### What Direct Impacts Do We Face?

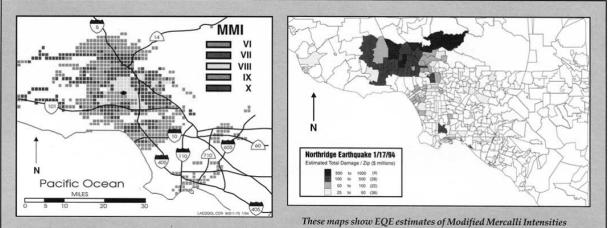




Business, Insurance, & Financial Implications of the next Northridge EQ Tom Larsen, Product Architect, EQECAT



#### The Northridge EQ A seminal moment for Cat Modeling



#### **Disaster** Aid

The California Office of Emergency Services retained EQE to assist the State with its application and administration of disaster aid by producing an immediate estimate of the total damage. The day of the earthquake, EQE used its EQEHAZARD software to produce a projected map of the affected zip codes, as well as initial damage estimates for residential, commercial, industrial, and public property. The damage to (MMIs) and expected damage in the affected zip codes.

the supporting infrastructure (transportation, water, power, telecommunications) was also estimated. The \$15 billion total damage estimate became the basis for the Governor's appeal to the President and Congress for aid to California. The resulting map was also used to allocate resources in the affected area. To our knowledge, this was the first use of this technology to improve overall disaster response.

- The 1994 EQ was one of the earliest demonstrations of modeling
- EQE (a prior company to EQECAT) provided immediate postevent guidance to help Governor Wilson expedite the recovery

From: The January 17, 1994 Northridge, CA Earthquake. An EQE Summary Report





## Earthquakes affect many aspects of buildings

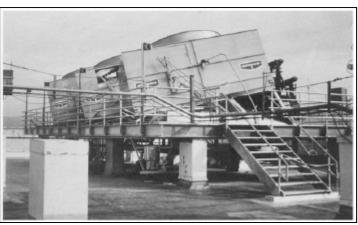


2<sup>nd</sup> story collapse, Concrete Frame Building



Collapsed interior, Northridge Fashion Center (retail)

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Cooling towers damaged (no occupancy)



**Collapsed Parking** 





#### **Damaged Housing**

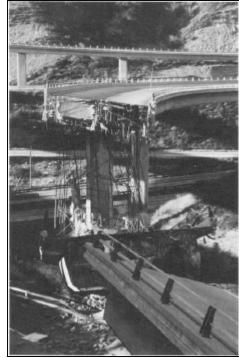






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#### Transportation



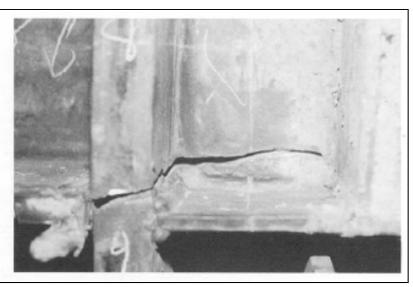






# Not all damage is immediately visible

- The construction practice of leaving backing bars in welded connections led to brittle behavior
- Damage to steel buildings was only discovered after expensive inspection of ALL steel joints in a building







### What to expect for the next one?

- A recurrence of the Northridge EQ today \$90 B (80-\$140B)
  - ~10 seconds of ground shaking
  - Displaced lodging / Business Interruption
- Direct Insurance Recoveries
- Cash shortfall

\$85 B (\$75 -\$110) \$6 B (\$5 - \$30)

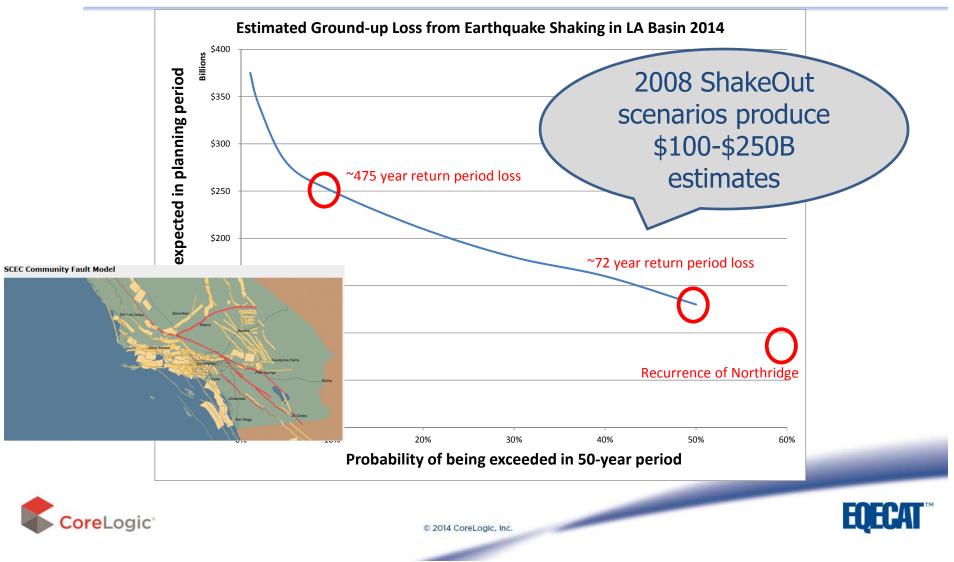
\$15 B (\$12 - \$30B) \$75 B

The ground-up damage estimate for Northridge today is about twice what was observed in 1994. Consumer inflation and population growth are the primary drivers, but a 4:30 AM occurrence time reduced the loss potential





# Is "Northridge" the right planning scenario?



### What else to expect?

#### Issue:

- Extended power outages (Hurricanes Ike & Irene)
- Direct hit/Damaging Aftershock (Christchurch NZ)
- Parallel disasters / CBI
  Tohoku
- Residential Mortgage default (seen in Hurricane Katrina)
  - Commercial Mortgage-back securities default (Sandy)

"Things always become obvious after the fact" — <u>Nassim Nicholas Taleb</u>, author of the Black Swan

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#### Potential Solution:

- Keep improving mutual aid agreements
- Super-hardening of selected facilties?
- Mandatory EQ Insurance? Alternative to Insurance?





local

#### Northridge Earthquake, 20 years later

- Northridge EQ demonstrated the value of catastrophe models for immediate response
- Catastrophe models can help us identify and anticipate reasonable planning scenarios
- The next disaster will include everything that we have seen in past catastrophes, plus much more

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