

# National Earthquake Hazards Reduction Program

*... a research and implementation partnership*

**Program Update**  
**5<sup>th</sup> NEES Annual Meeting**  
20 June 2007

Jack Hayes – NEHRP Director



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## Presentation Outline

- Background
- P.L. 108-360 overview
  - Statutory Program Activities
  - Agency Roles
  - Ongoing Efforts Supporting Legislation
- Conclusion



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## Background

- NEHRP was established by Public Law (PL) 95-124, the *Earthquake Hazards Reduction Act of 1977*.
- Thru NEHRP, Congress *authorizes* appropriation levels for the four principal agencies.
- Most recent reauthorization (PL 108-360, enacted 25 October 2004) covered FY 2005 – FY 2009 at average annual totals (for all 4 agencies) of ~ \$180M, an increase of \$75M per year from previous levels.
- With reauthorization, Congress observed that new mitigation technologies are being implemented slowly, while urban development has accelerated, resulting in significantly increased societal vulnerabilities.



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## PL 108-360: Statutory “Program Activities”

- Improve understanding of earthquakes and their effects.
- Develop effective measures for earthquake hazards reduction.
- Promote adoption of earthquake hazards reduction measures.
- Develop, operate, and maintain Advanced National Seismic System; George E. Brown, Jr. Network for Earthquake Engineering Simulation; and Global Seismographic Network.



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## PL 108-360: NEHRP Agency Roles

Department of Homeland Security

### Federal Emergency Management Agency (FEMA)

- Promote, with NIST, implementation of research results.
- Promote better building practices.
- Operate program of grants & assistance.
- Support implementation of a comprehensive earthquake education and awareness program.
- Assist NIST, other Federal agencies, & private sector groups, in preparing, maintaining, & widely disseminating seismic resistant design guidance.
- Aid in developing performance-based design guidelines.
- Develop, coordinate, & execute National Response Plan when required following an earthquake, & support development of specific State and local plans.



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## PL 108-360: NEHRP Agency Roles

### FEMA, continued

- Develop approaches to combine measures for earthquake hazards reduction with measures for reducing other natural and technological hazards.
- Provide preparedness, response, and mitigation recommendations to communities after an earthquake prediction has been made.
- Enter into cooperative agreements or contracts to establish demonstration projects on earthquake hazard mitigation, to link research & mitigation efforts with emergency management programs, or to prepare educational materials for national distribution.

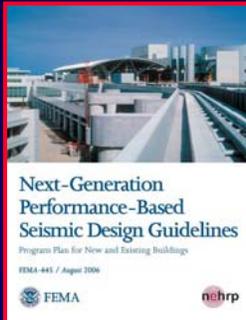


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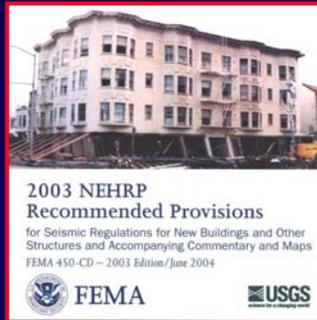
PL 108-360

## NEHRP Agency Roles

### Recent Typical FEMA Activities



*Ongoing efforts involve all  
NEHRP agencies*



*Joint effort with USGS  
(seismic hazard mapping).*



*Cooperative effort with NIST.*



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## PL 108-360: NEHRP Agency Roles

### National Institute of Standards and Technology (NIST)

#### Lead Agency

Responsible for program planning & coordination.

- Promote implementation of earthquake hazard reduction measures.
- Support development and promote commercial application of performance-based seismic engineering tools.
- Request assistance of Federal agencies other than the Program agencies, as necessary to assist.
- Work with FEMA, NSF, & USGS, to develop a comprehensive plan for earthquake engineering research to effectively use existing testing facilities and laboratories, upgrade facilities & equipment as needed, & integrate new, innovative testing approaches.



