

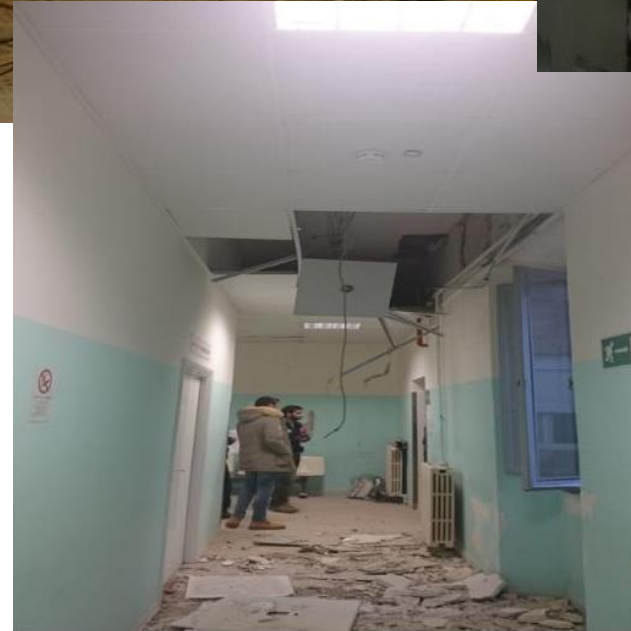
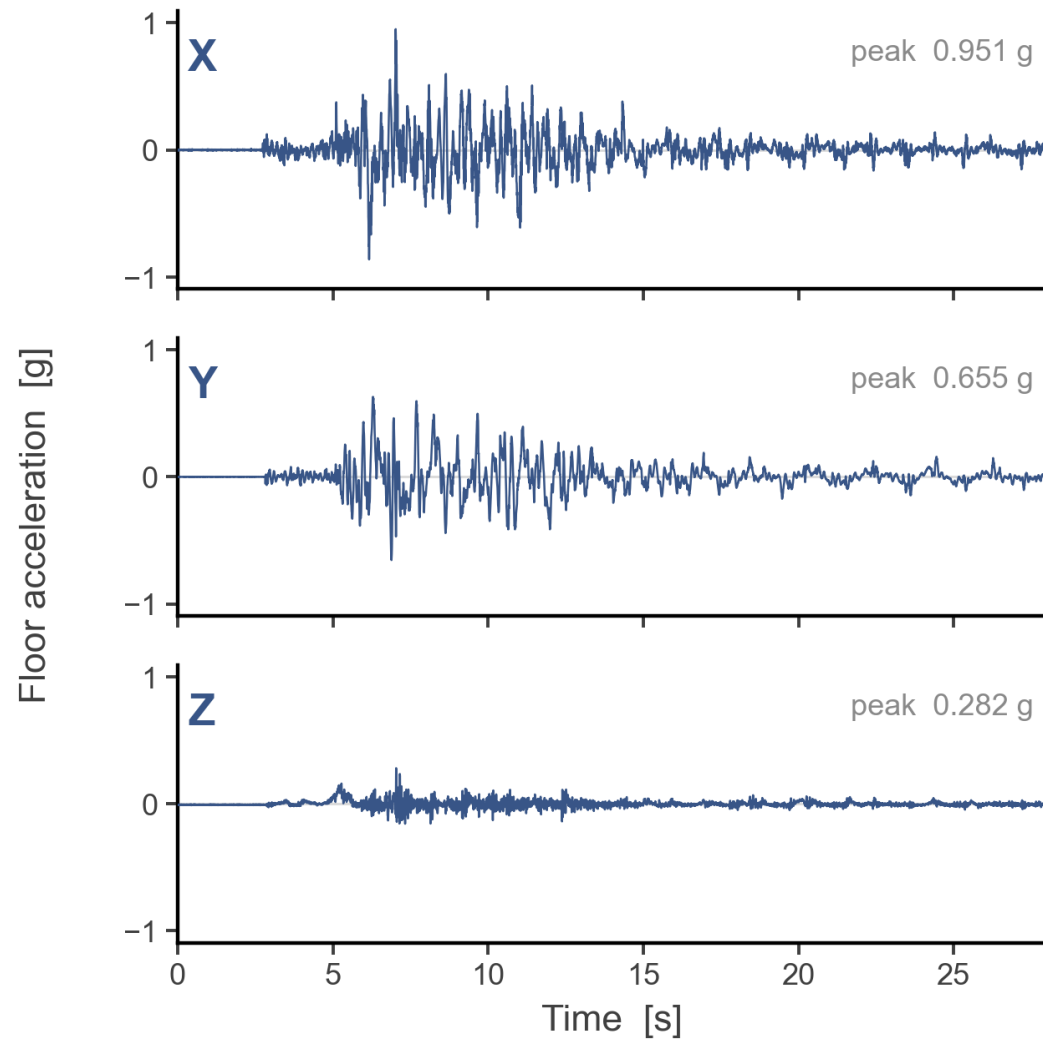
Prototype sensor architecture for SONATA: sensor-driven statistical tools to evaluate and manage safety in the built environment

