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PRE-DISASTER MULTI-HAZARD DAMAGE AND ECONOMIC LOSS ESTIMATION MODEL

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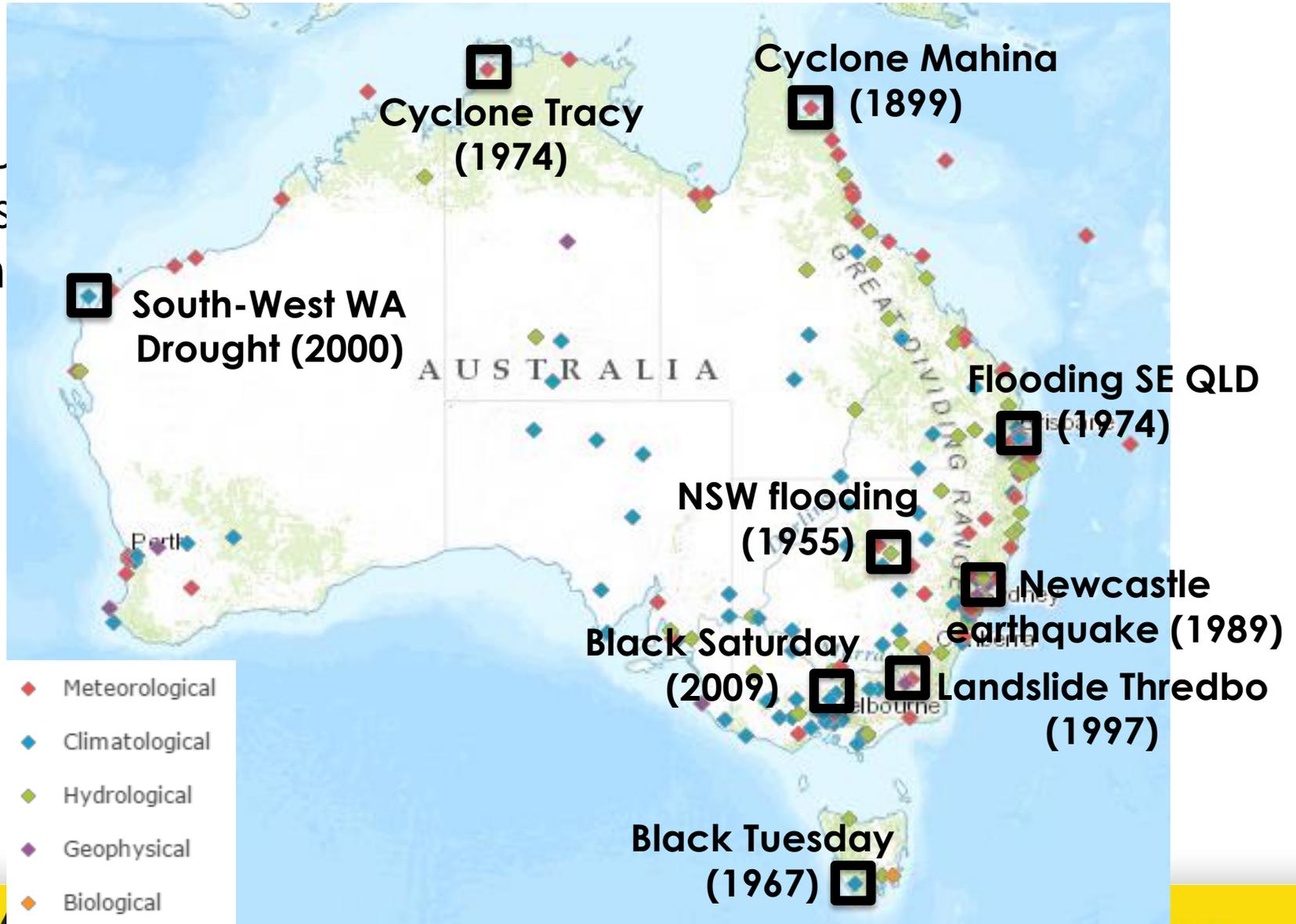


THE PROJECT:

**PRE-DISASTER
MULTI-HAZARD
DAMAGE AND ECONOMIC LOSS
ESTIMATION MODEL**

BACKGROUND TO THE PROJECT:

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COST OF NATURAL DISASTERS: (1)

On average, the Australian community spends

\$1.58 billion

each year in recovering from natural disasters, including the costs of injury and death.

