Disaster and Failure Events Data Repository

Eric Letvin
Director, Disaster and Failure Studies Program
Engineering Laboratory
National Institute of Standards and Technology
U.S. Department of Commerce

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Repository Scope

- Extreme events test buildings and infrastructure in ways and on a scale that cannot easily be replicated in a laboratory – buildings and infrastructure are built without being tested at full scale. The “real world” is the laboratory for buildings and infrastructure.
- Collection and analysis of data and artifacts from the field and other sources is essential to improve the understanding of hazards, the real-world performance of buildings and infrastructure during disaster and failure events at both the component and the system levels, and associated emergency response and evacuation procedures.
- The results of disaster and failure studies using such data and artifacts will enable recommendations to enhance disaster-resilience at the structure and community levels through improvements to building codes, standards, and practices and identification of gaps in current knowledge about buildings, infrastructure, emergency response, and human behavior.
- NIST will create and maintain the repository to facilitate disaster and failure studies and widely disseminate the data, findings, and recommendations from these studies.
- Other federal agencies, state and local governments, research institutions and industry organizations that are engaged in parallel efforts and can provide input for the repository will be engaged in the development of the database.

Repository Data Types

- As the database grows, it will include data on significant hazard events.

Data Types
Site Documentation and Collection of Artifacts
Hazard or Threat Event Data
Safety and Performance Data
Design, Construction, Operation and Maintenance Information
Evacuation and Emergency Response Information
Findings, Conclusions and Recommendations
Changes to Standards, Codes and Practices Based on Recommendations

NIST Repository Workplan

- Phase 1 – World Trade Center dataset
- Phase 2 – HUB technology pilot
  - Chile dataset
  - Joplin dataset
- Phase 3 – Implementation plan

Phase 1 – World Trade Center Dataset

- Data previously released from NIST's 7-year investigation of the collapses of three buildings at New York City's World Trade Center
- Over 94,000 photos and videos
- Computer simulations
- Complete set of technical reports
- Repository created and managed by NIST
- Website publically released in August 2011

Phase 2 – HUB Technology Pilot: Chile Dataset

- Develop event-specific, web-based repository
- Data-rich event that will support the National Earthquake Hazards Reduction Program (NEHRP)
- Opportunity to coordinate with the Network for Earthquake Engineering Simulation (NEES)
- NIST retained a contractor to assist with obtaining data previously collected by others (American Society of Civil Engineers - ASCE, Earthquake Engineering Research Institute - EERI, and Los Angeles Tall Buildings Council study teams)

Phase 2 – Chile Dataset: Data Requirements

- Collect photographic evidence
- Collect geotechnical and ground motion information
- Associate photographs and performance data with building information
- Associate damage information and information on recorded ground motion
- Export data in a variety of formats
- Sort and select relevant information using multiple filters

Phase 2 – Chile Dataset: Contents

- 100 fields of data on 273 building structures (1985 Valparaiso and 2010 Maule earthquakes)
- Hundreds of drawings
- 22,000 photographs (searchable by keyword)
- Landing page to guide user and provide references