Davit Shahnazaryan

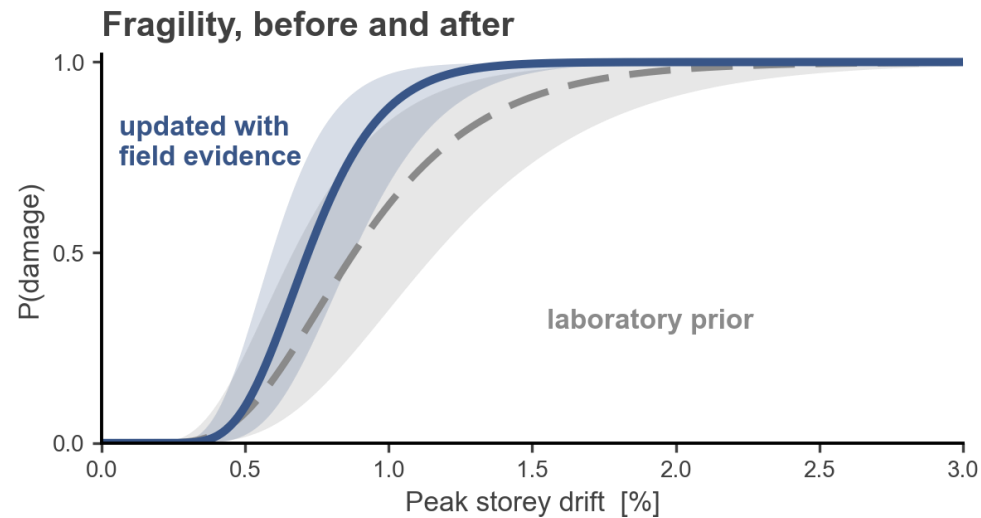
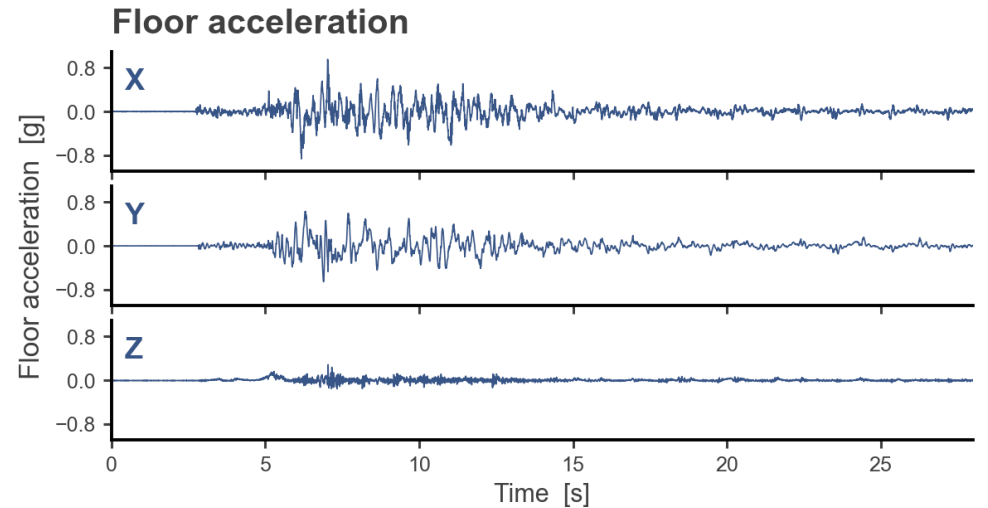
IUSS Pavia, Italy



The components that dominate repair cost and downtime are invisible to the sensors we install



SONATA turns laboratory testing into live risk estimates

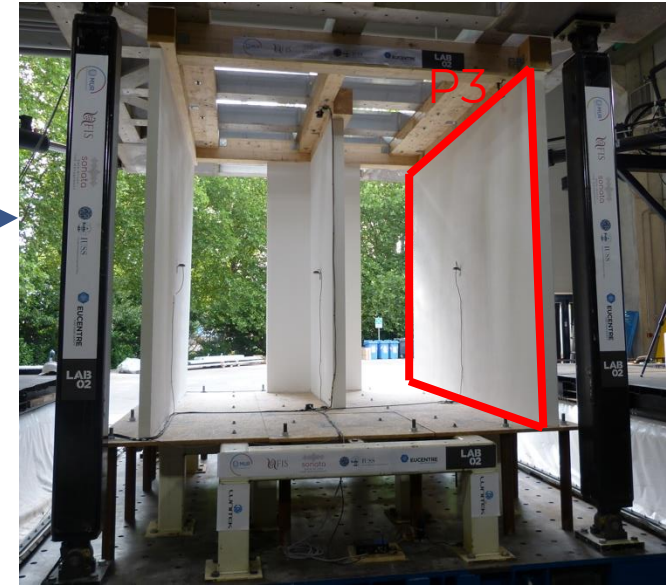


Measured: floor acceleration, laboratory prior. Indicative: updated fragility, repair cost.

