

## **2009 BFRL Project Description**

### **Project Title: Computer-Based Clearinghouse for Retrieving NEHRP-Funded Earthquake Research**

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**BFRL Program: National Earthquake Hazards Reduction Program**

**Objective:** To develop a publicly available electronic clearinghouse that will facilitate the search and retrieval of NEHRP-funded earthquake research publications.

#### **Problem:**

*What is the problem?* Advancements in measurement science are required to identify, quantify, and disseminate NEHRP-funded earthquake research. Since 1977, NEHRP-funding through NSF, USGS, FEMA, and NBS/NIST has supported earthquake-related research in the fields of geoscience, engineering, and the social sciences. Better data integration is needed to ensure earthquake research is used in the development of field applications, building code provisions, and design tools. Incorporating research in the areas of earthquake engineering capabilities and hazard mitigation into the design of new codes, standards, and guidelines for building and lifeline (infrastructure) construction will greatly aid in the minimization of earthquake losses in the U.S.

*Why is it hard to solve?* It is a hard problem to solve because it requires advancements in measurement science. New tools are needed to identify and disseminate NEHRP-funded earthquake research to ensure maximum distribution and impact on the U.S. building industry. To date, a comprehensive, easy-to-use catalogue of earthquake-related research does not exist. This severely hampers NIST efforts to develop appropriate applied research projects that advance NEHRP-supported research products toward field applicability.

*How is it solved today, and by whom?* It has not been solved, but recent progress has been made. In FY2008, the analysis phase of the project was completed and the preliminary design for the graphical user interface was developed. The National Technical Information Service (NTIS) was identified as the most comprehensive source for earthquake research publication data to be used in the application. A collaboration was established between NIST and NTIS for producing a searchable NEHRP Clearinghouse Website.

*Why NIST?* As NEHRP Lead Agency, NIST is required by statute (PL 108-360) to develop and maintain “a repository of information, including technical data, on seismic risk and hazards reduction.” The NEHRP Clearinghouse will facilitate the integration of NSF-, USGS-, FEMA-, and NBS/NIST-funded earthquake-related research into building code provisions and

earthquake hazard mitigation strategies, thereby reducing the life-cycle costs of achieving target levels of earthquake protection. Advancements in measurement science that reduce earthquake hazards to the built environment are consistent with BFRL's *Performance, reliability and resilience of structures and communities under extreme loads* core competency, BFRL's *Measurement science for disaster-resilient structures and communities* strategic goal, and BFRL's mission.

### **Approach:**

***What is the new technical idea?*** To solve this problem, a Clearinghouse accessible to the public from the BFRL (NEHRP/FireDoc) Website will be created containing information on NSF-, USGS-, FEMA-, and NBS/NIST-sponsored earthquake research publications, dating back to 1977. The Clearinghouse will mainly be derived from data compiled by the NTIS and provided to BFRL as part of an interagency agreement. The initial focus will be on NSF-funded research; these data, to be purchased from NTIS, include: metadata (e.g., title, author, keywords) and electronic downloadable Portable Document Format (PDF) files. There are some NSF-, USGS-, FEMA-, and NBS/NIST-sponsored publications which are not included in the NTIS database, but are available from other sources such as: the Multidisciplinary Center for Earthquake Engineering Research (MCEER), Earthquake Engineering Research Center (EERC), Pacific Earthquake Engineering Research Center (PEERC), and National Information Service for Earthquake Engineering (NISEE). These publications will also be targeted for inclusion in the Clearinghouse. A Web-based graphical user interface (GUI) will facilitate the Clearinghouse searches and a list of relevant publications will be displayed, which will include the title, keywords, and other details, in a user-friendly format. Users that search the metadata and identify titles for download will be able to obtain, free of charge, full-text digital versions of the publications (i.e., a PDF file).