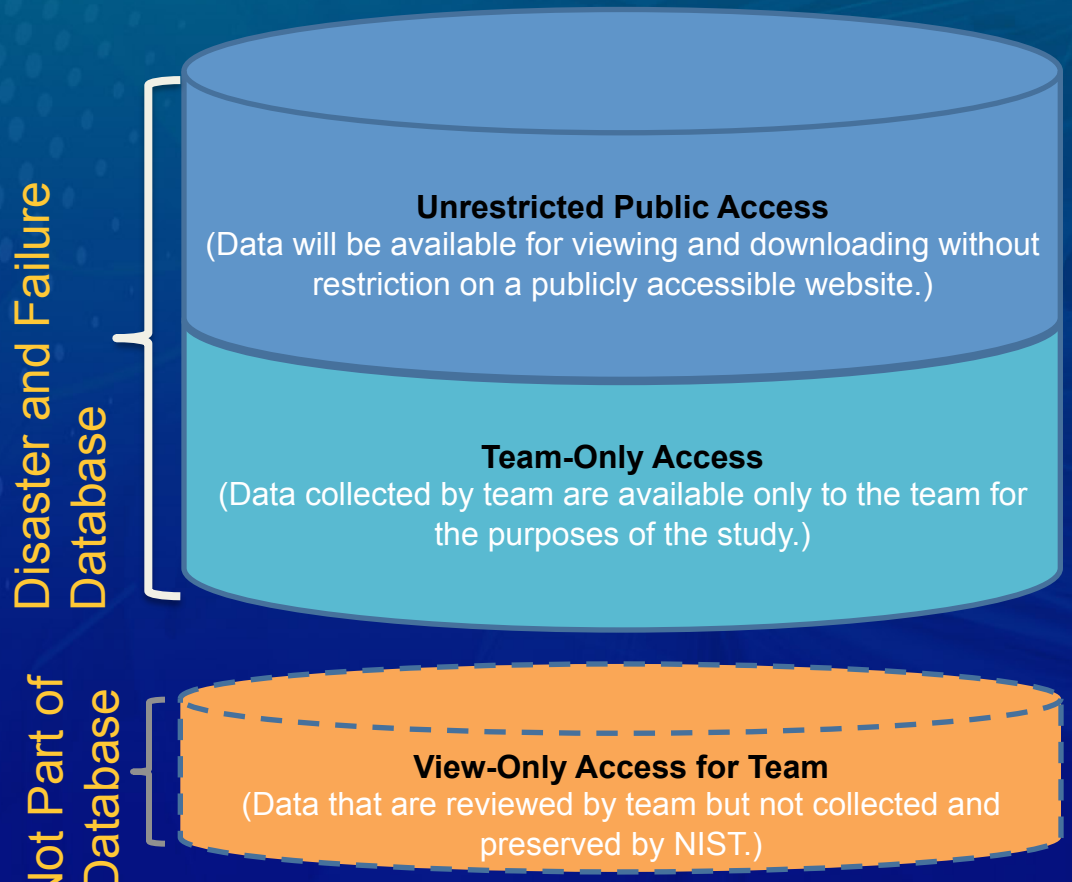
Phase 2 – Chile Dataset: Schedule and Deliverables

1. HUB installed at NIST (September 2012)
2. Final Chile repository delivered by contractor, installed on NIST HUB and ready for internal use (October 2012)
3. Draft final Chile system design document and recommendations report for larger repository delivered by contractor. Currently undergoing review and will be finalized in the next few months
4. Planned initial release of Chile dataset on NIST's website in 2013

Joplin Dataset

- 800 building drawing files
- ~3,000 photos obtained by NIST
- Video imagery
- Damage data such as field reports
- Modeled tornado wind field
- GIS layers (fatalities, building damage, etc,)
- Audio files from first responder radio traffic

Levels of Access



Phase 3 – Implementation Plan

- Finalize user requirements / system design document
  - Creating standard taxonomy / ontology for each hazard type
  - Setting minimum criteria for data to be accepted by NIST
  - Exploring and developing software requirements for geospatial enhancements of data in repository
  - Finalizing which types of data to be included
  - Determining criteria for inclusion in repository (which events?)
- Select operating platform based on user requirements

Phase 3 – Implementation Plan (cont.)

- Develop standard data collection systems for different kinds of events
- Populate with selected high-impact data from historical and future events
- Develop plan to maintain, update, operate and improve accessibility of the repository
- Maintain, update, and operate ongoing communication with stakeholder / user community

Hurricane Sandy Data Collection

- Alpha testing of field data collection form
- Prototype application created by LSU under Cooperative Agreement based on review of 30+ flood/wind data collection forms

Disaster and Failure Events Data Repository

NCST Advisory Committee
December 10, 2012

Questions/Discussion

Eric Letvin
Director, Disaster and Failure Studies Program
National Institute of Standards and Technology
U.S. Department of Commerce