(Geoscience Australia, 2007)

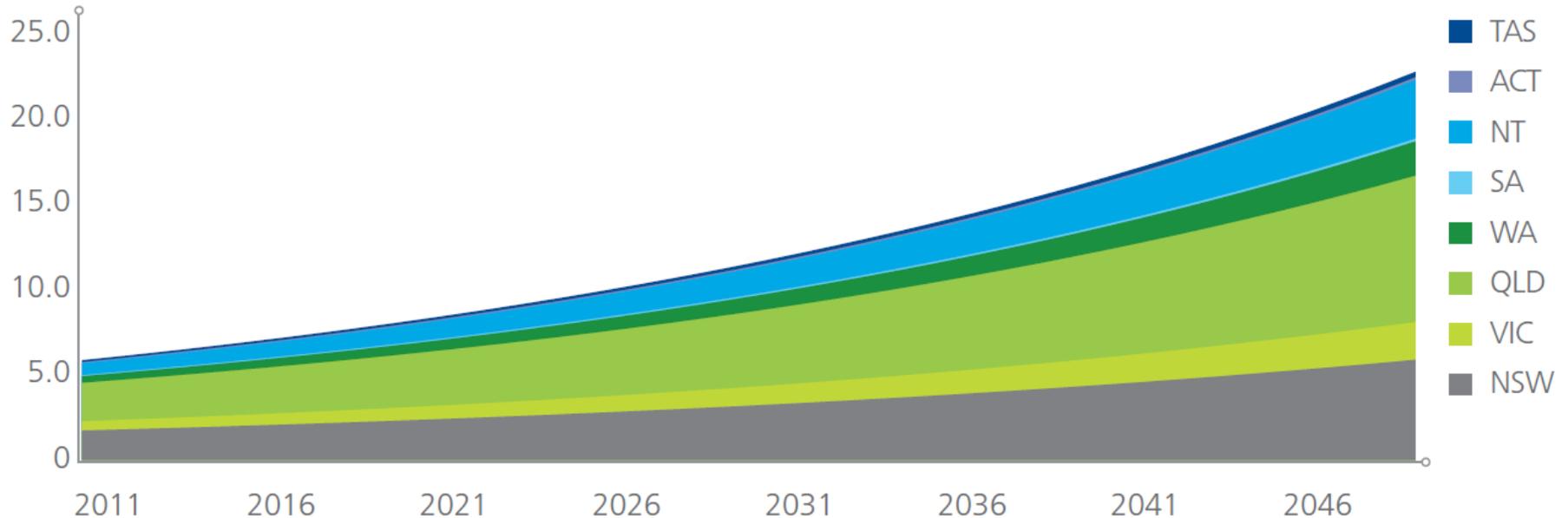
COST OF NATURAL DISASTERS: (2)

In **2012** alone,
the total economic cost of natural disasters
in **Australia**
is estimated to have exceeded
\$6 billion

COST OF NATURAL DISASTERS: (3)

Chart i: Forecast of total economic cost of natural disasters: 2011 – 2050

\$bn (2011 prices)



Source: Deloitte Access Economics (2013)

This statistic, which includes the costs carried by individuals, governments, businesses etc., along with the rapid economic growth in Australia, makes natural disasters a **significant issue for policy makers.**

PROBLEM:

