

Post-Hazard learning, risk assessment and decision-making for infrastructure systems

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Robust performance and rapid recovery of infrastructure systems in the immediate aftermath of a major hazard are crucial for mitigating losses and assuring well-being of communities. Infrastructures, such as transportation and communication networks and power, water and gas distribution systems, are especially vulnerable to natural and man-made hazards due to their spatially distributed exposure, interdependence between components, and multiplicity of failure modes. In this lecture, I will use the Bayesian network methodology to model the hazard and the infrastructure system and to process information gained from sensors, and I will use influence diagrams to make decisions on operational levels of system components and to prioritize component inspections. An application to a hypothetical model of the California high-speed rail system in the aftermath of an earthquake in the Bay Area will demonstrate the main ideas of the approach.