Seattle Fault Earthquake Scenario Project

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Topics
- Impacts of Scenario EQ
- Scenario development process
- Scenario rollout
- What has happened since
- What went well, what we could have improved

Why develop the scenario?
- Start (or continue) a conversation.
  - Increase awareness of a real threat.
  - Foster public policy debate.
- Increase our region’s preparedness.
- Develop recommendations and impetus for effective actions to protect:
  - Lives.
  - Critical facilities.
  - Key infrastructure.

Two products developed
1. A document explaining the impacts of a Seattle Fault earthquake and including a “call to action” to improve earthquake safety.
2. A separate document providing guidelines for other communities who wish prepare similar scenarios for their own earthquake threat.

This presentation addresses development of the scenario, not the guidelines document.

EQ 50-year probabilities
- Deep M ≥ 6.5: 84%
  - Nisqually (2001), Olympia (1949)
- Random shallow M ≥ 6.5 in Puget Sound area: 15%
- Cascadia M9: 10-14%
  - Jan 26, 1700
- Seattle Fault M ≥ 6.5: 5%
  - ~900 – 930 AD

Basis for project
- Increasing concern for impacts of surface faults on region.
- Seattle Fault runs through economic heart of the state.
- Used evidence of previous EQ on fault as a basis for scenario EQ (M6.7).
**Scenario Study Area**

- King, Pierce, Snohomish Counties
  - Cornerstone of state’s economy.
  - More than half state’s population.
  - King County has 44 percent all jobs statewide.
  - Employers: Boeing, Port, Microsoft, WaMu, Starbucks, Alaska Air Group, UW, Military.
  - WA is fifth largest exporter in nation.
  - Ports of Seattle, Tacoma handle $52 billion waterborne international freight annually.

**Scenario Earthquake Losses**

- Moment-magnitude 6.7, 14 mi. fault rupture
- Property, economic loss – $33 billion
- Deaths – 1,660
- Injuries – 24,000
- Buildings destroyed – 9,000
- Buildings unsafe to occupy – 29,700
- Buildings with restricted use – 154,500
- Property damaged by fire – $500 million
- Households displaced – 46,000
- People seeking shelter – 11,000
- Recovery time – Many years.

**Ground Motion Comparison**

- M6.7 Nisqually
- Scenario EQ

**Scenario Development Process**

- Funding:
  - EERI – $50,000.
  - State EMD – $27,000, plus dedicated staff ~10 months.
- Multi-disciplinary steering committee guided project.
- Est. 3,000 volunteer hours by 75 public/private sector participants.

**Steering Committee**

- 12 members from variety of disciplines / organizations:
  - Seismologists and Geologists.
  - Geo-technical, Civil, and Structural Engineers.
  - Land Use Planners and Emergency Managers.
  - Economists and Social Scientists.

**Steering Committee - 2**

- Committee composition:
  - Good - lot of varied expertise and experience.
  - Not-so-good – we all had other full-time jobs that we needed to do.
  - Headed up subcommittees that reviewed information, assembled information and drafted chapters.
  - “Storming, forming, norming, performing.”
**Issues / Discussion**

- Content, packaging of scenario.
  - Used existing studies, information and modest additional studies (HAZUS).
- Structure of scenario
  - Ch 1. Scenario EQ and Ground Motions
  - Ch 2. Ground Failure
  - Ch 3. Lifelines
  - Ch 4. Transportation
  - Ch 5. Buildings
  - Ch 6. Essential Facilities
  - Ch 7. Economic, Business Impacts
  - Ch 8. Community Impacts
  - Ch 9. Call to Action

**Audience for the scenario**
- Local and state decision/policy makers - #1.
- Land-use planners, engineers, emergency/risk managers in public/private sector.
- General public - educational sense.
- Date/time/size of EQ, length/location of the fault rupture.
- Study area size - who's in/who's out and why.
- Scenario limitations:
  - Aftershocks / Fires / Tsunamis / Seiches.
  - Call to action.

**Steering committee meetings**
- Met monthly to track progress, refine shape of scenario, topic areas to be covered, etc.
- Subcommittee meetings/special meetings - as needed.
- Special meetings - examples:
  - June 2003 – Integration workshop.
  - April 2004 – Final scenario development workshop.
  - April 2004 – Business impacts workshop.

**Flow of scenario development**
1. Earthquake event, hazard information.
   - USGS - Golden, CO and Seattle, WA
2. Ground failures.
3. Impact chapters:
   - Lifelines.
   - Transportation.
   - Buildings, Essential Facilities.
   - Economic, Business, Community Impacts.
4. Response and Recovery.
5. Call to Action.

**Summer of 2004**
- Two years into scenario development.
- Process/project foundering a bit.
  - We’d hit what marathon runners call “the wall” – enthusiasm & energy was waning.
- First consolidated draft.
  - Some dissatisfaction with results of initial edit.
- No money for printing.

**Heading to the finish line**
- State EMD made offer to trade $ for printing for managing process to completion in September 2004.
  - Offer made and accepted by steering committee, then EERI Endowment Committee.
  - Chaired final steering committee meetings, conference calls.
  - Edited publication, obtained graphic design services, got scenario printed and distributed.
  - Developed media plan for roll out.
Peer review - Nov-Dec. 2004

- Sent to 29 people wide variety of disciplines, organizations.
- Got good feedback, got scolded a bit.
- Golden nugget: copy of draft study by Sandia National Labs on transport of goods through region that was incorporated into the economic chapter.

