Managing the Risk of Earthquake-induced Failure of Critical Facilities

By Keith Porter

Business-continuity risk from earthquakes can be said to depend on the likelihood of strong shaking at the business’s building (called seismic hazard), on the building’s seismic fragility (which here means how likely the building is to become inoperative given how strongly it is shaken, and on the degree to which it relies on utilities), and on how well staffed and trained its personnel are to deal with earthquakes. The work focuses on the first 2 issues, and offers a method for estimating the probability of earthquake-induced operational failure at a single facility or a number of primary and backup facilities. To deal with seismic hazard, the method uses new information from the US Geological Survey. To deal with seismic fragility we use a diagram called a fault tree, and on new information developed for FEMA and others about the seismic reliability of building components and utilities. With these, one can estimate the probability that earthquakes will cause a facility or facilities to become inoperative in some planning period such as 5 years, under as-is and what-if-mitigated conditions. One can use the method to identify mitigation measures to cost-effectively reduce risk to tolerable levels.

Keith Porter is Associate Research Professor at CU Boulder specializing in societal loss estimation, seismic vulnerability, and performance-based earthquake engineering. See http://spot.colorado.edu/~porterka or call +1 (626) 233-9758 for more information.