



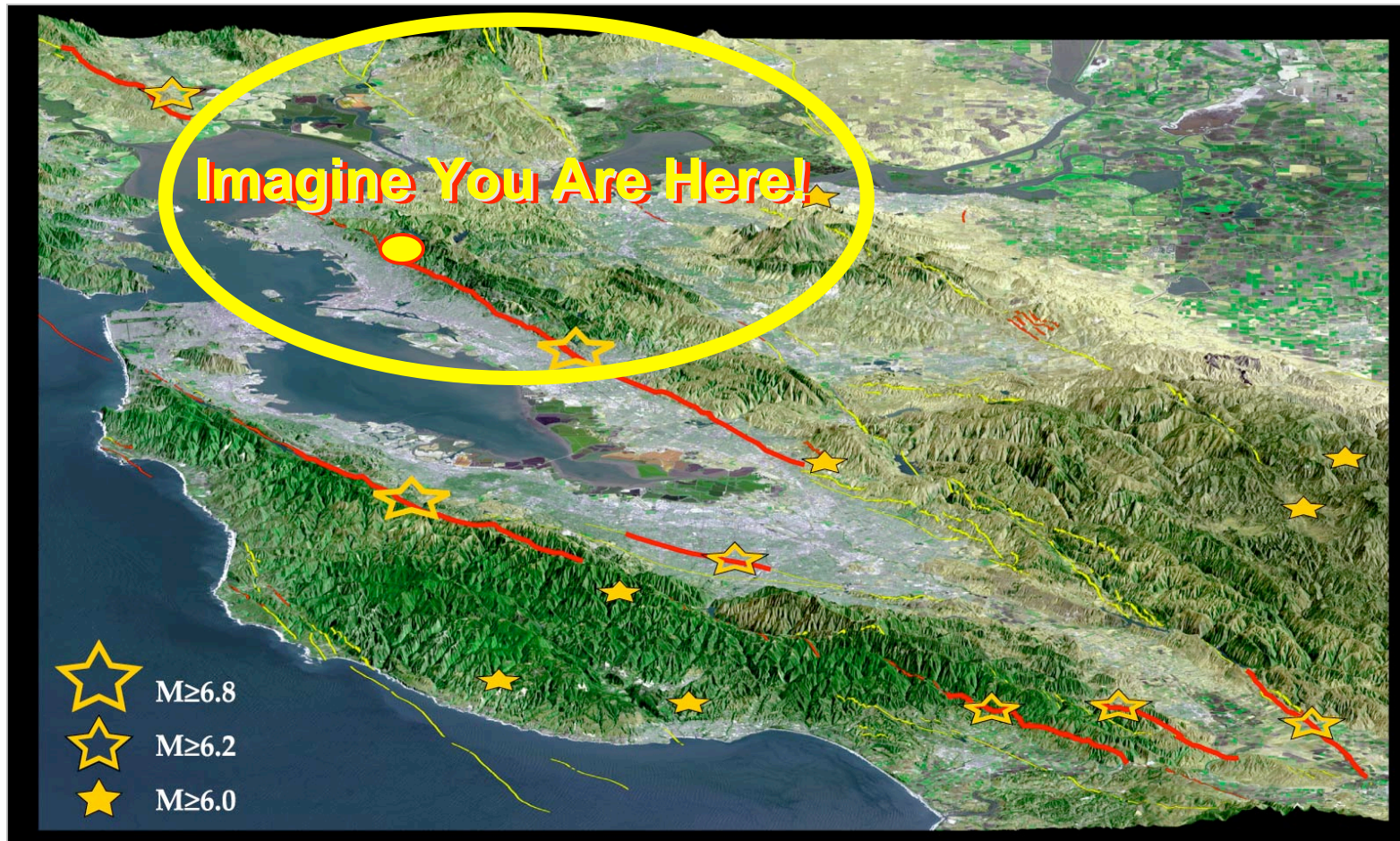
# Session 7: Distributed Network Systems

