Agenda

- 9.15 –9.30 Introduction to WISE
- 9.30 –10.30 WISE Economic module
- 10.30–11.45 Case studies: Airport expansion and Convention centre
- 11.45-12.00 EDS Modelling, Recent developments

Tentative Only, Ask Questions!

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Waikato Integrated Scenarios Explorer
'WISE' - Economic Development Scenarios

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Creating Futures

Developing and applying planning tools to make informed choices for the future

Environment Waikato Regional Council

Programme Leader *Dr Beat Huser*
Science Leader *Dr Daniel Rutledge*

Dr Liz Wedderburn

OBJECTIVE 1:
Improved communication & deliberation tools,

agresearch

SCION

C3ED

FOUNDATION FOR RESEARCH SCIENCE & TECHNOLOGY

Dr Daniel Rutledge

OBJECTIVE 2:
Spatial decision support system development

Landcare Research Manaaki Whenua

NZCEE

NIWA Taihoro Nukurangi

me market economics environment • spatial

RIKS research institute for knowledge systems

The University of Waikato

Who is using ISE?

- WISE was originally developed for the Waikato Region in the Creating Futures Programme (http://www.youtube.com/watch?v=RgEABCz1RrI)

- 'ISE' models are also being developed in Auckland and Wellington under **Sustainable Pathways 2**, and in Christchurch under **Economics of Resilient Infrastructure**

- Each version has slightly different sub-modules, but they may be transferred from one version to another

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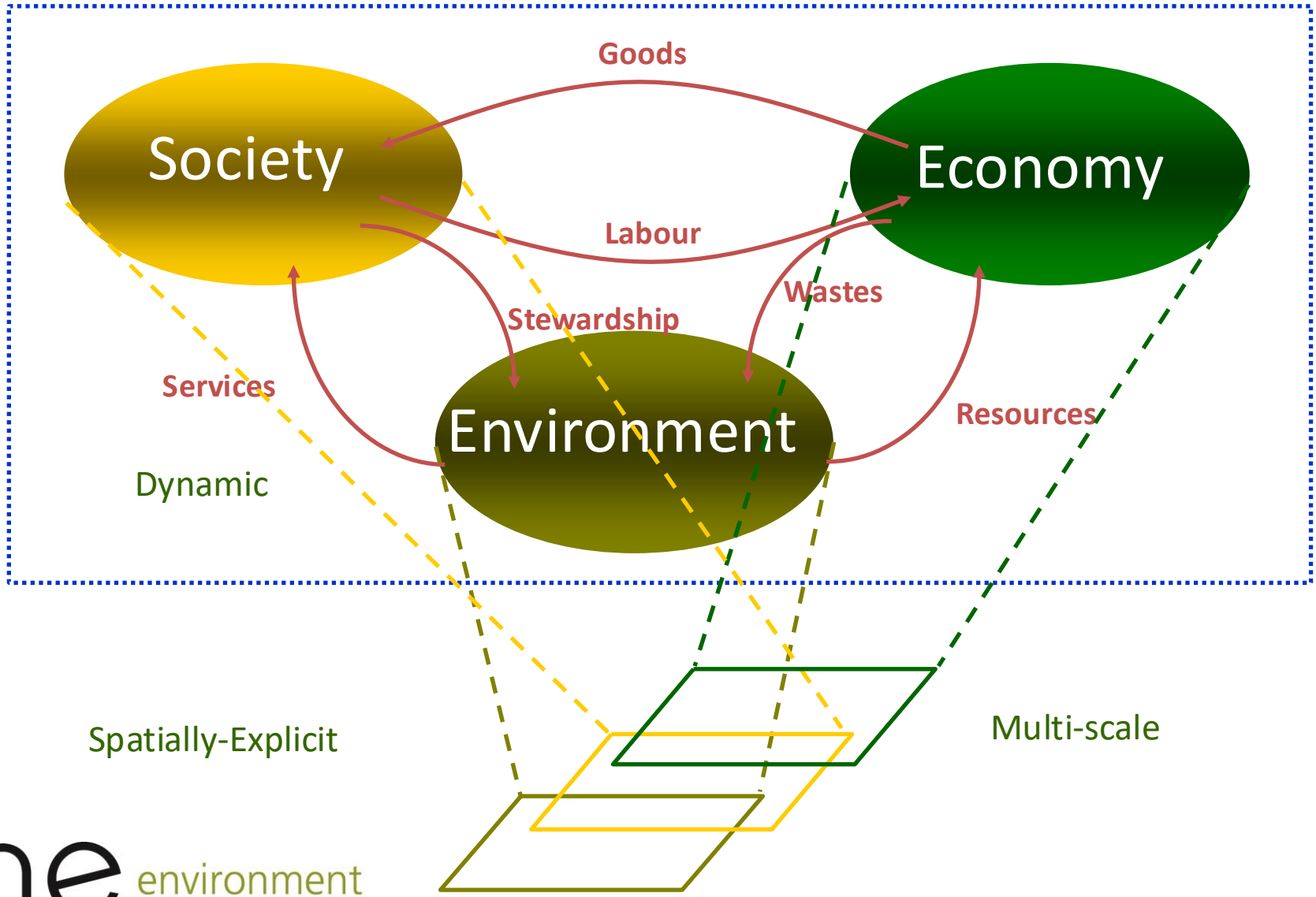
Cultural
Environmental
Cultural
Social
WELLBEING
Economic
Environmental
Social
Economic

What is ISE?



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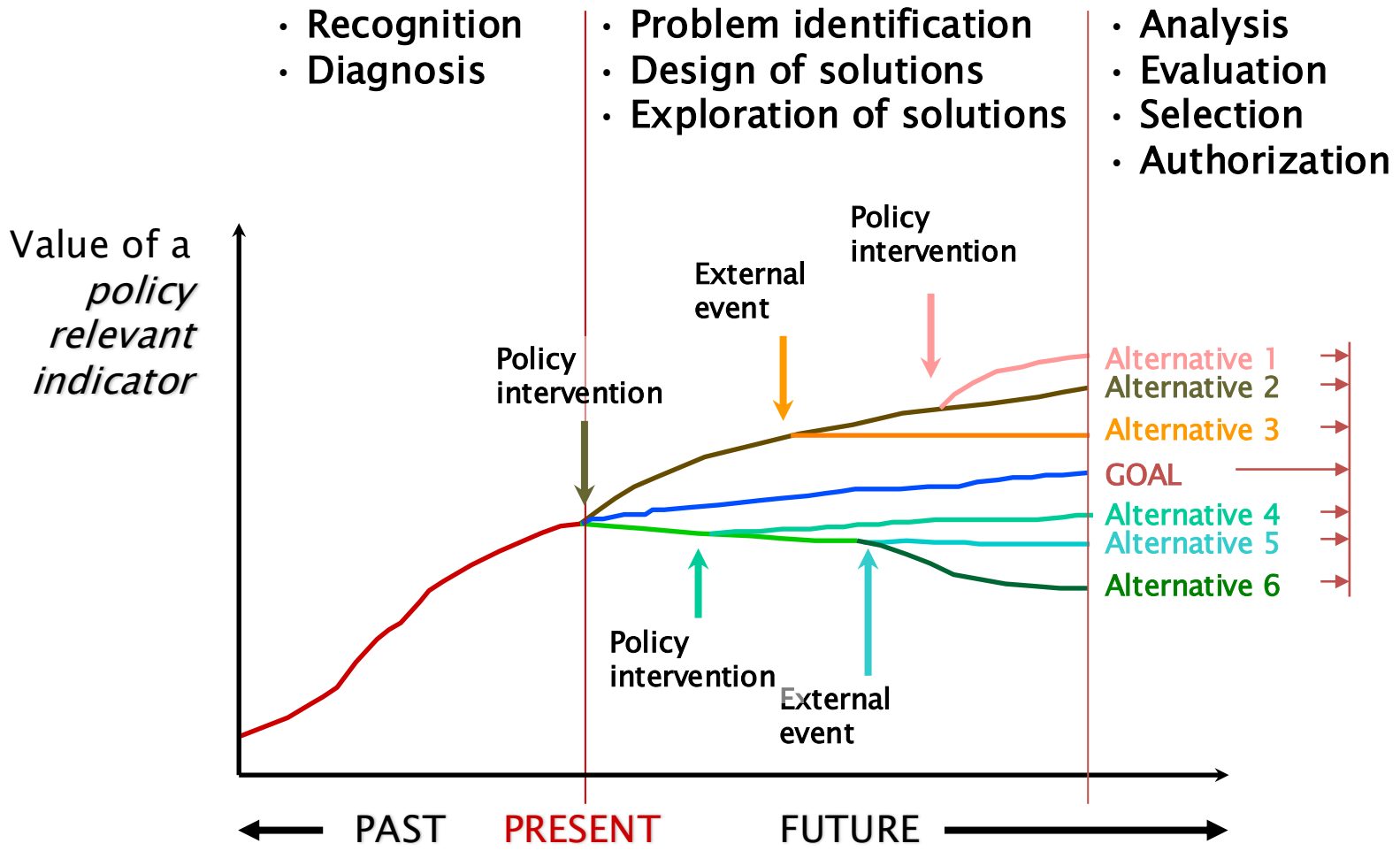
Simulating policy options