***Why can we succeed now?*** Success can be achieved now because a strong partnership among BFRL, NEHRP, NTIS, and CAUDRA—the web services contractor of FireDoc—has been established. CAUDRA has experience developing Web and software tools for disseminating scientific findings, and NTIS has the NSF-, USGS-, FEMA- and NBS/NIST-sponsored earthquake research publications catalogued.

***What is the research plan?*** In FY 2009, NIST will put in place a contract with CAUDRA to produce Version 1.0 of the Clearinghouse. NIST and CAUDRA will then develop, test, and make available to the public Version 1.0 of the NEHRP Clearinghouse. The Clearinghouse will be hosted on the NIST/BFRL/NEHRP/FireDoc Website. Version 1.0 will contain metadata from NTIS and full text format documents for approximately 1500 NSF-funded earthquake-related publications. All documents contained in Version 1.0 will be available for download free of charge. To develop and make Version 1.0 available to the public, NIST will establish an interagency agreement with NTIS to purchase and obtain: (1) metadata for all NSF-sponsored publications in the NTIS database and (2) any NSF-sponsored publications currently available as an electronic PDF file. In addition, as part of the interagency agreement, NIST will cover the cost of digitizing any NSF-sponsored publications currently available in paper copy only. The co-investigators will meet periodically with the NEHRP member agencies to: provide updates on the software development effort, seek input on establishing a focus group for software testing, and demonstrate both the Beta Version and Version 1.0 of the Clearinghouse. During FY 2009,

the co-investigators will identify USGS-, FEMA-, and NBS/NIST-funded technical reports found within the NTIS Database and develop estimates of the costs of purchasing the metadata and digitizing any publications currently available in paper copy only.

In FY 2010, NIST will put in place a contract with CAUDRA to produce Version 2.0 of the Clearinghouse to include all NEHRP-funded, earthquake-related research. NIST and CAUDRA will then develop, test, and make available to the public Version 2.0 of the NEHRP Clearinghouse, by expanding NIST's collaboration with NTIS to include all NEHRP-funded, earthquake-related research.<sup>1</sup> BFRL will seek funding from USGS and FEMA to cover the costs of purchasing the metadata for their publications and for digitizing paper copy only publications, as well as seeking funding from NSF to incorporate future documents from NSF sources. All NBS/NIST-funded publications will include full text format documents available for download free of charge from the Clearinghouse. All USGS- and FEMA-funded publications will include web links to full text format documents on the USGS and FEMA websites, where they will be available for download free of charge. BFRL will work proactively with other recipients of NEHRP-funded research (e.g., Quakeline and NISEE) to identify documents not included in the Clearinghouse, facilitate their conversion to PDF files, and make arrangements for including them in the Clearinghouse. Finally, NIST and CAUDRA will put in place a procedure for obtaining and posting annual updates to the NEHRP Clearinghouse.

Beginning in FY 2011, CAUDRA will maintain the NEHRP Clearinghouse.<sup>2</sup> CAUDRA in collaboration with NIST will obtain and post annual updates to the NEHRP Clearinghouse.<sup>3</sup>

**Recent Results:** Established collaboration between NIST and NTIS to produce a searchable NEHRP Clearinghouse Website of NSF-funded, earthquake-related research. Obtained electronic copies of approximately 20 NSF-funded documents for use in "Beta testing" of the NEHRP Clearinghouse prototype. Selected CAUDRA as the web services contractor responsible for developing the NEHRP Clearinghouse.

**Standards and Codes:** The NEHRP Clearinghouse will facilitate technology transfer, promote the adoption of earthquake-related research into new codes, standards and guidelines, and aid in the minimization of earthquake losses.

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<sup>1</sup> Total funding for the FY 2010 effort is \$75K (\$10K Office of Applied Economics; \$30K CAUDRA; and \$35K NTIS).

<sup>2</sup> Total funding for the FY 2011 effort is \$40K (\$20K CAUDRA; and \$20K NTIS).

<sup>3</sup> The annual recurring cost for maintenance and any updates by CAUDRA for FY 2012 and beyond is \$10K.