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SPEAKER TITLES/ABSTRACT

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“Rethinking Resilience Analytics”

The concept of “Resilience Analytics” has recently been proposed as a means to leverage the promise of big data to improve the resilience of interdependent critical infrastructure systems and the communities supported by them. Given recent advances in machine learning and other data-driven analytic techniques, as well as the prevalence of high-profile natural and man-made disasters, the temptation to pursue resilience analytics without question is almost overwhelming. Indeed, we find big data analytics capable to support resilience to rare, situational surprises captured in analytic models. Nonetheless, this article examines the efficacy of resilience analytics by answering a single motivating question: Can big data analytics help Cyber Physical Social (CPS) systems adapt to surprise? This article explains the limitations of resilience analytics when critical infrastructure systems are challenged by fundamental surprises never conceived during model development. In these cases, adoption of resilience analytics may prove either useless for decision support or harmful by increasing dangers during unprecedented events. We demonstrate that these dangers are not limited to a single CPS context by highlighting the limits of analytic models during hurricanes, dam failures, blackouts, and stock market crashes. We conclude that resilience analytics alone are not able to adapt to the very events that motivate their use and may, ironically, make CPS systems more vulnerable. We present avenues for future research to address this deficiency, with emphasis on improvisation to adapt CPS systems to fundamental surprise.