Scenario Rollout

- Wanted a date to generate interest.
- February 28, 2005 - fourth anniversary of Nisqually EQ.
  - Still in public consciousness.
  - EMD still noting the anniversary through public education process.
  - Repairs/renovation of Legislative Building starting to wrap-up.

Scenario Rollout - 2

- Planning began in fall 2004.
- Decided on multi-pronged outreach approach:
  - Public Officials briefings.
  - Professional Organizations.
  - Media Outreach.
  - Day-long roll-out workshop.
- Steering committee met via conference call weekly for last six weeks to continue planning/ problem solve for Feb 28 rollout.

Public Officials Briefings

- Local officials - Two half-day sessions early February 2005:
  - Seattle (city only).
  - All other jurisdictions.
- Members of Congressional delegation.

Media, Professional Organizations

- Media outreach
  - Established plan to inform media of project, its findings, call to action.
  - Invited media to rollout workshop.
  - Made plans to host media who attended workshop.
  - Prepared news release.
- Professional organizations
  - By steering committee members.

Rollout workshop

- Planning began late fall 2004 for 120-150 people.
- Publicity via email - steering committee members sent information to professional groups, other contacts, etc.
- CREW managed online registration process.
- Logistical support - USGS/CREW.
- Financial support to help defray expenses - USGS.
- EMD - got Sen. Patty Murray to introduce workshop via videotape message.
Workshop publicity, registration

- Publicity through email only.
- CREW handled registration through web site.
- Began about two months in advance of workshop.

Surprises

- Registration gone wild!
- Nearly 500 people attended event.
- $35 – lunch, copy of executive summary, copy of final publication.
- February 20, 2005 Sunday Seattle Times.
- Front page feature triggered enormous media interest in the project, our workshop.

Day of Workshop

- All 4 Seattle TV stations, 2 radio stations sent news crews.
- Stories appeared all day on TV, radio.
- Several local newspapers sent reporters or followed up after the workshop.

What has happened since ...

- Variety of presentations made:
  - Regional transportation workshop November 2005.
  - WA State Senate Transportation Committee, September 2005.
  - Congressional staff briefing October 2007 (Congressional Hazards Caucus).
  - Professional organizations (civil/structural engineers, etc) - post rollout.
  - Partners in Preparedness 2005

What has happened since - 2

- Scenario was part of "It Could Happen Tomorrow" documentary on The Weather Channel.
- SoundShake08 – regional EQ exercise.
- Military Department – internal preparedness tabletop exercise.
- Numerous public/private organizations used for planning/preparedness actions.
- 2008 National Earthquake Conference award for Outreach.
Call to Action

- Enhance the PNW Seismographic Network (#8)
  - Additional state funding, new network director.
- Public Ed programs (#7)
  - State EMD has been enhancing the past couple of years including self-help streaming videos on web.
- Retrofit of high risk buildings (#3)
  - Piecemeal (i.e., mitigation grant funding).
  - City of Seattle established inventory of URM buildings as first step in developing a long-term mitigation strategy.

Call to Action - 2

- Protect Transportation Infrastructure (#4)
  - Seismic retrofits of vulnerable bridges has increased somewhat due to new gas tax receipts.
  - What will happen as gas costs stay high or escalate, we drive fewer miles, and receipts decline … ?
- Establish independent Seismic Safety Board/Commission (#1)
  - Attempt to reinvigorate a state Emergency Management Committee seismic safety subcommittee has not occurred.

What we did well

- Committed steering committee:
  - Wide variety of expertise – geology/seismology, land use planning, civil/structural engineering, emergency management, etc.
  - Structure of the teams (steering committee, subcommittees) worked well.
- Iterative process – shape, size, content of scenario was worked like bread dough until it was just right.
- Response / recovery – issues addressed by scenario we saw in aftermath of Hurricane Katrina.

What we did well – 2

- Rollout:
  - Public Officials briefings.
  - Sunday Seattle Times article / resulting media coverage.
  - Bellevue event – 4th anniversary of Nisqually EQ – well attended and publicized; tremendous interest by participants.
- Quality of the publication – well written, good presentation, very accessible.
- Distributed 4,000 copies of scenario document – currently out of print.

What we could have done better …

- Took a bit too long – but volunteers were doing the work.
- Leadership:
  - Needed stronger leadership at start - no “go to” person; had meeting conveners.
  - Needed stronger leadership after workshop - steering committee dissolved; we hoped for an individual or organization to emerge and lead the “call to action” charge – didn’t happen.

Done better – 2

- Should have peeled the HAZUS “onion” more:
  - Potential post EQ housing/sheltering impacts likely grossly understated.
  - Examine specific structures, e.g., Alaska Way Viaduct
- We should have considered additional counties.
Done better - 3

- Obtain greater involvement of specific organizations:
  - WSDOT - Transportation impacts.
  - NOAA Pacific Marine Environmental Lab (tsunami modeling).
  - State Office of Financial Management (impact on state's economy, e.g., caseload projections, tax collections for state, locals, etc.)
- Flubbed peer review a bit - draft was not quite ready for prime time.
- Rollout
  - Scenario not ready for publication, but findings solid.
- Printed more publications.
- Secure budget w/ sufficient funds for all activities.

Final thoughts

- Some of us have discussed developing mini-scenarios/risk assessment for other communities facing surface fault hazards in Puget Sound region.
- Personal note - Helping bring the Seattle Fault project to life was a career highlight.

Questions?

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