The laboratory gives us two things the field cannot: labelled damage and a starting fragility curve

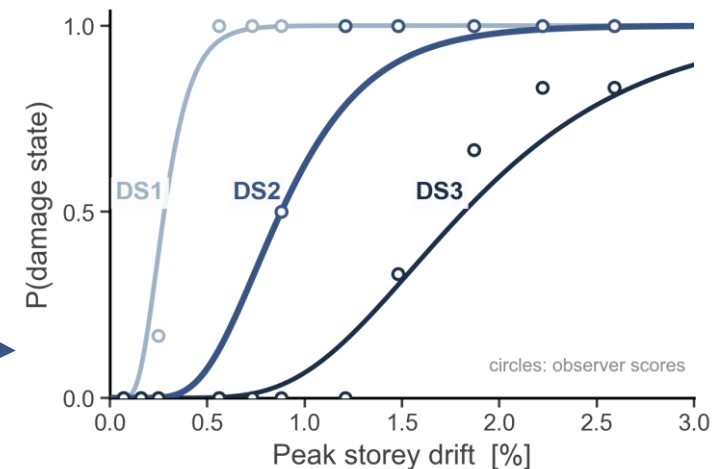


Labelled images and signals to train the model

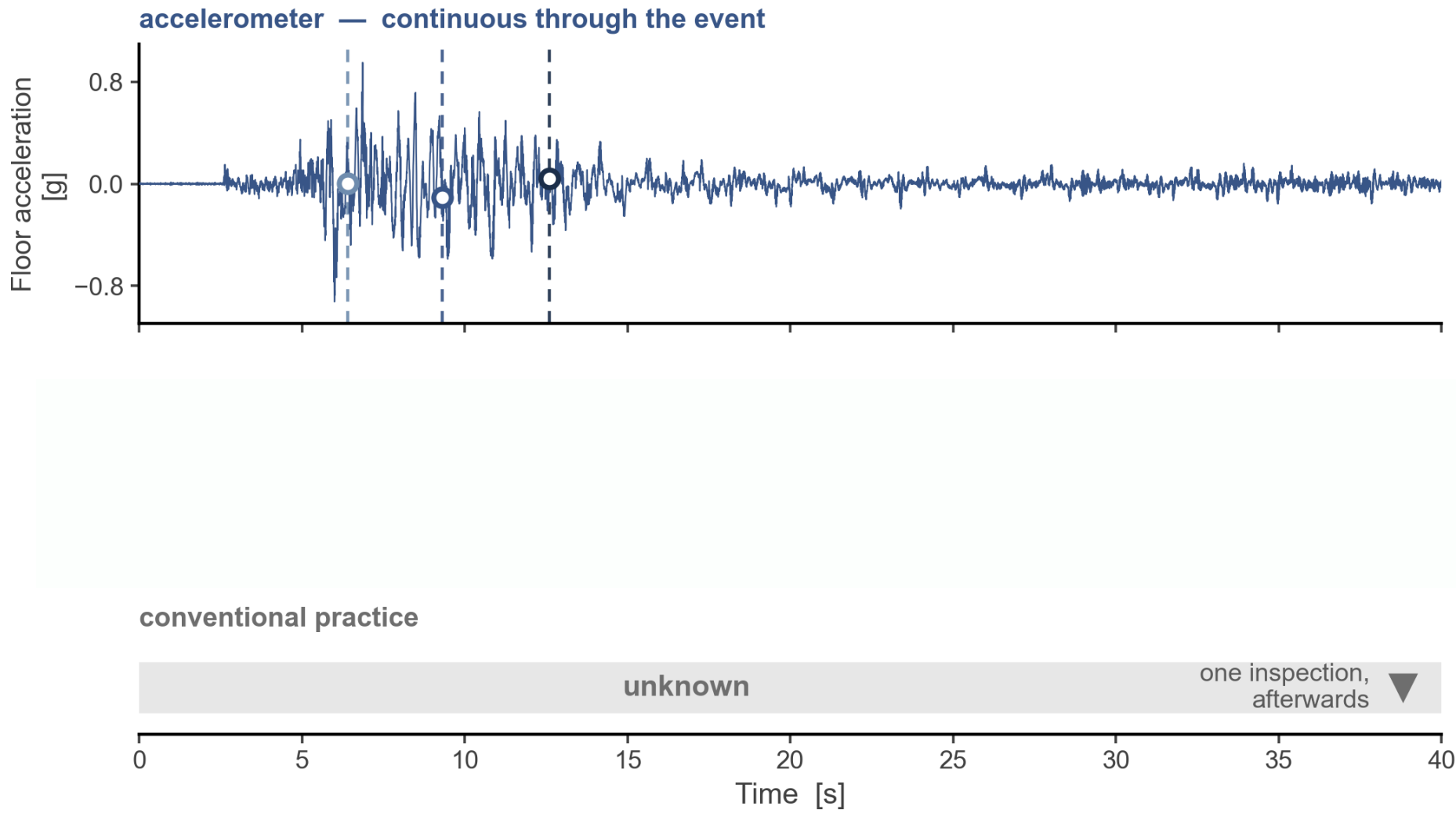


P3 – gypsum partition

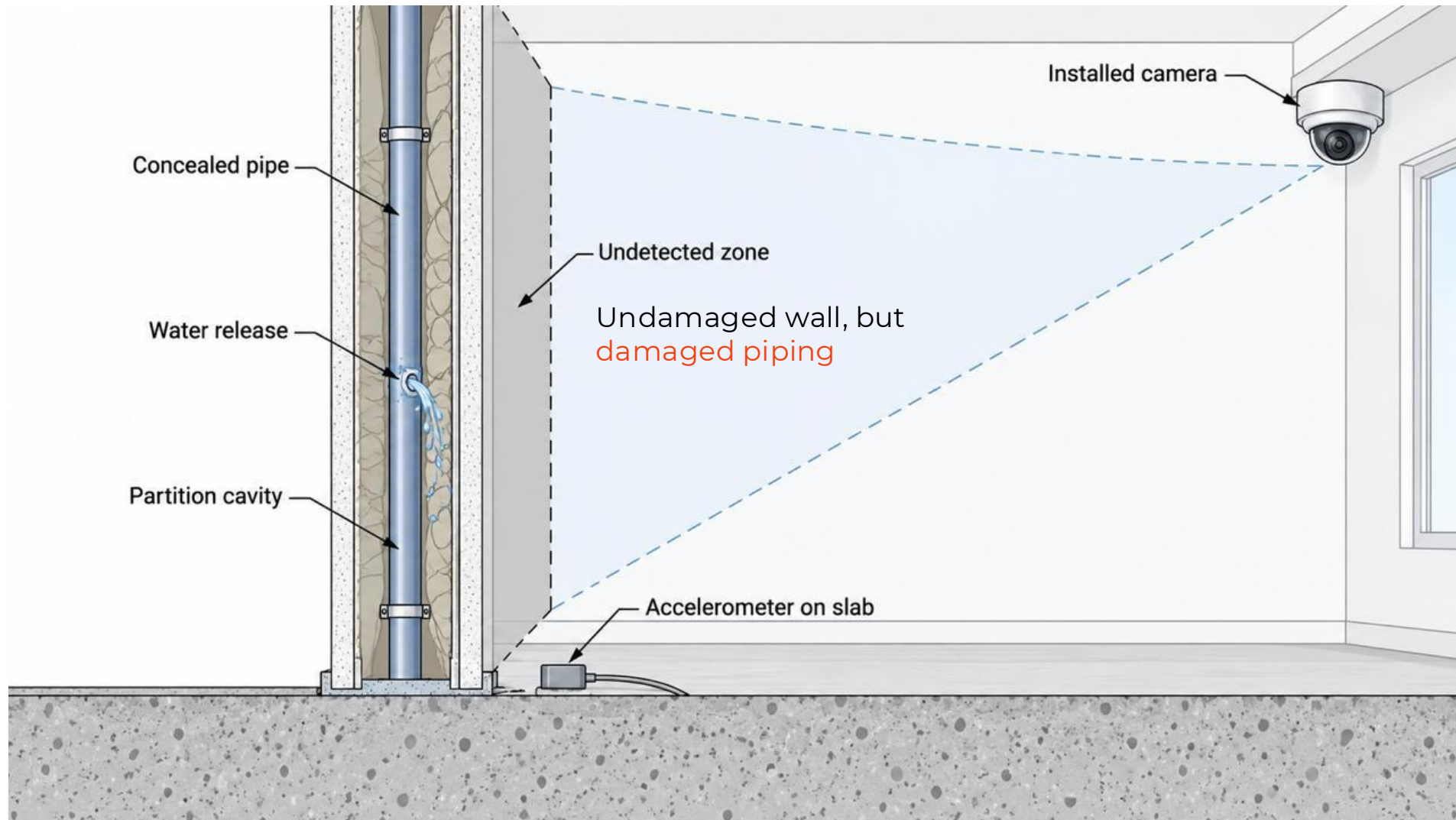
Prior fragility function



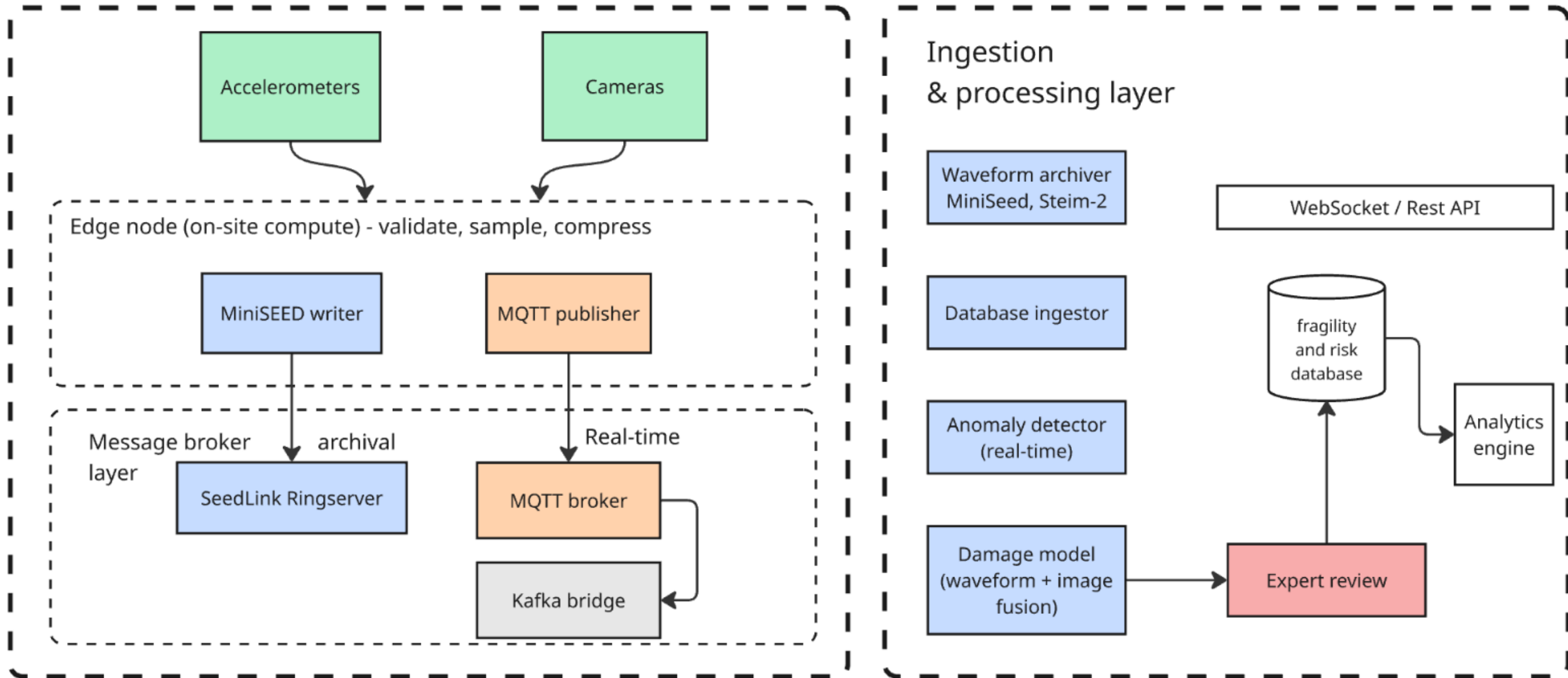
