# Understanding the Details: It's a waiting game

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What are the key science questions that are not, or not adequately answered today?

- Ground motion <10 km of faults is very poorly constrained, but we have facilities located close to faults

- The earthquake cycle is poorly understood:
  - What causes one region to switch on?
  - How do we model this temporal change?

- How does fault plane geometry and complexity influence ground motion? Do simple fault planes generate strong or weaker shaking?

- Dynamic rupture simulations have shown the importance of plastic zones for modeling of fault displacement; need observations to help constrain this modeling
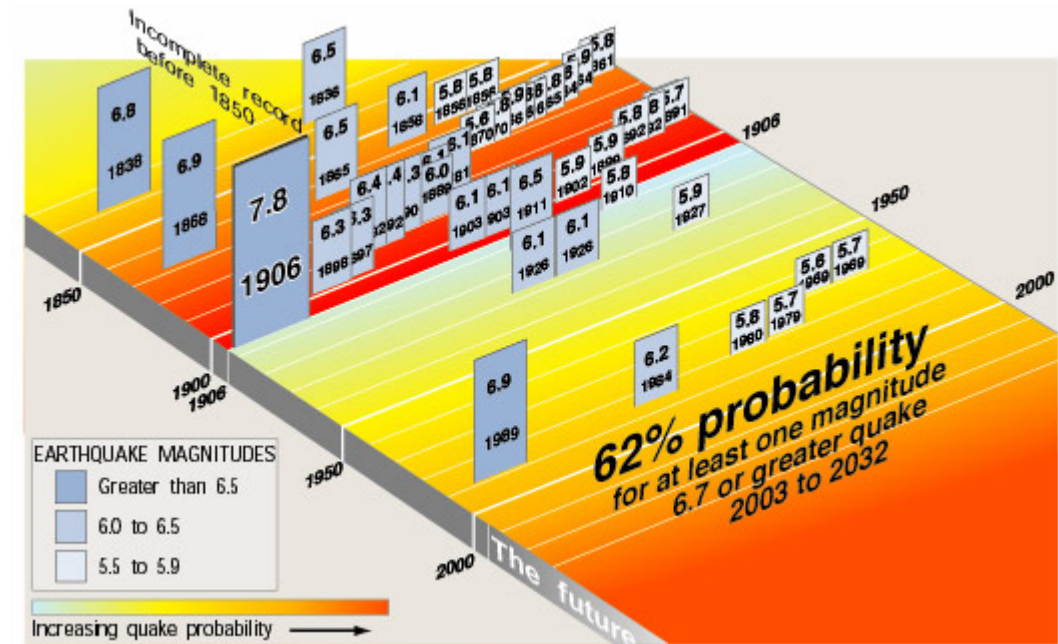
What observations (type and timeline) are required to address these questions? Additionally, justification for the geometry, scale, spacing etc. for the choices made - or identify if modeling is still needed

- Most valuable observations will be of >M5 events; ideally some would break the surface
- Unlikely to occur:
  - Need to have long-term support for the project
  - Instrument multiple faults to increase likelihood of recording a large event; and help separate fault-specific and general behavior
  - Can EQ simulators provide any insights on likely areas?
- Want ground motion to 100 Hz (200 sps)
- Perhaps use temporary areas for high fidelity velocity models

What will you learn prior to a large rupture (or with only small and moderate earthquakes)? (interseismic period)?

- Small events will be helpful to develop detailed velocity models that can be used to improve the location of events

- Events can be used to understand the changes happening along the fault plane

- Data might be useful to looking at damping of the near-surface soil

How does your topic / observation evolve as a major fault system is preparing for a large earthquake?

What is directly derived from collecting these data (at least annually) to address your science focus / question?

How will efforts in this topical area contribute to / encourage/ enable training the next generation of technologists and researchers?

- The project will be successful if it exists for a long-time and/or has good spatial coverage; need to start now so that we can start waiting

- Without it, information on the near-fault behavior will only be captured in the rare exception

- Without observational data, we have no ability to test and refine our understanding