**Moderator:** Cliff Roblee, Caltrans Research

**Speakers:** Stu Werner, Seismic Systems Engineering  
Ron Eguchi, ImageCat  
Jim Moore, USC

2003 PEER Annual Meeting  
3/8/03 Palm Springs, CA

# Network Performance = Common Interest



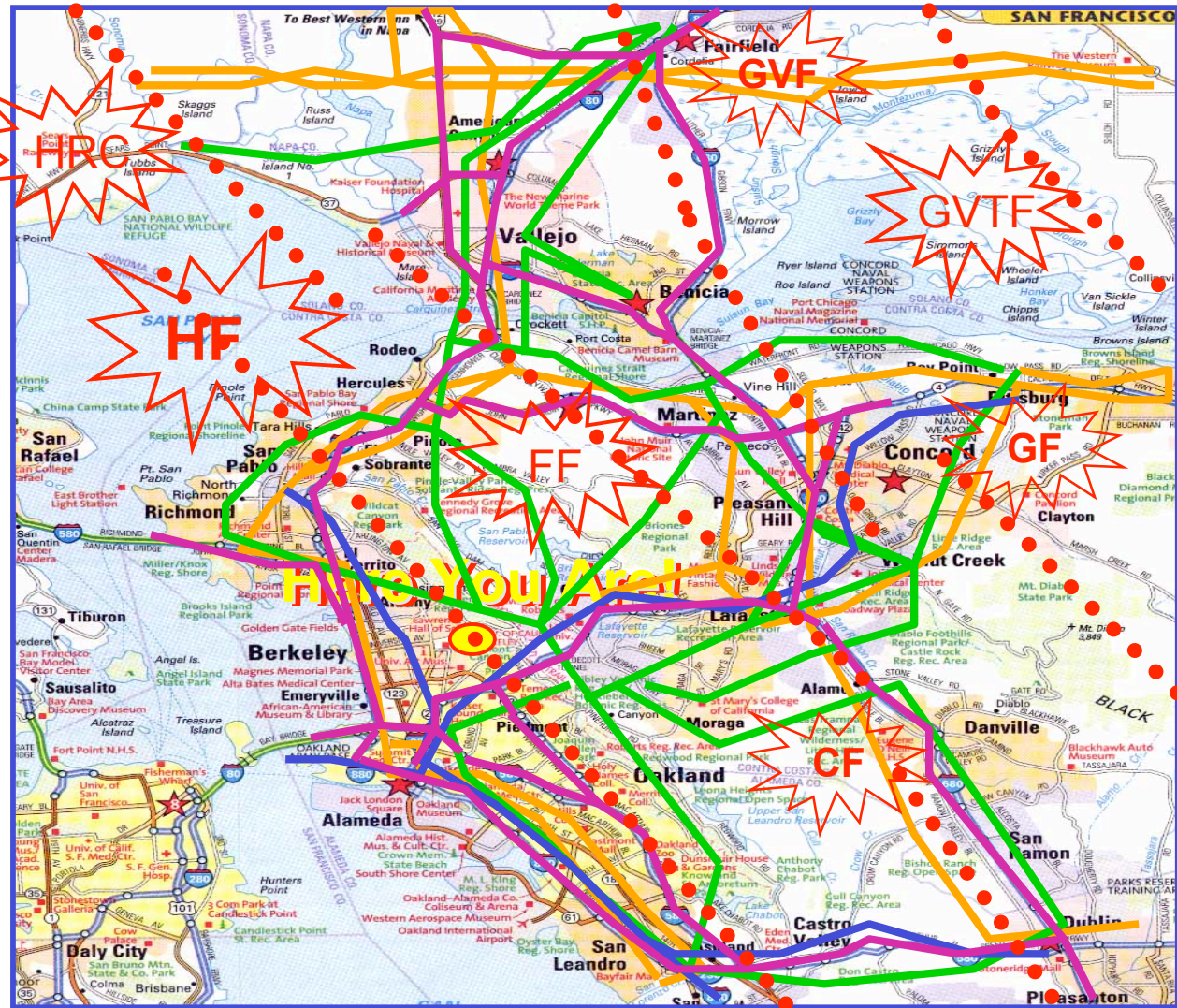
M>6 Earthquakes from 1830-1900: Bakun, 1999 and Ellsworth, 1990





# Common Hazards & Lifeline Networks

- Key Faults
- Highways
- BART
- Electrical Transmission
- Natural Gas Distribution