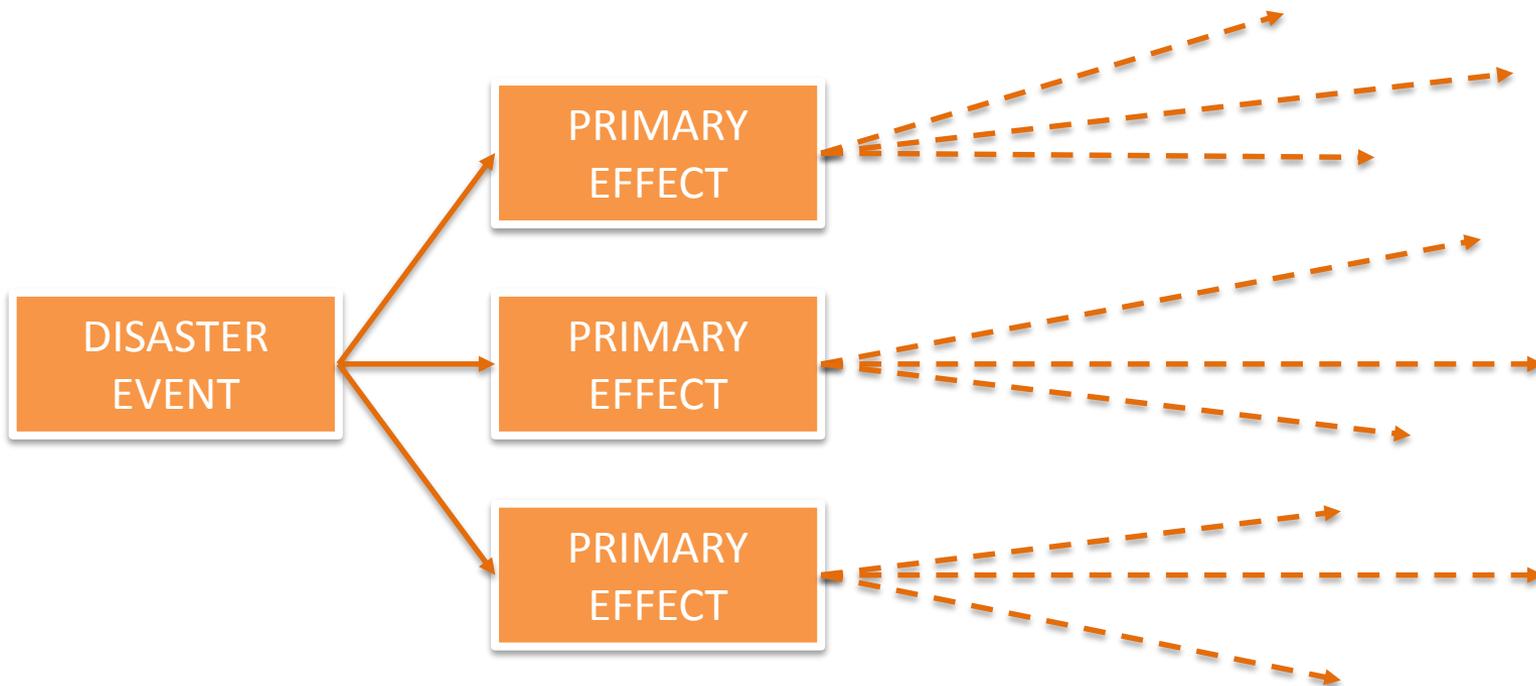
One of the substantial issues identified in this connection is the **inability to estimate the full economic impact of natural hazards**, considering **all the affected sectors** of the economy.

