

Rapid Earthquake Damage Estimation to Save Lives in Canada

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In the first several hours following an earthquake, municipalities are often forced to rely upon reports from first responders, reconnaissance along disrupted roadways by emergency personnel, or wait for aerial surveillance performed by the military to gain situational awareness. The latter is expected to take at least 12 hours to initiate, a crucial period for life-saving following a major earthquake (Fig 1). Overall, in the first 24 hours, situational awareness can be significantly improved using existing seismic risk modelling tools, adapted for use with seismic products typically available within tens of minutes.

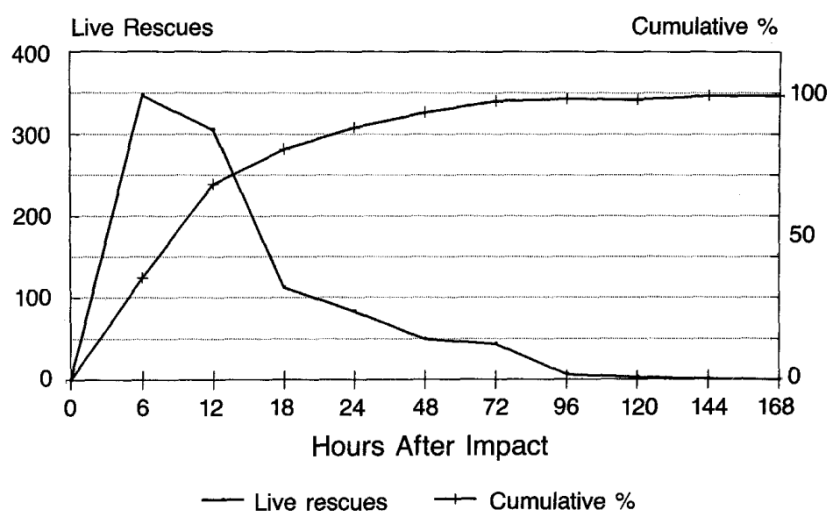


Figure 1. Number of hourly and cumulative live rescues following the 1989 Armenia Earthquake. Survival rate falls off after roughly 12 hours. Source: Figure 3 from Noji et al., 1990 (Annals of Emergency Medicine).

This work presents a new initiative to develop a Rapid Earthquake Damage Estimation (REDE) tool for earthquakes in Canada. We explore best practices and determine the feasibility of using rapidly available seismic data from the upcoming Canadian Earthquake Early Warning network in the first generation Canadian Seismic Risk Model (CanSRM1) framework to model the impacts to people, the built environment, and the economy from an earthquake in near-real time. In particular, we focus on consequences most relevant to life safety and early response: collapsed buildings, entrapment injuries, hospital demand surge, roadway debris which may block response, and immediate mass care needs like shelter requirements. This tool is designed to become obsolete as direct observations and aerial reconnaissance become available. In the meantime, these outputs could likely be made available within tens of minutes of the earthquake occurring, affording emergency managers the opportunity to best direct resources to save lives and reduce suffering.

Currently, information is being collected about how such a tool might be used by stakeholders: first responders, emergency managers and critical infrastructure operators. Prototyping of a viable product is scheduled to be complete by late 2024, around the time of launch of the National Earthquake Early Warning Network in Canada.