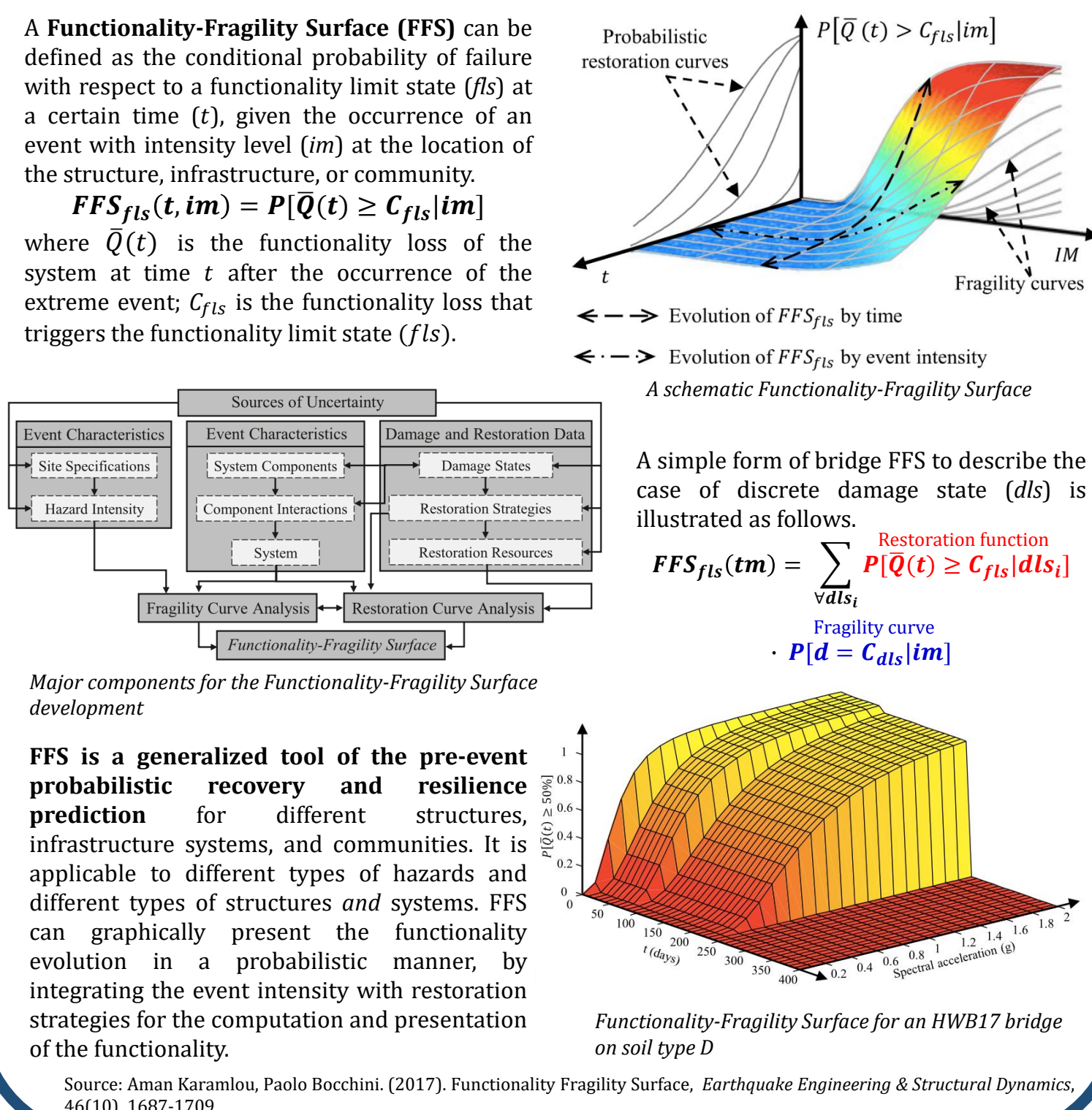


Probabilistic Resilience Assessment of Interdependent Systems (PRAISys)

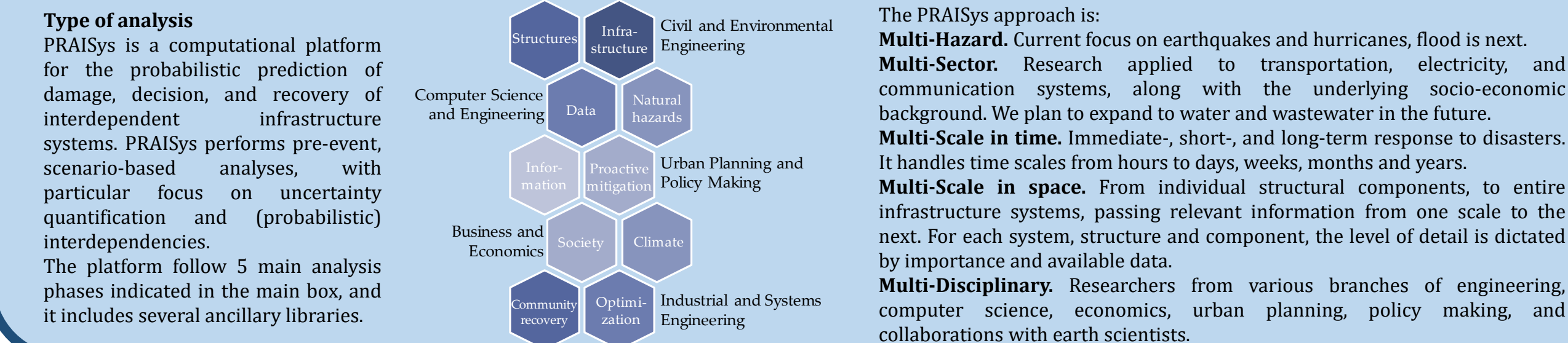
Contributors (to date)