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## PL 108-360: NEHRP Agency Roles

### NIST

- Perform R&D to improve building codes and standards & practices.
- Work closely with national standards and model building code organizations, in conjunction with FEMA, to promote implementation of research results.
- Promote better building practices among architects and engineers.
- Work closely with national standards organizations to develop seismic safety standards and practices for new and existing lifelines.
- Support development & commercial application of cost-effective and affordable performance-based seismic engineering.
- Work with other program agencies to develop comprehensive plan for earthquake engineering research using existing facilities, upgrade facilities as needed, and integrate new testing approaches.



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## PL 108-360: NEHRP Agency Roles

### NIST: *Perform problem-focused research!*



President's *American Competitiveness Initiative* re-energizes NIST earthquake research program:

- FY 2007 budget started process (+\$800K from FY 2006).
- Requested FY 2008 budget strengthens commitment (+\$5.5M from FY 2006).

NIST will follow the "ATC Roadmap" approach with a program that combines in-house and extramural research efforts.



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## PL 108-360: NEHRP Agency Roles

### National Science Foundation (NSF)

- Fund (fundamental) research on earth sciences, earthquake engineering, and human response to earthquakes.

*Note: Earthscope is maintained as a related non-NEHRP activity.*

- Encourage prompt dissemination of significant findings, sharing of data, samples, physical collections, & other supporting materials, & development of intellectual property.
- Support individual investigators, university research consortia & centers for research in geosciences & in earthquake engineering.
- Work closely with USGS to identify geographic regions of national concern.
- Support research that improves the safety & performance of buildings, structures, & lifeline systems using large-scale experimental and computational facilities of NEES & other institutions.



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## PL 108-360: NEHRP Agency Roles

### NSF, continued

- Emphasize development of economically feasible methods to retrofit existing buildings and protect lifelines.
- Support research that studies political, economic, & social factors that influence implementation of hazard reduction measures.
- Include diverse institutions, including HBCUs and those serving large proportions of (minorities) and other underrepresented populations.
- Work with other program agencies to develop comprehensive plan for earthquake engineering research using existing facilities, upgrade facilities as needed, and integrate new testing approaches.

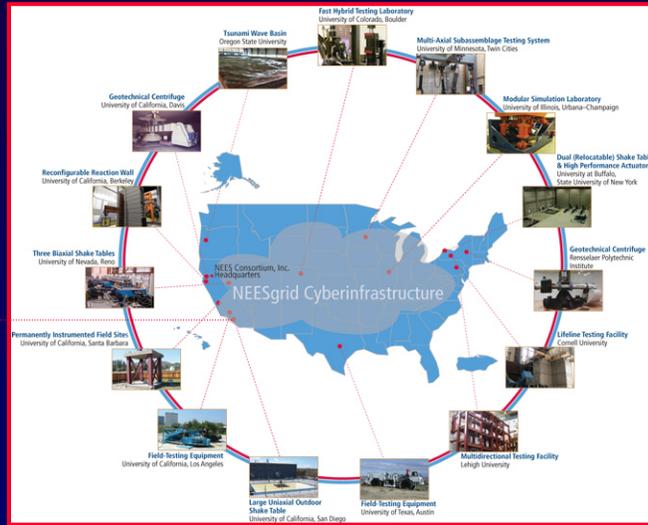


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# NEHRP Agency Roles: NSF and NEES

**NEES Shared Use Infrastructure**  
[Operated by NEES Consortium, Inc.]

**NEESit:  
San Diego  
Supercomputer  
Center @ UCSD**



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# NEHRP Agency Roles: NSF and Centers

 **Mid-America Earthquake Center**  
Assessment, Mitigation, Response & Recovery

 **MCEER**  
EARTHQUAKE ENGINEERING TO EXTREME EVENTS

 **PEER**  
PACIFIC EARTHQUAKE ENGINEERING RESEARCH CENTER

 **SCEC**  
SCEC is jointly supported by NSF & USGS! SCEC has 50+ members & affiliates!



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## PL 108-360: NEHRP Agency Roles

### U.S. Geological Survey (USGS)

- Conduct research & other activities necessary to characterize and identify earthquake hazards, assess earthquake risks, monitor seismic activity, and improve earthquake predictions.
- Conduct a systematic assessment of seismic risks in each region of the Nation prone to earthquakes, including appropriate establishment and operation of intensive monitoring projects on hazardous faults, seismic microzonation studies in urban & other developed areas with significant earthquake risk, & engineering seismology studies.
- Work with officials of State & local governments to ensure that they are knowledgeable about specific seismic risks in their areas.
- Develop standard procedures for issuing earthquake predictions, including aftershock advisories.



