

Interim Report on NEHRP Performance Measures

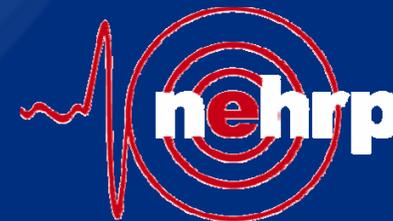
Presentation to the NEHRP Advisory Committee on
Earthquake Hazards Reduction

Edward Laatsch, Chief
Building Science Branch
FEMA, Mitigation Directorate,

October 23, 2007



FEMA



- Interim Report describes work carried out from December '04 - May '05 to develop performance measures for the NEHRP thru a subcommittee
- Two primary factors shaped the work of the Subcommittee: federal requirements relating to performance measurement and congressional legislation pertaining to the NEHRP
- A multi-tiered approach made the most sense where 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



Interim Report on NEHRP Performance Measures

December 2005



Framework for Assessing Performance

- Federal process for performance assessment has been evolutionary (GPRA - 1993, PART - 2003)
- Performance assessment made use of agencies' existing performance measures and measurement infrastructures
- To evaluate the suitability of existing or new measures for the NEHRP, a conceptual framework for performance measurement was developed
- Framework classifies and describes performance goals and measures using eight-level taxonomy



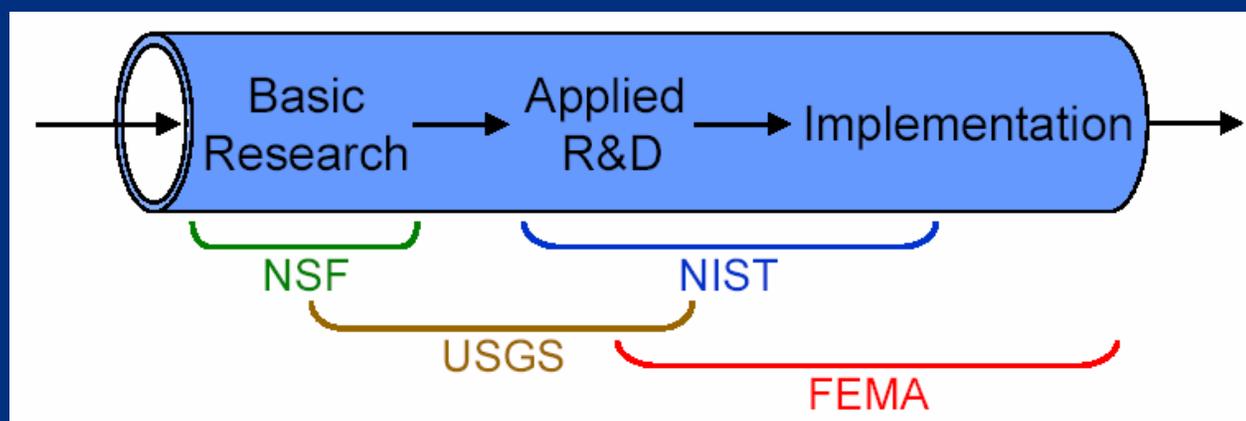
Framework Organization

- The framework organizes NEHRP performance measures by means of the eight-level taxonomy with the top three levels comprise the mission statement, 4 strategic goals, and 17 strategic objectives contained in the NEHRP Strategic Plan and the five remaining levels were developed by the agency subcommittee



Framework

- NEHRP performance is largely a sequential process carried out among the four participating agencies or a “research-to-practice pipeline”
- Performance defined as Short-term (less than 2 years), Intermediate (from 2 to 5 years), and Long-term (more than 5 years)



Performance Measure Specifications

Each performance measure is described using following set of data elements:

- **Measure** — A statement identifying the performance data 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 this performance data and specifies how it is measured
- **Data source** — The source (e.g., organization, information system, report, employee) of the performance data
- **Frequency of measurements** — How often the data is measured (e.g., annually, quarterly, triennially, one time only)
- **Baseline measurement** — The current, latest, or beginning data value, to which the next measurement should be compared
- **Target measurement(s) and associated timeframe(s)** — The data values to be achieved and how soon each should be achieved. These elements, together with the measure, make up the performance goal. For example, “install 20 seismic sensors by September 2007”
- **Other** — Background information or notes intended to enhance understanding of the specifications



NIST Performance Measures

- Publication of *Standards of Seismic Safety for Existing Federally Owned or Leased Buildings* and guidance on the use of model codes and standards



FEMA Performance Measures

- 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 HAZUS software, in their local planning efforts



NSF Performance Measures

- 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 Performance Measures

- 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





FEMA

Baseline for Adoption of Building Codes

Strategic Goal	B. Improve techniques to reduce seismic vulnerability of facilities and systems.
Strategic Objective	3. Support efforts to improve seismic standards and codes and improve design and construction 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)



Baseline for Adoption of Building Codes

Output Measure	Number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions incorporated.
Definition	<p>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.</p> <p>“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.</p> <p>“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.</p> <p>“Jurisdiction” is defined as all cities and counties in the relevant states and territories.</p> <p>“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.</p> <p>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.</p>
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.