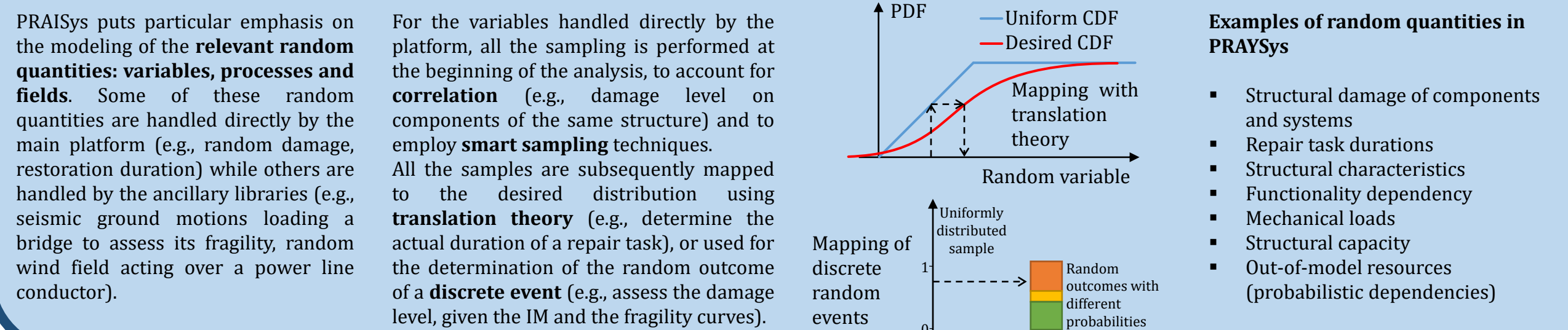
Functionality Fragility Surfaces



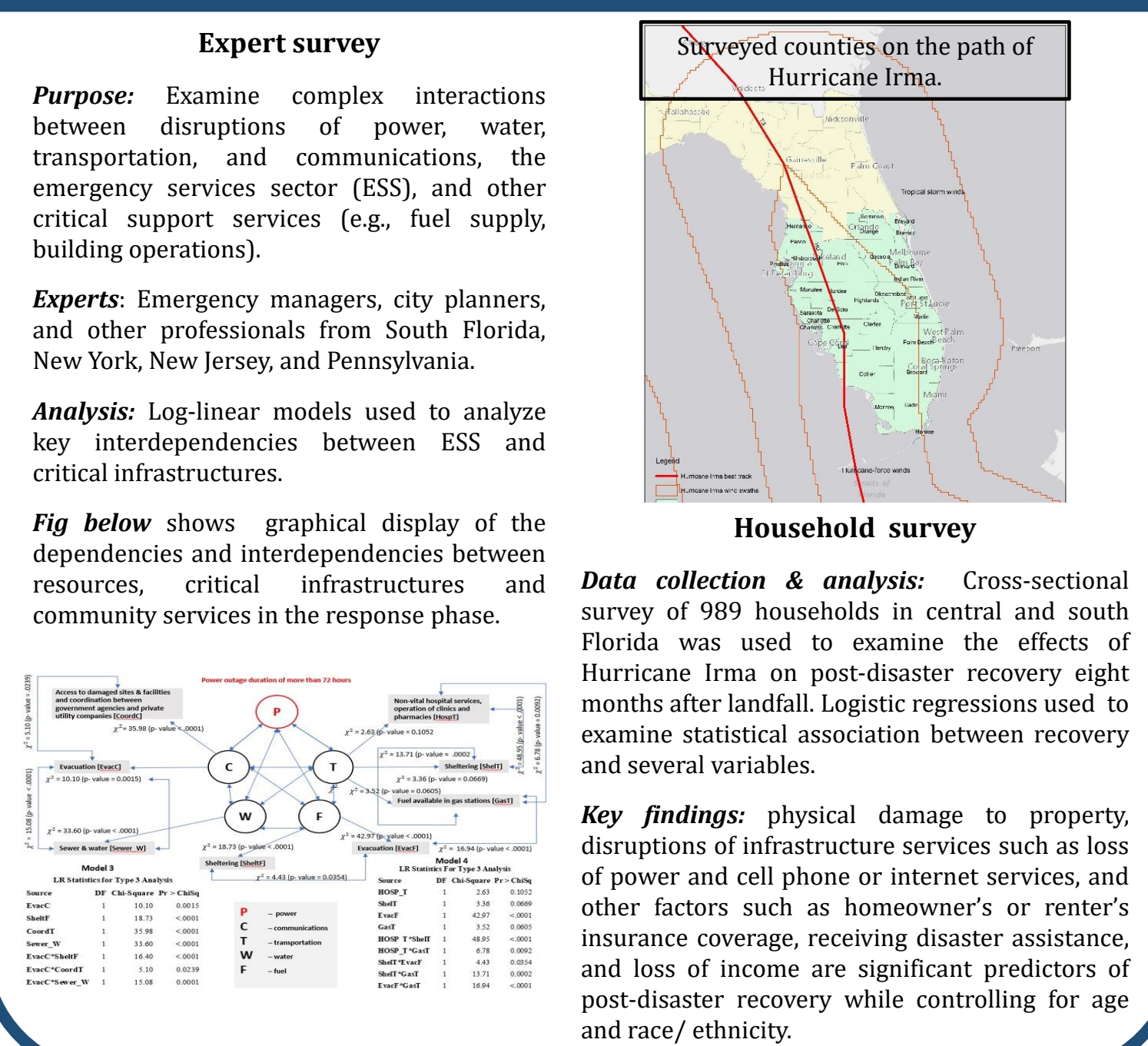
Scope



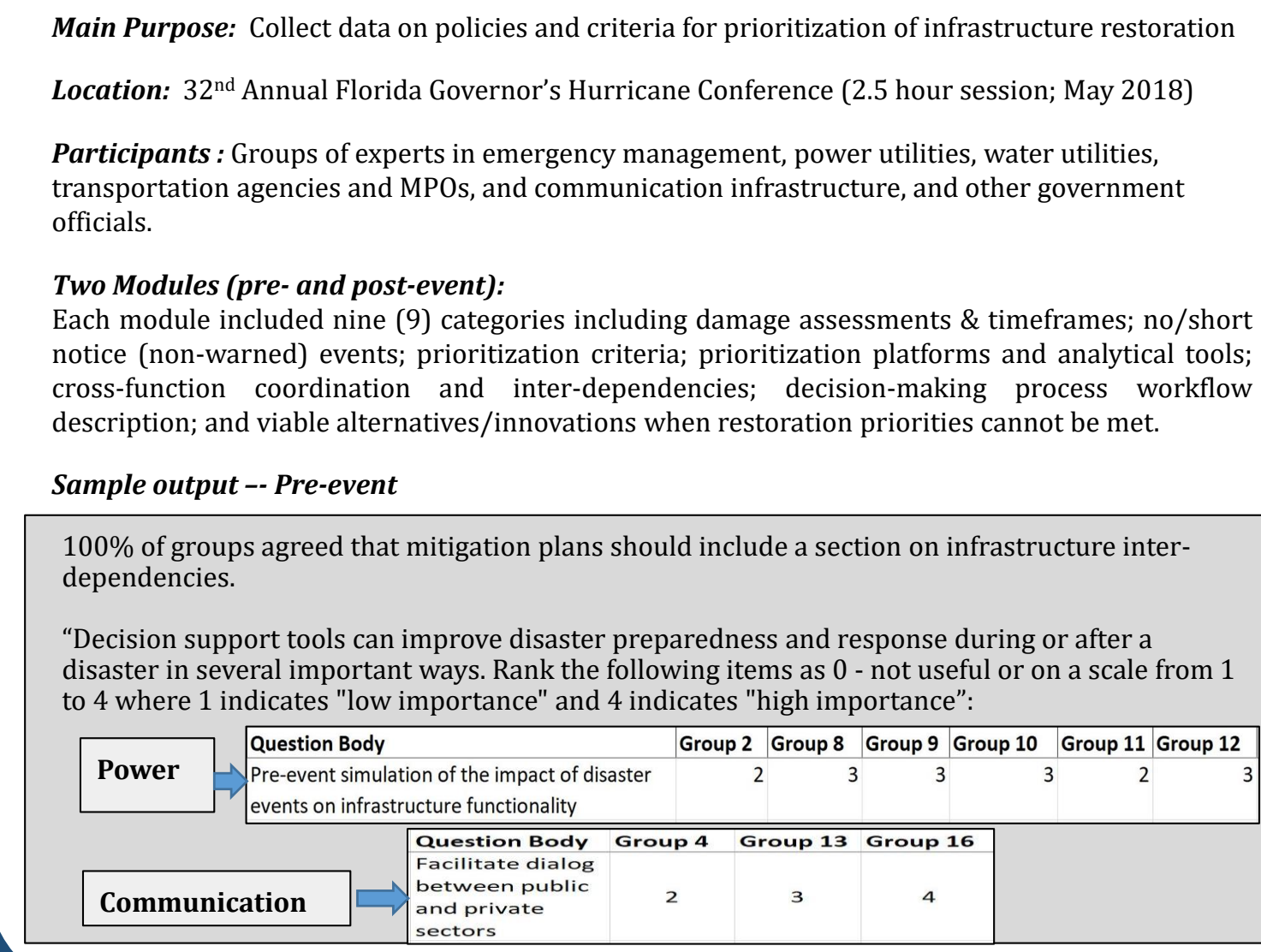
Uncertainty quantification and propagation



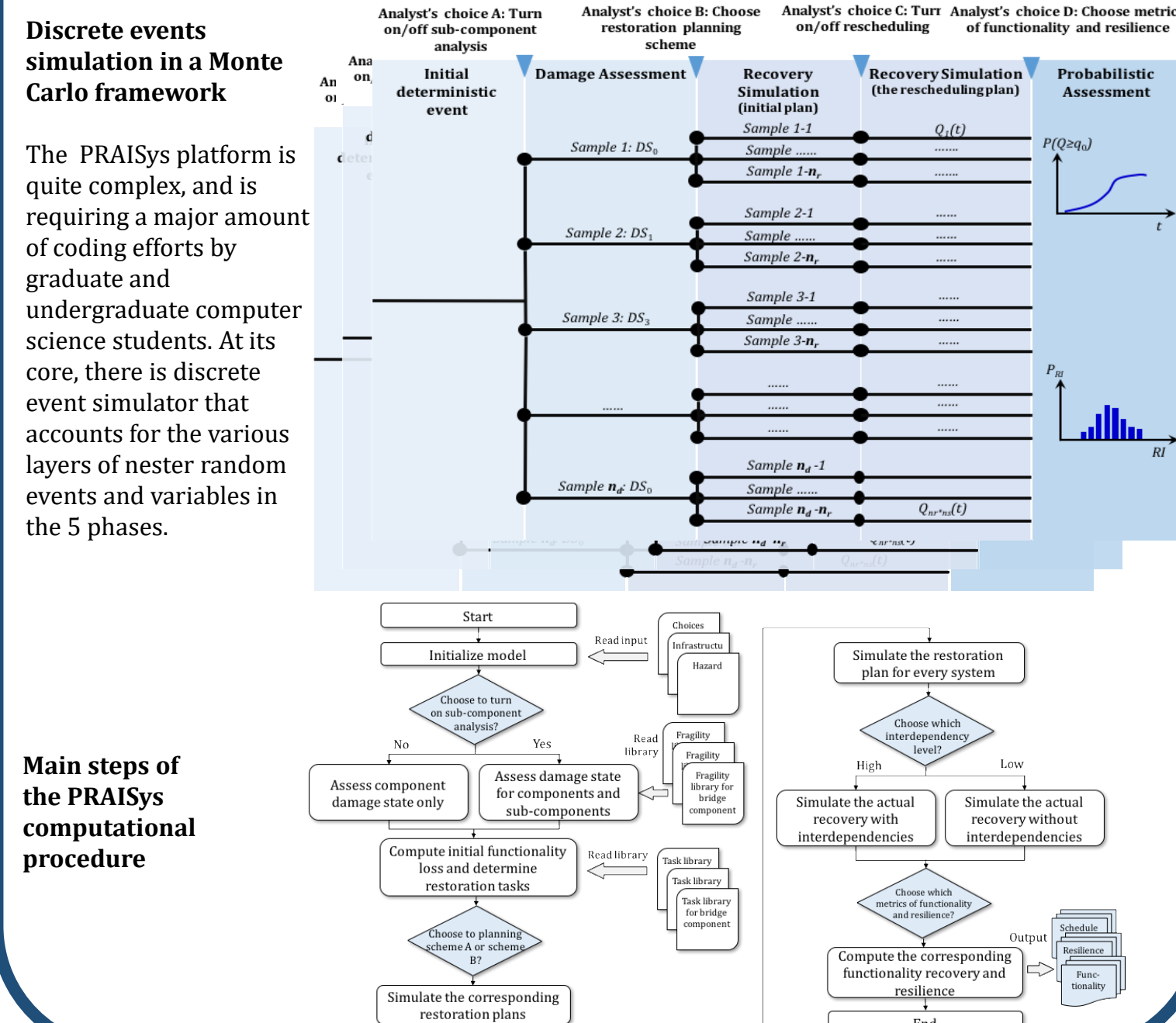
Impacts of infrastructure disruptions



Tabletop (simulated scenario) Exercise



Discrete event simulation & architecture



PRAISys Platform

Hazard Modeling



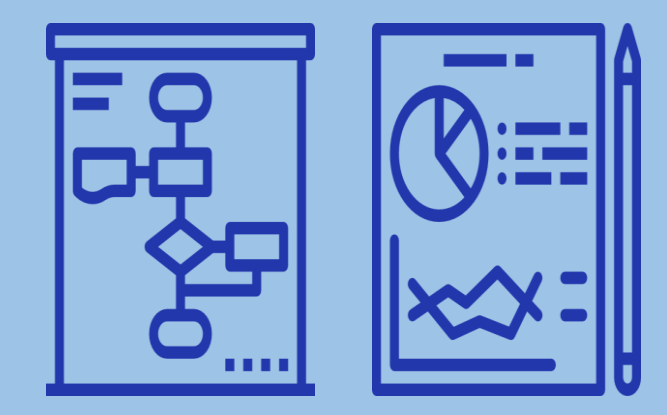
The hazard scenario over the entire region is represented by an intensity measure (IM) map. PRAISys can handle different types of IM to describe different scenarios (e.g., a hurricane and an earthquake) or the same scenario (e.g. PGA and Sa for the same earthquake).

