THE STANDARD

Forecast Catastrophic Events

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

ANCHORING PHENOMENON

Two Mountains, Two Endings: Mt. St. Helens, 1980

On March 20, 1980, a magnitude 4.2 earthquake hit Mt. St. Helens, the first major quake in a swarm that had started a few days earlier. Over the next eight weeks, the north flank of the mountain bulged outward by more than 450 feet (about 135 meters), growing up to 5 feet per day. Gas emissions climbed. Small quakes swarmed under the summit. On May 18, the mountain exploded sideways and the eruption killed 57 people. Scientists had been watching the whole time and had already restricted access. The hazard was unstoppable. The disaster was partly reduced because the data was being read.

> DRIVING QUESTION
>
> *"If a volcano shows weeks of warning signs, why don't we get the same kind of warning from an earthquake?"*

INVESTIGATIVE 1

The 2004 Indian Ocean Tsunami and the Sirens That Weren't There

On December 26, 2004, a magnitude 9.1 earthquake off Sumatra sent a tsunami racing across the Indian Ocean. Over 230,000 people died across 14 countries. At the time, the Indian Ocean had no tsunami warning system. The Pacific had one. The technology existed. After 2004, a network of deep-ocean buoys and coastal sirens was built across the Indian Ocean. Use this one to sharpen the mitigation lens the anchor opens up: same kind of hazard data, completely different outcome when the warning system is there.

> DRIVING QUESTION
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> *"If the science to predict a tsunami already existed, why didn't every ocean have a warning system?"*

INVESTIGATIVE 2

The Building That Stayed Standing in Tokyo, 2011

The March 11, 2011, Tōhoku earthquake hit magnitude 9.1. Skyscrapers in Tokyo, 230 miles from the epicenter, swayed for several minutes. Most of them stayed standing. Many newer Japanese high-rises are built on base isolators, rubber and steel pads that let the building rock slightly while the ground shakes underneath. Same kind of pattern reading as the anchor, only this time the data shaped engineering, not just monitoring. Decades of earthquake data told Japanese engineers what their buildings had to survive.

> DRIVING QUESTION
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> *"If we can't predict when an earthquake will happen, how do we engineer for the one that's coming anyway?"*