# Performance: Network Components

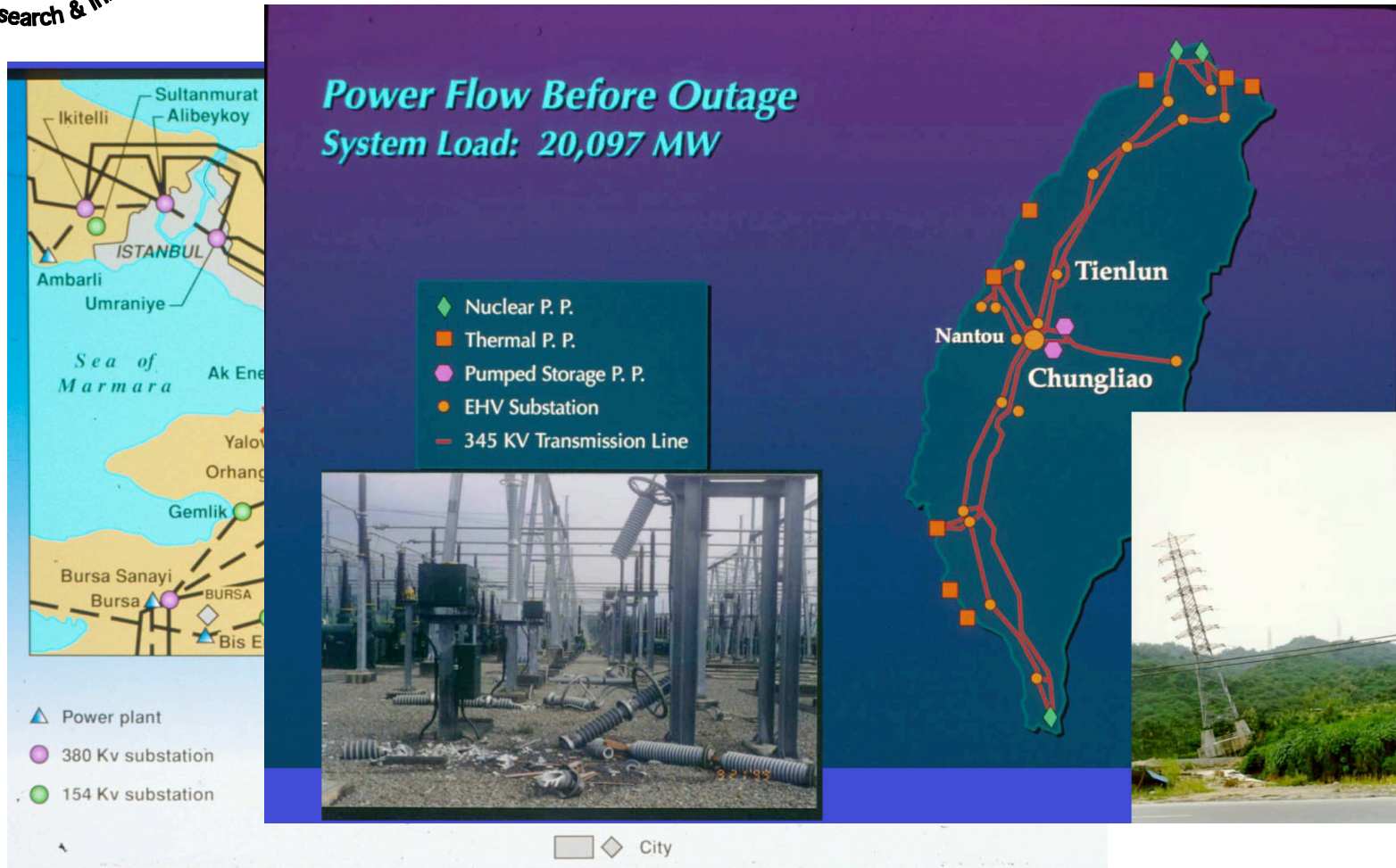


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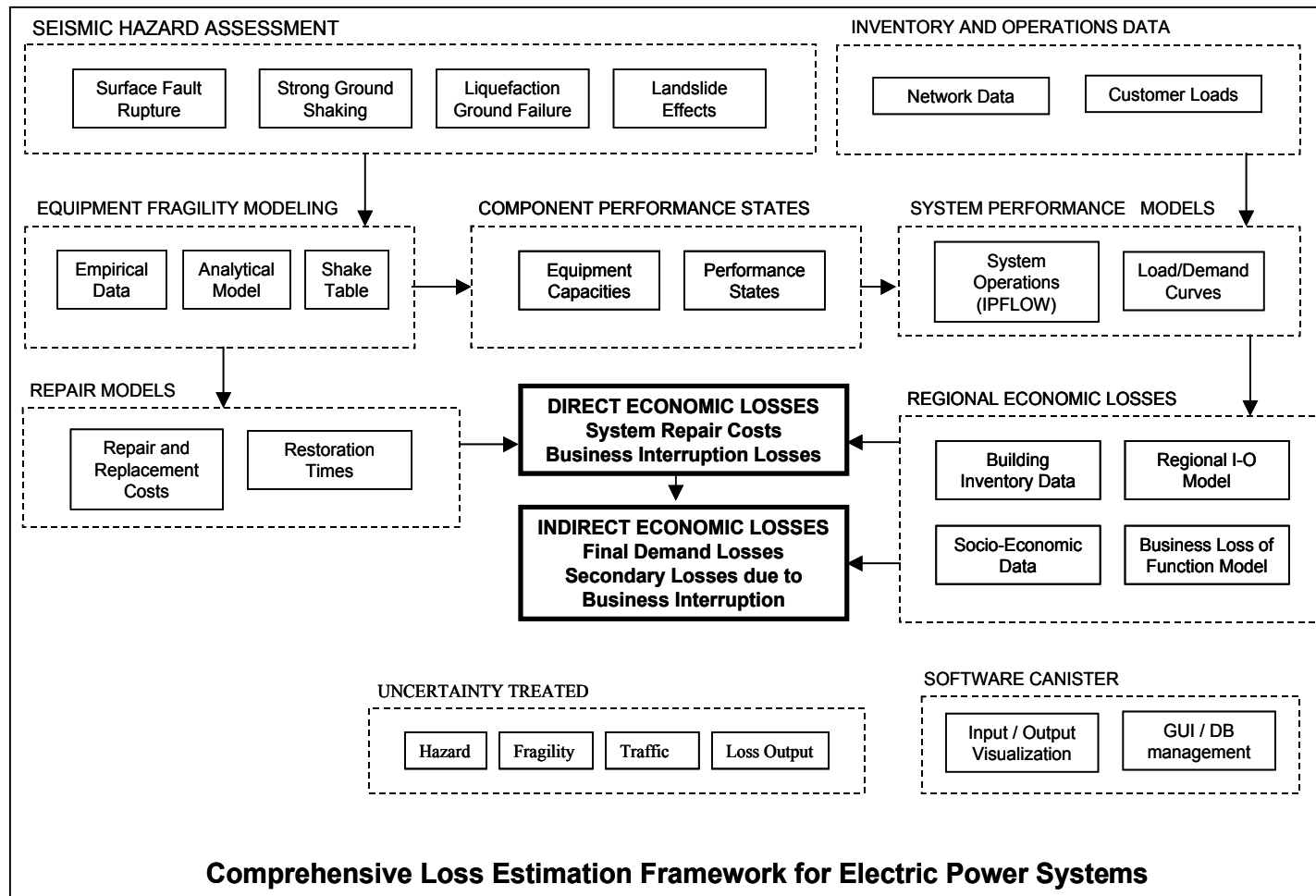
# Performance: Network Redundancy

(Courtesy of Lloyd Cluff, PG&E)



# Seismic Risk Analysis for Networks: The Big Picture

(Courtesy of Ron Eguchi, ImageCat)