Accelerometers say when the shaking happened; cameras say when the damage happened



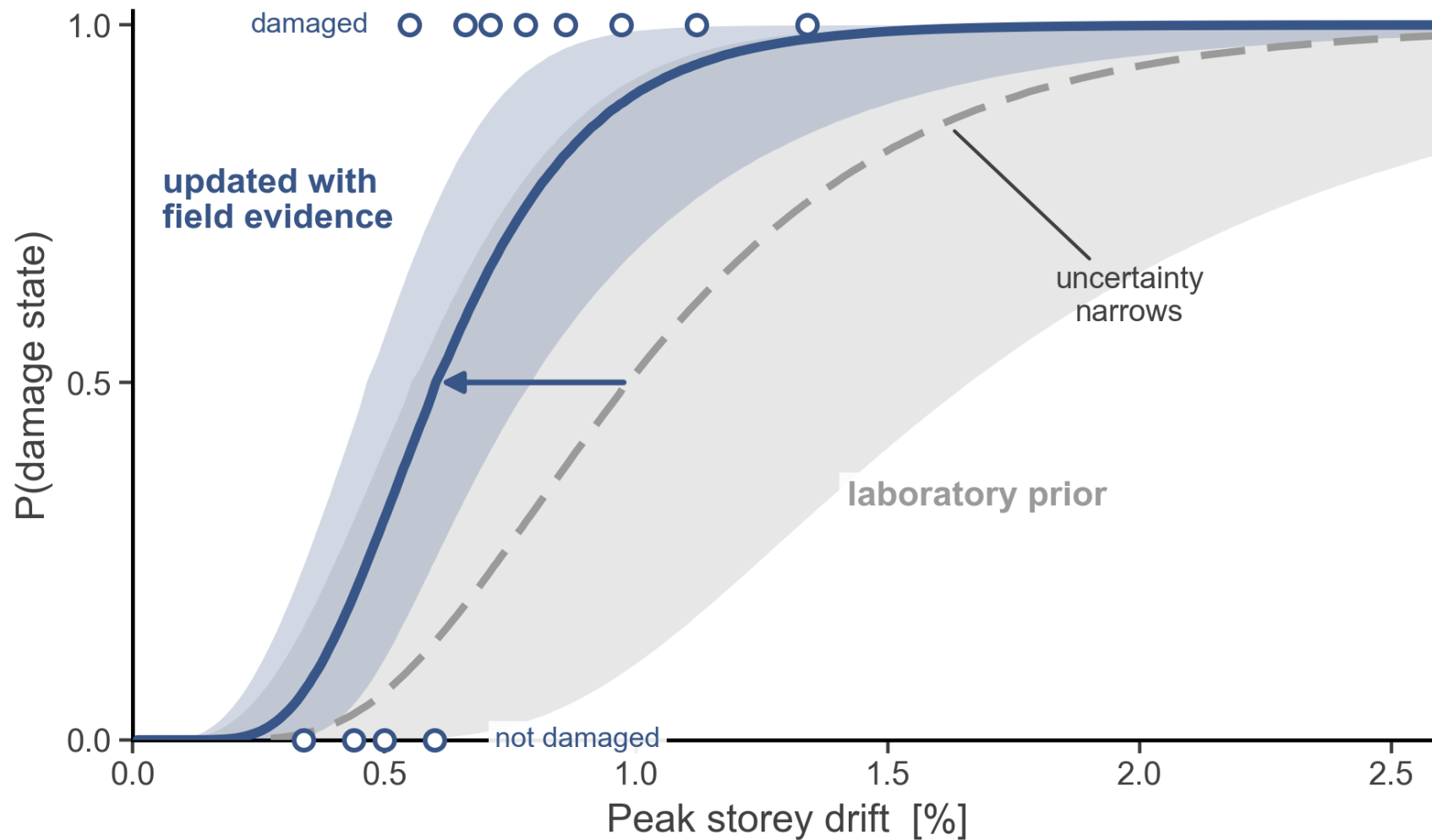
A water stain on a floor is a measurement of a broken pipe



