

# ECONOMICS *of* RESILIENT INFRASTRUCTURE

February 2013

Developing New Zealand's understanding of the economic impacts of infrastructure outages



*Photo: Brighton Pier, Christchurch, New Zealand, GNS Science*

**The Economics of Resilient Infrastructure project is a research project funded by the New Zealand government\*.**

A new tool will be developed which will:

- quantify the economic implications of vulnerabilities to infrastructure failure from both natural hazards and infrastructure-only events, and
- explore alternative post disaster recovery strategies.

The key output will be a high resolution assessment across space and through time of the economic consequences of infrastructure failure, business response and recovery options.

## Value Proposition

The new tool is an integrated spatial decision support system called SEDEM = Spatially Explicit Dynamic Economic Model. This will be available as a test-bed to inform central and local government policy and lifeline utilities looking to quantify resilience enhancement options.

Our four-year research project (2012-2015) will focus on Auckland and Christchurch. Outputs will describe local, regional and national impacts. SEDEM will be portable to other parts of New Zealand and potentially internationally.

## What will SEDEM include?

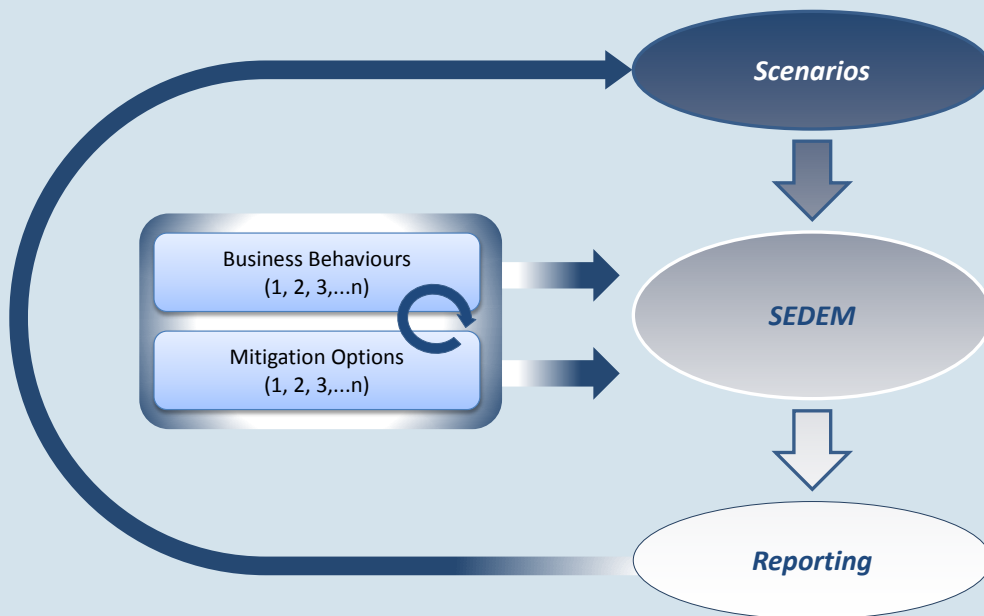
- A behavioural module linking shocks and business behaviour through time.
- A spatial module enabling city-wide impacts to be identified at a high level of resolution (the Netherlands-based Research Institute for Knowledge Systems (RIKS) will provide this capability).
- An economic module bringing together supply and demand in relevant markets (including labour and capital markets), pricing impacts and other dynamics.

Scenarios will be developed to “shock” the model. These will be determined in consultation with model users. Possible examples include outage of infrastructure services (e.g. a specified pipeline, or port).

Business behaviours that influence economic outcomes will be identified and incorporated. Possible examples include: post-event business location migration; product diversification; supply chain changes. Case studies will be developed including how Maori business practices might differ.

The benefits of mitigation will also be tested. Possible examples include: steps by infrastructure providers and end-users to promote business continuity through investment in network redundancy and stand-by generators.

The following diagram explains the relationships between these components:



## Team and Stakeholders

- Project Team: GNS Science, Market Economics Ltd, Resilient Organisations, Research Institute for Knowledge Systems (RIKS). Auckland Council, Tony Fenwick (Wellington) and Simon Worthington (Christchurch) are also involved.
- Main potential users and other stakeholders include: Auckland Council, Treasury (National Infrastructure Unit), Canterbury Development Corporation, Canterbury Earthquake Recovery Authority, New Zealand Lifelines Committee, Lifeline organisations, local government.
- An independent Advisory Group has been set up to guide the work.

## Funding

Funding of \$2.8 m over 4-years was granted within the New Zealand Ministry of Business, Innovation and Employment's 2012 Investment Round. The project has connections to a number of other New Zealand central government funded programmes including the Natural Hazards Platform.

The project will rely on in-kind support from stakeholders and others including the provision of Geographical Information System (GIS) information. This will need to cover a range of city descriptions, hazard exposures and infrastructure layouts, initially for Auckland and Christchurch.

## What are we including in the term 'infrastructure'?

- Energy (fuel, gas, electricity)
- Water (potable, wastewater, stormwater)
- Telecommunications (cell, landline)
- Transport (roads, rail, ports, airports)

The degree to which we can include all these sectors and the level of detail will depend on the information available.

## Find out More

We want to keep in touch with a range of stakeholders and will be seeking input from a variety of organisations as the project proceeds. If you are interested in keeping in touch and would like to contribute to the project please contact the project co-leaders below. Your input and advice will be most welcome.

Further information is also available on <http://www.naturalhazards.org.nz/NHRP/Hazard-themes/Societal-Resilience/Economics-of-Resilient-Infrastructure>

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