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Co-development of interactive decision support tools for policy and planning

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Sax Institute

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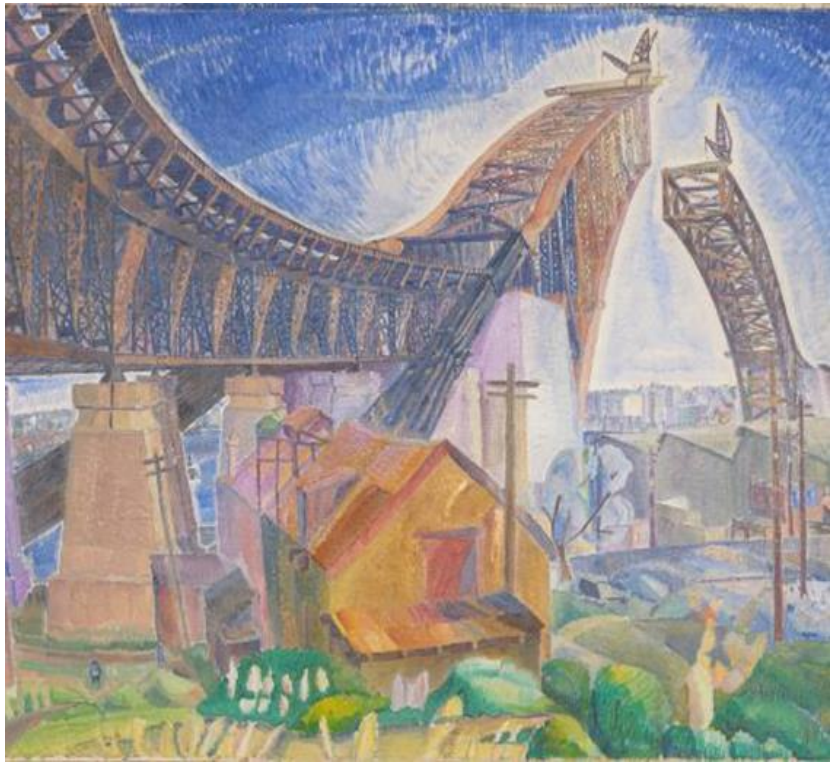
To improve health and wellbeing by driving the use of research in policies, programs and services

- Not for profit, infrastructure funding from NSW Ministry of Health
- Provide policy makers with a gateway to expertise from 46 academic member organisations
- Work with more than 70 policy and program agencies
- Provide systems and services that have been developed and tested over more 15 years



‘The bridge in curve’ Grace Cossington Smith

Decision Analytics

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Latest advances in computer simulation

+ Best research evidence and data
+ Transdisciplinary perspectives & local knowledge
+ Participatory approach

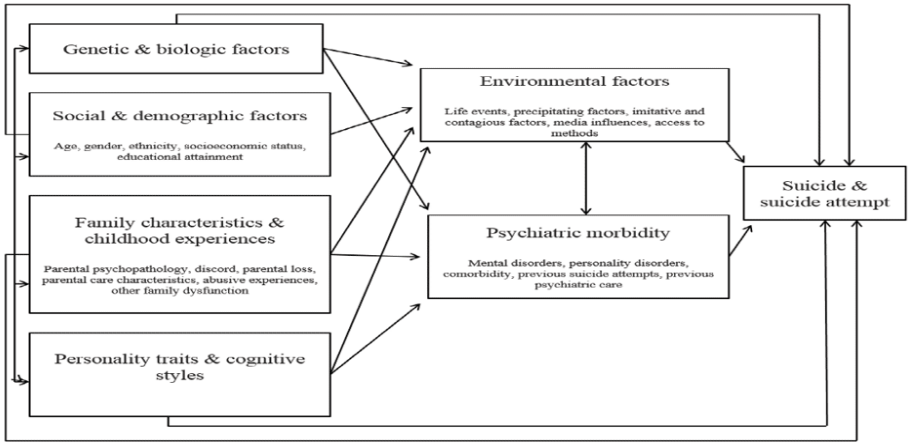
=

Interactive decision support tools for policy and practice

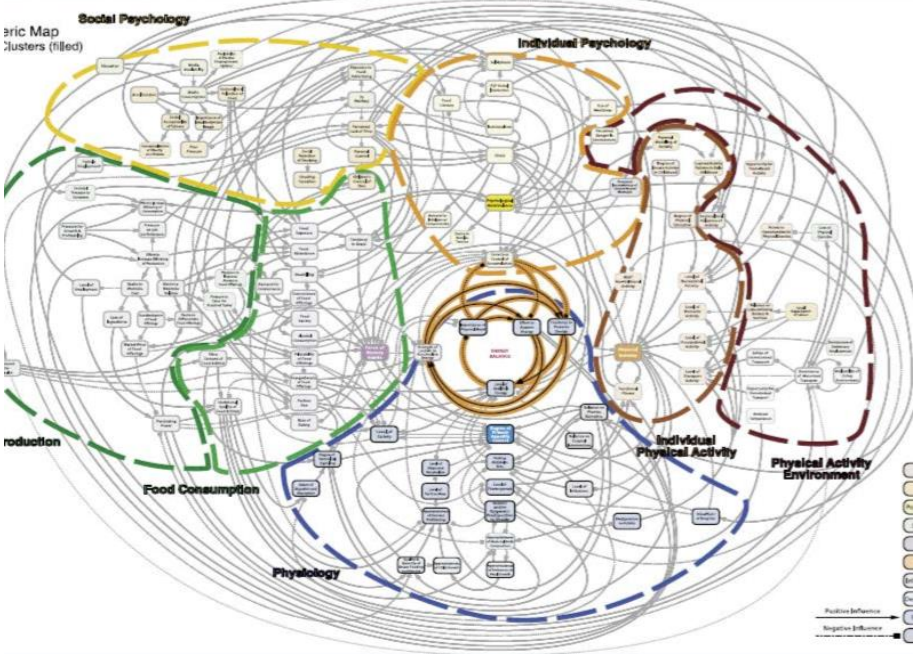
The Australian Prevention Partnership Centre
Systems and solutions for better health

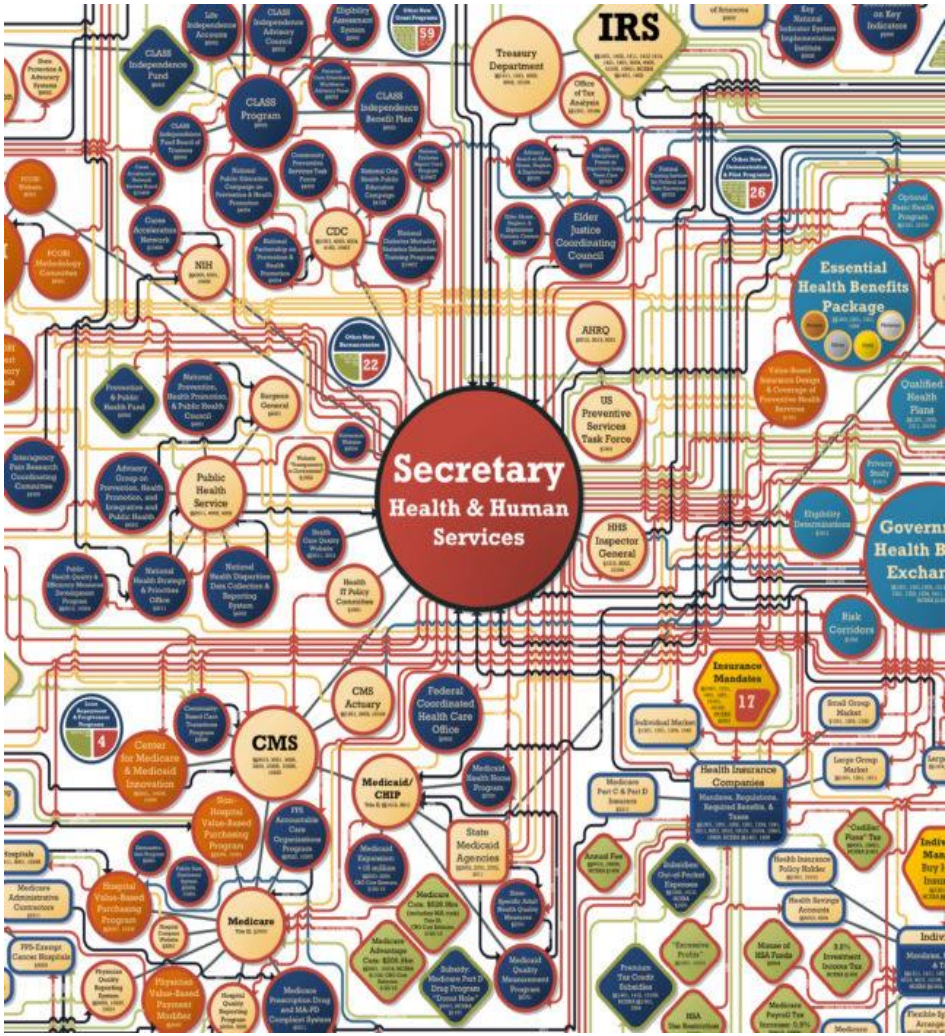
Challenges of policy and planning:

1. The complexity of the problem

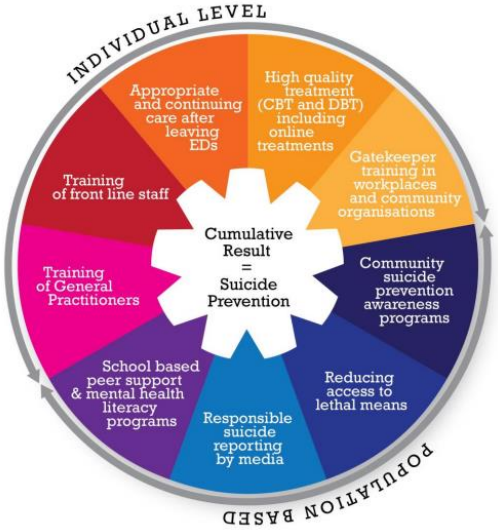


Source: Risk Factors for Suicide and Attempted Suicide Among Young People (Beautrais, A. 2000).