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## PL 108-360: NEHRP Agency Roles

### USGS, continued

- Issue, when necessary, earthquake predictions or other earthquake advisories.
- Operate, using the National Earthquake Information Center (NEIC), a forum for the international exchange of earthquake information.
- Operate a National Seismic System (ANSS).
- Support regional seismic networks that complement the National Seismic Network.



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## PL 108-360: NEHRP Agency Roles

### USGS, continued

- Work with other program agencies to develop comprehensive plan for earthquake engineering research using existing facilities, upgrade facilities as needed, and integrate new testing approaches.
- Work with other Program agencies to coordinate Program activities with similar earthquake hazards reduction efforts in other countries.
- Maintain suitable seismic hazard maps in support of building codes for structures and lifelines, including additional maps needed for performance-based design approaches.



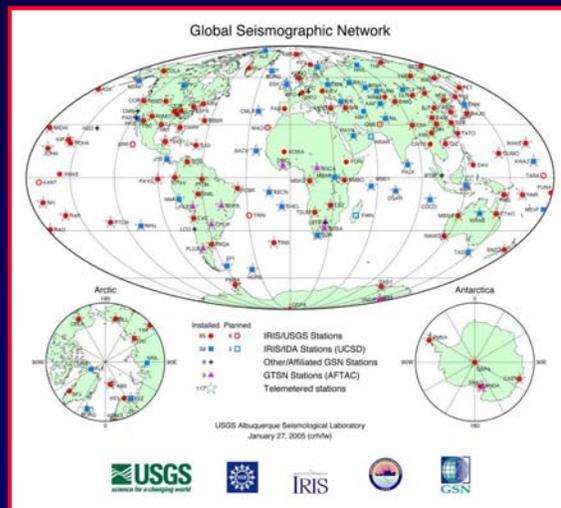
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## PL 108-360: NEHRP Agency Roles

### USGS

#### Unique Geoscience and Seismology Initiatives

*GSN is jointly supported by NSF & USGS, as well as the Incorporated Research Institutions for Seismology (IRIS)!*



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# PL 108-360: NEHRP Agency Roles

## USGS

Unique Geoscience & Seismology Initiatives

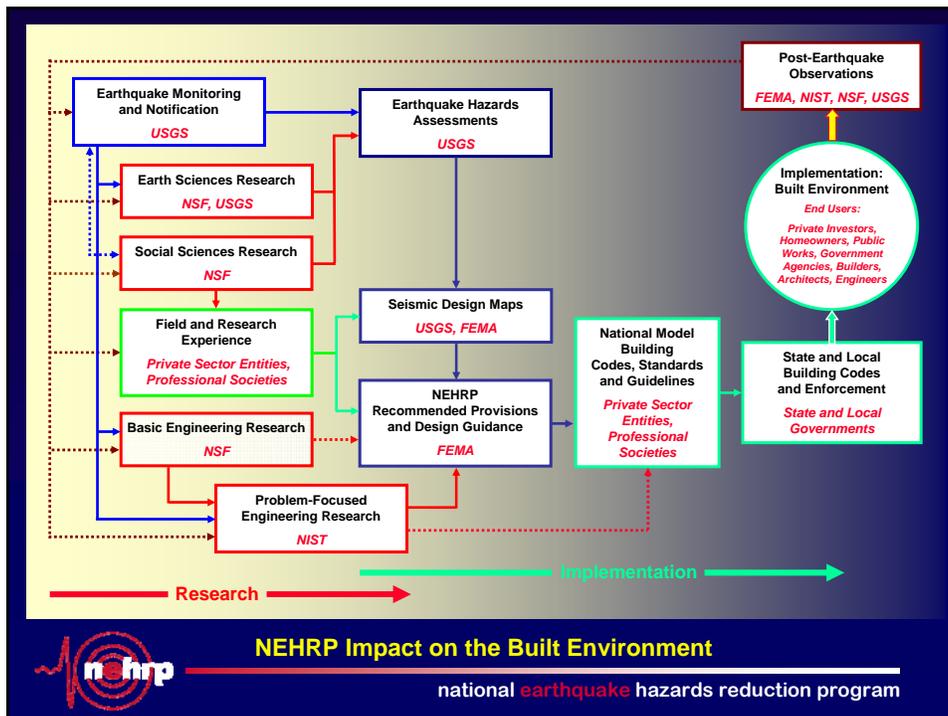
ANSS is jointly supported by NSF & USGS and will ultimately also be used by NIST & FEMA!