FEMA

Adoption of Building Codes

Strategic Goal	B. Improve techniques to reduce seismic vulnerability of facilities and systems.
Strategic Objective	3. Support efforts to improve seismic standards and codes and improve design and construction 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)



Adoption of Building Codes

Outcome Measure	Number of jurisdictions with high and very high earthquake risk that have adopted building codes with seismic resistant provisions incorporated.
Definition	<p>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.</p> <p>“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.</p> <p>“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.</p> <p>“Jurisdiction” is defined as all cities and counties in the relevant states and territories.</p> <p>“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.</p> <p>By the end of FY 2006, the target is 2,000 jurisdictions. For each fiscal year thereafter, the target is an additional 50 jurisdictions.</p>
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)	<p>FY 2006: 2,000</p> <p>FY 2007: +50</p> <p>FY 2008: +50</p> <p>FY 2009: +50</p> <p>FY 2010: +50</p> <p>FY 2011: +50</p>



Support for Building Code Adoption

The seismic data results are based on data from September 28, 2006 (1st Quarter), through September 15, 2007 (4th Quarter)

	Q1	Q4	Difference Q1 to Q4	% Increase
	28-Sept-06	15-Sep-07		
Total Jurisdictions	9,280	11,964	2,684	29%
Commercial Jurisdictions with high or very high risk	940	1,338	398	42%
Commercial Jurisdictions that have adopted Building Codes with Seismic Resistant Provisions	637	837	200	31%
Residential Jurisdictions with high or very high risk	653	880	227	35%
Residential Jurisdictions that have adopted Building Codes with Seismic Resistant Provisions	376	479	103	27%



Baseline for Printing and Distribution Costs

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)



Baseline for Printing and Distribution Costs

Output Measure	The costs for printing and distribution of NEHRP resource materials.
Definition	<p>This one-time measure is to establish the baseline for FEMA’s annual costs to print and distribute NEHRP resource materials.</p> <p>“Printing and distribution costs” are defined as all costs associated with printing and distribution, including (1) camera-ready costs, such as preparation of print files and cover artwork; (2) printing costs, including hard copies and CD’s; and (3) administrative costs associated with the preparation, maintenance, and distribution of NEHRP resource materials through the dissemination cycle.</p> <p>“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 publications for building professionals and engineers; (2) publications for homeowners, schools, and communities; (3) training materials; and (4) brochures and public awareness documents.</p>
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.



Printing and Distribution Costs

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)



Printing and Distribution Costs

Efficiency Measure	The costs for printing and distribution of NEHRP resource materials.
Definition	<p>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.</p> <p>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.</p> <p>“Printing and distribution costs” are defined as all costs associated with printing and distribution, including (1) camera-ready costs, such as preparation of print files and cover artwork; (2) printing costs, including hard copies and CD’s; and (3) administrative costs associated with the preparation, maintenance, and distribution of NEHRP resource materials through the dissemination cycle.</p> <p>“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 publications for building professionals and engineers; (2) publications for homeowners, schools, and communities; (3) training materials; and (4) brochures and public awareness documents.</p>
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.



FEMA NEHRP Publications Production Efficiency Calculations

Fiscal Years 2005 and 2006

Production efficiency measure = $\frac{\text{printing costs} + \text{CD production costs}}{\text{number of copies produced in print and on CD}}$

FY 2005

Production efficiency measure = $\frac{\$184,200 + \$15,000}{110,900 + 7,200}$ or \$1.69 per copy

FY 2006

Production efficiency measure = $\frac{\$117,020 + \$5,622}{36,400 + 5,350}$ or \$2.94 per copy



FEMA NEHRP Publications Distribution Efficiency Calculations

Fiscal Years 2005 and 2006

Distribution efficiency measure = $\frac{\text{postage costs for publications shipped in print and on CD}}{\text{number of copies shipped in print and on CD}}$

FY 2005

Distribution efficiency measure = $\frac{\$17,708.32}{33,647}$ or \$0.53 per copy

FY 2006

Distribution efficiency measure = $\frac{\$24,402.10}{87,106}$ or \$0.28 per copy



Use of HAZUS

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)



Use of HAZUS

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	<p>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.</p> <p>“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.</p> <p>“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.</p> <p>“Jurisdiction” is defined as all cities and counties in the relevant states and territories.</p> <p>“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.</p> <p>A baseline of 300 jurisdictions has been established for the end of FY 2005. For each year thereafter, the targets are listed below.</p>
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)	<p>FY 2006: +50</p> <p>FY 2007: +25</p> <p>FY 2008: +25</p> <p>FY 2009: +15</p> <p>FY 2010: +15</p> <p>FY 2011: +15</p>



FEMA



FEMA