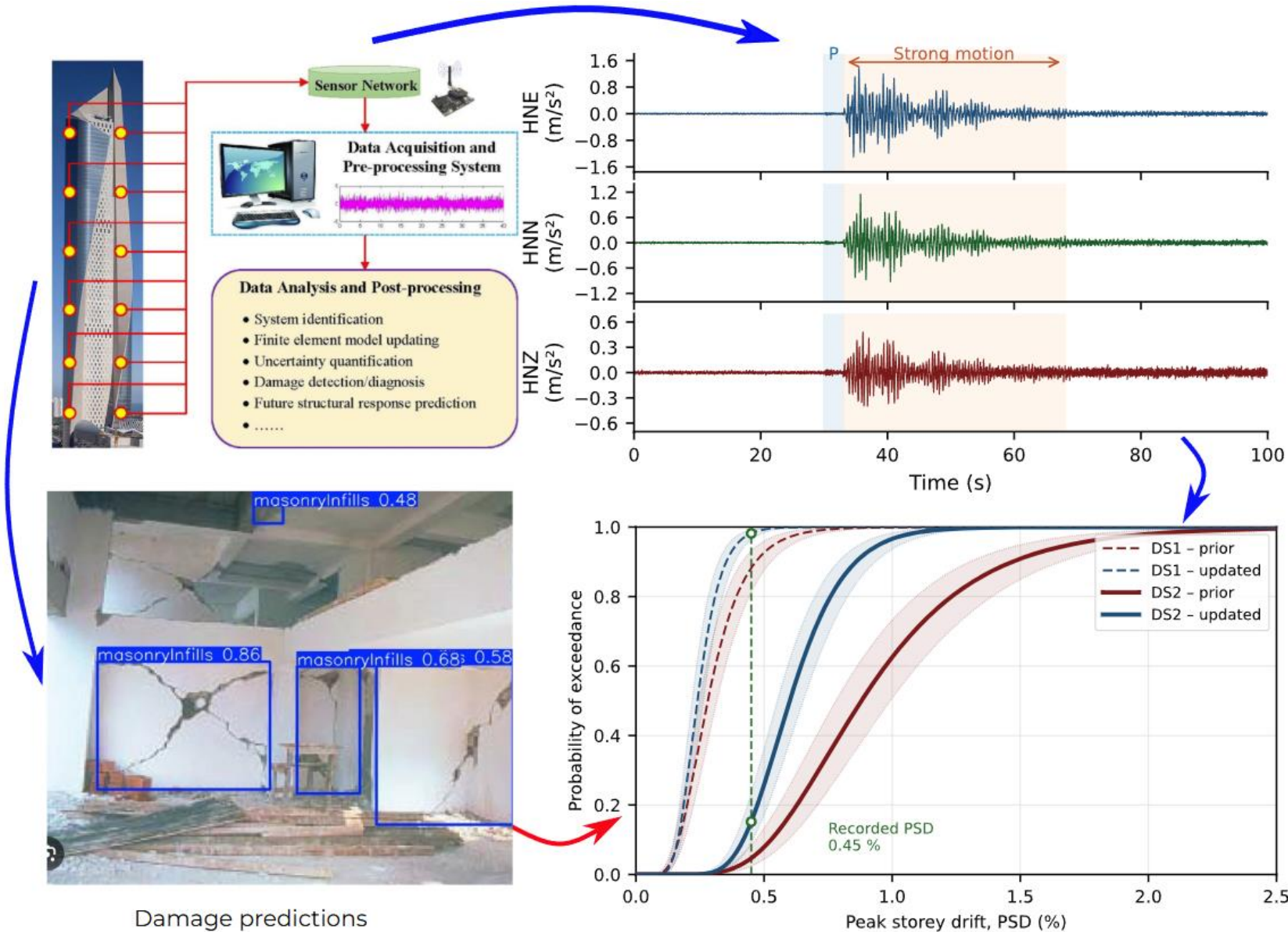
Independent services read the same data stream, so none can slow the others down