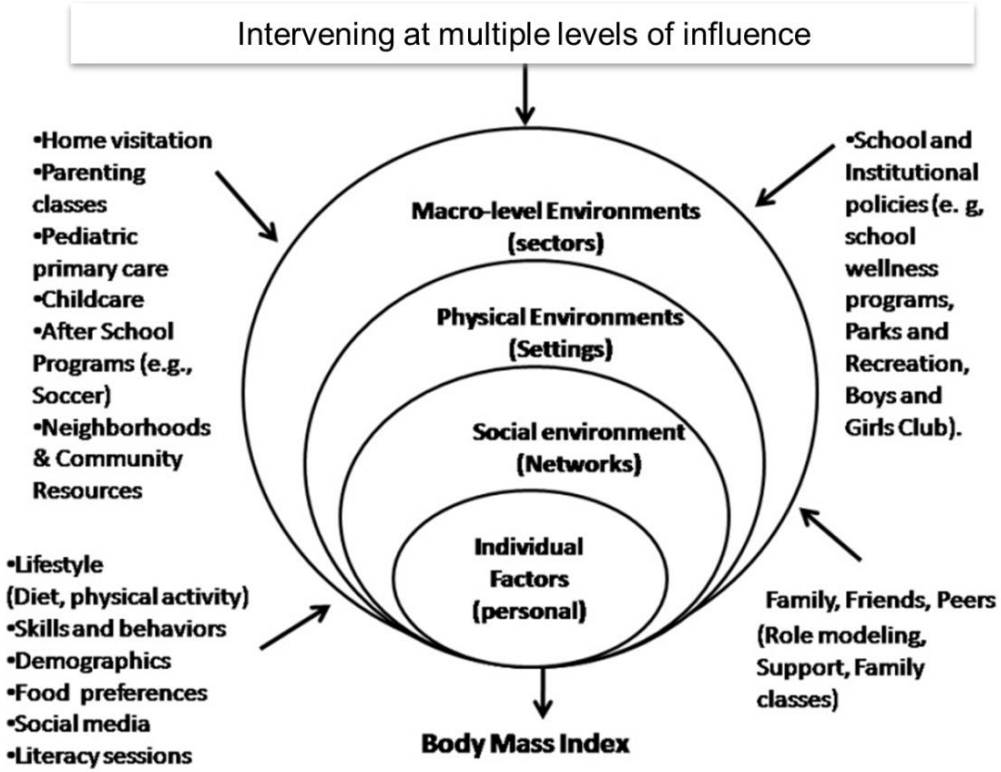




2. Broad range of options for intervening



Strategies to reduce obesity



National Institutes of Health Childhood Obesity Prevention and Treatment Research (COPTR) Consortium

Strategies to reduce alcohol related harms

- ☐ Differential price by strength
- ☐ Social marketing regarding alcohol harms
- ☐ Restricted hours/days of sale of alcohol
- ☐ Restricted outlet density
- ☐ Alcohol taxes
- ☐ Advertising bans/sponsorship restrictions (e.g. banned alcohol sponsorship of televised sporting events?)
- ☐ Minimum pricing (e.g. Min. Price per Unit [Scotland])
- ☐ Enhanced enforcement of liquor laws (e.g. RSA legislation)
- ☐ Ban on sales in particular communities or at identified events
- ☐ Sale restrictions by alcohol strength
- ☐ Minimum legal purchase age
- ☐ Bans on drinking in public places
- ☐ Responsible service of alcohol training/policies
- ☐ Aggression management training for licenced venue staff
- ☐ Voluntary codes of practice
- ☐ Commercial liquor liability (Hotelier and Server liability) including licence suspensions
- ☐ Limits on amount sold on an occasion (including how many drinks can be bought at one time at the bar).
- ☐ Late-night lock-outs (no new customers admitted after a designated time)
- ☐ Lowered alcohol content of drinks
- ☐ High school classroom education on alcohol-related harms
- ☐ Product warning labels and messaging
- ☐ Brief intervention with risk groups
- ☐ Mutual help/self help groups (eg. AA, online support forums, apps)
- ☐ Medication for alcohol problem treatment - antabuse, naltrexone etc
- ☐ Mandatory treatment of repeat drink drivers
- ☐ Ignition locks (0 or low BAL to start car) routinely on all new cars or convicted drink drivers
- ☐ Required ankle recorders of alcohol use as a condition of probation for drink drivers
- ☐ Freezes on liquor licence numbers
- ☐ Designated driver programs
- ☐ Higher penalties for drink driving
- ☐ Zero blood alcohol for young and new drivers
- ☐ Automatic Drivers' licence suspensions for mid-high level drink driving
- ☐ Random Breath Testing
- ☐ Municipal Alcohol Plans (community-driven management plans with local government enforcement)
- ☐ Sobering-up stations/facilities
- ☐ BAL definition of "intoxication" (ie. BAL 0.15) for refusing alcohol sales in licenced venues
- ☐ Community impact statement requirements for new liquor licences
- ☐ Rationing (designated limit, either individual or universal, on how much each person can buy in a month)
- ☐ Ban on secondary supply to young drinkers

3. Geographical variation

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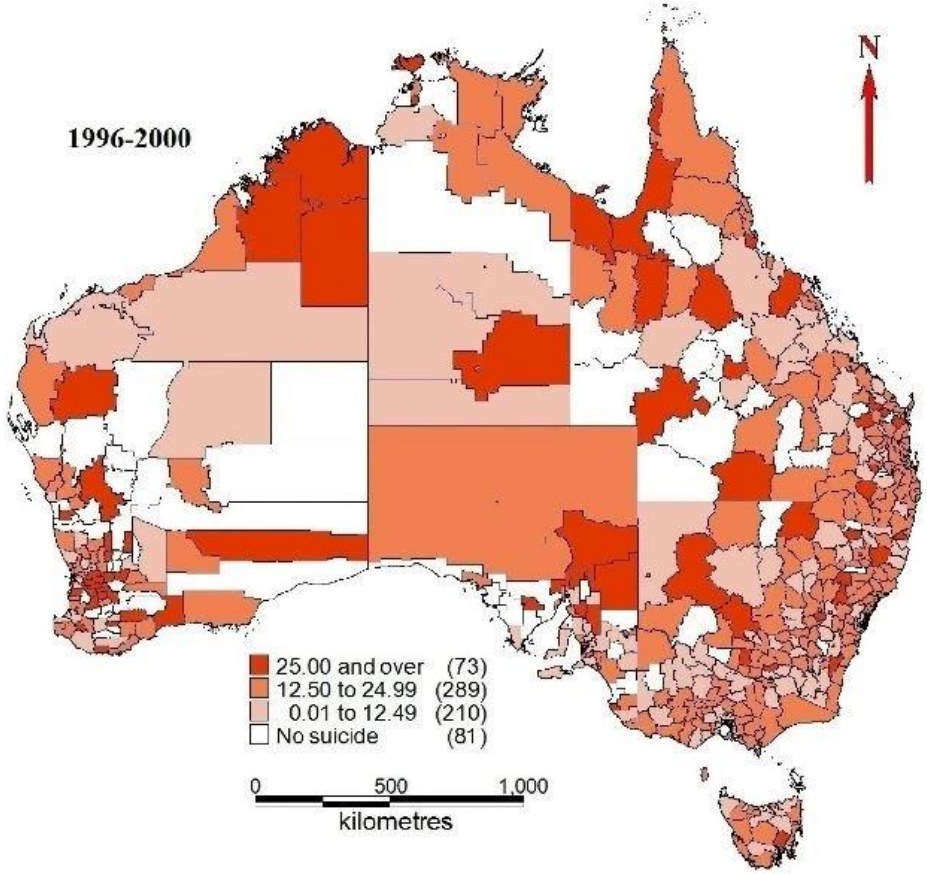
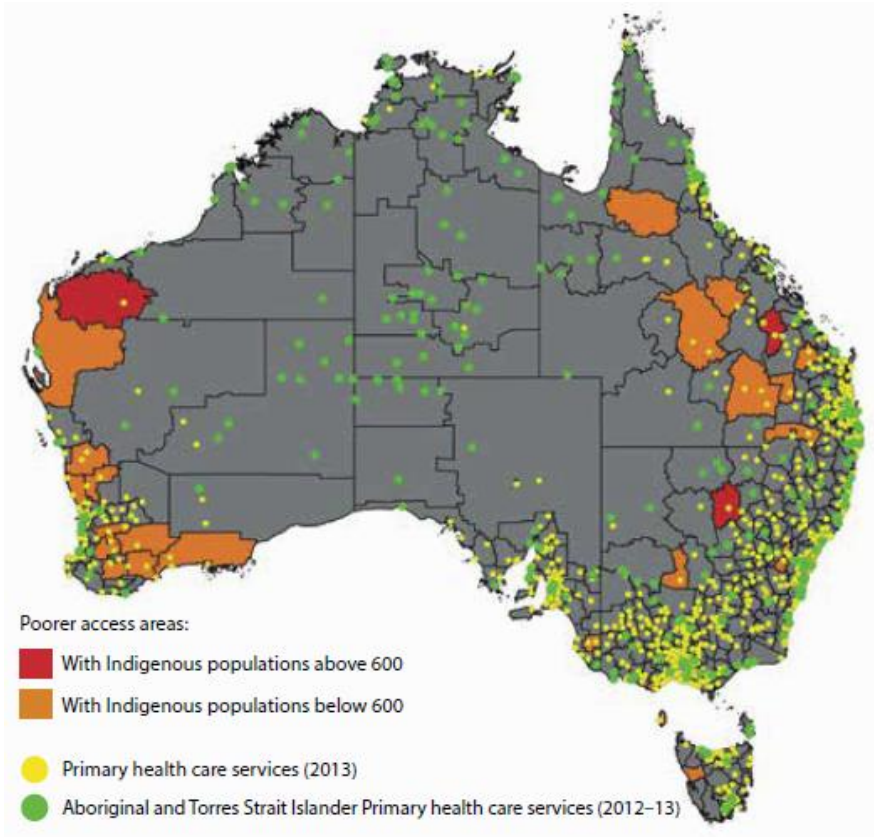
Suicide rates across LGAs and unincorporated SLAs, 1996-2000.





By Xin Qi, Wenbiao Hu, Kerrie Mengersen, and Shilu Tong. *BMC Public Health* 2014, 14:681, Published 4 July 2014

4. Changing needs over time

Fears domestic violence, crime, suicide will rise in Adelaide following Holden plant closure

Updated 10 Nov 2014, 7:55pm

Rates of domestic violence, crime and suicide will increase in Adelaide's north if Holden workers cannot eventually move to other jobs, a Senate inquiry has heard.

The inquiry into income inequality in South Australia has been focusing on the consequences of Holden ending manufacturing at the Elizabeth plant in 2017.

Reverend Peter Sandeman is with Anglicare but is also a member of the State Government's Automotive Transformation Taskforce.