Damage Assessment



The probabilistic damage assessment is performed using fragility curves and discrete event simulation. The damage of each sub-component is correlated, and it propagates to determine the repair tasks needed for entire structures and systems.

Decision & Planning



The decision process can be simulated by PRAISys in multiple ways. For instance, it can be based on a policy that prioritizes repairs by criticality. Otherwise, optimization can be used to simulated sophisticated decision making, with various constraints and objectives.

Recovery Simulation



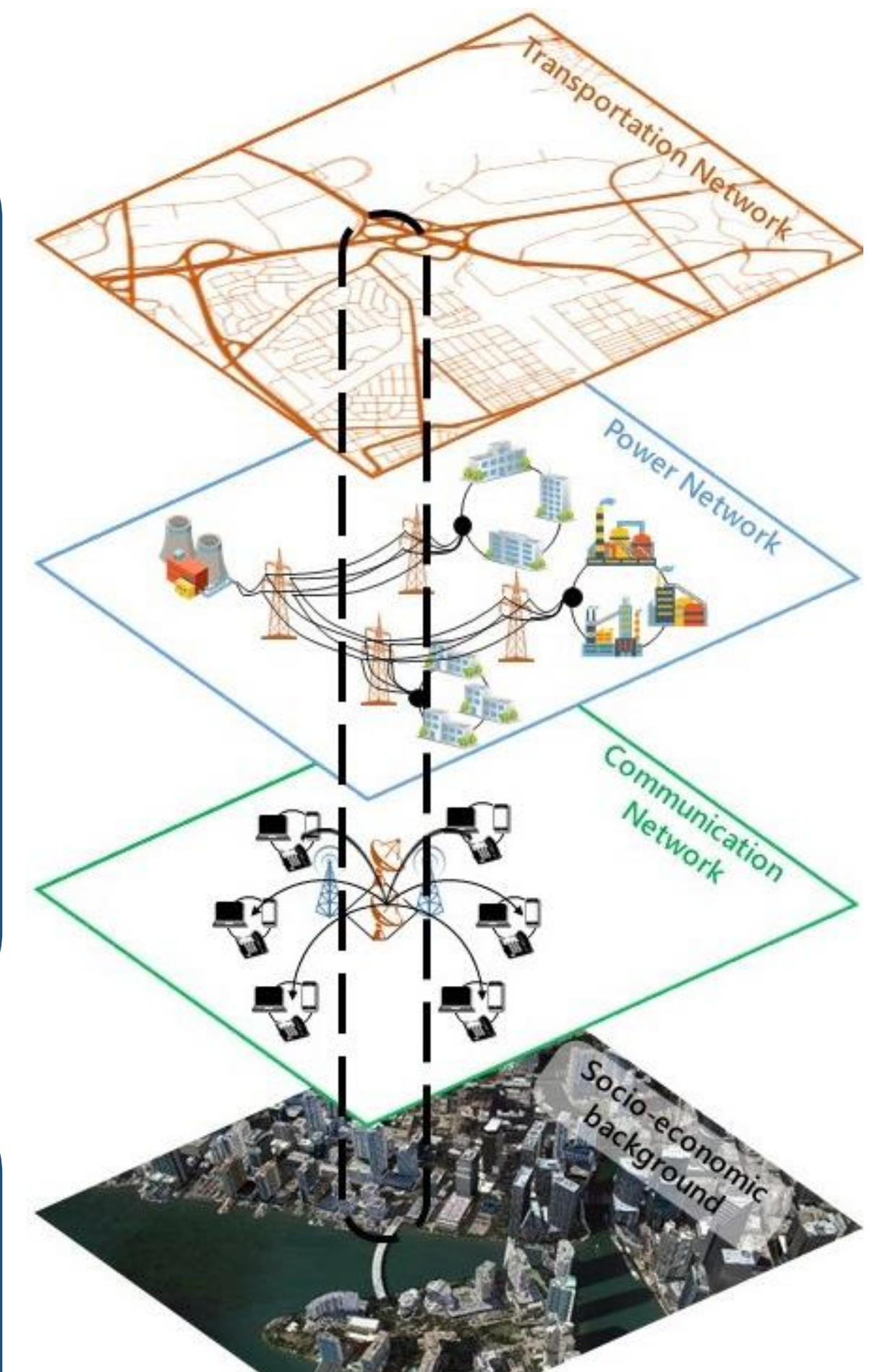
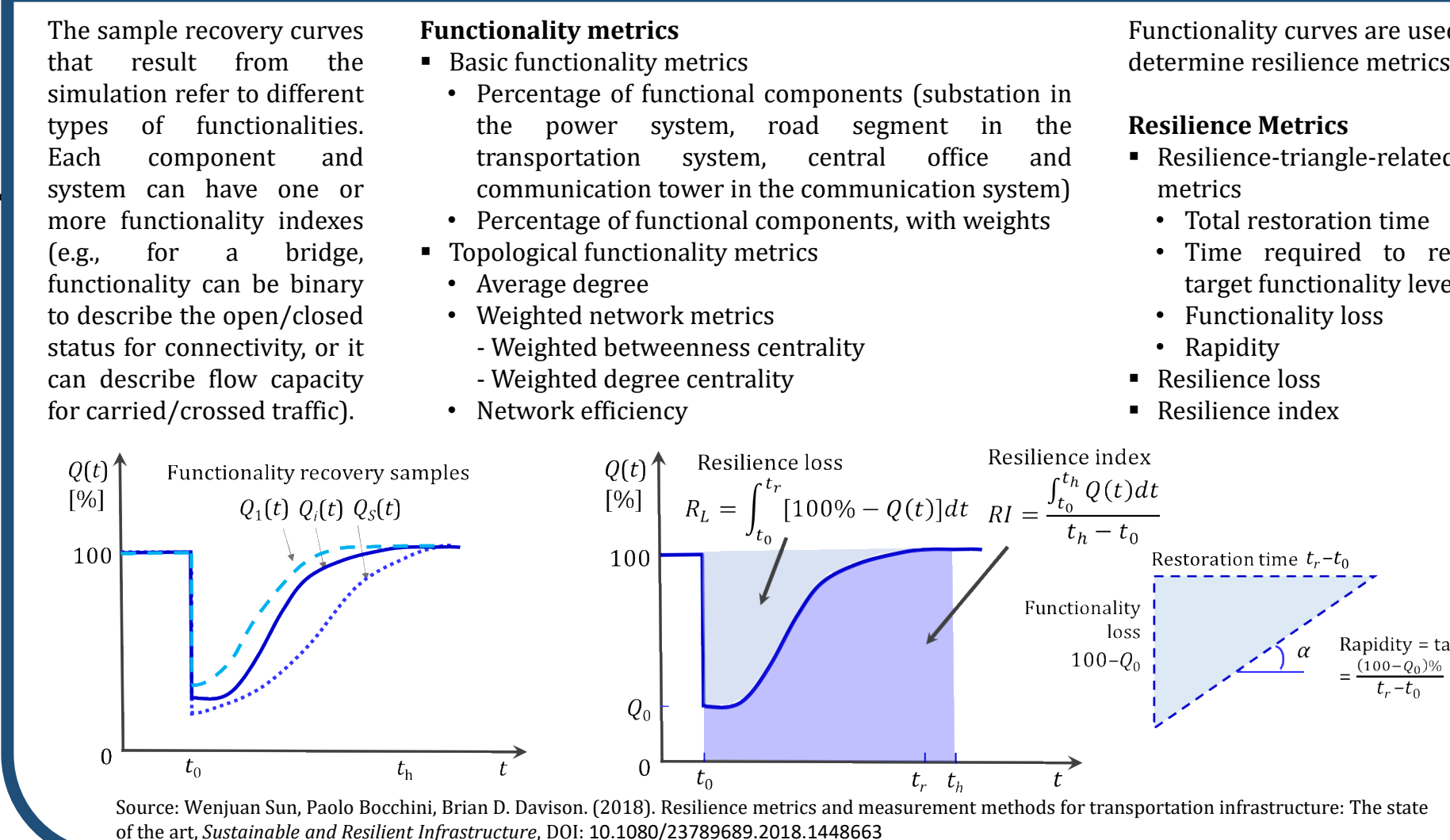
Given the recovery sequence determined in the previous step, the recovery simulator determines the actual schedule of the repairs and computes the functionality recovery curves, accounting for dependencies, resource sharing, precedence, and random task durations.