### ANSS Earthquake Information Products & Tools

<p><b>Latest Earthquakes</b> Maps and information for U.S. and worldwide earthquakes within minutes after they occur. <a href="http://earthquake.usgs.gov/eqcenter/">http://earthquake.usgs.gov/eqcenter/</a></p>	<p><b>Earthquake Notification</b> Customizable earthquake information automatically sent to your wireless device or email account. <a href="http://earthquake.usgs.gov/eqn/">http://earthquake.usgs.gov/eqn/</a></p>
<p><b>ShakeMaps</b> Distributions of shaking from an earthquake anywhere in the world within minutes. <a href="http://earthquake.usgs.gov/shakemap/">http://earthquake.usgs.gov/shakemap/</a></p>	<p><b>PAGER</b> Estimates of population exposure to significant earthquake shaking anywhere in the world within minutes. <a href="http://earthquake.usgs.gov/pager/">http://earthquake.usgs.gov/pager/</a></p>
<p><b>Realtime Feeds &amp; Data</b> Real-time earthquake data in a variety of formats including RSS, CAP, CSV, and XML. <a href="http://earthquake.usgs.gov/eqcenter/feeds_data.php">http://earthquake.usgs.gov/eqcenter/feeds_data.php</a></p>	<p><b>Did You Feel It?</b> Citizen science webpage where shaking intensity maps are created by the people who felt the earthquake. <a href="http://earthquake.usgs.gov/dyfi/">http://earthquake.usgs.gov/dyfi/</a></p>
<p><b>ShakeCast</b> Automated ShakeMap delivery, damage assessment, and notification for critical lifeline operations. <a href="http://earthquake.usgs.gov/research/software/shakecast/">http://earthquake.usgs.gov/research/software/shakecast/</a></p>	<p><b>CISN Display</b> Downloadable software to visualize and receive notifications for seismicity anywhere in the world on your computer. <a href="http://www.cisn.org/feature/cisndisplay.html">http://www.cisn.org/feature/cisndisplay.html</a></p>



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## NEHRP Impact on the Built Environment

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## PL 108-360: Major Technical Priorities

PL 108-360 endorsed priorities identified in 2001-2005 NEHRP Strategic Plan (FEMA 383), which was developed in partnership with the stakeholder community:

- Development and commercial application of performance-based seismic engineering tools, codes, standards, and practices.
- Completion of Advanced National Seismic System (ANSS).
- Operation and maintenance of and conduct of research using NEES.
- Operation and maintenance of Global Seismographic Network (GSN) by USGS & NSF.



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## PL 108-360: Leadership & Management Priorities

- Interagency Coordinating Committee (ICC).
- Advisory Committee on Earthquake Hazards Reduction (ACEHR).
- NIST to be Lead Agency.
- Updated Strategic Plan.
- Management Plan.
- Coordinated interagency budget.
- Annual Report to Congress.



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## Interagency Coordinating Committee (ICC)

- Directors of FEMA, NIST (Chair), NSF, & USGS, Office of Science & Technology Policy (OSTP), and Office of Management & Budget (OMB).
- Oversees planning, management, & coordination.
- Responsible for developing and updating strategic and management plans, coordinated interagency budgets, and annual program reports.
- Status:
  - Four meetings held thus far (April, July, October 2006; May 2007).
  - Very positive, with strong leadership consensus and support.
  - Meeting 4 included initial feedback from ACEHR.



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## Advisory Committee on Earthquake Hazards Reduction (ACEHR)

- Reports to NIST Director (as Chair of ICC).
- Assesses trends and developments in science and engineering; program effectiveness; need for program revision; and program management, coordination, and implementation activities.
- Composed of 15 qualified members representing research and academic institutions, industry standards development organizations, state & local governments, and financial communities (no Federal employees), plus USGS SESAC Chair serving in *ex officio* capacity.
- First meeting held on 10-11 May 2007.
- Plans to provide annual reports that coincide with Federal budget preparation cycles.



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# ACEHR

## Members

Walter Arabasz – Univ of Utah

Jonathan Bray – UC Berkeley

Lloyd Cluff – PG&E

Dave Cook – Boeing

Rich Eisner – CA OES (retired)

Ron Hamburger – SGH

Jim Harris – JR Harris & Co

Howard Kunreuther – Univ of PA

Tom O'Rourke - Cornell

Chris Poland – Degenkolb (Chair)

Paul Somerville - URS

Kathleen Tierney – Univ of CO

Anne VonWeller – Murray, UT

Yumei Wang – OR Dept of Geology  
& Mineral Industries

Sharon Wood – Univ of TX

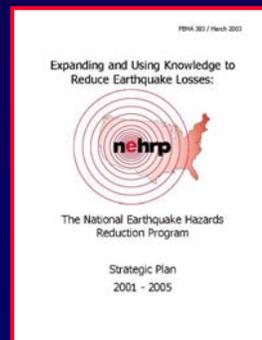
USGS SESAC Chair, Mark Zoback  
(*ex officio*)



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## Strategic Plan

- NEHRP agencies using 2006 stakeholder inputs and internal review results to update 2001-2005 plan (FEMA 383), creating new Strategic Plan.
- Emphasis on interagency synergy and areas of increased emphasis resulting from stakeholder inputs and internal reviews.
- Plan to be forward-looking in anticipation of future program developments.
- Draft plan currently under development – intended completion by December 2007.
- Draft plan to be available for ACEHR and stakeholder review before finalization.
- Plan development approach endorsed by ICC at 31 May 2007 meeting.



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## Strategic Plan: Emphasis Areas

*Internal gap analyses of current Strategic Plan & stakeholder comments from Spring 2006 point to 8 areas of added emphasis for revised Strategic Plan:*

- Develop advanced risk mitigation technologies and practices.
- Facilitate improved earthquake mitigation at state and local levels.
- Fully implement ANSS.
- Further develop techniques for evaluating and rehabilitating existing buildings.
- Further develop Performance-Based Seismic Design (PBSD).
- Foster conducting future earthquake scenarios for key urban areas.
- Develop a Post-Earthquake Information Management System.
- Increase consideration of socio-economic issues in both mitigation and response.



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## Coordinated Interagency Budgets

- Ensures appropriate balance among “program activities.”
- Ensures consistency with priorities in Strategic Plan and with Administration priorities, considering funding levels authorized by Congress.
- Ensures integrity of budget data with NEHRP goals and objectives.
- Budgets to be reported at “Program Activity” levels defined in PL 108-360.
- Coordinated budget to be submitted to OMB at time established by OMB for agencies to submit annual budgets.
- ICC endorsed approach proposed by Program Coordination Working Group (PCWG) at the 31 May 2007 ICC meeting - **Unified NEHRP planning with coordinated budget requests.**



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# Program Budgets

Agency	\$M							
	FY 2005		FY 2006		FY 2007		FY 2008	
	Authorized <sup>1</sup>	Enacted <sup>2</sup>	Authorized <sup>1</sup>	Enacted <sup>2</sup>	Authorized <sup>1</sup>	Enacted <sup>2</sup>	Authorized <sup>1</sup>	Requested <sup>3</sup>
FEMA <sup>4</sup>	21.0	14.7	21.6	9.5	22.3	9.1	23.0	9.1
NIST	10.0	0.9	11.0	0.9	12.1	1.7	13.3	6.4
NSF <sup>5</sup>	58.0	53.1	59.5	53.8	61.2	54.8	62.9	55.7
USGS <sup>6</sup>	77.0	58.4	84.4	54.5	85.9	55.4	87.4	56.5
<b>Totals</b>	<b>166.0</b>	<b>127.1</b>	<b>176.5</b>	<b>118.7</b>	<b>181.5</b>	<b>121.0</b>	<b>186.6</b>	<b>127.7</b>

**Notes:**

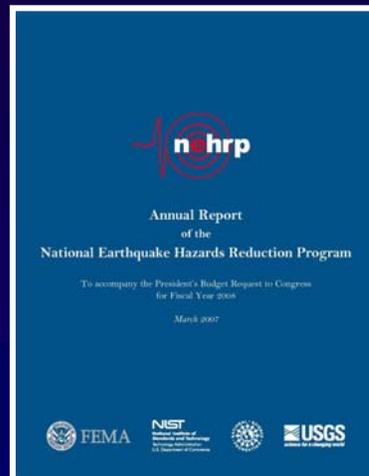
- Budgets authorized by Congress in Public Law 108-360.
- Budgets reported by NEHRP agencies for FY 2005 – FY 2007.
- Budgets for NEHRP agencies in President's FY 2008 budget Request in February 2007, except for FEMA.  
FEMA FY 2008 "requested" budget is estimated portion of President's FY 2008 DHS budget request that will be allocated for FEMA NEHRP activities.
- FEMA FY 2005 actual budget covered program activities & S&E, but excluded state grants that are administered by DHS.  
FEMA FY06 & FY07 budgets cover program activities, but excludes S&E and state grants that are administered by DHS.
- NSF budgets include NEES O&M funds: FY 2005 -\$17.9M, FY 2006 - \$20.3M, FY 2007 - \$21.3M, FY 2008 - \$22.2M.
- USGS authorization includes for ANSS: FY 2005 - \$30M, FY2006 and beyond - \$36M per year.  
USGS FY 2005 actual budget includes funds for tsunami warning from emergency supplemental appropriation (\$3.95M for EHP, \$4.15M for GSN).  
USGS actual budgets include funds for GSN: FY 2005 - \$7.5M, FY 2006 - \$3.9M, FY 2007 - \$3.9M.



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# Annual Report

- Format follows statutory requirements:
  - Current FY budgets for agencies, listed by "program activities"
  - Proposed next FY budgets for agencies, listed by "program activities"
  - Description of program activities and results for previous FY
  - Description of extent program has incorporated ACEHR recommendations
  - Description of activities carried out by program agencies that are related and supportive but not included in the program
  - Description of activities related to FEMA grants
- Report has been released and is available in pdf form on NEHRP web site.



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# Joint Agency Planning Activities

- Upcoming workshops:
  - Scenario workshop – planned for late 2007
  - Existing buildings workshop – planned for September 2007
  - Post-earthquake Information Management System workshop – tentatively planned for late 2007 or early 2008



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# Conclusion

- PL 108-360 required program changes to increase interagency coordination & cooperation – **Congress wants the whole of NEHRP to be more than the simple sum of its parts.**
- In particular, PL 108-360 mandated higher level and broader agency involvement through creating ICC and ACEHR.
- NEHRP agencies are working hard to coordinate their activities.
- Stakeholder interaction is a “must!”



[www.nehrp.gov](http://www.nehrp.gov)



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