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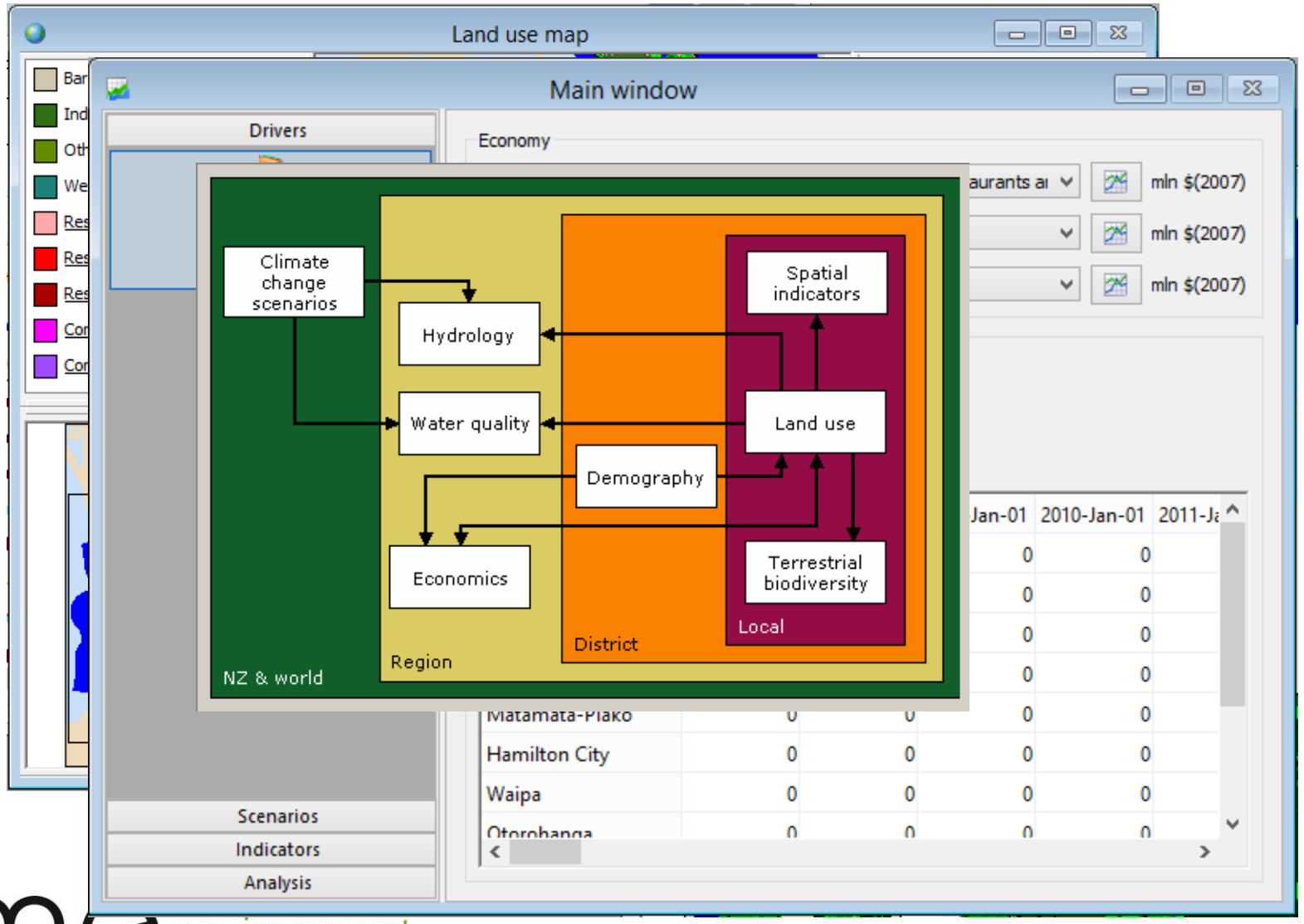
ISE Interface



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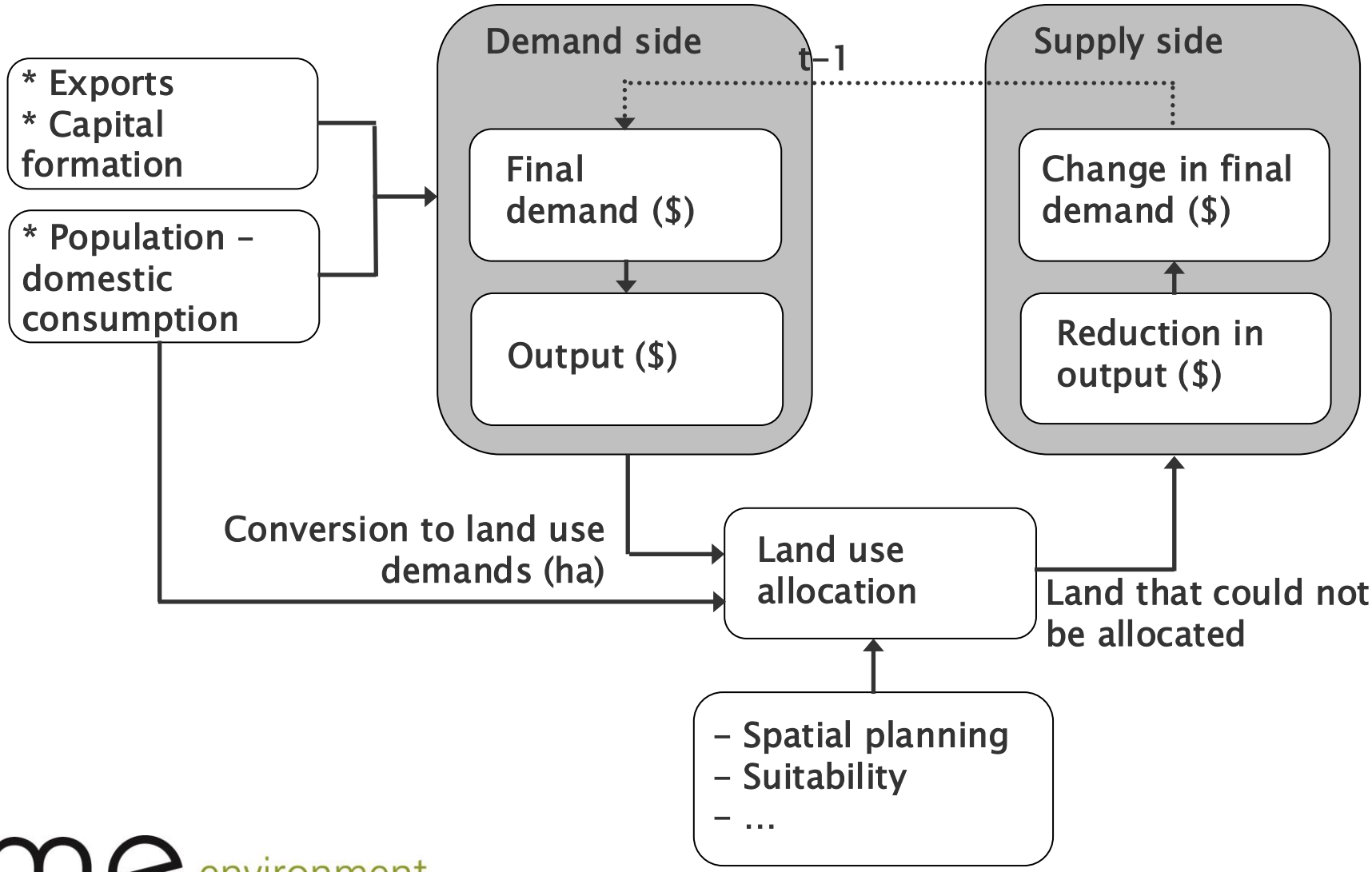
How does ISE work?



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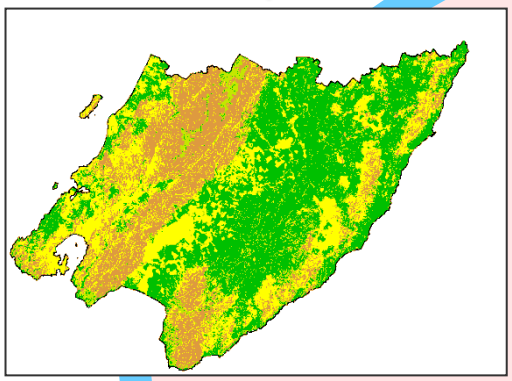
How does ISE work?