Resilience Forecast

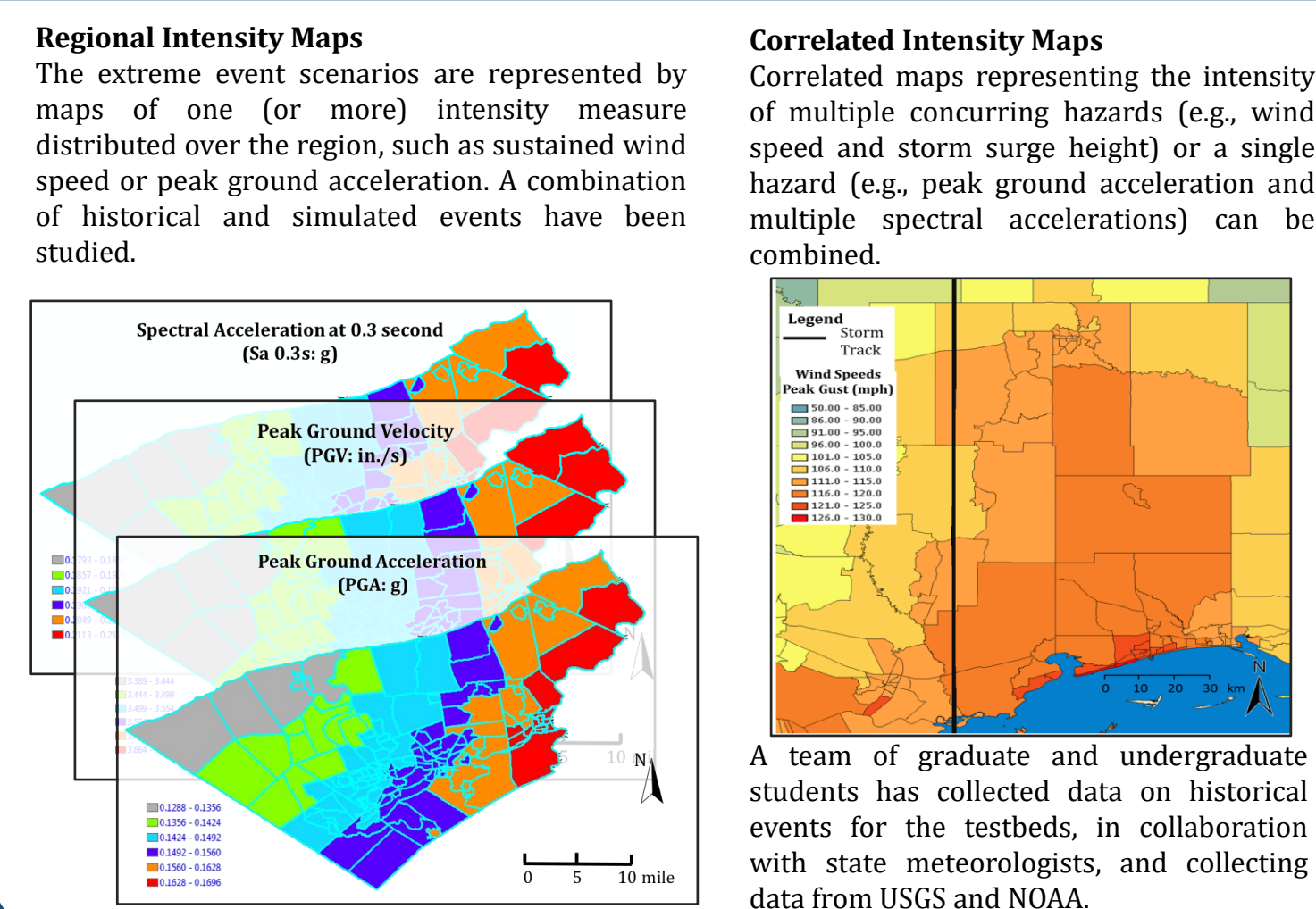


The three previous tasks are repeated with many random samples, to generate sample recovery curves for components and systems. The resulting metrics are analyzed statistically, to determine the resilience of the region.