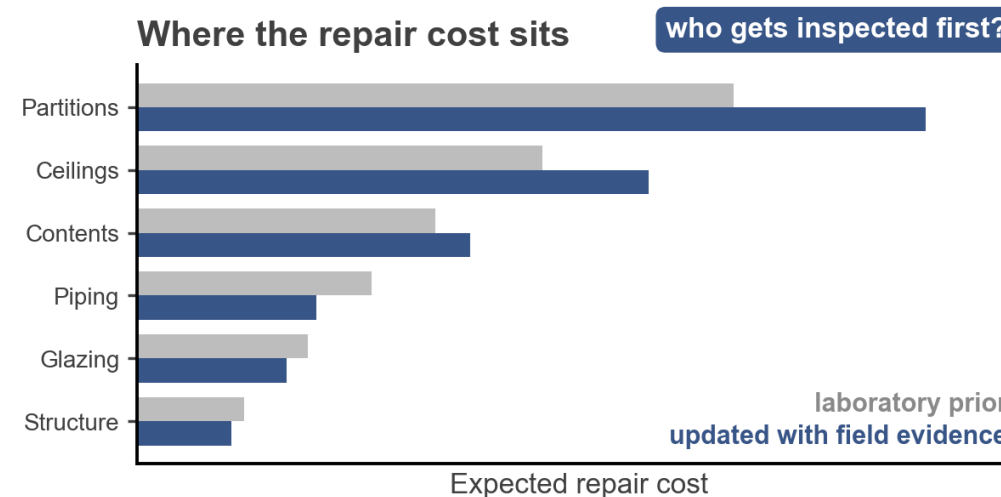
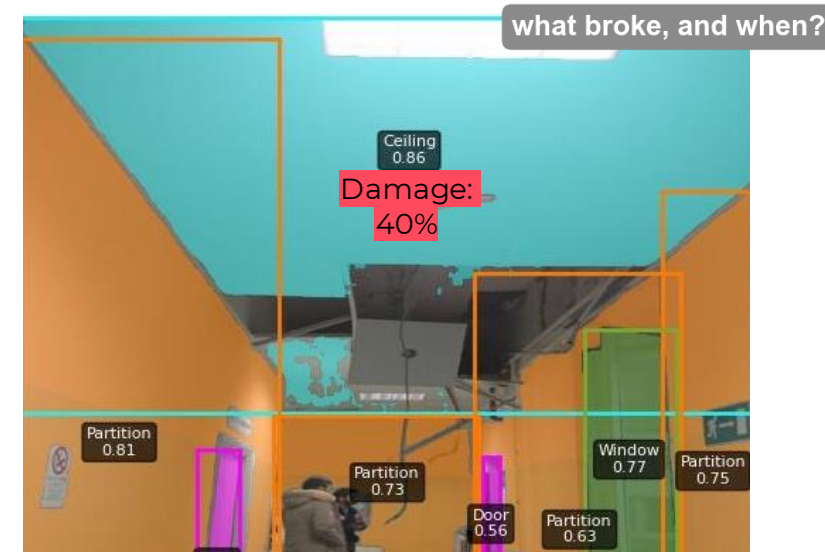
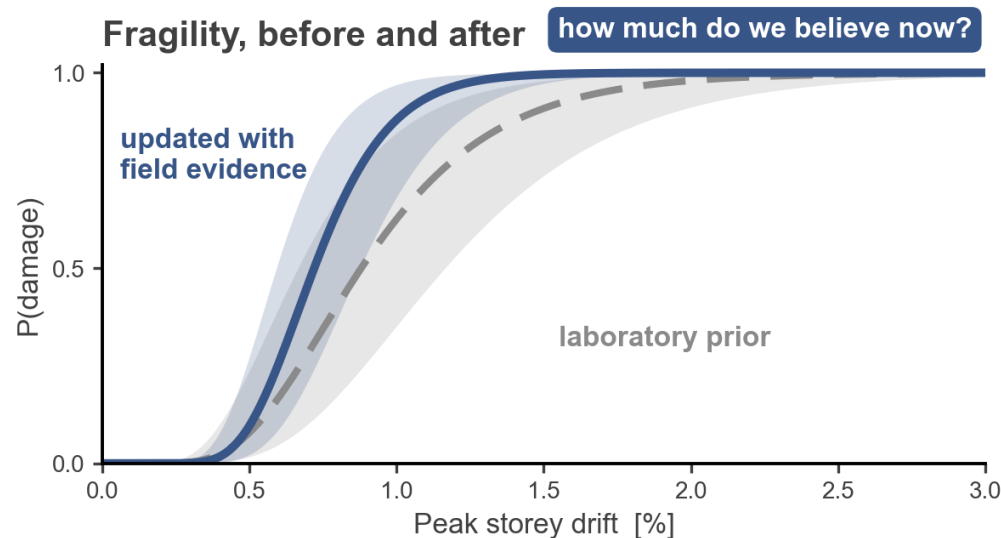
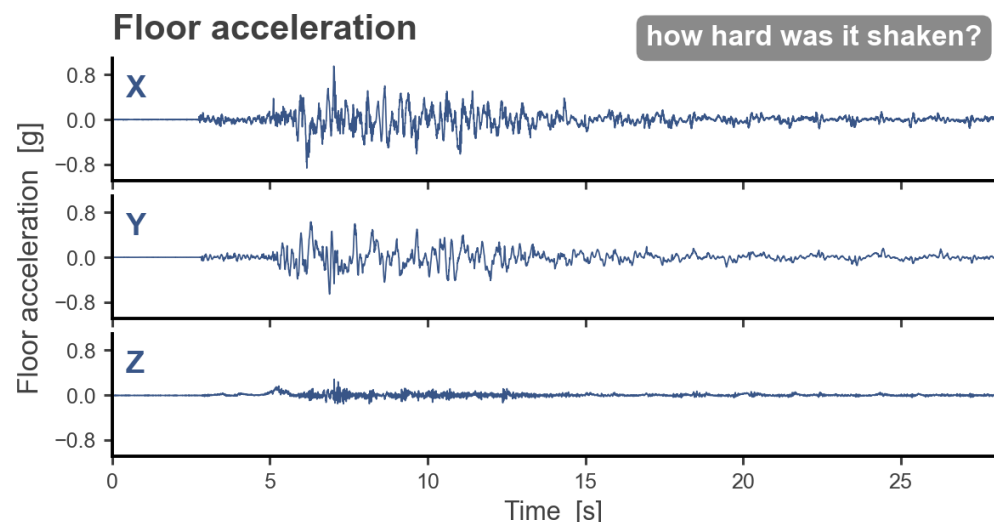
Laboratory fragility is the starting point, not the answer