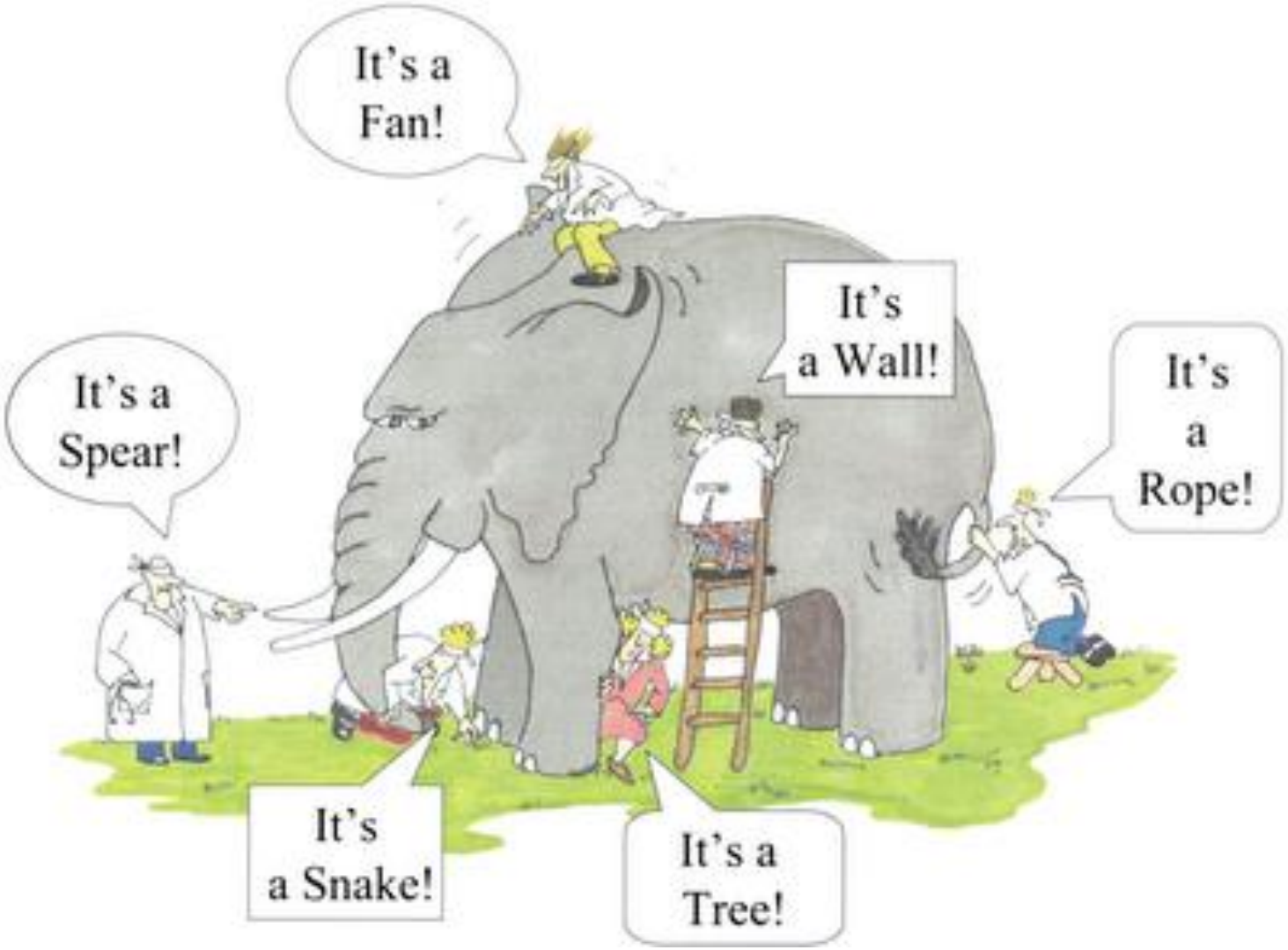
He told the inquiry there was only a short window of opportunity to train workers in other areas.

"If young people don't see a chance of getting employment at the end of school, why stay in school?" he said.

PHOTO: The future of Holden workers under the spotlight at the Senate inquiry into income inequality in South Australia. (ABC News)

NEWS

5. Different perspectives and competing views of what should be done

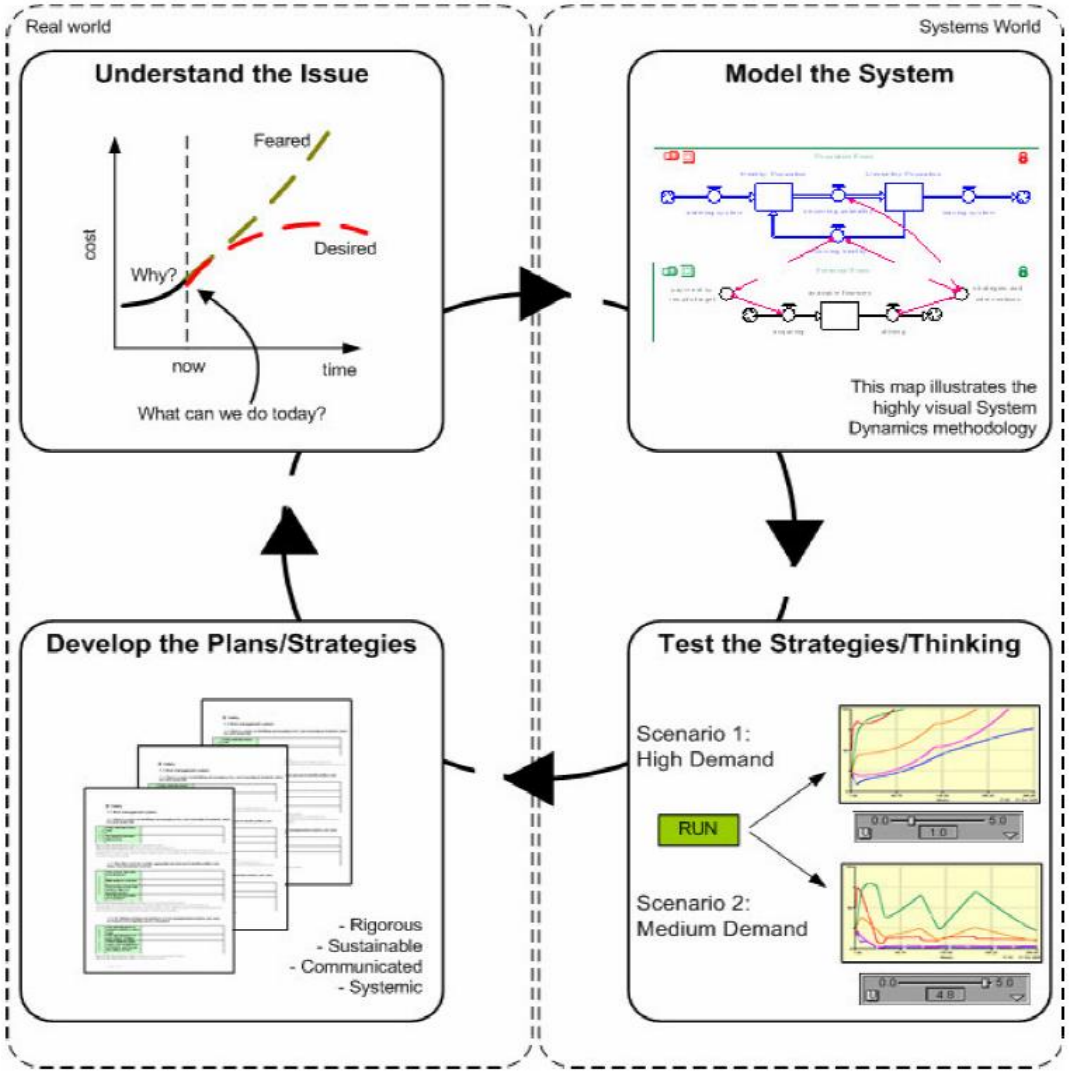


WHAT CAN DYNAMIC SIMULATION MODELLING OFFER HEALTH POLICY AND PLANNING?

