

**Update**  
**Role of the National Science Foundation (NSF)**  
**in the**  
**National Earthquake Hazards Reduction Program (NEHRP)**

**Presented to the**  
**NEHRP Advisory Committee for Earthquake Hazards Reduction (ACEHR)**  
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**National Institute of Standards and Technology**

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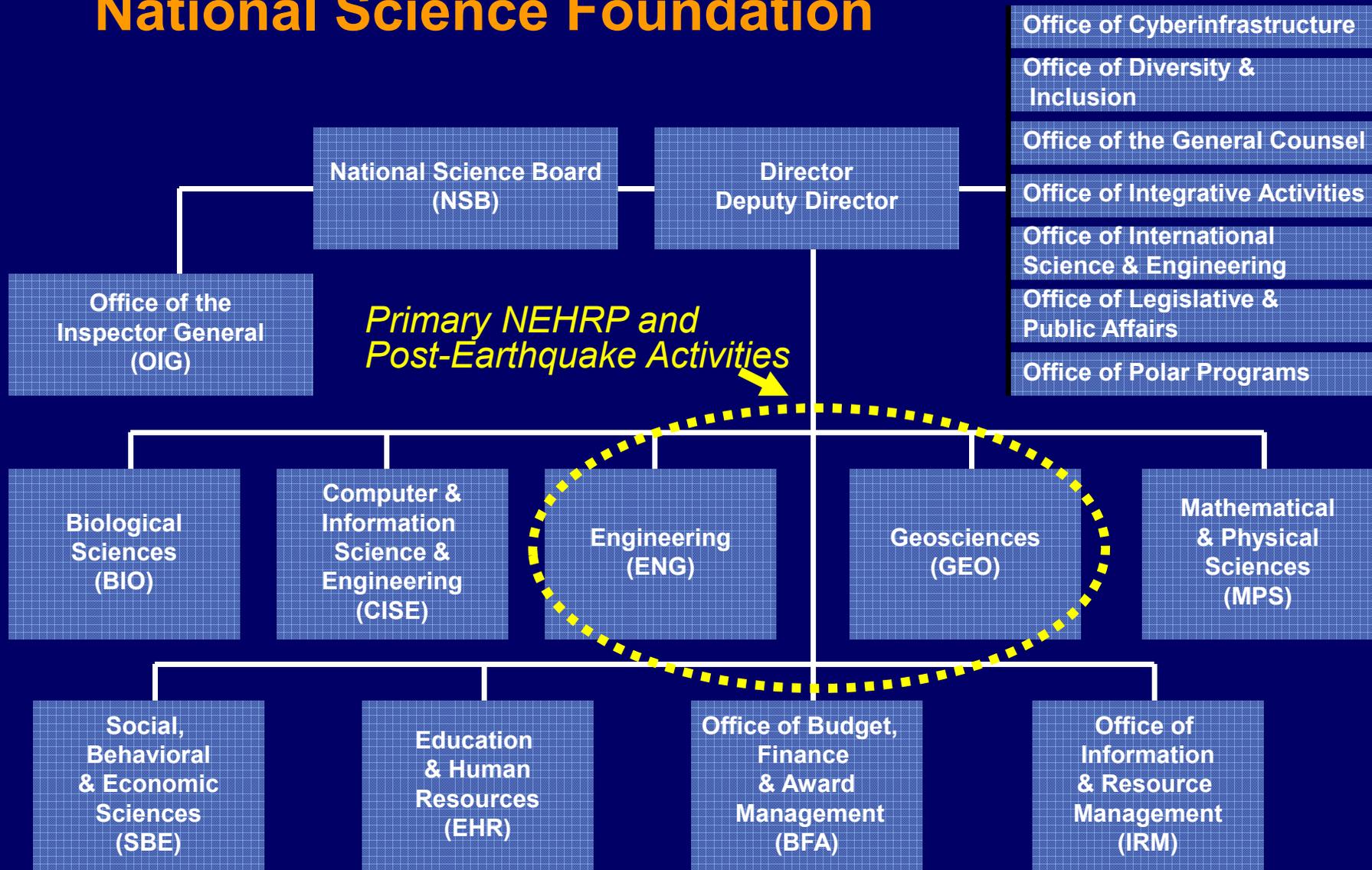
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# NSF Presentation Outline

- Preliminary response to 2010 ACEHR Annual Report to ICC
- NSF NEHRP Highlights
- NSF FY 2012 Budget Request

# National Science Foundation



# 2010 ACEHR Annual Report to ICC

## Status of Agency Responses to Recommendations

**NSF Recommendation #1:** *Commit to supporting future earthquake reconnaissance, coordination, and outreach efforts and needed additional studies for significant earthquakes occurring throughout the world; provide this support in close coordination with the NEHRP Office.*

### **Preliminary Response/Activities:**

- NSF supports post-earthquake reconnaissance through
  - Unsolicited proposals, primarily through the RAPID proposal mechanism
  - Event-based Dear Colleague Letter, as warranted (e.g., 2010 Haiti earthquake)
- Follow-up research from post-earthquake reconnaissance may be submitted to ongoing NSF core research programs
- NSF supported dissemination of 2010 Haiti and Chile earthquake RAPID findings through two workshops coordinated by EERI (NSF Award CMMI-1045037)
- NSF staff and NSF-supported PIs coordinate reconnaissance with NEHRP and other federal and state agencies, e.g., the 2010 Haiti and Chile and 2011 New Zealand earthquakes
  - NSF staff participate in USGS-led coordination phone calls
  - NIST, USGS, FHWA, and FEMA staff participated with NSF-supported reconnaissance teams, e.g., 2010 Haiti and Chile earthquakes

# February 2011 New Zealand Earthquake NSF RAPID Research Support

- Geo-Engineering Extreme Events Reconnaissance (GEER)  
(CMMI-0825760, -0825734, -0825507)  
<http://www.geerassociation.org>
- ENG and GEO considering RAPID proposals
- NSF staff, as well as members of earthquake engineering research community, participate in USGS-led coordination phone calls



# Research Needs Emerging from Haiti Earthquake Workshop September 30-October 1, 2010 at NSF

- Organized by EERI under award CMMI-1045037
- Participants
  - 40 RAPID award participants
  - NSF Program Officers
  - 4 Haitian researchers/government officials
  - NEHRP and international agency representatives
- Summary presentations on RAPID awards
- Posters on NEEShub site  
<http://nees.org/topics/haitirapidsandresearchworkshop/wiki/MainPage>
- 16 break-out sessions, organized by
  - Discipline
  - Time frame
  - Cross-cutting themes
- Workshop Report available  
[http://www.eqclearinghouse.org/20100112-haiti/wp-content/uploads/2010/10/Haiti-Workshop-Report\\_FINAL1.pdf](http://www.eqclearinghouse.org/20100112-haiti/wp-content/uploads/2010/10/Haiti-Workshop-Report_FINAL1.pdf)



# Research Needs Emerging from the 2010 Chile Earthquake Workshop August 19, 2010 at NSF

- Organized by EERI under CMMI-1045037
  - 44 participants, research community, NSF and NEHRP
  - 4 Chilean researchers
- Summary presentations on RAPID awards
- Workshop Report  
[http://www.eqclearinghouse.org/20100227-chile/wp-content/uploads/2010/11/Chile-Workshop-Report\\_FINAL.pdf](http://www.eqclearinghouse.org/20100227-chile/wp-content/uploads/2010/11/Chile-Workshop-Report_FINAL.pdf)
- Participants and presentations posted on Chile Clearinghouse  
<http://www.eqclearinghouse.org/20100227-chile/>



# 2010 ACEHR Annual Report to ICC

## Status of Agency Responses to Recommendations

**NSF Recommendation #2:** *Assess large-scale experimental facilities throughout the United States, along with the equipment sites of the George E. Brown, Jr. Network for Earthquake Engineering Simulation, to determine how best to ensure that state-of-the-art experimental capabilities for earthquake engineering are available.*

### **Preliminary Response/Activities:**

- NSF is supporting this assessment as of summer 2010 through two separate studies (see next two slides)
- These two studies were discussed at the November 2010 ACEHR meeting and are currently underway
- Studies to conclude by spring 2012
- By fall 2012, NSF will inform the earthquake engineering community of its plans beyond 2014 for multi-user earthquake engineering research infrastructure

Reference: NSF 10-071 Dear Colleague Letter

Future of Earthquake Engineering Research Infrastructure Support beyond FY 2014

<http://www.nsf.gov/pubs/2010/nsf10071/nsf10071.pdf>

# NSF 10-071 Dear Colleague Letter Future of Earthquake Engineering Research Infrastructure Support beyond FY 2014

<http://www.nsf.gov/pubs/2010/nsf10071/nsf10071.pdf>

## National Academy of Sciences Study (CMMI-1047519)

- Grand Challenges in basic earthquake engineering research that require a **network** of earthquake engineering experimental facilities and cyberinfrastructure
  - Networked experimental and cyber infrastructure needed to address the Grand Challenges
  - Focus is on requirements, rather than reference to existing or anticipated specific facilities
- March 14-15, 2011 Workshop at NAS Beckman Center, Irvine, CA  
<http://www8.nationalacademies.org/cp/projectview.aspx?key=49278>



# NSF 10-071 Dear Colleague Letter Future of Earthquake Engineering Research Infrastructure Support beyond FY 2014

<http://www.nsf.gov/pubs/2010/nsf10071/nsf10071.pdf>

## Science & Technology Policy Institute Study (AST-1045173)

- Retrospective review of NEES research accomplishments
- Priorities and scenarios for networked experimental facilities and cyberinfrastructure needed to address the Grand Challenges in basic earthquake engineering research
- Community input via <https://collab.ida.org/eeforum>



# **NSF NEHRP Highlights**

# COCONet

(Continuously Operating Caribbean GPS Observational Network)



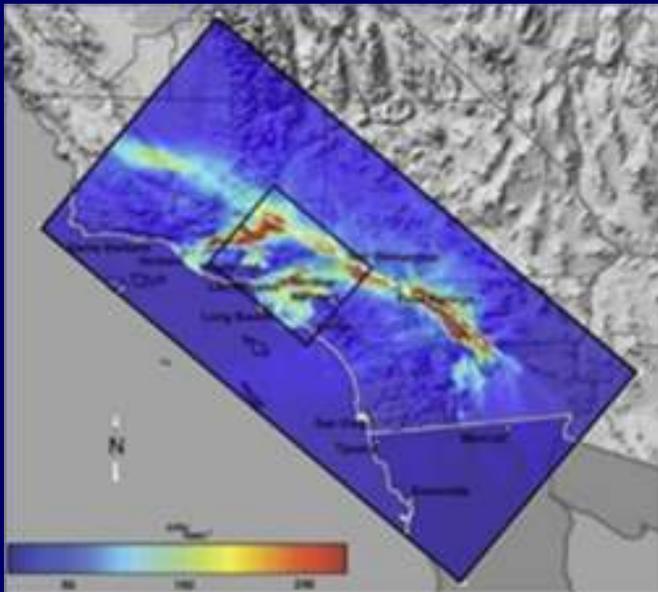
NSF Awards 1042906 & 1042909:

UNAVCO and UCAR lead institutions, with Purdue University and University of Puerto Rico

- 50 new & 50 existing stations, continuous GPS & weather network for Caribbean multi-hazard science
- Multiple international partnerships between U.S. and Caribbean scientists on research, network design and operations, and use of data for societal needs
- Five-year, \$6.7M project conceived in response to 2010 Haiti earthquake
- Workshop held February 2-4, 2011 in San Juan, Puerto Rico to “kick-off” the collaborative network. Workshop report is available in multiple languages  
<http://www.unavco.org/community/meetings-events/2011/coconet/agenda.html>



# Southern California Earthquake Center (SCEC) Kraken Supercomputer Advanced Earthquake Simulation



Selected as a Gordon Bell Prize  
Finalist, 2010

SCEC performed the largest simulation of the effects of a significant earthquake yet undertaken, the M8 Scenario.

M8 couples a full dynamic rupture model for a magnitude 8 earthquake on the southern San Andreas with detailed 3D Earth structure from the SCEC Community Velocity Model.

The rupture model used for M8 required more than 7.5 hours of sustained operation on 2160 cores in the TeraGrid Kraken computer at Oak Ridge National Lab, and produced more than 2 terabytes of input used for the waveform simulation.

The simulations can be used to create scenario and probabilistic seismic hazard maps.

# NEES Updates/Highlights

- NEES Annual Meeting
  - June 9-10, 2011 in Buffalo, New York
- NEES/E-Defense Coordination
  - Concrete wall tests in December 2010
  - NEESR base isolation and nonstructural tests in late summer/fall 2011
- NEES Highlight (February 2011)
  - NEES UCSD shake table test of a full-scale three-story reinforced concrete masonry structure
  - Supported by NIST (PI: Benson Shing) and NSF
  - Photo courtesy of Benson Shing



# Multi-Hazard Resilience and Vulnerability Observatory Network

- Multi-directorate initiative (Engineering, Geosciences, and Social, Behavioral and Economic Sciences)
- Multi-disciplinary network for ongoing data collection and analysis on regional resilience and vulnerability for multiple hazards, including earthquakes, hurricanes, floods, tornados, and other natural hazards
- Network nodes would be multi-disciplinary sites involving collaborative research by engineering, geoscience, and social science researchers
- Workshop planned to be held at NSF on April 26-27, 2011

## NSF FY 2012 Budget Request

[http://www.nsf.gov/about/budget/fy2012/pdf/fy2012\\_rollup.pdf](http://www.nsf.gov/about/budget/fy2012/pdf/fy2012_rollup.pdf)

- NSF: \$7,767,000,000, up 13.0% from FY2010 Enacted
- ENG: \$908,300,000, up 22.1% from FY2010 Enacted
- GEO: \$979,160,000, up 10.1% from FY2010 Enacted
- Several highlighted programs, portfolios, and initiatives
  - Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)
  - Wireless Innovation (WIN) Fund...research on...cyber-physical systems such as wireless sensor networks for smart buildings, roads, and bridges
  - Engineering Research Centers (ERCs) and Industry/University Cooperative Research Centers (I/UCRCs)
  - Cyberinfrastructure Framework for 21<sup>st</sup> Century Science and Engineering (CIF21)...computational and data-intensive science and engineering
  - Science, Engineering, and Education for Sustainability (SEES)

# National Science Foundation

<http://www.nsf.gov>



national **earthquake** hazards reduction program