Land use
at time T+1

Suitability



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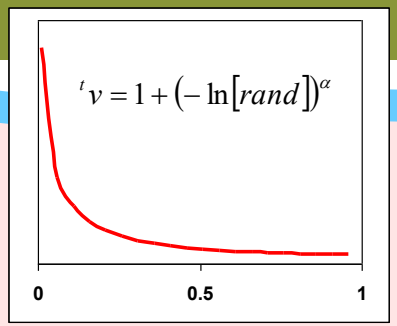
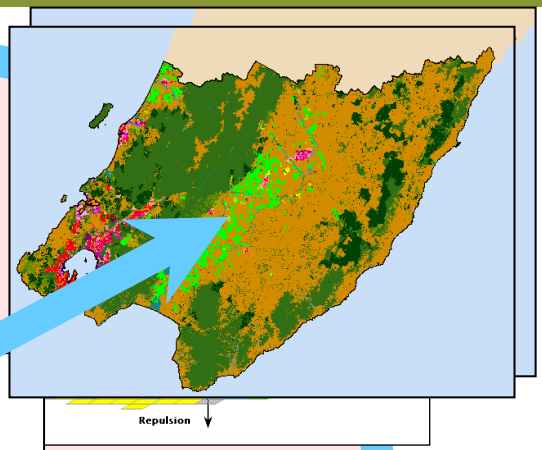


Stochastic perturbation



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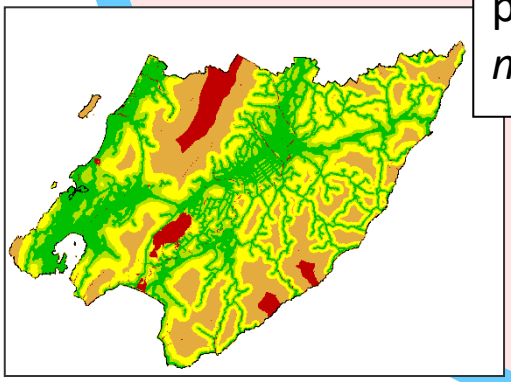
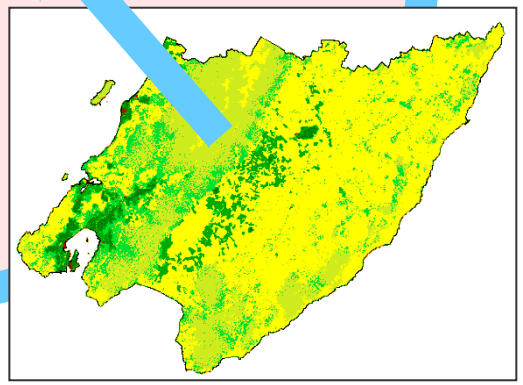
Accessibility



<u>Transition Rule</u>

Change cells to the land use for which they have the highest transition potential *until regional demands are met*

Transition Potentials



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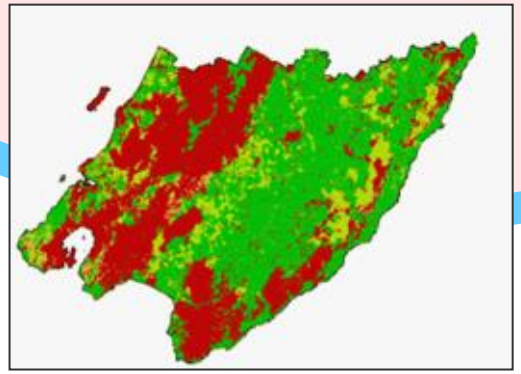
Zoning



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What can ISE be used for?

Assessing the socio- economic and environmental impacts of:-

Urban issues

- Spatial planning
- Understanding the implications of zoning and road/port/airport infrastructure changes e.g. Ruakura inland port, SH1
- Residential, business and urban growth strategies e.g. Future proof
- Economic development strategies e.g. Waikato EDS

Rural issues

- Catchment issues such as N, P loadings and sediment associated with intensive farming e.g. WRISS
- Land use change e.g. dairy conversion, carbon forestry

What can ISE be used for?

- ***Policy evaluation***
  - Quantifying trade-offs of different growth scenarios
  - Implications of city form questions e.g. compact versus extended MULs
  - Hazard impacts
- ***Spatial Economy***
  - Business land use and requirements by economic sector
  - Residential land use by household type
  - Infrastructure delivery
- ***Socio-Economic Impacts***
  - Future skills demand
  - Labour force projections
  - Identifies the mismatch between future jobs and skills

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Who is using ISE?

- ISE was originally developed for the Waikato Region in the Creating Futures Programme (FRST) (http://www.youtube.com/watch?v=RgEABCz1RrI)

- ISE is also being developed in Auckland under ***Sustainable Pathways 2*** programme (FRST) (Yr 4 of 6, $3.6m)

- A similar model is also being constructed for Christchurch and Auckland under ***Economics of Resilient Infrastructure*** programme (MBIE) covering infrastructure outages and natural hazard events (Yr 1 of 4, $2.8m)

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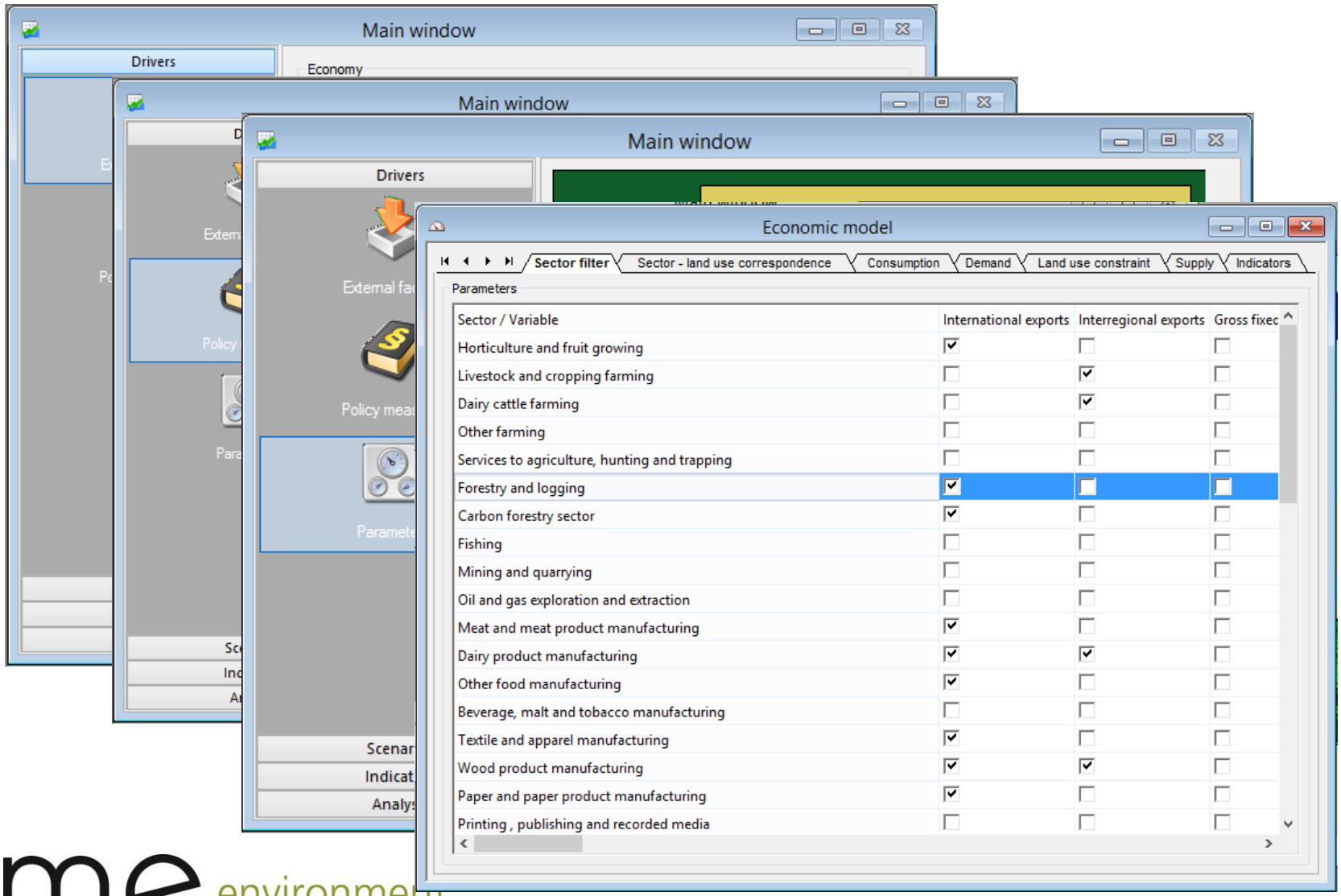
Economic module



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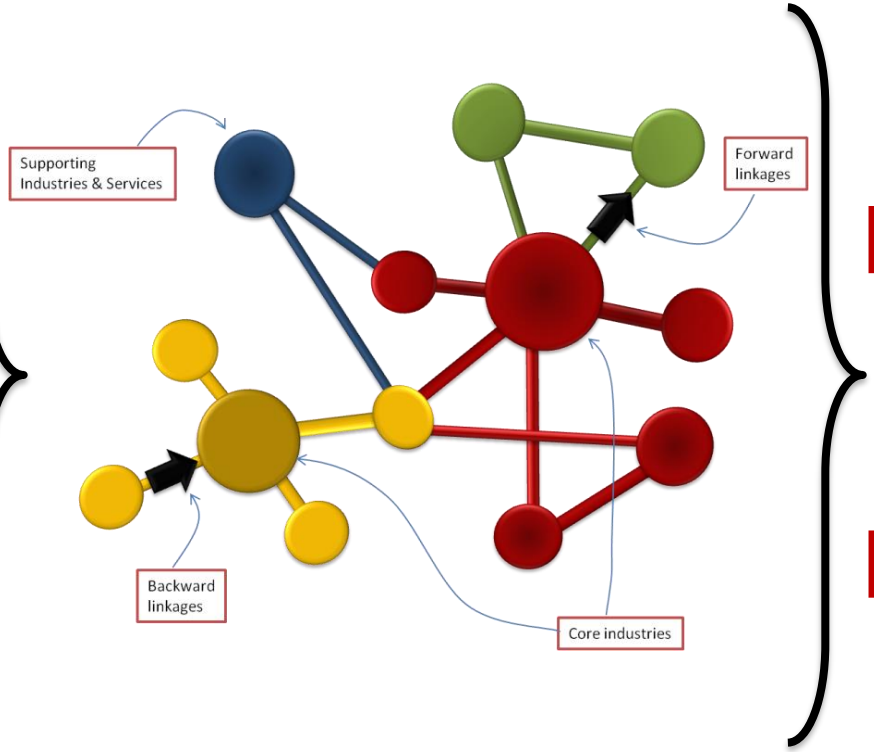
Economic model

Households (Consumers)

Households (Labour)

Exports (Global value chains)

Capital formation



Economic

Gross output
Value added
Employment (FTEs/MEC)
Multipliers

Social

Occupations
Infrastructure requirements

Ecological

Energy use
Emissions (CO_2, N_2O, CH_4)
Solid waste
Land use
Carbon footprint

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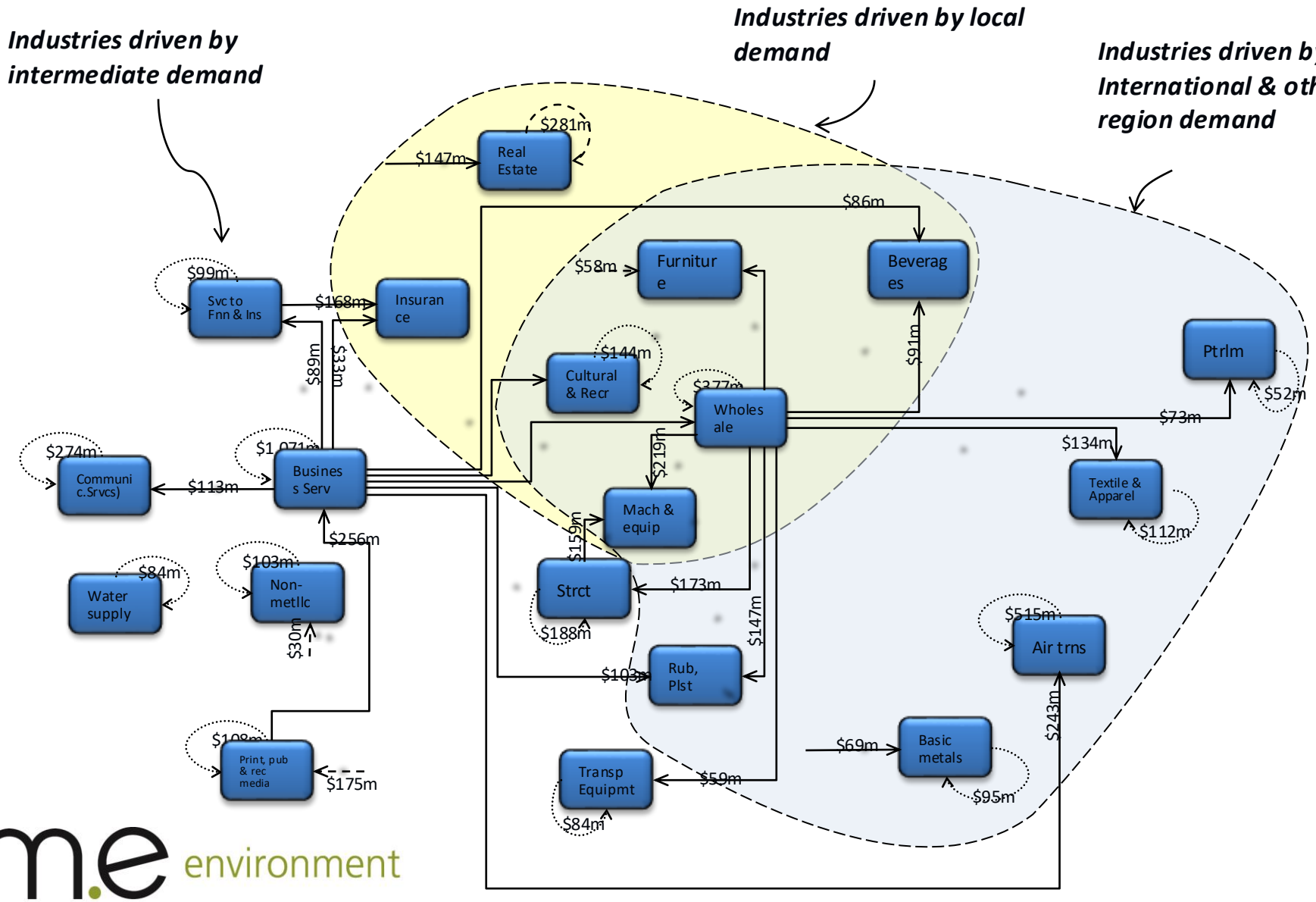
Economic interdependencies



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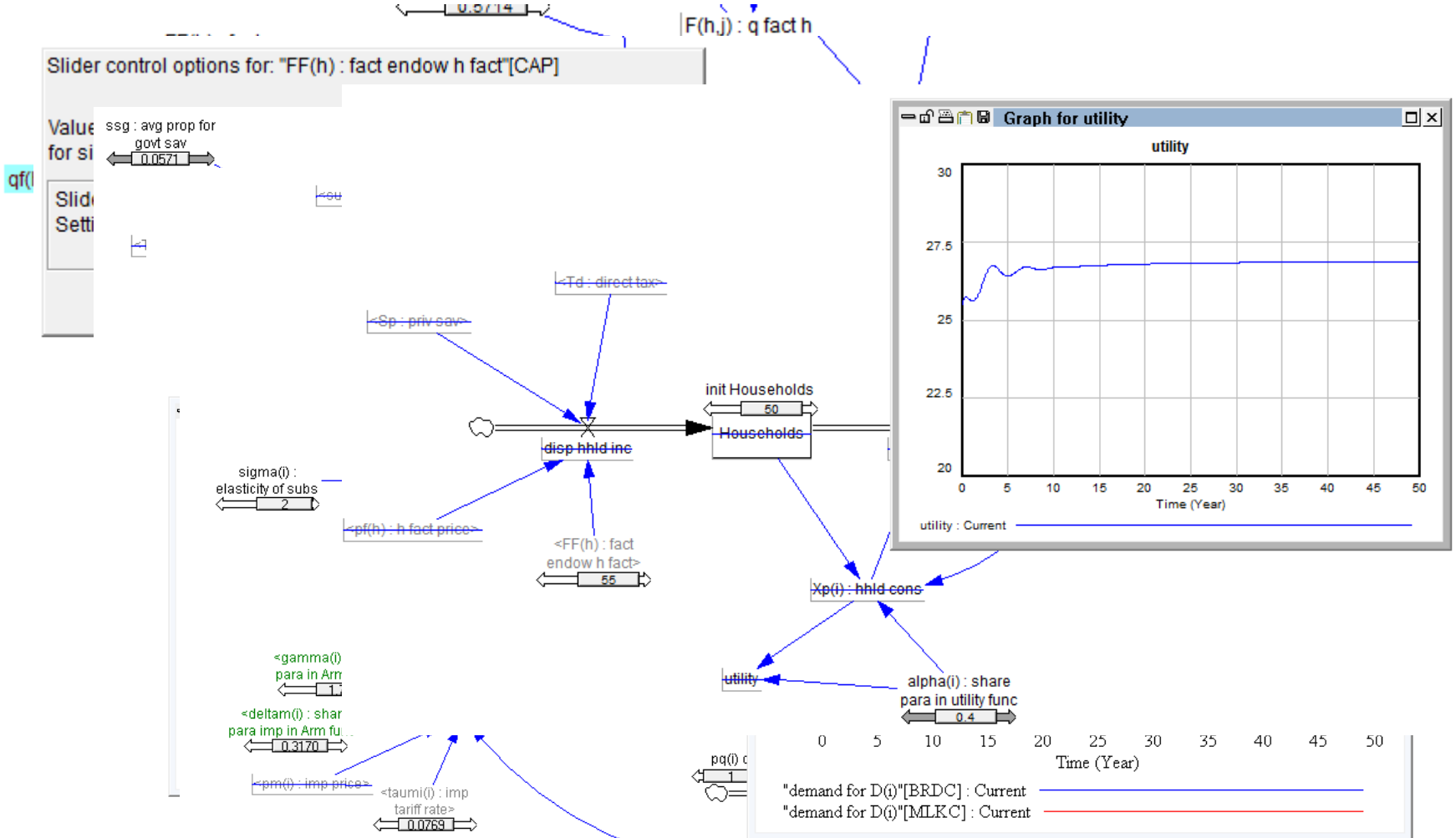
Dynamic economic model



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Eg1: Airport expansion scenario

- Expansion of airport to enable international flights (Airbus 350, 787 Dreamliner)
- This would enable people to fly directly into Hamilton via several international destinations throughout the Asia Pacific region
- Initially 4 to 5 flights per week (9,500 NZR departures and 14,000 overseas visitor arrivals), within 3 years 14,500 NZR departures and 19,000 overseas visitor arrivals)

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Main impacts

- **Overseas visitors** increase by 19,000 with total direct value added estimated at $12.3m per year, comprised of $2.6m hospitality, $3.9m wholesale and retail, $1.5m culture and recreational srvcs, $3.0m air transport & $1.3m road transport

- **International students** increase from 2,000 to 4,000 then additional $14m per year

- **Total cost** $300m, direct $80-100m investment coupled with LG/CG investment of $200m

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Economic Impacts

- A value added impact of between $\$_{2006}$16m and $\$_{2006}$18m per annum from 2016 through 2031. Or, put alternatively, 0.14% of total Waikato value added.

- An average increase in direct and indirect employment of 393 jobs per year (MECs), or 7,290 job years for the period 2016 to 2031

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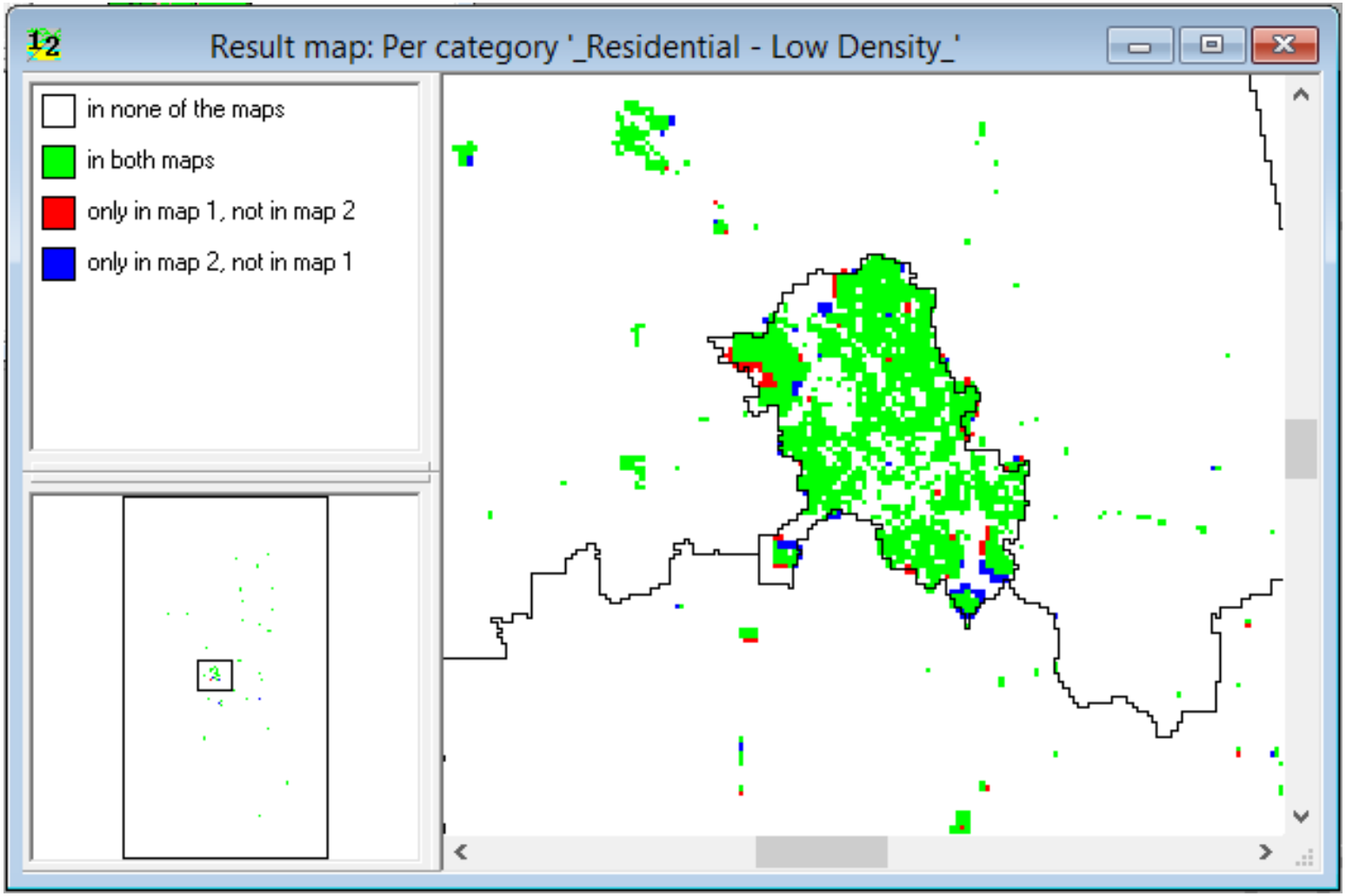
Land use change BS vs AE, 2031



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Eg2. Airport & Convention Centre Scenario

- Proposed convention centre
  - Build cost of $120m
  - Operational cost of $40m per year

- Assumptions
  - Build is funded through FDI
  - All operational costs are net additional i.e. no displacement or transfer effects
  - Overseas tourists expenditure increases by 30% above airport expansion scenario

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Economic Impacts

- Direct and indirect value added contribution of $\$_{2006}$64m based $\$_{2007}$40m + CAGR 0.5% pa ongoing operational expenditure

- Direct and indirect value added contribution of $\$_{2006}$100m associated with the $\$_{2006}$120m construction build

- Approximately 1850 jobs p.a. created. Or, put alternatively, 0.7% of employment in 2025.

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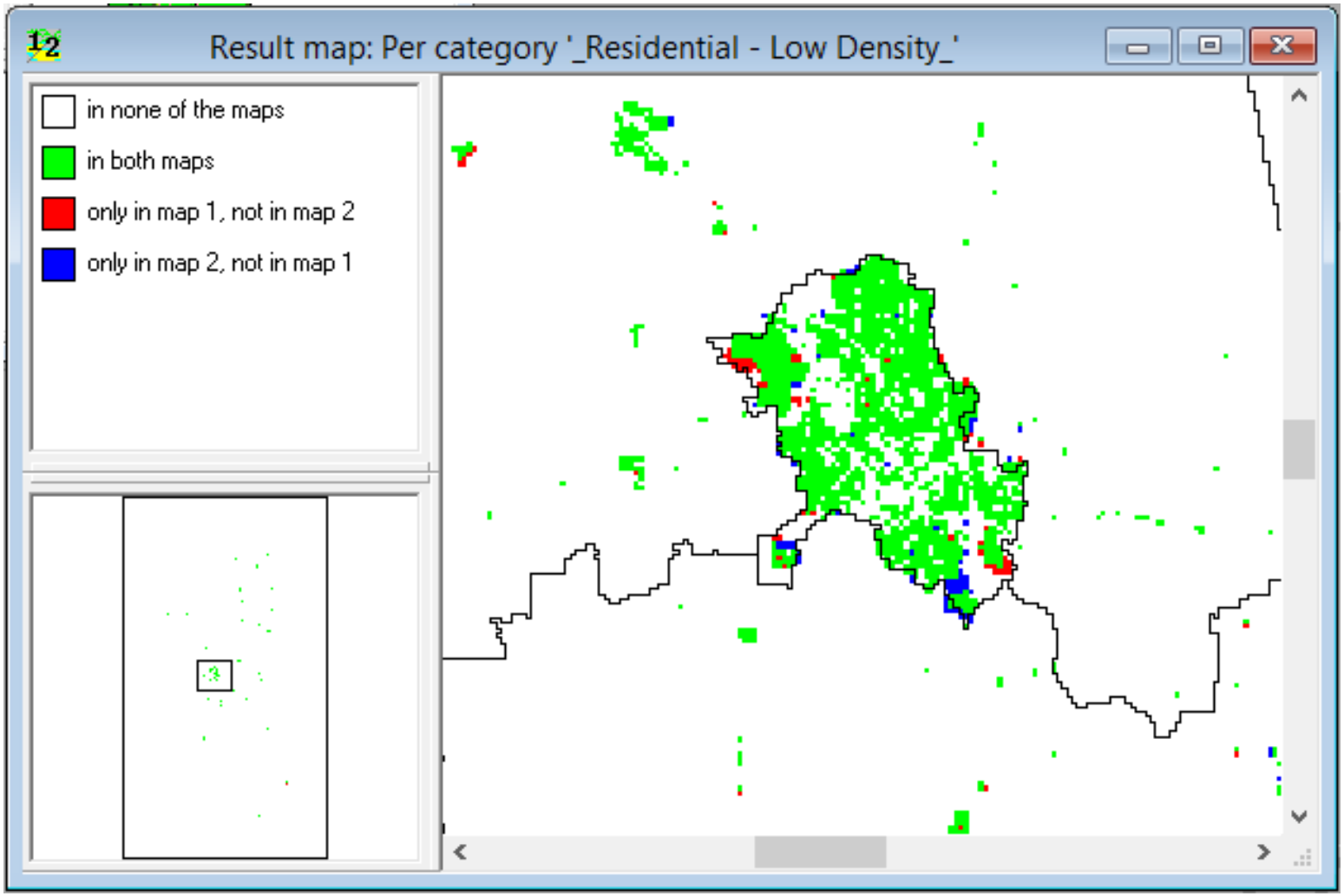
Land use change BS vs AE & CC, 2031



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Modelling Economic Development

- **Integrated scenarios are complex to setup**, requiring knowledge of all ISE modules

- Economic impact should be **net of the next best alternative**, not net of the baseline – as there may be opportunity costs

- **Both costs and benefits must be modelled**; many EIAs only model capital and operational expenditures – but, there are costs associated with funding, displacements, transfers

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Waikato EDS and ISE

- Socio-economic and environmental implications of proposed growth strategies
  - ***Definition*** of key sectors driving the economic development
  - ***Interpretation*** of what economic growth is required to meet EDS goals or targets under different scenarios
  - ***Analysis of growth scenarios*** using ISE over the next 20-30 years
- ISE allows us to consider, in an integrated way, the economic, social (employment, skills) and environmental (land use, water, energy, emissions) tradeoffs of the EDS

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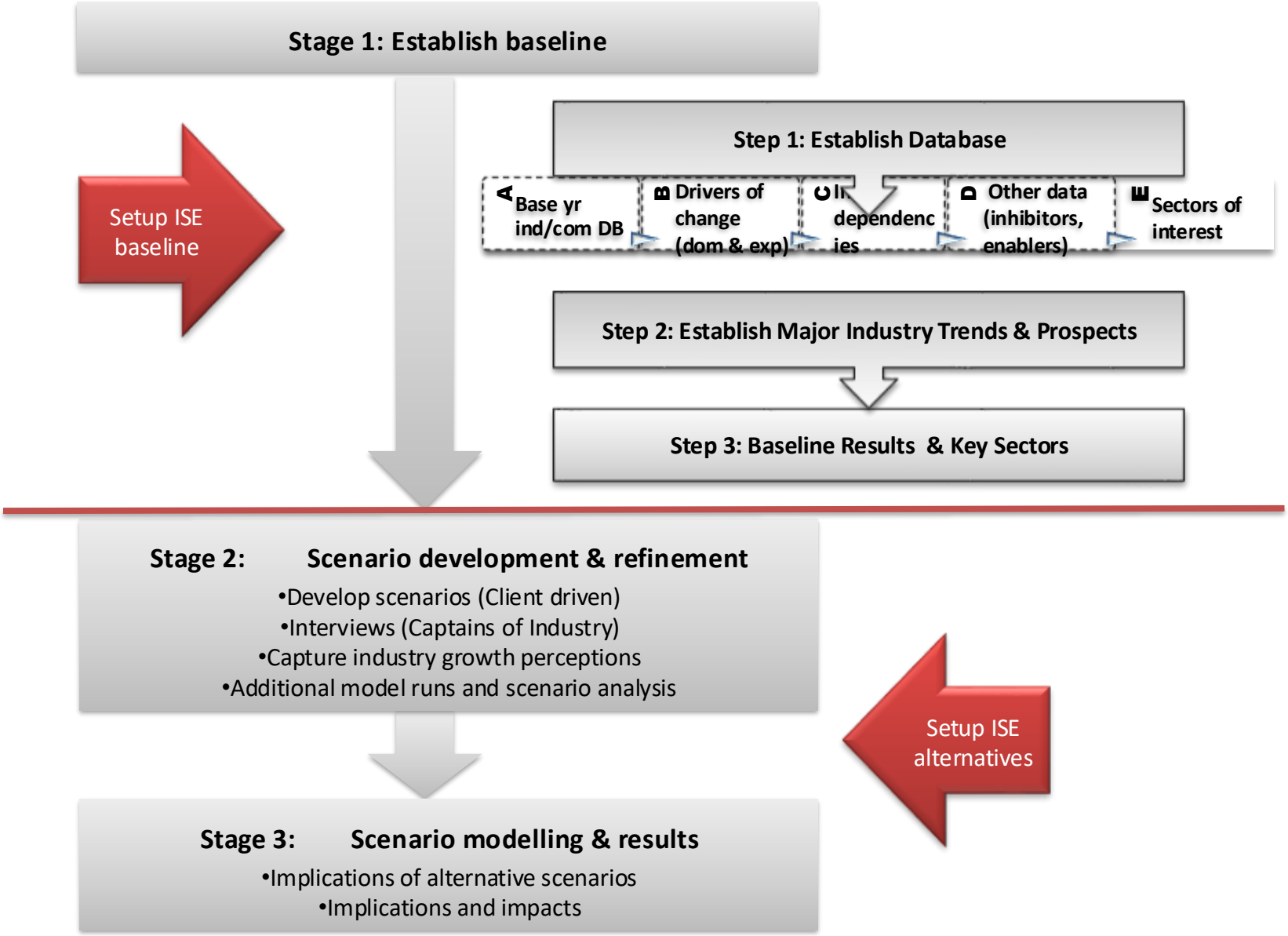
EDS Analytical Process



Growth Goals

	Goal Name	Description
a)	**20 in 20 (OECD)**	Gain 20 places in the OECD rankings in 20 years (by 2031).
b)	Top 10 in the South	Auckland to be in the top 10 cities in the southern hemisphere by 2031.
c)	**Third in Australasia**	Auckland to be in the top 3 cities in the Australasia by 2031.
d)	Top 10 in the ASEAN	Auckland to be in the top 10 cities in the ASEAN cities by 2031.
e)	2025 Task Force	NZ to have living standards that is comparable to Australia by 2025.
f)	Top half of OECD	New Zealand to be in the top half of the OECD by 2031.
g)	**20% better than Historic**	Auckland grows 20% faster than in the past.
h)	**Top 10 in 20**	Auckland to be placed in the top 10 OECD rankings in 20 years (by 2031).
i)	**Top in the South**	Auckland to be the top city in the southern hemisphere by 2031.
j)	**20 in 20 (Demograhia)**	Gain 20 places in the Demographia rankings in 20 years (by 2031).

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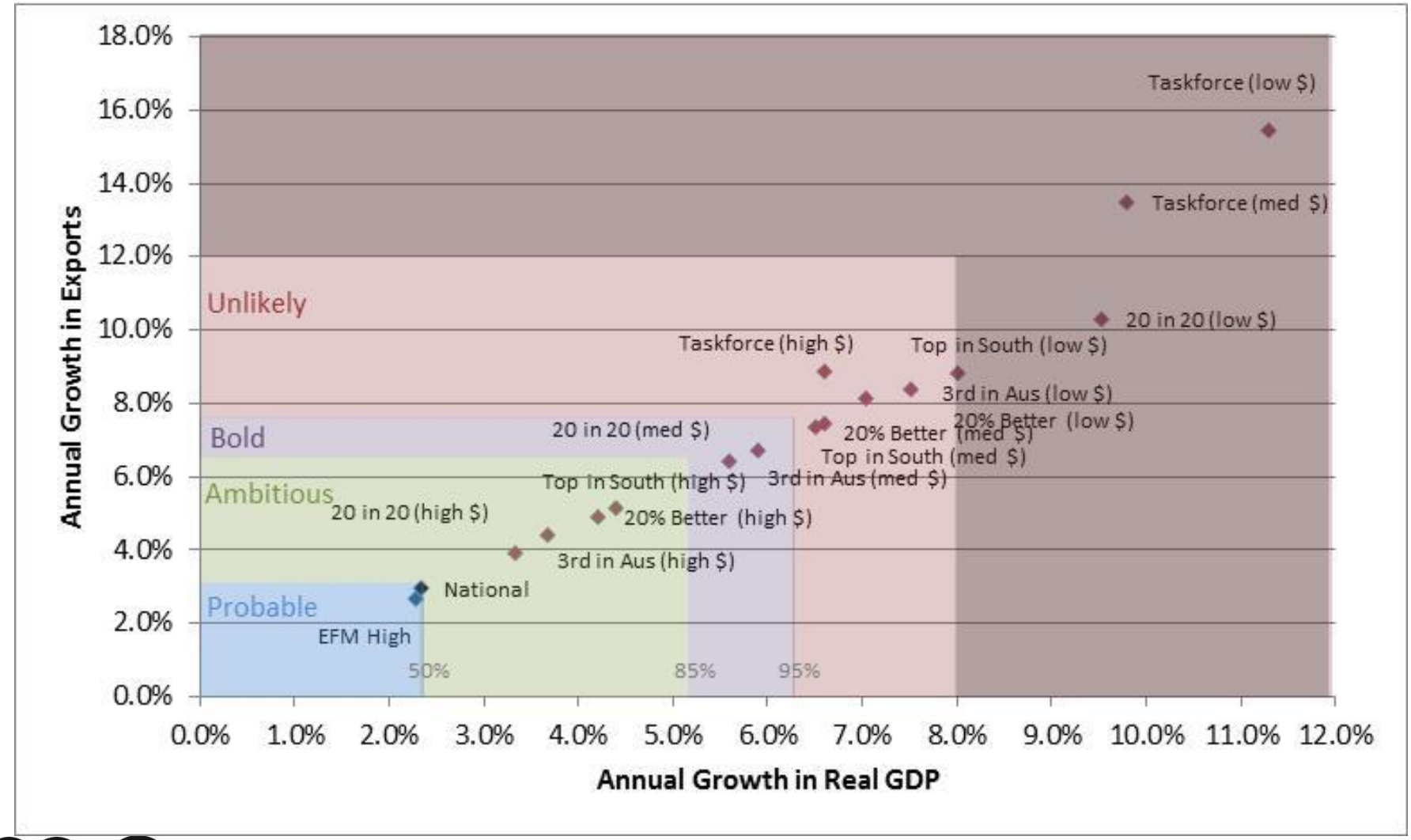
EDS Growth Goals



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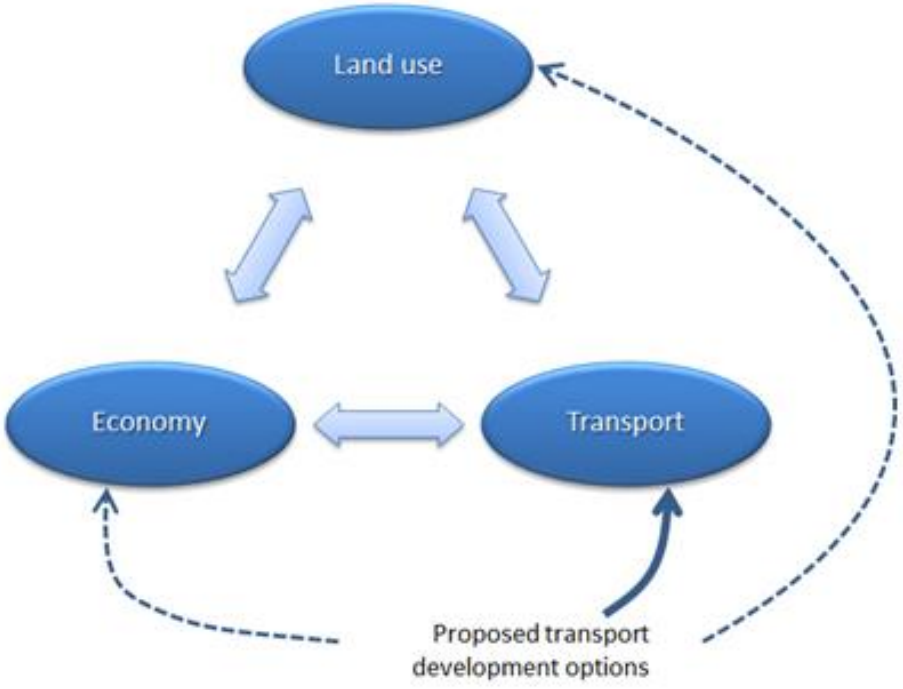
ISE Recent Developments

- ***Dynamic economic model (Dec 2013)***
- Activity-based land use change model – AC and GW, CCC (Jun 2014)
- Integration of land use, economics and transport (Sep 2013)



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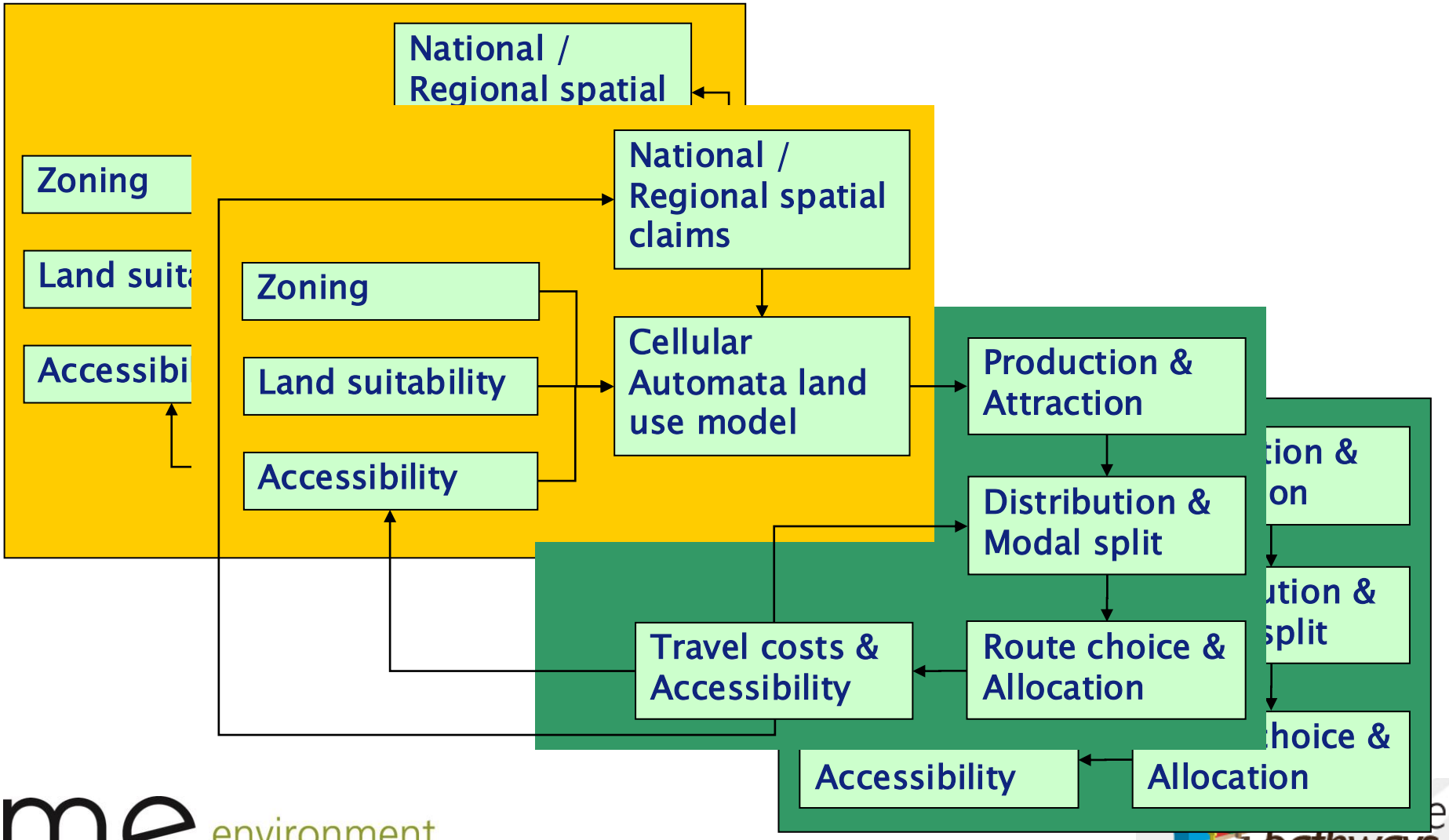
sustainable pathways

Transport module



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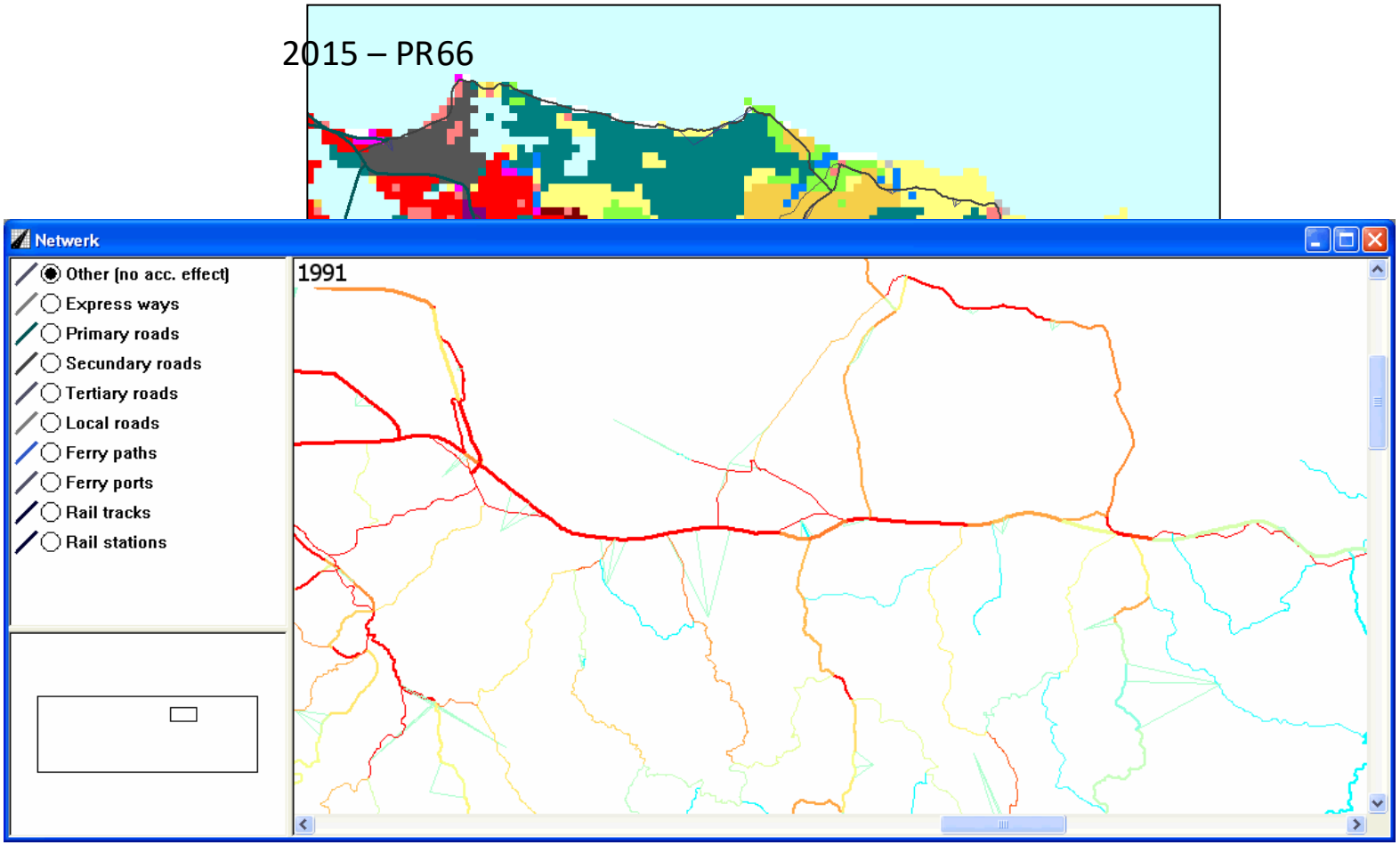
pathways

Eg. Construction of Highway



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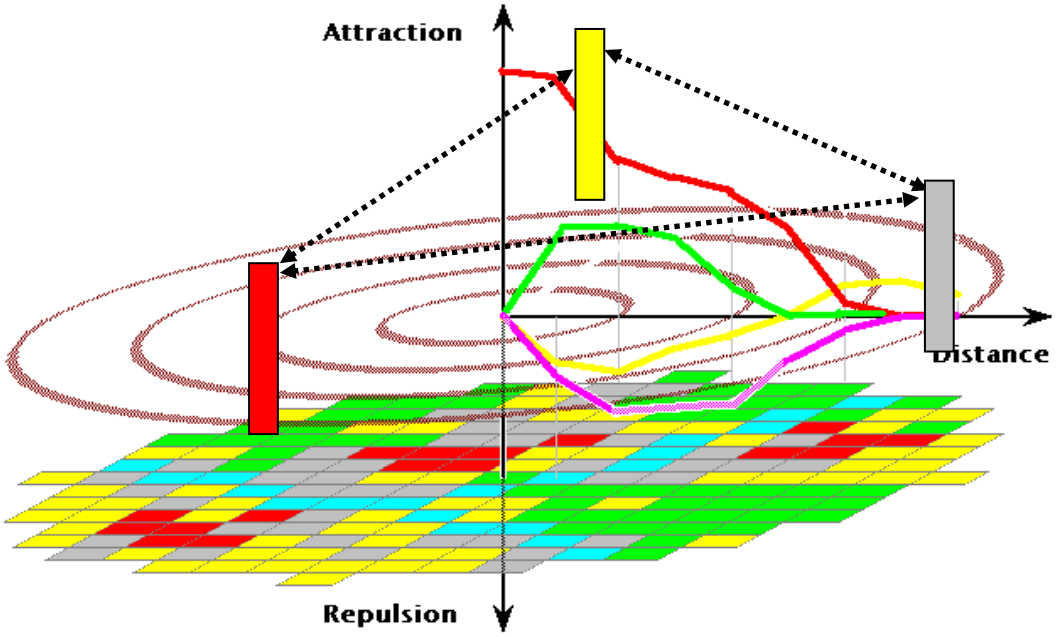
Activity based approach

- Model activity and land use separately
- Land use and activities are mutually influential
- More than one activity in one location



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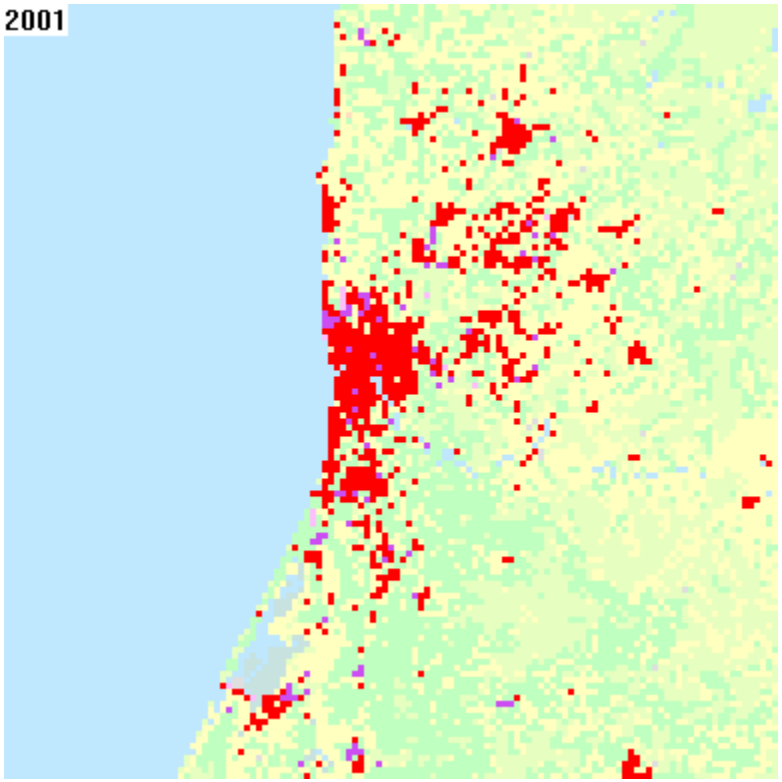
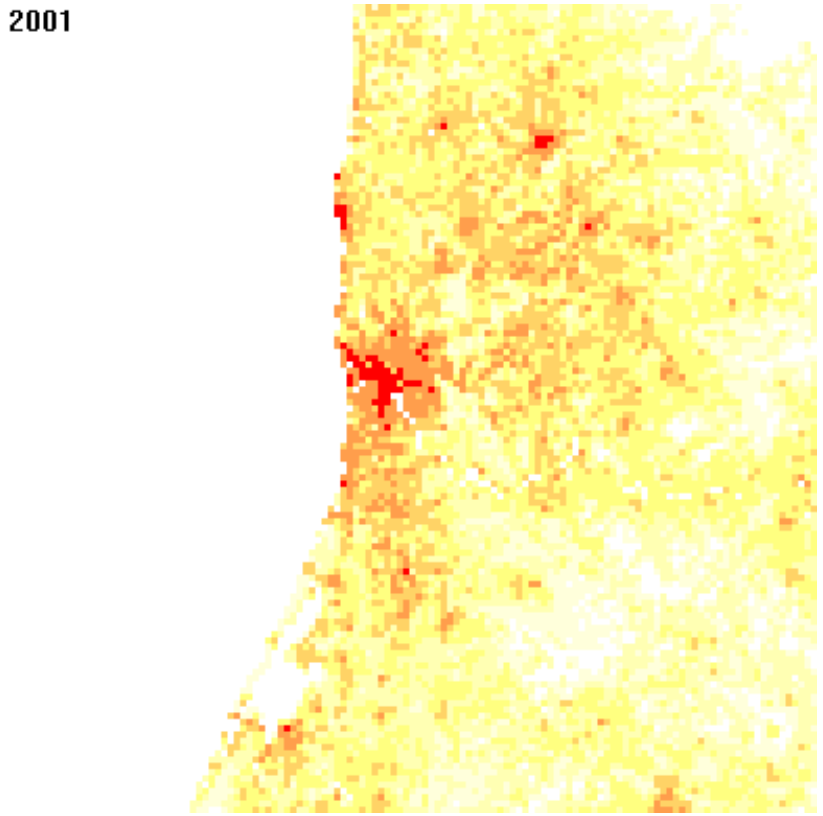
sustainable pathways

Activity based approach



Land use



Population

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