19 sectors as identified in the National Accounting System of Australia:

- agriculture, forestry and fishing
- Mining
- Manufacturing
- food, beverage and tobacco products
- electricity, gas, water and waste services
- construction
- wholesale trade
- retail trade
- accommodation and food services
- transport, postal and warehousing
- information media and telecommunications
- financial and insurance services
- rental, hiring and real estate services
- professional, scientific and technical services
- administrative and support services
- public administration and safety
- education and training
- health care and social assistance
- arts and recreation services
- other services

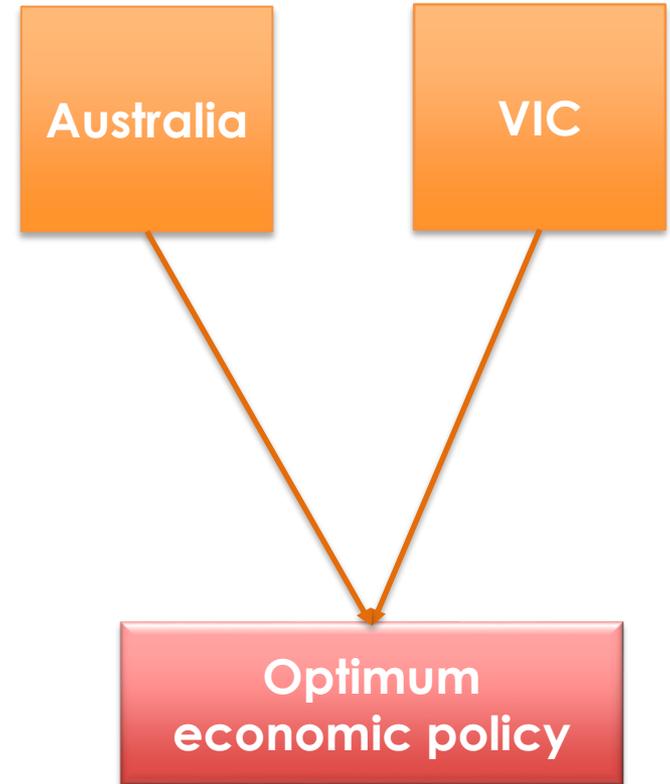
RESEARCH PROBLEM

The calculation of impact and cost should consider not only the **primary effects** of the natural disasters, but also its **secondary effects** due to losses propagated through the economy due to inter-sectoral linkages.