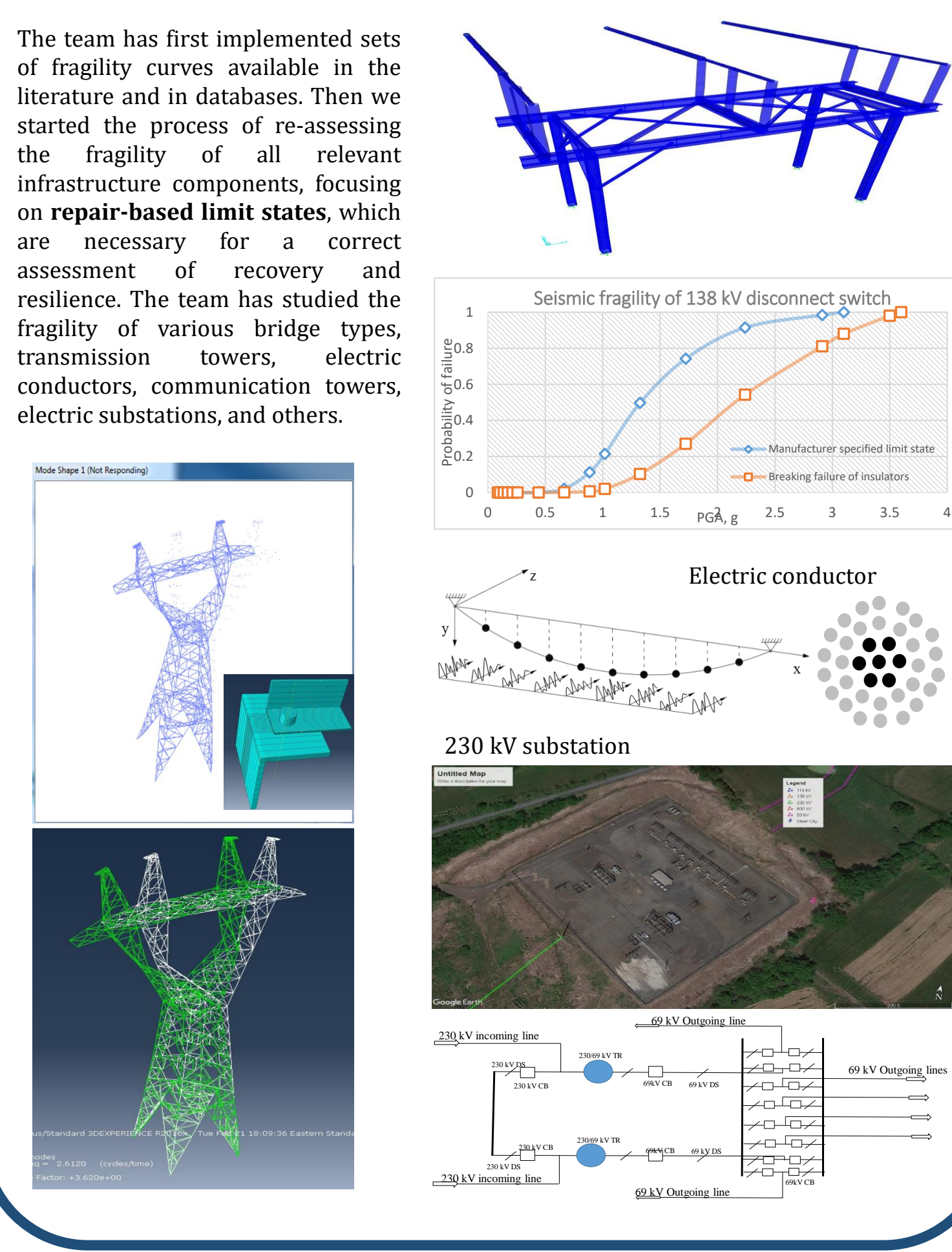
Functionality and resilience metrics



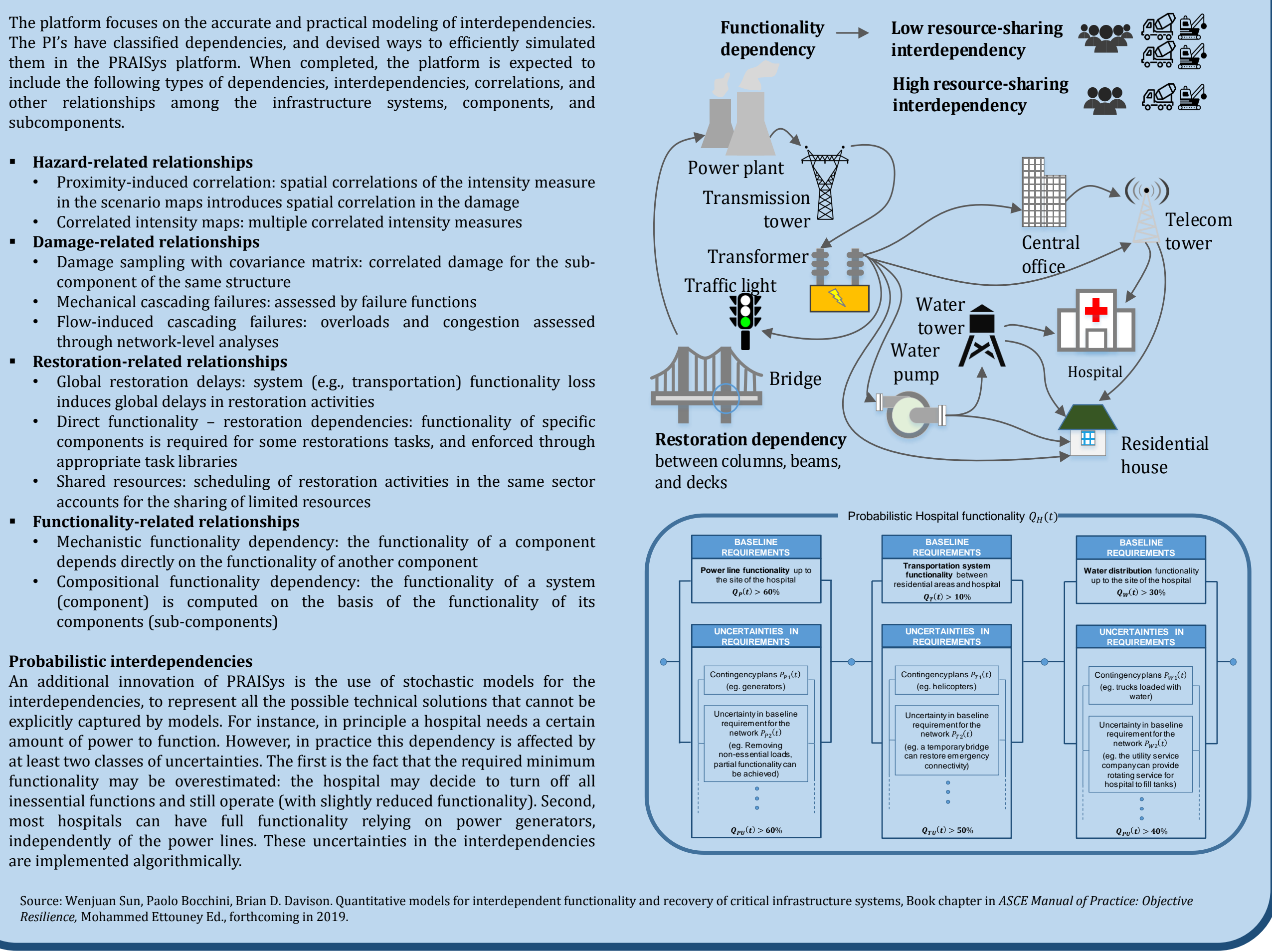
Extreme event scenarios



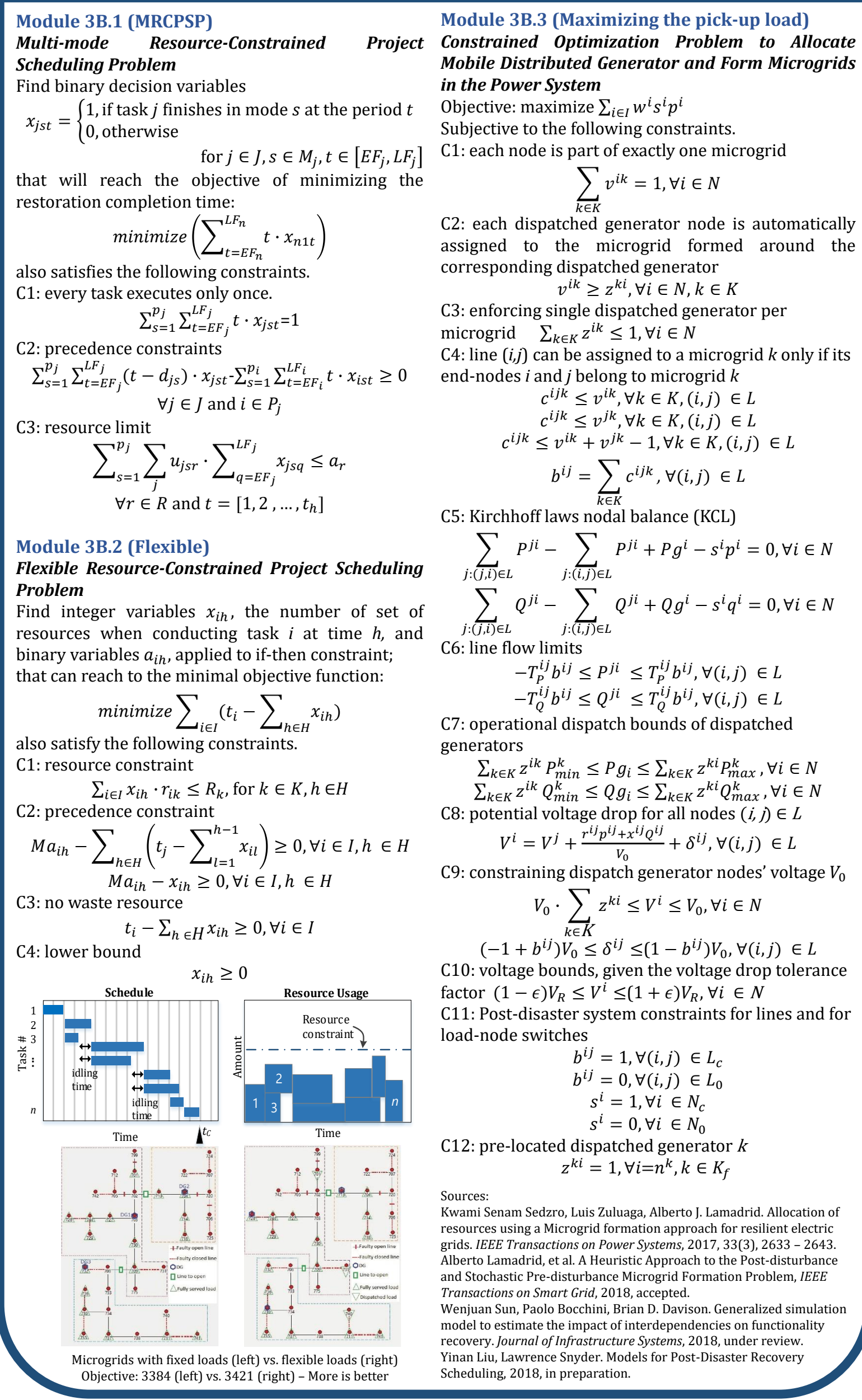