Vibration, vision and the laboratory prior give one updated curve



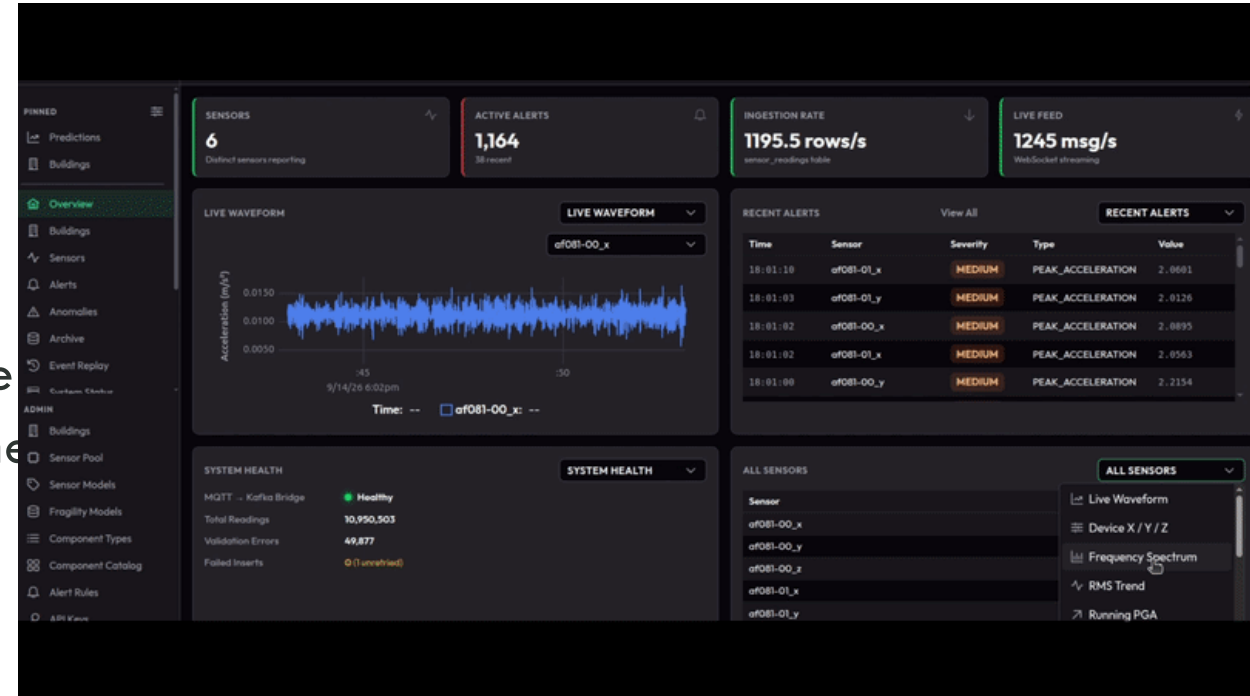
Every panel here is a decision someone has to make



Measured: floor acceleration, laboratory prior. Indicative: updated fragility, repair cost.

Accelerometers and cameras together close the gap between how hard a building shook and what actually broke

- Watching damage happen, rather than reconstructing afterwards, is what makes field fragility inference possible.
- One platform closes the loop: the laboratory gives the first curve, every monitored building gives a better one



Shahnazaryan, Davit; Todaro, Marco; Guamán, Mauricio; Ozsarac, Volkan; Sivori, Daniele; O'Reilly, Gerard J. (2026) "Prototype system architecture for SONATA: sensor-driven statistical tools to evaluate and manage safety in the built environment", 18th European Conference on Earthquake Engineering, Berlin Germany.