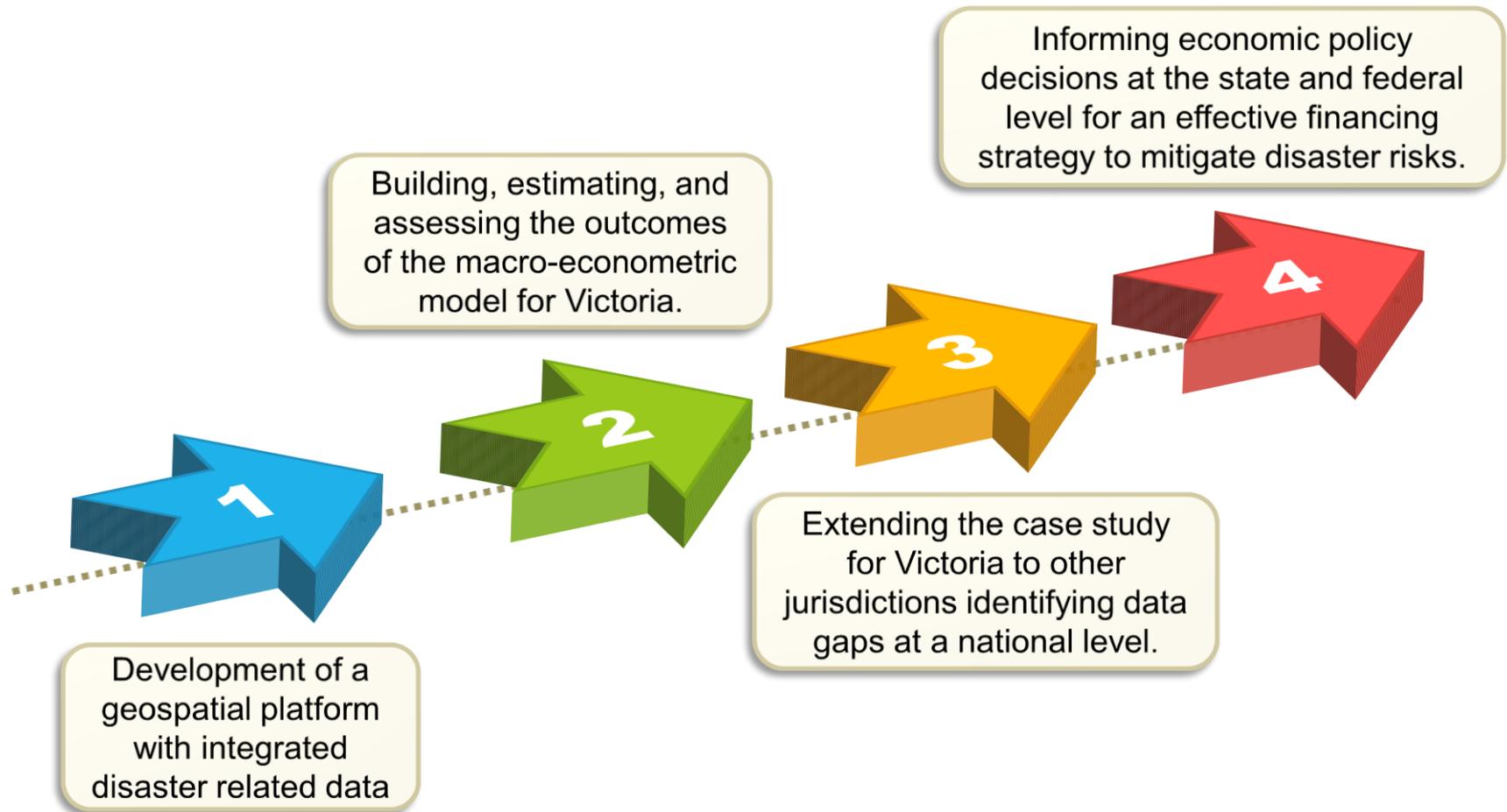


PROJECT OVERVIEW

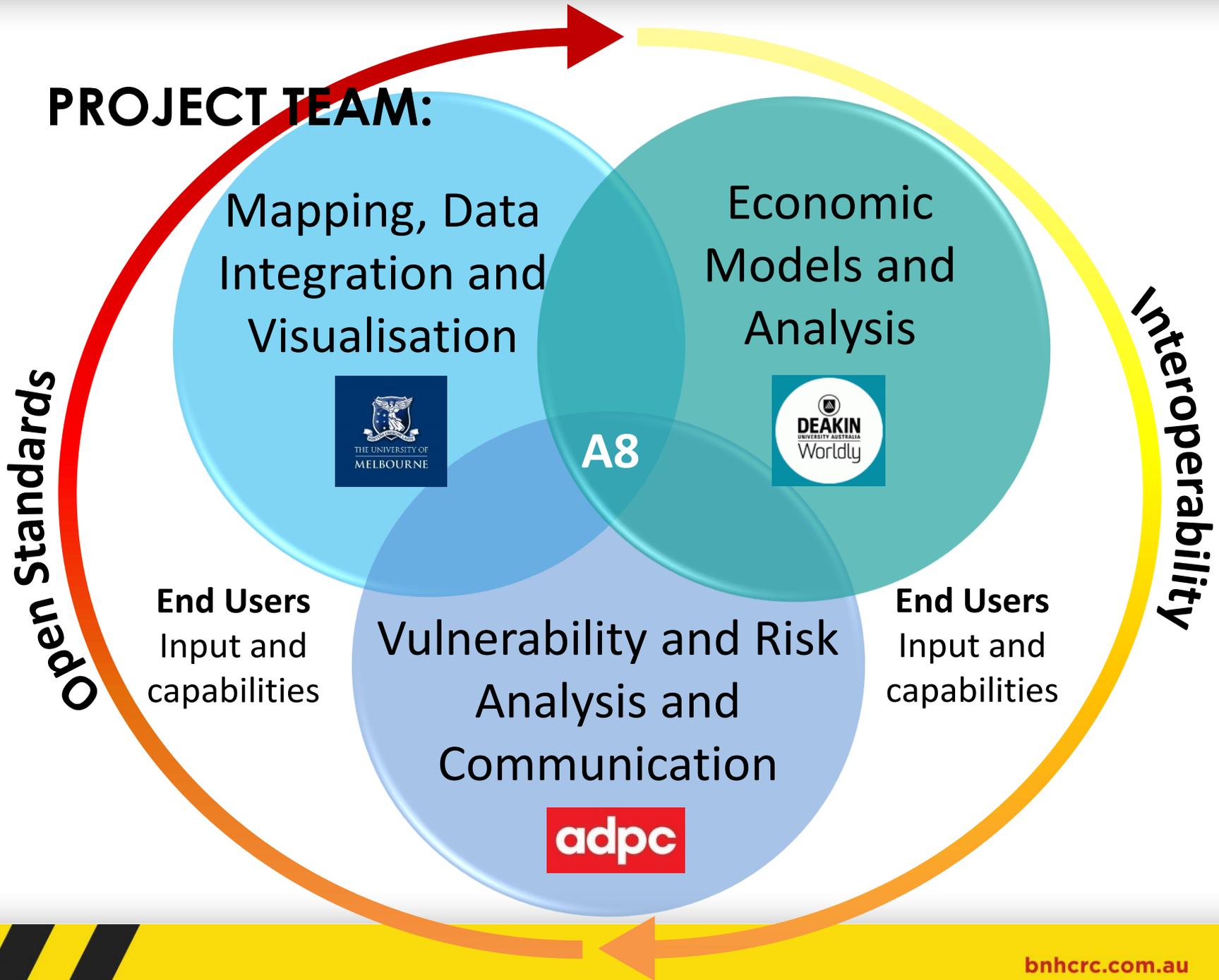
- 1) at the national level it will analyse the total impact of natural disasters on sectoral growth of the Australian economy
- 2) For the state of Victoria, it will assess the multi-hazard risks, and estimate the potential damages and economic losses at a finer geographic space
- 3) This will be followed by identifying the optimum economic policy options to recover/minimise such adverse effects



PROJECT PHASES:



PROJECT TEAM:



DATA OUTCOMES, PROJECT OUTPUTS AND ACHIEVEMENTS

DATA OBTAINED (1)

Economic Measures

1. Sector-specific Gross State Product (GSP) of all states from 1990 to 2014
2. Journey to Work (JTW) Dataset that provide sector-specific total number of employees at a finer geographic unit
3. Disaggregated sector-specific GSP in Victoria at a finer geographic unit

DATA OBTAINED (2)

Natural Disasters

4. Natural disasters data on their magnitudes and location

DATA OBTAINED (3)

Multi-Hazard Disaster Risk Assessment in Victoria

5. Hazard maps: Earthquakes, bushfires and floods
6. Exposure map: NEXIS data

DATA OBTAINED (4)

Climate Change Variables

7. Data on excessive rain and extreme temperature

PROJECT OUTPUTS: REPORTS AND PAPERS

A pre-disaster multi-hazard damage and economic loss estimation model for Australia

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Theme: Impact of disasters

Abstract

Throughout history, the impact of numerous natural disasters on communities has been witnessed. Examples include: cyclones *Melina* (1899) and *Wilma* (2005) and South-east Queensland (EP4, 2011; 2012), earth quakes (1997), and bushfires in Victoria, South Australia, Tasmania (Black Saturday 2009; Curlewis Pines 2009; Ash Wednesday 19 February 1998). Among all of these natural disasters, bushfires are one of the most destructive, due to their impact on ecosystems, landscapes and biological diversity. The resulting damage is estimated to cost an average of AUD\$1.14 billion annually, along with the rapid economic growth in Australia, creates a significant challenge for policy makers. In recent catastrophic natural disaster events, the use of disaster risk reduction (DRR) appears to be less successful in reducing the impact of natural disasters. One of the significant problems observed in the current approach is the failure to estimate the full economic impact of natural hazards, taking into account the secondary effects due to losses propagated through the economy. This effort should consider not only the primary effects but also the secondary effects due to losses propagated through the economy. To achieve a paradigm shift from reactive responses to a proactive approach, disaster risk reduction measures need to be integrated into the economic development. This paper discusses the shortcomings of the current approach and proposes a disaster risk resilience of the Australian economy.



