented.
Whenever possible, the document provides examples of performance goals and 2004 PARTs that effectively address the problem at hand. All PART summaries and the completed PART worksheets can be found at http://www.whitehouse.gov/omb/budget/fy2004/pma.html.

1. The program's outcomes are extremely difficult to measure

Some programs' outcomes are inherently difficult to measure. For example, programs designed to address foreign policy objectives might fall into this category. By focusing on why a program is important and what makes it difficult to measure, the scope of the problem can sometimes be more specifically defined. Going through this process may also identify the root of the 'difficult to measure' problem as one of the other core problems identified in this document.
Performance measure challenges can often be traced back to fundamental questions about the program, which when reexamined may yield insights into better ways to assess effectiveness. As mentioned earlier, one way to reexamine those issues is to relentlessly ask "why?"

- Why it is important that the program receive funding?
- Why are program operations important?
- Why does the program do what it does?
- If the program were fabulously successful, what problem would it solve?
- How would you know?

This line of questioning should help clarify the program's true purpose and what its desired outcome is, which should help determine what really needs to be measured. For example, a program's purpose may be to support an international coalition. In trying to define a performance measure, it might be helpful to ask "Why is the success of that coalition important and what role does the program play in achieving that goal?"
It also can be helpful to identify what core issues make measurement difficult. For example:

- The program purpose is not clear.
- The beneficiary or customer is not defined. Consider who are the direct and indirect beneficiaries. Who are the long- and short-term beneficiaries? If the government does not do this, who would pay for it?

- Stakeholders have a different view of the program than program managers. How would stakeholders be affected if the program did not exist? Are there performance measures for stakeholders that shed light on the program's effectiveness?
- Some programs are difficult to measure because data is not available. To help address this situation, ask the following questions: Why is data unavailable? What data is available? Can we fund the cost to find data? If data is not available, are there proxy measures that will indirectly measure the program's outcomes? Do stakeholders have data that they generate to track the program?
- If quantitative data is unavailable and inappropriate, consider using qualitative data, such as assembling a panel of experts on the topic. For example, in assessing the quality of public defenders' services, a survey of judges may be useful, and could complement output measures such as cost per case.

2. The program is one of many contributors to the desired outcome

Often several Federal programs, programs from various levels of government (Federal, State, local), private-sector or non-profit activities, or even foreign countries all contribute to achieving the same goal. The contribution of any one Federal program may be relatively small or large. Examples of programs with these characteristics include international peacekeeping (PKO 2004 PART), special education preschool grants (IDEA Preschool 2004 PART), highways (FHWA Highways 2004 PART), Vocational Education (2004 PART), and many education, labor, and housing formula grant programs.
One approach to this situation is to develop broad, yet measurable, outcome goals for the collection of programs, while also having program-specific performance goals. For a collection of programs housed primarily in one Federal agency, a broad outcome measure may be one of the goals in an agency strategic plan (e.g., increasing the home ownership rate). The broad outcome goal can often be tracked using national data that is already being collected, while the program-specific goals may require more targeted data collection. Both the broad outcome goal and the program-specific goals could be addressed in the PART.
Example: *Several Federal education programs, totaling nearly $14 billion, contribute to helping children learn to read. One of those programs, Reading First State Grants, provides about $1 billion to help implement proven literacy reforms in schools with low reading scores.*

- *Common outcome goal: Percentage of children in high-poverty schools reading proficiently by the end of third grade.*
- *Reading First goal: Percentage of at-risk third graders receiving Reading First services who can read at or above grade level.*

It is important to "right size" the measure to suit the program. Sometimes a program is such a significant contributor, or leverages so many dollars, that an appropriate goal is a societal outcome. Other times it is more appropriate to write measures specific to program beneficiaries. There is no rule of thumb on where that threshold is. We suggest only that programs of similar size, or with a similar percentage contribution to the desired outcome, approach this issue similarly.
Example: *Several Federal programs provide student aid so that low and moderate income students can afford to attend college. Of these, only the Pell Grant program and the loan programs contribute a large enough share of student aid to merit a societal outcome. The Pell Grant program provides grants to nearly one-third of all college students, while about half of all students receive loans from or backed by the Federal government. In contrast, the College Work Study program reaches only about 6% of college students, and so the measures relate to the program participants only:*

- *Federal Pell Grant long-term measure (see 2004 PART): College enrollment gap between low-income and high-income high school graduates.*

- *College Work Study long-term measure: Rate of College Work Study students who complete their post-secondary education program.*

Sometimes programs are designed to work together toward a common goal, but each provides a different piece of the service or activity. In other cases, programs are designed to merge funds and support the same activities as well as goals; this is particularly true when Federal, State, and local dollars all contribute to reaching a common goal.

When programs fund different activities and do not co-mingle funds, programs should be able to develop activity-specific performance goals that support the broader outcome. It is likely, however, that these will be output goals and the challenge will be agreeing on how each of the separate activities contributes to the outcome.