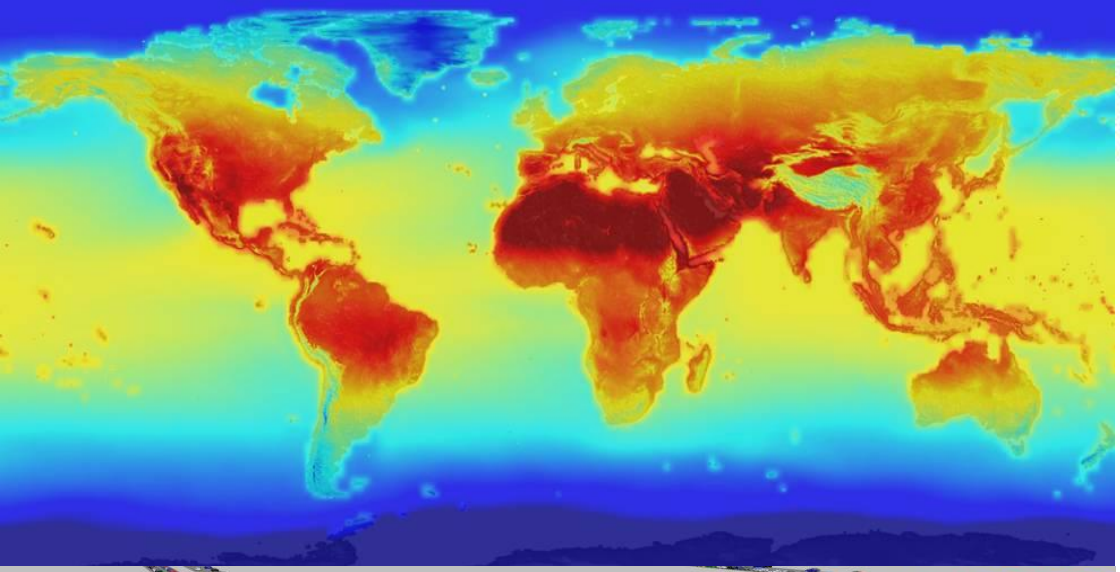
Systems modelling | Computer simulation

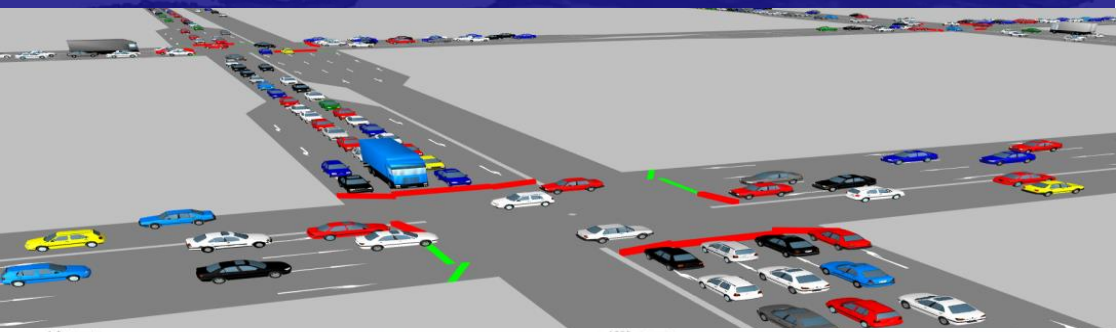
System understanding leading to insight

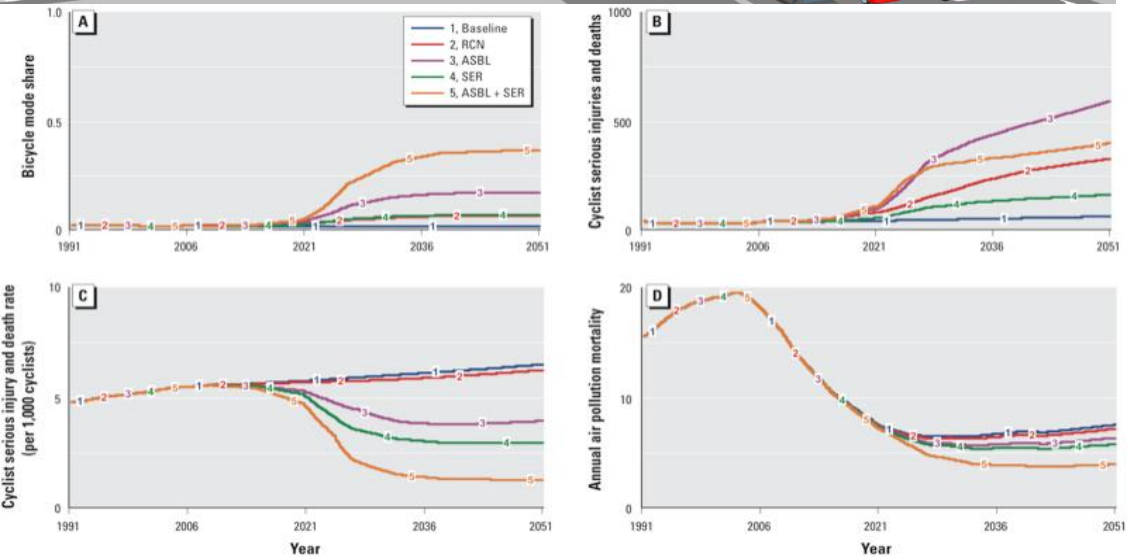
- Help manage uncertainty
- Ask ‘what if’ questions
- Inform strategic planning

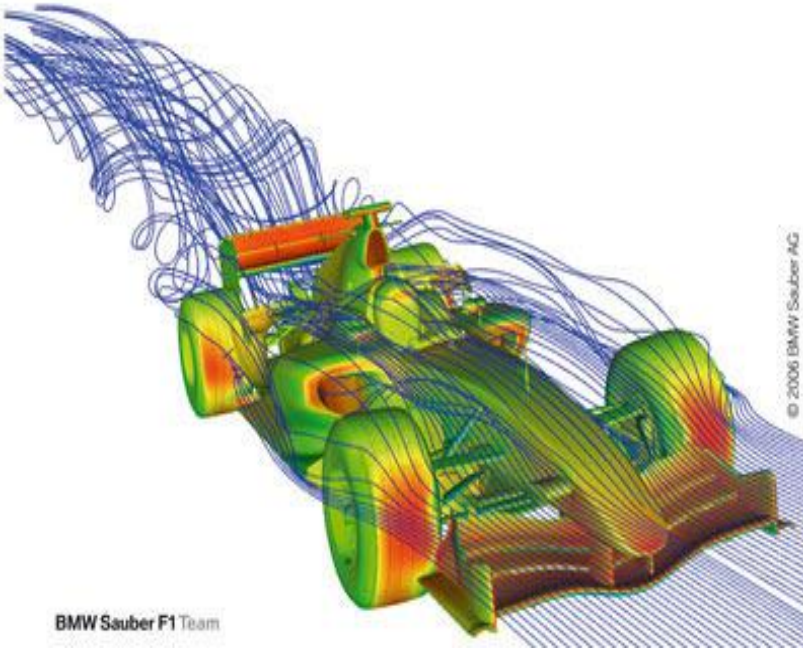


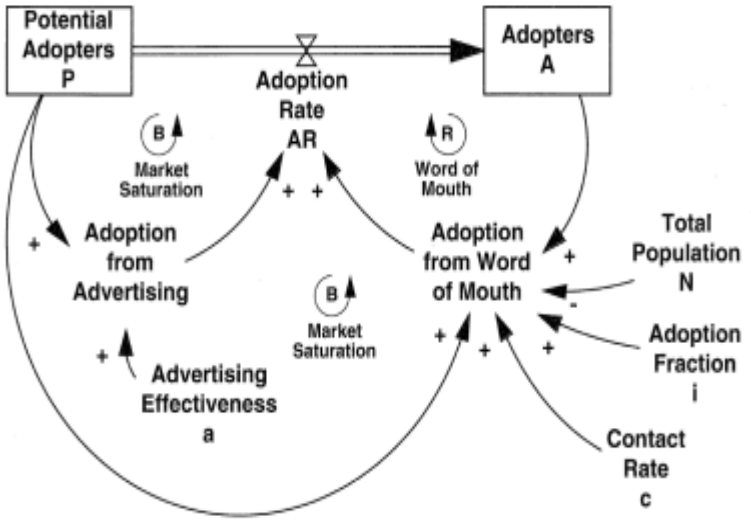
Source: Wolstenholme E F et al. (2006) Reforming Mental Health Services in the UK - Using System Dynamics to support the Design and Implementation of a Stepped Care approach to Depression in North West England. Proceedings of the 2006 System Dynamics Conference, Nijmegen, Netherlands





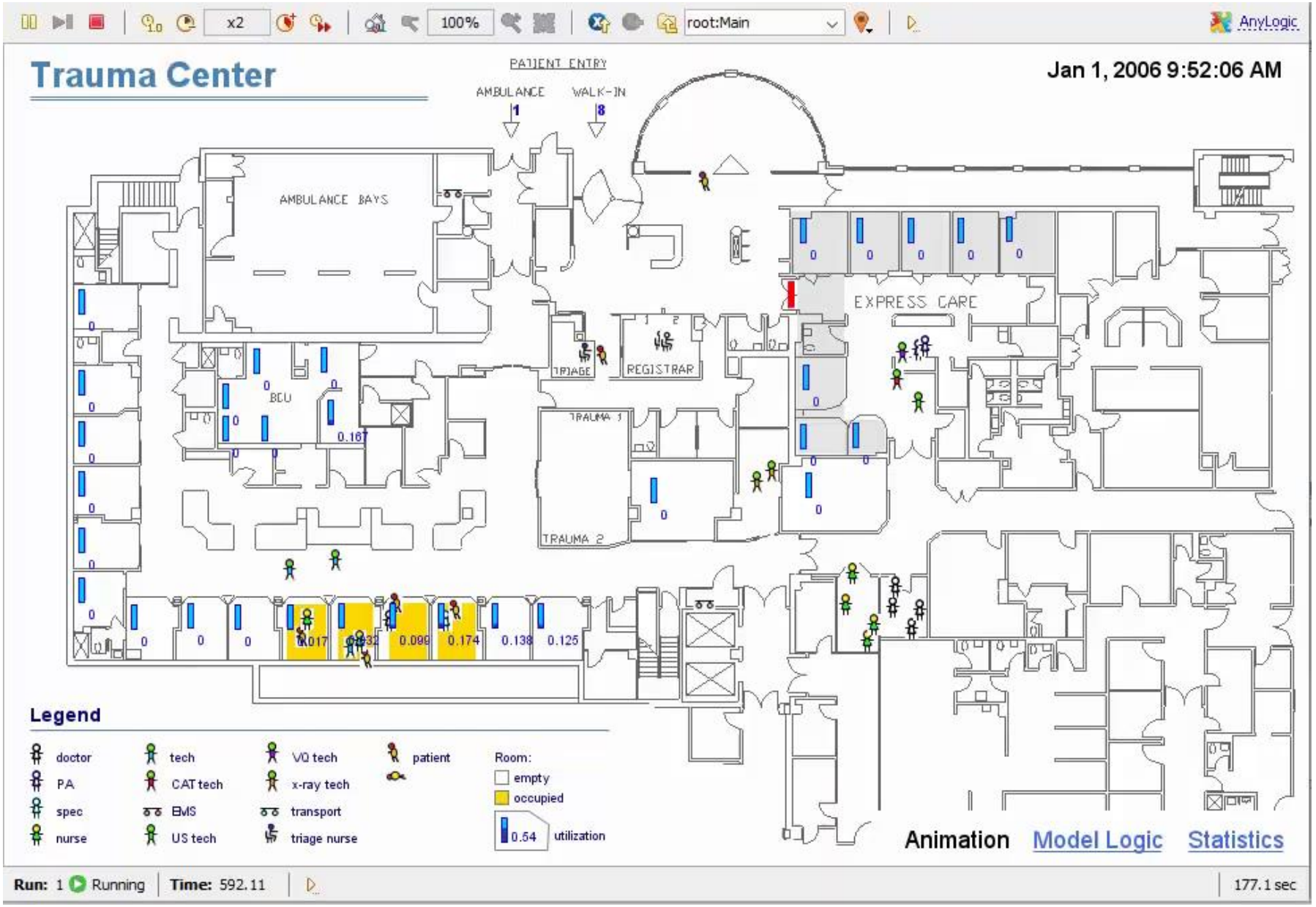






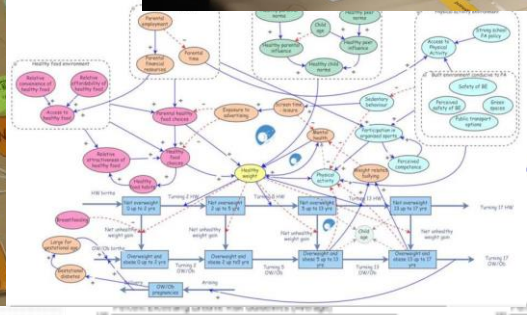
Adoption of new technology

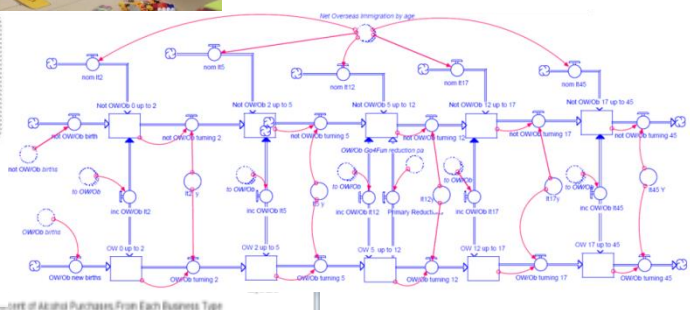
Helping to address efficiency and safety in health sector

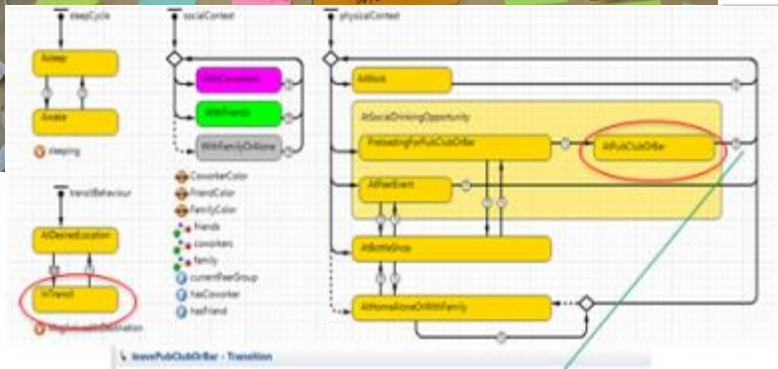


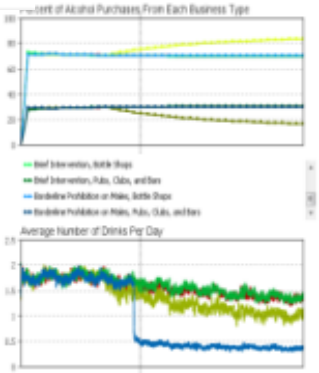
Policy makers at centre of unique approach to test solutions to complex problems

A low-cost, low-risk simulation tool enables decision makers to forecast what will happen when they launch policies in the real world.