THEME: ECONOMICS, POLICY AND DECISION-MAKING

Pre-disaster multi-hazard economic loss estimation model

A report on
The Multi-Hazard
Map for Victoria



THEME: ECONOMICS, POLICY AND DECISION-MAKING

Pre-disaster multi-hazard economic loss estimation model

A report on
Exposure with re
Natural Disasters
Australia



THEME: ECONOMICS, POLICY AND DECISION-MAKING
Pre-disaster multi-hazard damage & economic loss estimation model

Review of the data obtained from past natural hazard events in Victoria

1. Introduction

This report reviews the data obtained from past natural hazard events in Victoria. It provides an overview of the natural hazard data used within the project and provides some statistics on the natural hazard events. The original data received contained information on broader events outside the scope of natural hazards in Victoria, and this data was excluded from the review, however details of how and why it was excluded are provided below. The data was acquired from the Australian government website www.emknowledge.gov.au and details events from the year 1857 to 2014.

2. The Original Dataset

The original dataset contained information on all disaster events for Australia. There was data listed for a range of disaster events for all states and territories in Australia.

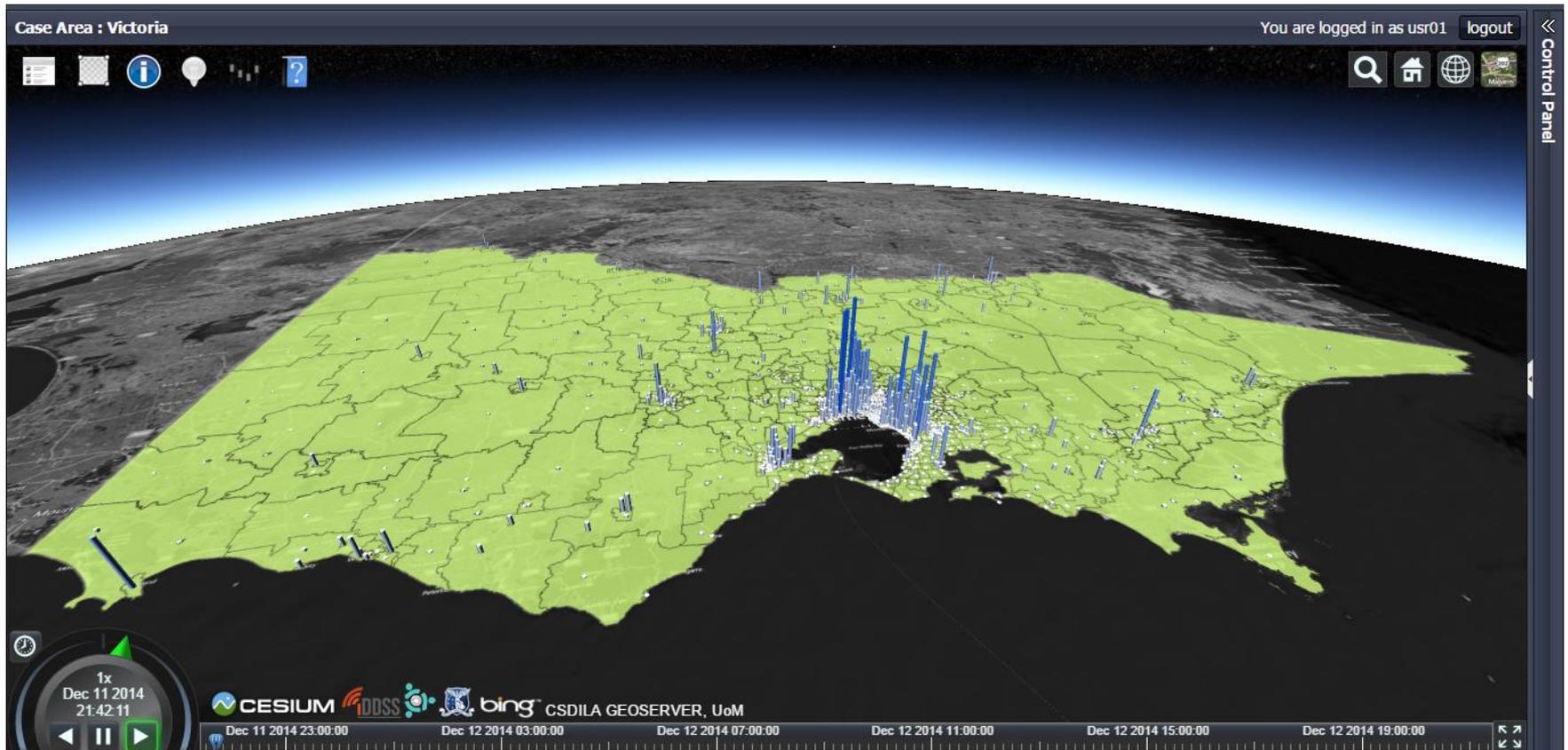
The original disaster events included were:

