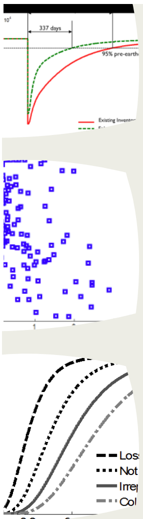

Presented By:

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UCI Samueli School of Engineering | Department of Civil and Environmental Engineering

Civil Engineering
Seminar Series

Thursday, February 9th, 2017
MDEA
2:00PM - 3:00PM

Performance-Based Engineering To Urban Resilience

Advancements in the performance-based earthquake engineering framework provide rigorous probabilistic descriptions of seismic performance, using metrics such as economic losses, fatality estimates and downtime. More recently, the concept of seismic resilience has been emphasized, focusing on the role that buildings play in ensuring that communities, particularly urban centers, can minimize the effect of, adapt to and recover from earthquakes. A key aspect of assessing resilience is establishing a link between building performance and the post-event functionality and recovery of a community. Limit states such as functional loss, damage that renders a building unsafe to occupy or irreparable, which (by comparison) have received much less attention in past research, play a central role in evaluating resilience. The ability to quantify factors that affect downtime, business interruption, and restoration of functionality is also relevant. This presentation will explore challenges to utilizing performance-based engineering as a tool to address specific aspects of resilience and evaluate policies that are intended to enhance community resilience. An integrated post-earthquake recovery model will be presented, which combines robust assessments of building performance with spatiotemporal characterization of socioeconomic vulnerability and stakeholder decisions and actions. Post-earthquake recovery activities are mathematically represented as stochastic processes. The proposed model is applied to re-create the recovery of the damaged building stock following the 2014 South Napa earthquake with two goals in mind. First, the modeling technique is evaluated by comparing recovery predictions with empirical data on building repair and reconstruction following a real earthquake. Secondly, the empirical data is used to calibrate the prediction model for application to future earthquakes, while recognizing the inherent limitations with regards to the placed-based and event-specific characteristics of the current dataset. A novel approach to probabilistically assessing post-earthquake structural safety and the limit state defined by damage that renders a building unsafe to occupy will also be introduced. The methodology integrates key elements from previously published guidelines including component-level damage simulation, virtual inspection and structural collapse performance assessment.

Dr. Henry V. Burton is an Assistant Professor and the Englekirk Presidential Chair in Structural Engineering in the Department of Civil and Environmental Engineering at the University of California, Los Angeles. His research is directed towards understanding and modeling the relationship between the performance of infrastructure systems within the built environment, and the ability of communities to minimize the extent of socioeconomic disruption following extreme events such as major earthquakes. Dr. Burton is a registered structural engineer in the state of California. Prior to obtaining his PhD in Civil and Environmental Engineering at Stanford University, he spent six years in practice at Degenkolb Engineers, where he worked on numerous large scale projects involving design of new buildings and seismic evaluation and retrofit of existing buildings. Current projects include (1) utilizing remote sensing to assess the implication of tall building performance on the resilience of urban centers, (2) stochastic characterization of building aftershock collapse risk and (3) developing design and assessment methods for resilient and sustainable buildings. Henry is a recipient of the National Science Foundation Next Generation of Disaster Researchers Fellowship (2014) and the National Science Foundation CAREER Award (2016).

Questions? - cee@uci.edu - (949) 824-7548