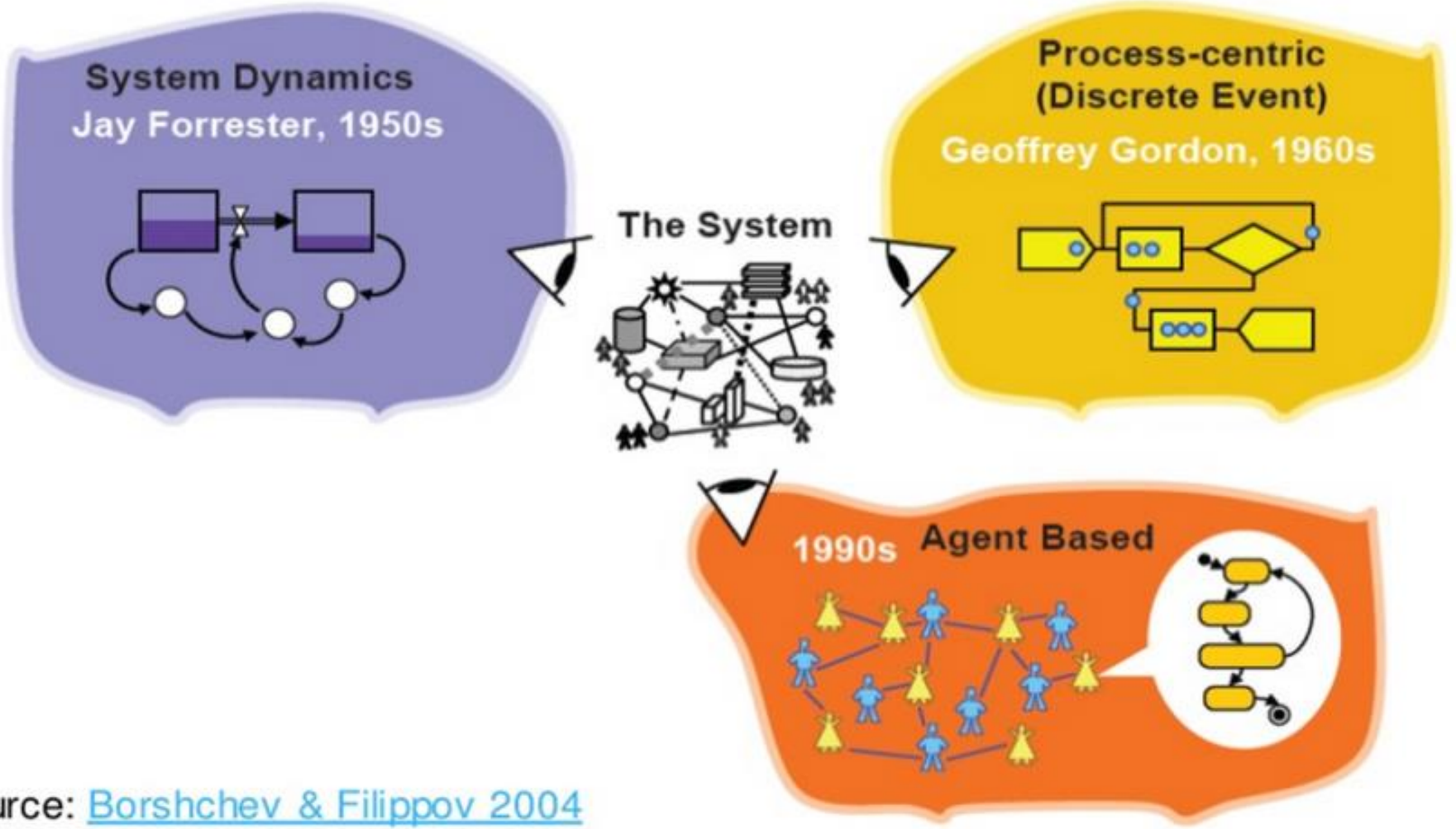


Exemplars | Policy and Planning Models

A selection of applications in partnership with policy agencies

- **Reducing alcohol related harms** – models for New South Wales, ACT, and Tasmania
- **Tobacco control models** – Queensland and ACT models
- **Reducing childhood overweight and obesity** – New South Wales and National models
- **Diabetes in pregnancy** – Australian Capital Territory
- **Smoking and Chronic Obstructive Pulmonary Disease** – New South Wales model
- **Mental Health service planning and suicide prevention –** Western Sydney Primary Health Network and National models
- **Portfolio management across common lifestyle related chronic disease risk factors** – National and ACT models
- **Integrated service planning across the health system** – Queensland model
- **Food policy** – ACT model

Dynamic simulation modelling methods



Source: Borshchev & Filippov 2004

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NEW SOUTH WALES HEALTH

- REDUCING ALCOHOL RELATED HARMS -

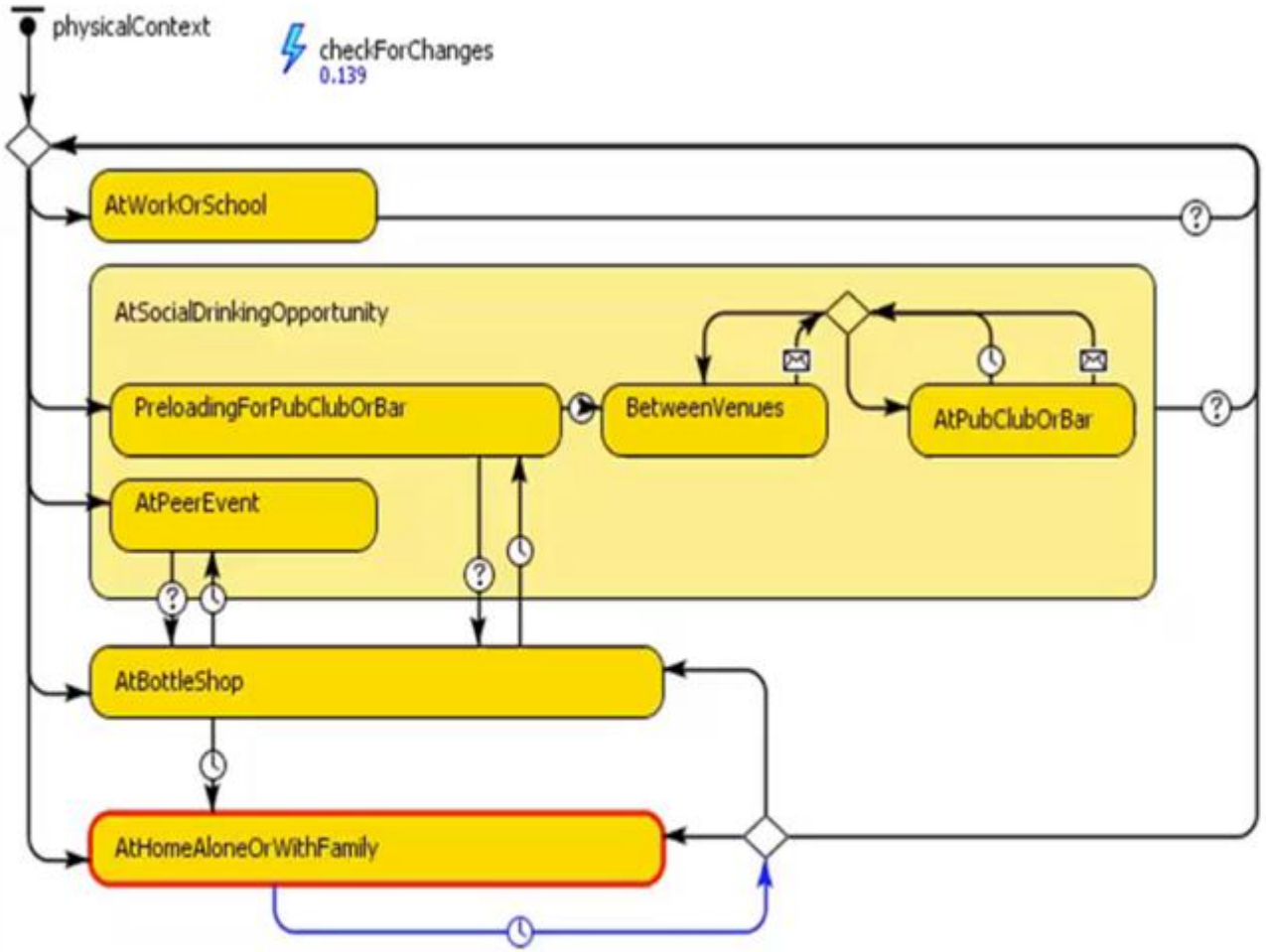
NSW model of alcohol related harms
- Agent based model -

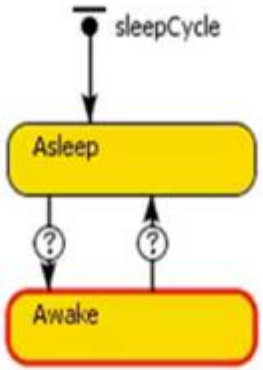
The Australian Prevention Partnership Centre
Systems and solutions for better health

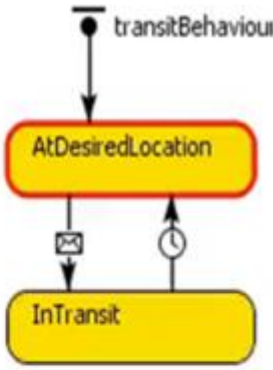
- Academic alcohol experts
- Clinical experts
- Policy and program experts
  - NSW Health
    - Centre for Population Health
    - Centre for Epidemiology and Evidence
    - Drug & Alcohol Directors
    - Local Health District Directors
    - Office of Preventive Health
  - NSW Treasury

Modellers: Dylan Knowles, Ante Prodan, Geoff McDonnell

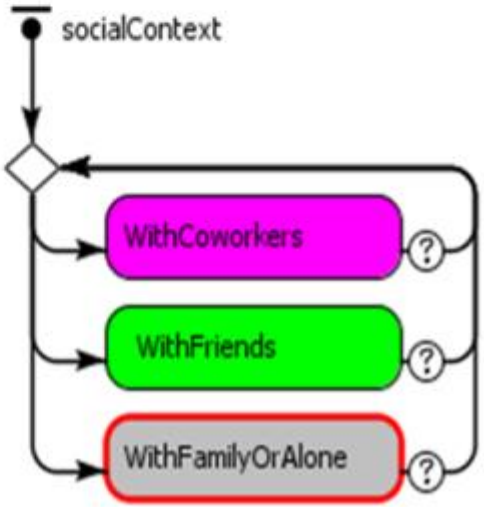
Physical Context



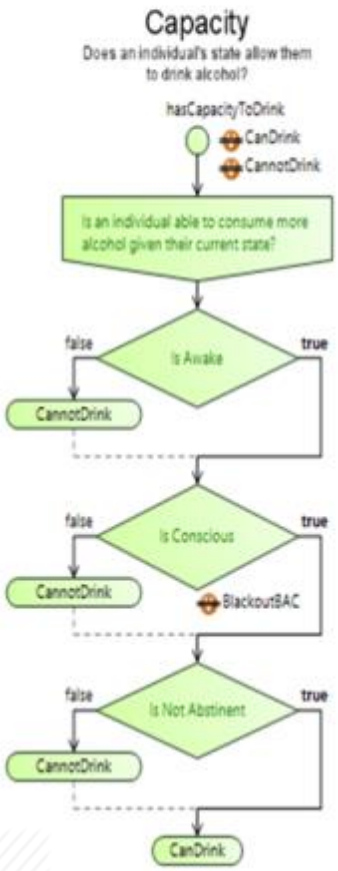


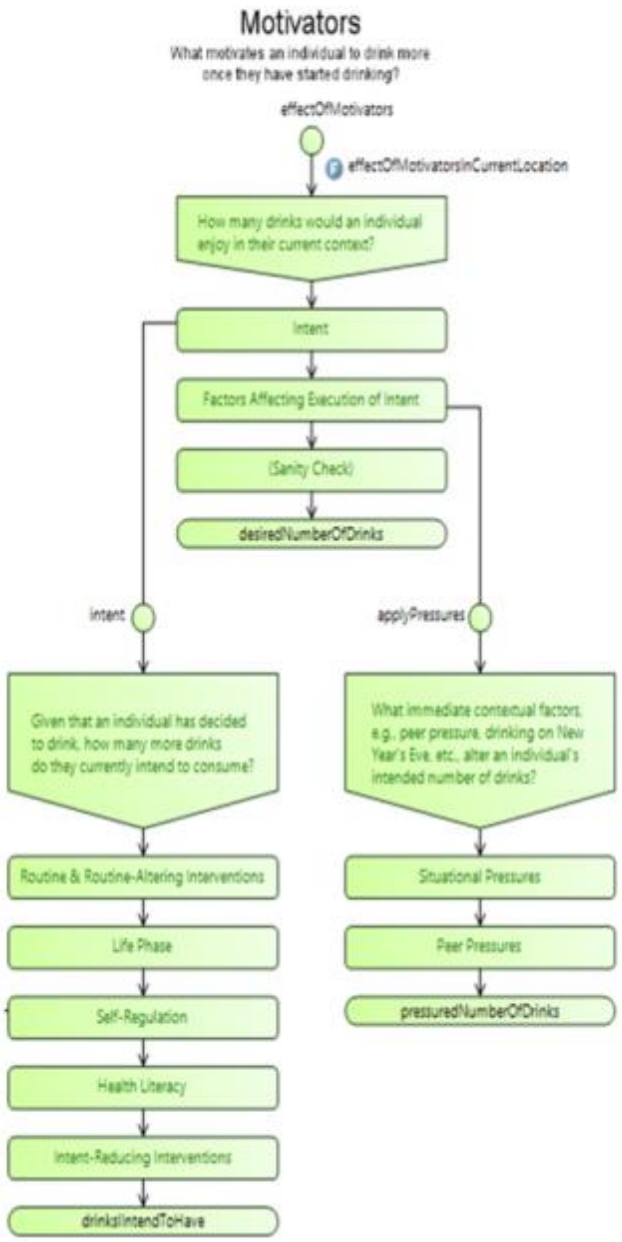


Social Context

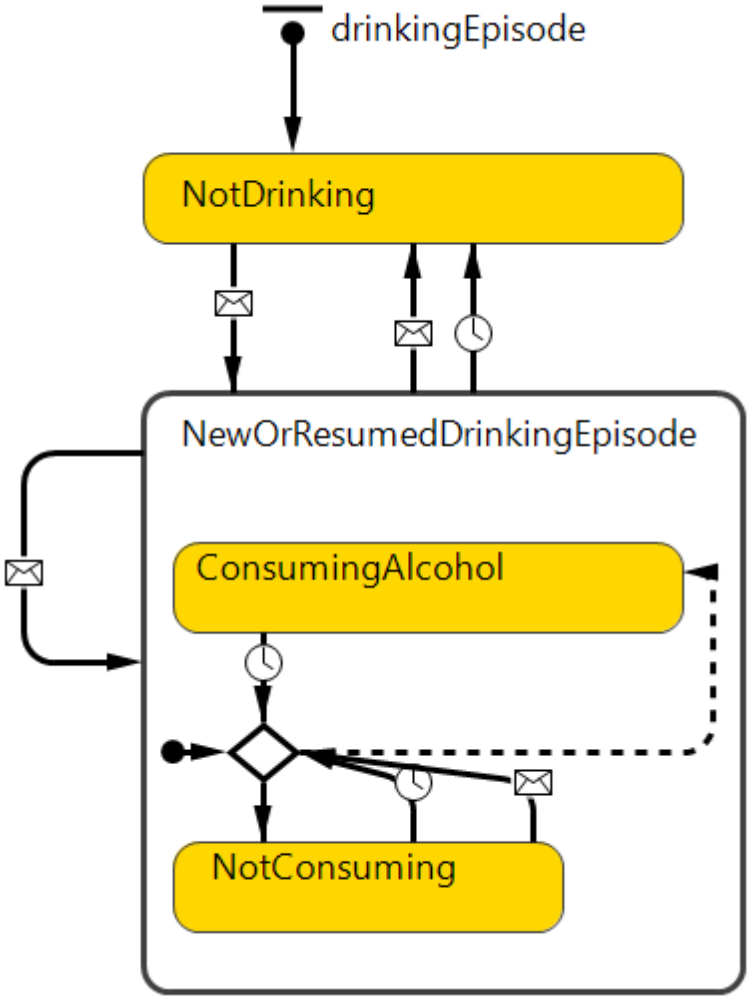


Rules govern the behaviour of individuals

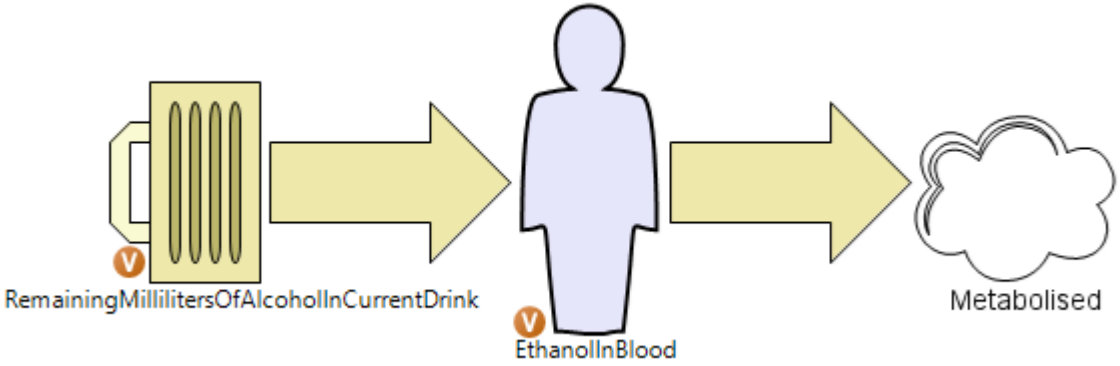




Drinking episodes



The model keeps track of each individuals' blood alcohol concentration

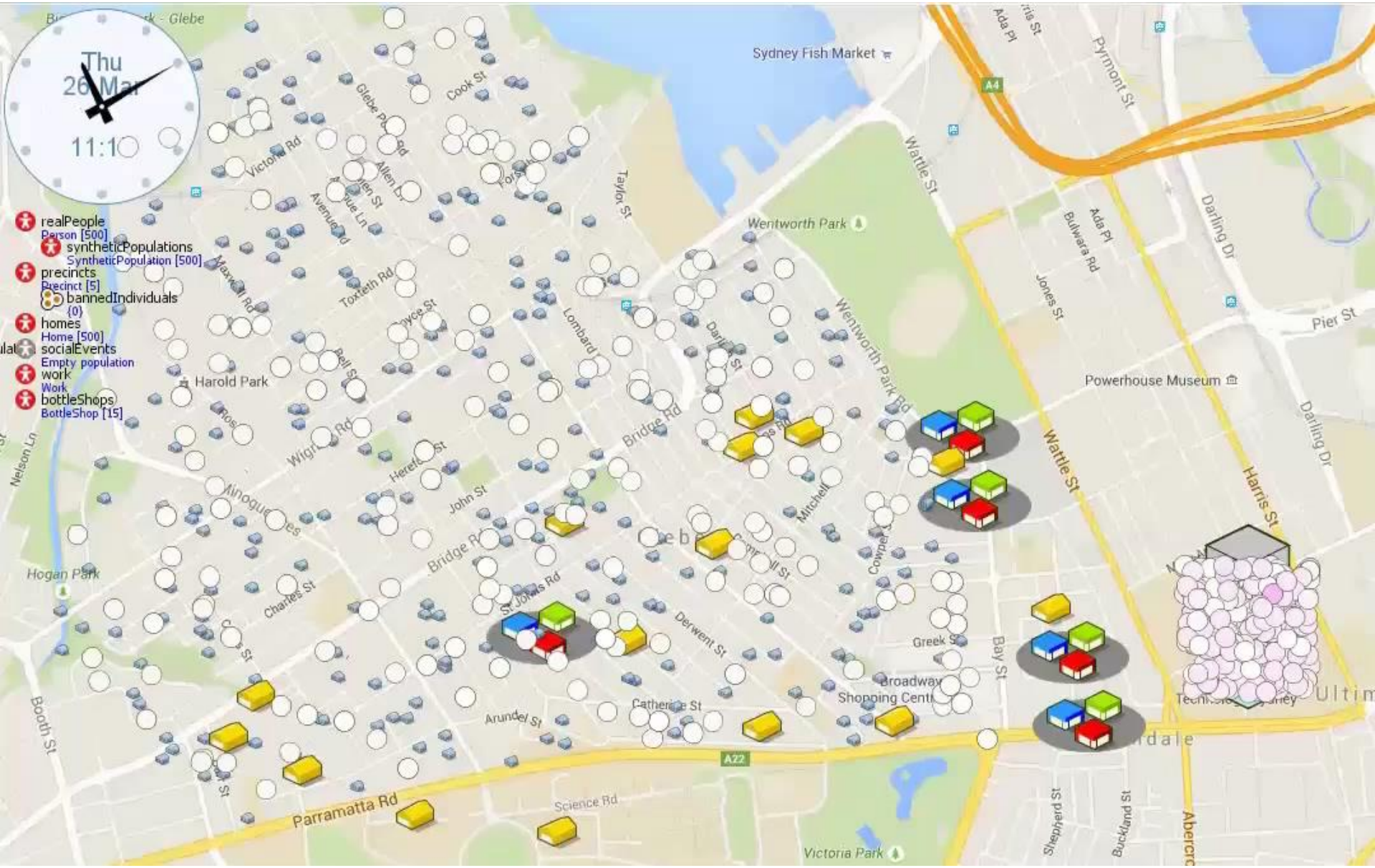


Chronic harms simulated:

Lip, oral and pharyngeal cancer
Oesophageal cancer
Liver cancer
Breast cancer (female)
Colorectal cancer
Hypertensive diseases
Ischaemic heart disease
Haemorrhagic stroke
Cirrhosis of liver

Acute harms simulated:

Violence
Road traffic accidents
Alcohol poisoning
Accidental injuries (e.g. falls, fire, drowning)
Acute presentations resulting from chronic alcohol use disorder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bannedIndividuals
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work
Work
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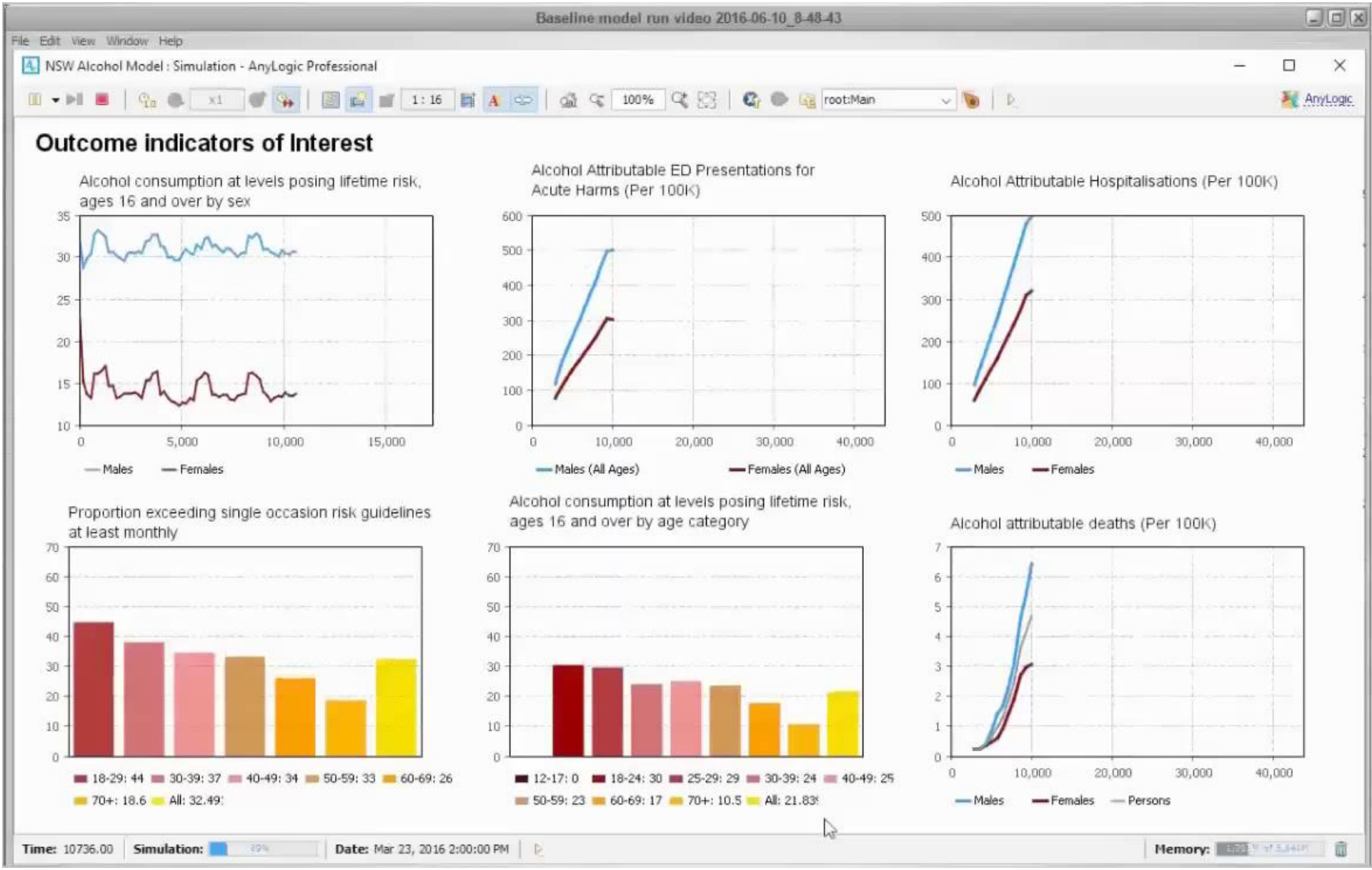
Sydney Fish Market
Wentworth Park
Harold Park
Powerhouse Museum
Hogan Park
Victoria Park
Parramatta Rd
Bridge Rd
Wattle St
Harris St
Pyrmont St
Darling Dr
Pier St
Jones St
Bulwara Rd
Ada Pl
Wentworth Park Rd
Lombard St
Taylor St
Cook St
Victoria Rd
Glebe Point Rd
Allen St
Avenue Rd
Toxteth Rd
Maxwell Rd
Bell St
John St
Hereford St
Mitchell St
Cowper St
Derwent St
St Johns Rd
Charles St
Arundel St
Catherine St
Broadway
Shopping Centre
Greek St
Bay St
Science Rd
Booth St
Nelson Ln
Shepherd St
Buckland St
A4
A22

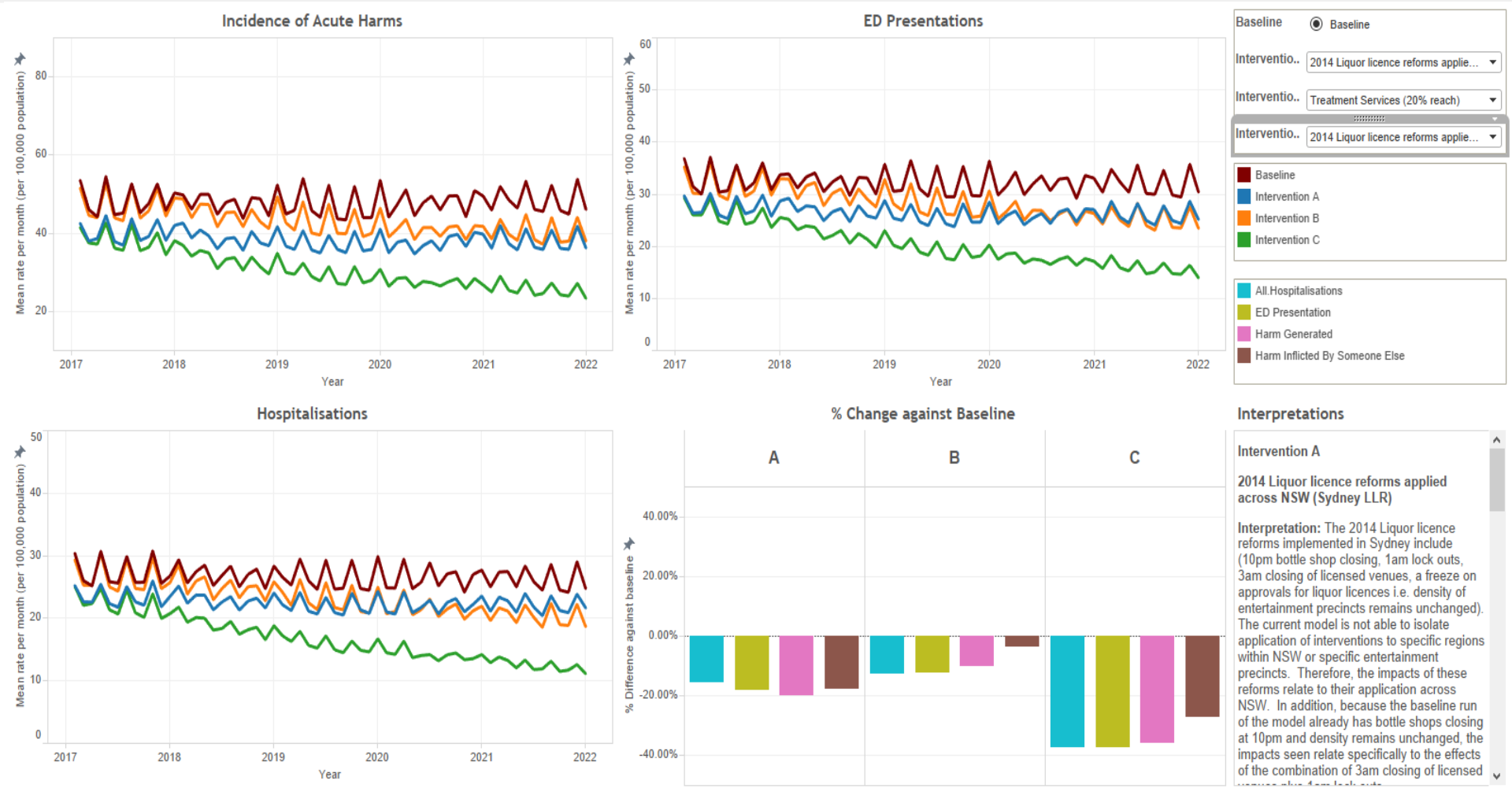
Test whether model is able to reproduce historic data pattern across a range of indicators