Structural fragilities



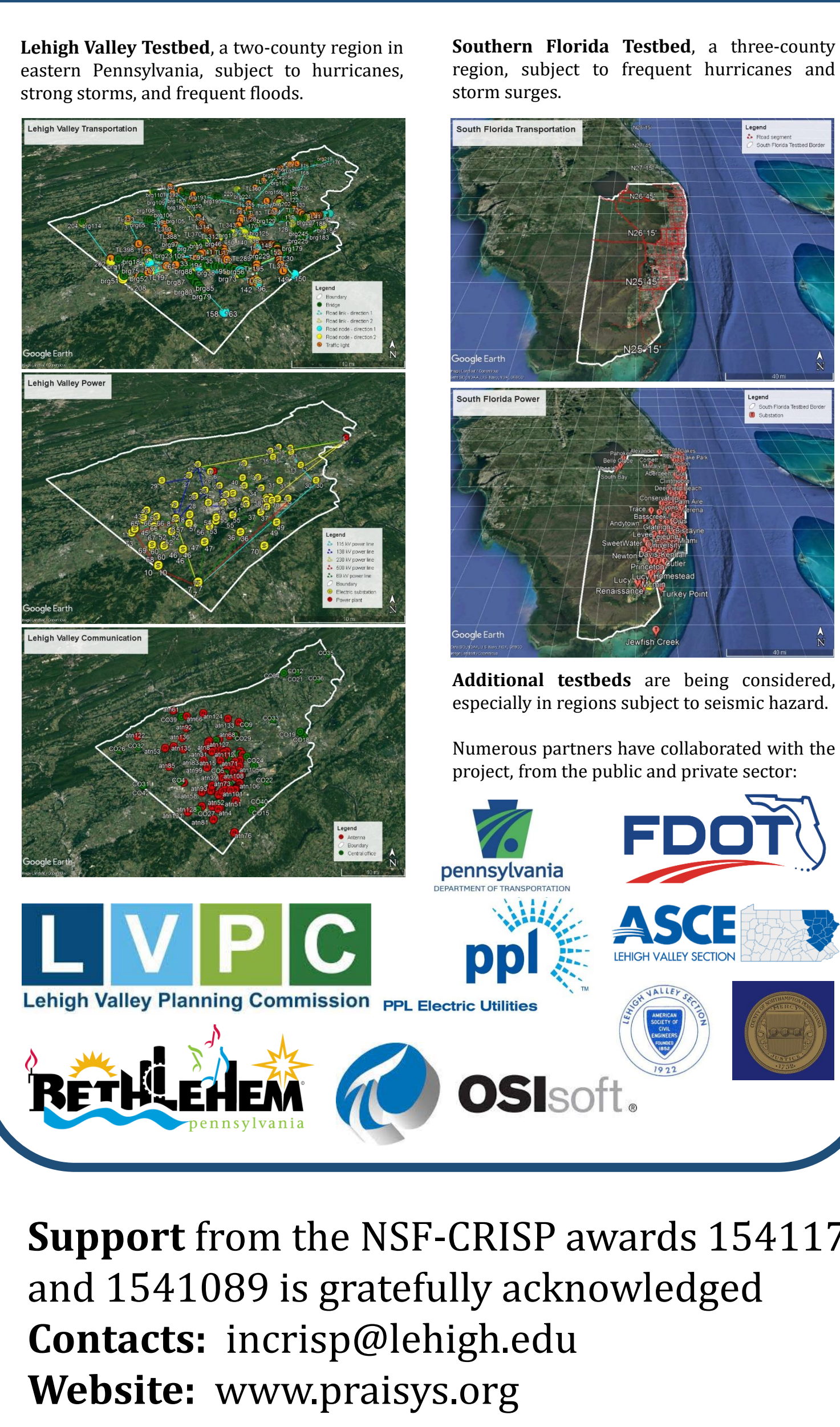
Interdependencies and other relationships



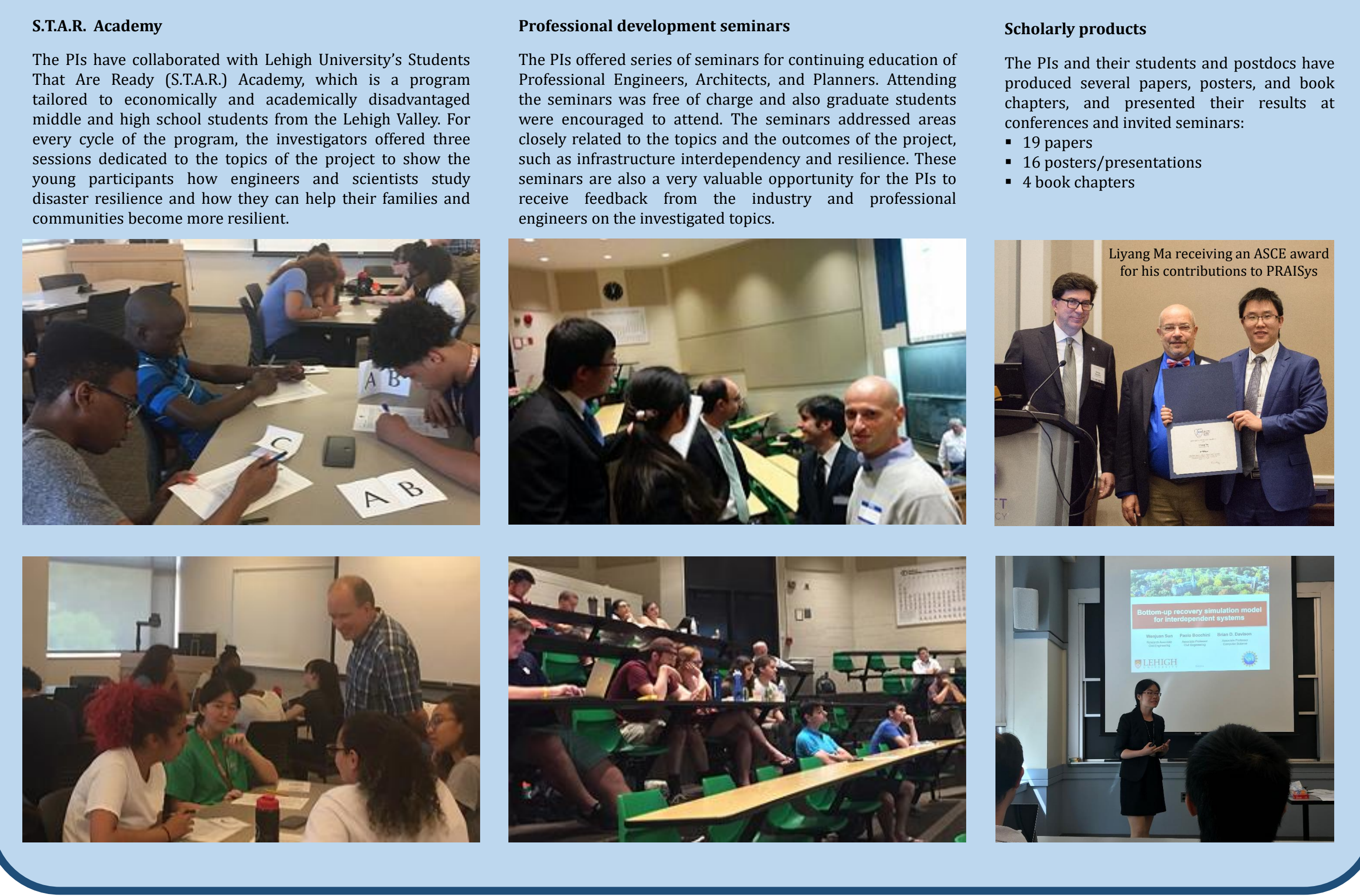
Optimization



Application to testbeds & partners



Outreach & scholarly dissemination



Support from the NSF-CRISP awards 1541177 and 1541089 is gratefully acknowledged
Contacts: incrisp@lehigh.edu
Website: www.praisys.org