- Bushfire
- Chemical
- Complex
- Emergencies
- Criminal Act
- Cyclone
- Earthquake
- Environmental
- Epidemic
- Flood
- Hall
- Industrial
- Landslide
- Severe Storm
- Shipwreck
- Tornado
- Transport
- Tsunami
- Urban Fire

As the scope of this project relates only to natural hazard events, the disaster events that were not geophysical, meteorological, hydrological, climatological or biological events were removed. The data was classified using the EM-DAT International Disaster Database from the Centre for Research on the Epidemiology of Disasters (CRED). After this filtering eight primary disaster event types remained. Figure 1 shows the disaster classifications with the subgroups, disaster main types and the disaster sub-types.



PROJECT OUTPUTS: DEVELOPMENTS



PROJECT ACHIEVEMENTS: GENERAL

- 1) Data and economic method to estimate the full effect of natural disasters on sectoral economic growth of Australia

Which will lead to:

- 1) Improved ability to advise appropriate budget allocations and project rankings for policy makers

NEXT STEPS

UPCOMING DELIVERABLES

- 1) Estimation of the relationship between natural disasters and sectoral economic performance at national level
- 2) Exposure and vulnerability maps for Victoria
- 3) Estimation of the localised (both direct and indirect) effects of natural disasters on economic sectors in Victoria

RESEARCH TEAM

- Prof. Abbas Rajabifard (UoM – project leader)
- A.Prof. Mehmet Ulubasoglu (Deakin)
- A.Prof. Nelson Lam (UoM)
- Dr. Mohsen Kalantari (UoM)
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- Roozbeh Nafari (UoM – PhD student)



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End User's Perspective

Martine Woolf
Geoscience Australia

Third Research Advisory Forum, Sydney

Date: 09 April, 2015



An Australian Government Initiative



SCOPE OF THE PRESENTATION

- What the project is about
- Value of the project
- End user interaction

OVERALL GOAL OF THE PROJECT:

National Level

- ❑ Identifying the impact of natural disasters on sectoral economic growth in Australia to help guide federal budget allocation.

State Level

- ① Spatially enabled hazard specific risk assessment information (physical damage assessment for bushfires, floods)
- ② Natural hazard economic loss estimation and geographic distribution of it by capturing the localised effects of disasters
- ③ Rank the economic sectors in terms of their disaster vulnerability to advocate for resource reallocation accordingly

VALUE OF THE PROJECT:

END USER INTERACTION: