Resilience of Infrastructure

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Resilience of Infrastructure

Reliability & Resistance

Redundancy & Maintenance

Response & Recovery
**Capacity Building**
Equipment & Instrumentation
Education & Training
Measurements & Data

**Science & Engineering**
Disaster Risk Research
Probabilistic Hazard Engineering Design & Analyses

**Codes & Regulations**
Construction Codes
Disaster Related Design Loads
Code Compliance
Example Project

- US Department of Energy – International Seismic Cooperation
  - Lawrence Livermore National Laboratory
- Long-Term Support for National Governments (Middle East, Central Asia, Caucasus)
- All Elements of Code Development Support
  - Capacity Building: Instrumentation, Training, Data
  - Science & Engineering: Research Collaboration
  - Code Development: Generation of Supporting Information (Hazard Maps) for Seismic Provisions
Code Development – Challenges

**Developing Countries**
- Coordination
  - Government
  - Private Sector
- Modernization
  - Science and research
  - Code updates
- Enforcement
  - Responsibility
  - Consequences

**Developed Countries**
- Overarching Policy
  - Consistency among codes
- Expectations
  - Code developers
  - Public
- Performance-based codes
  - Explicit criteria
Coordination of Code Development

Codes are typically developed at the national level but enforced at the local level.

Broad-based Committee

Performance Targets

Review & Update
Migration towards performance-based codes allow clear and explicit performance goals.

• Expectations of code developers vs. public
• Performance of buildings vs. infrastructure
• Who is coordinating the code development?
  – Building codes: Typically government
  – Infrastructure codes: Mixed
Existing Infrastructure

Codes are typically developed for new structures and guidelines for existing structures.

- Codes are mandatory and enforceable (law), while upgrading of existing structures are typically NOT mandatory.
- Drivers for decision making:
  - Cost
  - Protection of lives, public interest & investment (owner-built vs. developer-built)