When programs co-mingle funds in support of a goal, it is extremely difficult to assess the marginal impact of the program dollar since all funding supports similar activities. Programs may seek to claim responsibility for the entire outcome and output, despite having a shared, and sometimes small, role in the overall activity. However, we should seek to evaluate whether such claims are realistic. It may be useful in such situations to consider measures such as unit costs in terms of output per Federal dollar spent as well as the output per combined Federal, State and local dollars spent.

There are three basic sets of questions that one would aim to answer with performance information:

- First, is the overall effort working? Are there outcome measures for the overall effort/program? Are there evaluations?
- Second, is the Federal contribution making a difference? Because withholding funding as an experiment is not a viable option, analysts should consider whether there are other ways of seeing what would happen in the absence of Federal funding. Can one compare current funding to an earlier time when there was no Federal funding? Are there regions of the country where there is no Federal funding?
- Third, how is funding effort shared between Federal and non-Federal partners? How does the distribution of funding effort compare to measures of need or the distribution of benefits?

3. Results will not be achieved for many years

In some cases, the outcome of a program may not be realized for many years. In some cases, this can be addressed by identifying meaningful output-oriented milestones that lead to achieving the long-term outcome goal. Many research and development (R&D) programs, such as Hydrogen Technology (2004 PART) and Mars Exploration (2004 PART), fall into this category.

To address this issue, a program should define the specific short- and medium-term steps or milestones to accomplish the long-term outcome goal. These steps are likely to be output-oriented, prerequisite accomplishments on the path toward the outcome goal. A road map can identify these interim goals, suggest how they will be measured, and establish an evaluation schedule to assess their impact on the long-term goal. It is important that these steps are meaningful to the program, measurable, and linked to the outcome goal.

Example: *The purpose of NASA's Mars Exploration program is to explore Mars, focusing on the search for evidence of life. To that end, NASA defines spacecraft missions, which provide one level of measures to assess program effectiveness: mission success. Further, within each Mars mission, the program develops technologies; builds, launches, and operates robotic spacecraft; and performs research using the spacecraft instruments. While these steps take many years to complete, they provide many milestones against which a mission – and the*
program – can be monitored. Useful measures could include timeliness in achieving certain steps as well as percentage cost overruns.

It may also be useful to track process-oriented measures, such as the extent to which programs make

decisions based on competitive review. For example, research programs can have many uncertainties, including their expected outcomes. So, while research programs are encouraged to define measures that can track progress, not all will be able to. Such programs may rely, in part, on process measures, such as the extent to which the program uses merit-based competitive review in making awards.

To qualitatively address the research itself, some programs develop measures to reflect meaningful external validation of the quality and value of the program's research. To address the uncertainty of research outcomes, programs may also be able to demonstrate performance in terms of the broad portfolio of the efforts within the program. Expert independent evaluators might also help determine if the process of choosing appropriate long-term investments is fair, open and promises higher expected payoffs in exchange for higher levels of risk. Rotating evaluators periodically may help ensure independence and objectivity.

Another solution is estimation of future results using computer models or expert panels. EPA uses the former to estimate cancer cases avoided.

4. The program relates to deterrence or prevention of specific behaviors

Programs with a deterrence or prevention focus can be difficult to measure for a variety of reasons. Most importantly, deterrence measurement requires consideration of what would happen in the absence of the deterrence program. Also, it is often difficult to isolate the impact of the individual program on behavior that may be affected by multiple other factors.

Sample programs: Coast Guard drug interdiction (2004 PART), Department of Labor/Office of Federal Contract Compliance (2004 PART), Nuclear Regulatory Commission's Inspection and Performance Assessment Program.

If performance measures reflect a continuum from lower-level outputs to higher-level outcome measures related to the overall strategic goal, it is important for deterrence programs to choose measures that are far enough along the continuum that they tie to the ultimate strategic goal as well as to the program's activity. This will help ensure that the measures are both meaningful and genuinely affected by the program. Care should be taken, as some measures may create perverse incentives if they do not reach the correct balance between output and outcome (e.g., measures that focus on enforcement actions, as opposed to crime rates).

Example: *A useful measure for the Coast Guard drug interdiction program could be the total volume of drugs entering the United States. This measure might be contrasted with drug seizure rates. High drug seizure rates might suggest that the Coast Guard interdiction strategies are effective. However, if the amount of drugs being sent rises significantly, and the number of seizures goes up to a lesser extent, the measure would still show that the Coast Guard program was effective, even though the volume of drugs getting through has increased substantially. In contrast, the total volume of drugs entering the U.S. is tied more closely to the overall strategic goal of reducing the flow of drugs into the country. On the downside, the Coast Guard has only partial control over the measure of volume entering the country.*

Establishing deterrence targets. For some programs, deterring a majority of the negative outcome is appropriate. For other programs, most, if not all, of the negative outcome must be avoided. In principle, the target for the program should reflect consideration of the maximization of net benefits (see, for example, OMB guidance on rulemaking under E.O. 12866). In any event, understanding the costs and benefits of compliance at the margins will help the program to determine the correct target level for compliance.