Comprehensive Loss Estimation Framework for Electric Power Systems





# Some Motivators

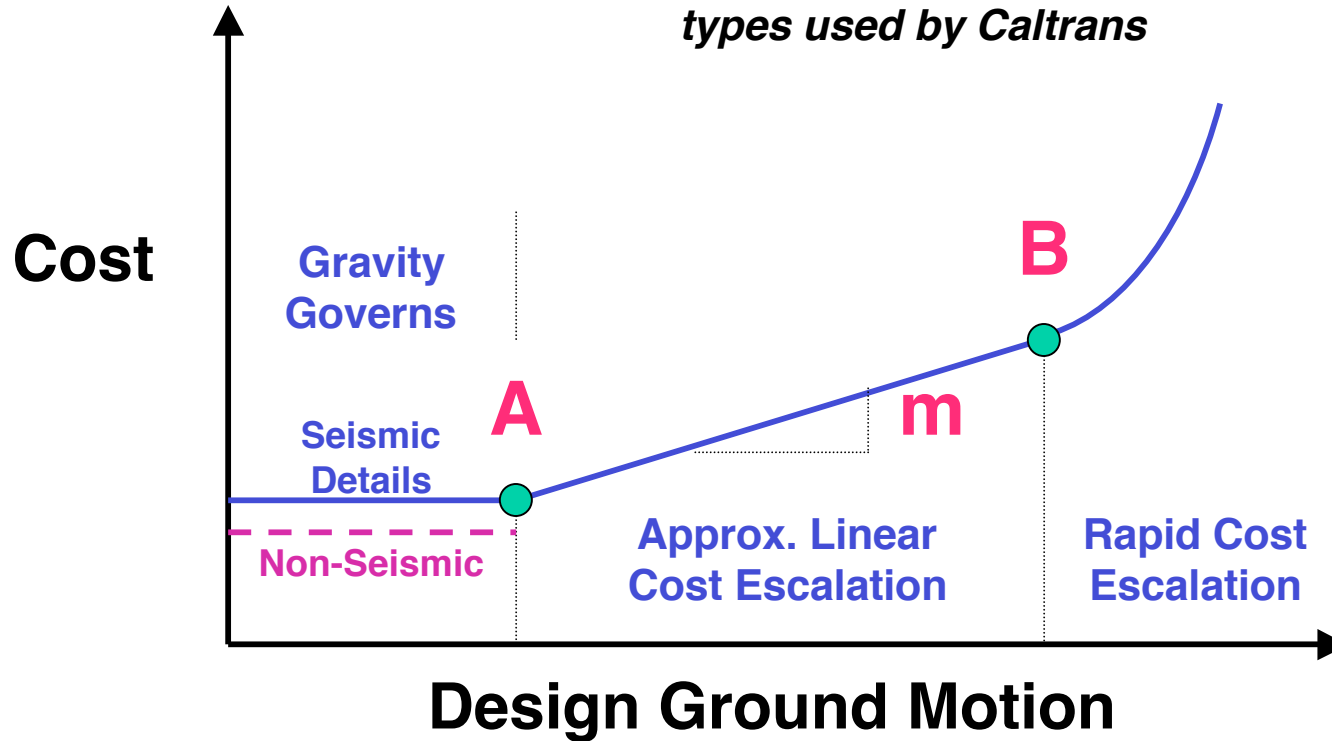
- **Challenge Statement:** “When cost-benefit of new/retrofit bridge is considered, there has never been sufficient justification to design beyond a life-safety performance standard”
- Moore et. al. on Elysian Park Scenario for LA Transportation Network
  - Approx. \$130 Billion in Total Losses
  - Approx. \$40 Billion Due to Transportation Delays
    - (Conservative Closure Criteria, Non-Retrofit Fragilities)

# Cost Sensitivity to Design Motions

(adapted from Tom Shantz)

**Assumption:** 10% change in motions = 1-2% cost impact

**Project Objective:** Establish A, B, and m for common bridge types used by Caltrans







## Session Theme Statement (highlights)

- Need Better Integration of SRA Research (PEER-LL, PEER-Core, Caltrans, MCEER/FHWA, MAE)
- Users Are Ready to Begin Evaluating/Adopting *Now*.
  - Transportation - **Caltrans**
  - Electric Transmission/Distribution – **PG&E & CEC**
- 2 Applications:
  - Pre-Event Planning for Improved Reliability
  - Post-Event Response



# Discussion Questions

**Werner** 1. What Do Users Want from Network SRA?

**Eguchi** { 2. What is the Current Status of Network SRA - Big Picture?  
3. What are the Biggest Model Uncertainties? Data Gaps?

4. Research Needs: What's Mature? Needs Immediate Attention? Overemphasized? Underemphasized?

**Moore** 5. How Make Decisions Based on Network SRA?

6. What Are Important Interactions between Lifeline Systems that Need Consideration?