Earthquake Early Warning Systems

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Earthquake Early Warning Systems (EQEWS) should be part of any Earthquake Resilience toolkit due to their potential to save lives and reduce injuries. The Sendai Framework of disaster risk reduction 2015-2030 has 7 global targets including “Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030”. Despite this New Zealand currently does not operate a national EQEWS.

EQEWS currently rely on 3 main pillars: earthquake science, sensor and communication technologies, and end-users. The addition of a 4th pilar is considered essential - Earthquake Engineering . EQEWS currently don’t take into account the way shallow geology or tall buildings amplify earthquake shaking. These systems fail to consider complexities generated by the urban environment, which is a critical omission given:

- In NZ, over 85% of people live in urban areas,
- Shaking intensity at the top of a multi-storey building can be ten times stronger than at ground level.

The response of a building to ground shaking is a complex function of the structural design, construction and site conditions, as well as shaking duration, intensity and frequency content. Seismic building monitoring is essential to better understand the type and amplitude of earthquake impact on building performance.

A new collaboration between NZ seismologists, social scientists, communication technology and structural engineers in a partnership with Māori, sensor companies and urban property developer-investor is pushing to develop a novel EQEWS customisable to national, regional, local, and building-level applications. The aim to significantly reduce the cost to society of earthquake-related deaths and injuries, and increase earthquake resilience for urban populations through increased education and awareness.

Next generation EQEWS must be designed for the modern, socio-economic diverse population and the different dwelling types in NZ cities.