Example: *For programs in which non-compliance is not life-threatening, and for which compliance is historically low, a legitimate long-term target may fall short of 100% compliance. In these cases, short-term targets that demonstrate forward progress toward the acceptable long-range goal may make sense.*

Programs where failure is not an option. For programs where failure to prevent a negative outcome would be catastrophic (including programs to prevent terrorism or nuclear accidents), traditional outcome measurement might lead to an "all-or-nothing" goal. As long as the negative outcome is prevented, the

program might be considered successful, regardless of the costs incurred in prevention or any close calls experienced that could have led to a catastrophic failure.
However, proxy measures can be used to determine how well the deterrence process is functioning. These proxy measures should be closely tied to the outcome, and the program should be able to demonstrate -- such as through the use of modeling -- how the proxies tie to the eventual outcome. Because failure to prevent a negative outcome is catastrophic, it may be necessary to have a number of proxy measures to help ensure that sufficient safeguards are in place. Failure in one of the proxy measures would not lead, in itself, to catastrophic failure of the program as a whole; however, failure in any one of the safeguards would be indicative of the risk of an overall failure.
Example: *Outcome goals for the Nuclear Regulatory Commission of no nuclear reactor accidents, no deaths from acute radiation exposures from nuclear reactors, no exposure events at reactors, and no radiological sabotage are not necessarily sufficient to evaluate the program. There have been no occurrences of the above-mentioned events during the years 1999 to date. Therefore, annual goals used for the program include no more than one precursor event per year, no statistically significant adverse industry trends in safety performance, and no overexposures exceeding applicable regulatory limits. These proxy measures are useful to assess the ongoing effectiveness of this program.*

5. The program has multiple purposes and funding can be used for a range of activities.

Some Federal programs are both large and diverse. They may be designed to address multiple objectives or support a broad range of activities or both. Block grant programs often have these characteristics, with the added feature of allowing grantees the flexibility to set priorities and make spending choices. Increased flexibility at the local level can limit efforts to set national goals and standards or create obstacles for ensuring accountability. In other cases, the program may focus on a limited set of activities which in turn are used for multiple purposes by many distinct stakeholders. Establishing performance measures for these types of programs can be challenging.
Sample Programs: Block grants, such as the Community Development Block Grant program (CDBG), the Social Service Block Grant program (SSBG), and Temporary Assistance for Needy Families (TANF). Establishing performance goals for block grant programs. Some block grant programs provide resources to non-Federal levels of government to focus on specific program areas, such as education, job training, or violence prevention. While the funds can often be used for a variety of activities, they are for a specific purpose. In these cases, national goals can be articulated that focus on outcomes to highlight for grantees the ultimate purpose of program funds. Targets for these measures may be set by surveying grantees to gauge the expected scale of their work or by looking at historical trend data. A system could be developed that uses performance measures and national standards to promote “joint” accountability for results. With this approach, after agreeing on an appropriate set of performance measures, program targets can be set at the local level and aggregated up to national targets.
Example: *CDBG is a large program with broad objectives. Seventy percent of CDBG funds are provided by formula to approximately 1,000 “entitlement” jurisdictions. The remaining 30 % of funds are allocated to States. The broad objectives of the program, coupled with local flexibility to determine community needs and relatively weak targeting criteria, have allowed grantees to use CDBG funds for a large range of activities. Through consultation with grantees and stakeholders, a core list of strategic objectives can be identified along with illustrative local/State performance measures. Each grantee could be asked to commit to specific strategic objectives and a set of procedures that will institutionalize a joint accountability partnership in each community. These procedures would be used to (1) establish and approve annual performance targets, (2) collect and verify performance data, and (3) determine when targets have been achieved. Accountability would require that results are publicized and assessed. A web-based system for reporting goals and accomplishments, for instance, could facilitate citizen review.*

6. The purpose of the program is administrative or process oriented.

Many programs in the government are administrative or process-oriented in nature which tends to present a number of problems when it comes to measuring performance. One issue is the appropriate balance between outputs and outcomes. Realistically, output measures may be useful for evaluating the efficiency of process oriented activities. In cases such as procurement of computer systems, for example, the spending may be better evaluated with other capital asset evaluation tools (such as business cases and Form 300s) than with the PART. However, for larger administrative efforts, consideration should still be given to ultimate outcomes. In some cases, it may make most sense to evaluate the administrative costs as part of the overall program, rather than as a separate activity. For example, a grant program may contain separate accounts for the grants themselves and for administrative salaries and expenses, yet both accounts might be viewed as providing inputs into a single program.

Benchmarking with other agencies or the private sector, competitive sourcing, and the use of intermediate outcomes such as returns on investment are all approaches that can assist where data availability is an issue. For instance, GSA developed performance measures for its real property and vehicle acquisition programs based on private-sector costs.

As many administrative functions run across agencies, the development of common measures is also encouraged. For instance, the Inspector General community is working towards common measures to ensure consistency.

IV. Topics for Further Discussion

This is a living document that will be updated periodically to provide new ideas and to address new issues. To comment on this document or to raise additional issues for consideration, please send an e-mail to any member of OMB's Performance Evaluation Team or performance@omb.eop.gov.