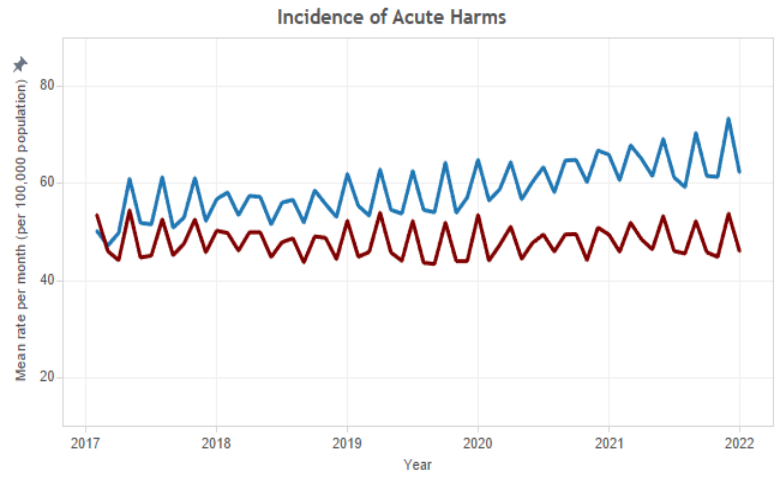
Model interventions:

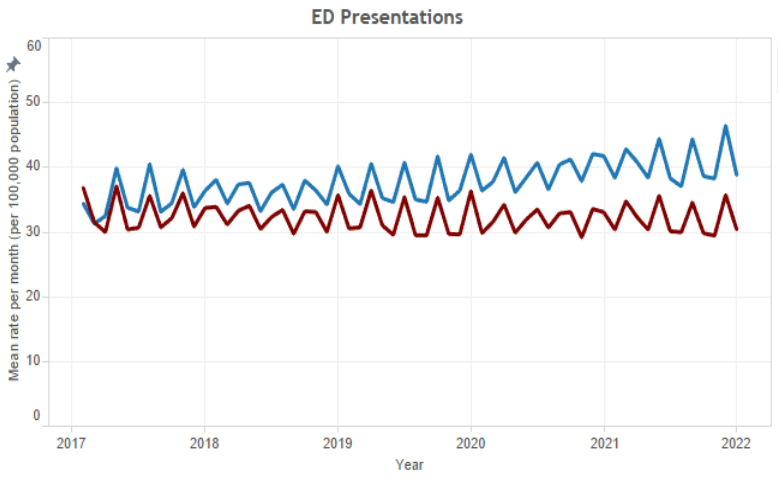
Brief interventions (delivered by health professionals)
Improved access to alcohol treatment services
Restriction of hours of sale of alcohol
‘Lock outs’
Limiting the density of licensed venues
Advertising bans
Minimum pricing
Enhanced enforcement of RSA

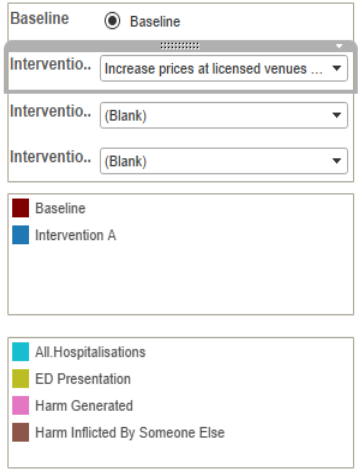
The effects of combining multiple interventions are not necessarily additive

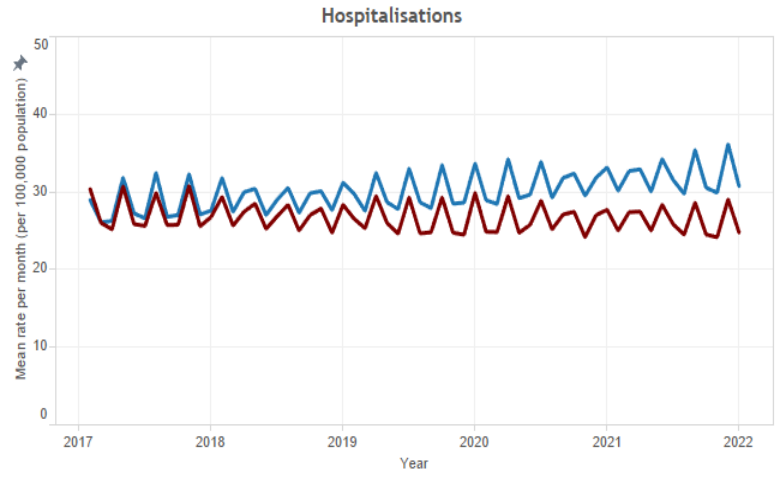


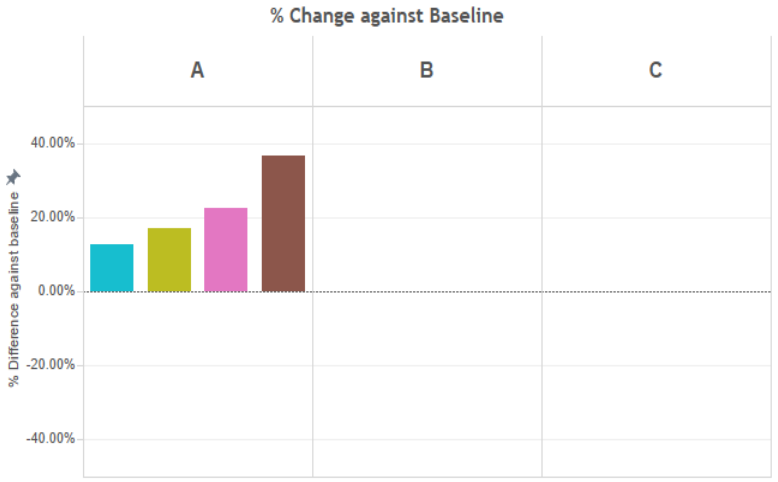
Some interventions can have unintended consequences

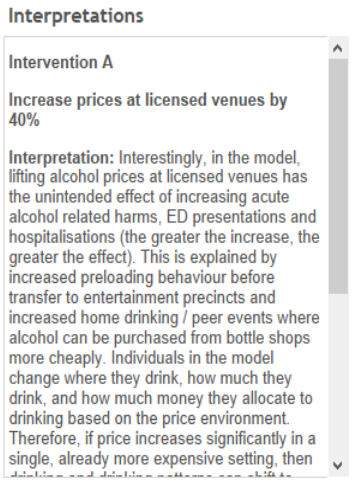




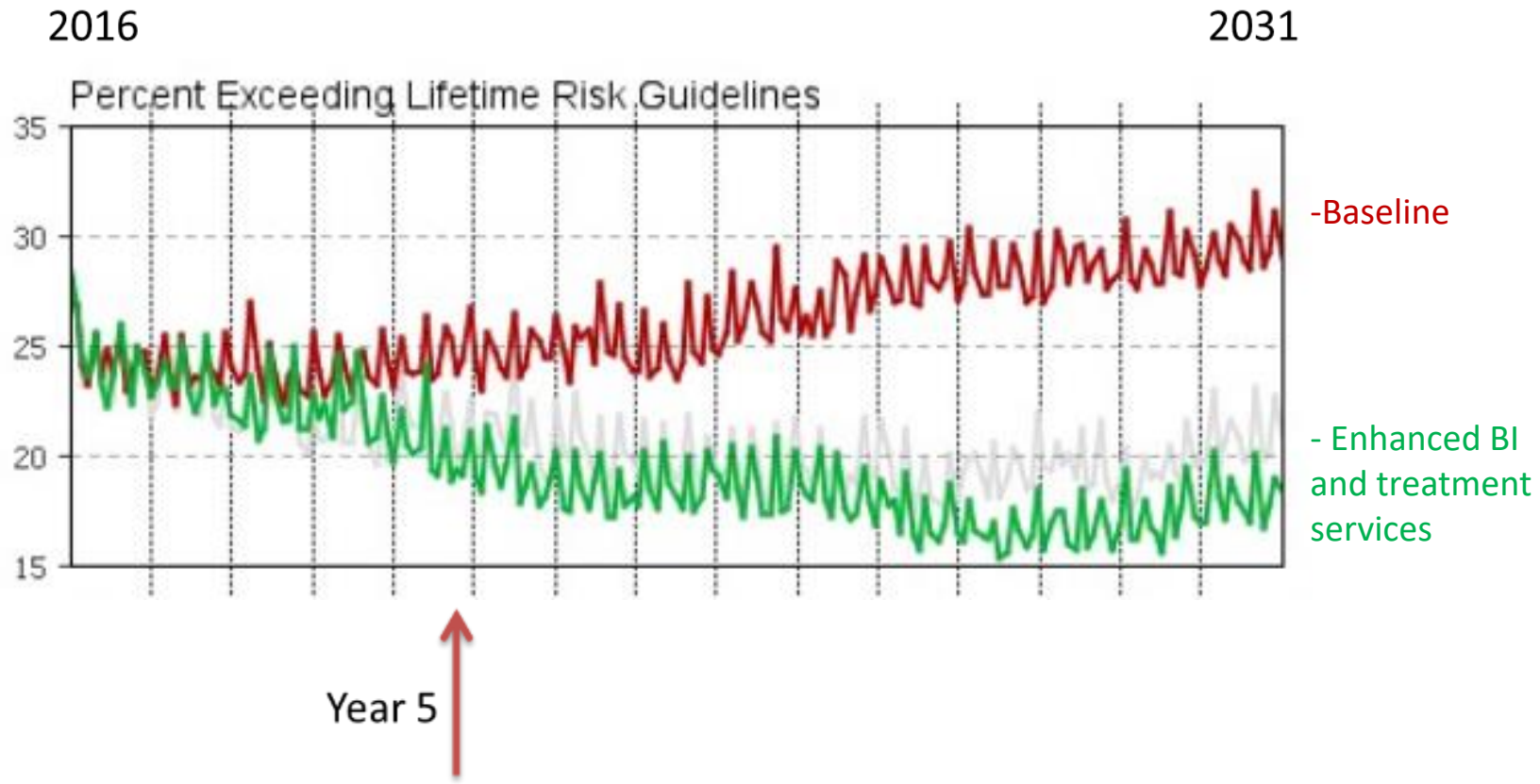








The effect of interventions can grow stronger over time with impacts not seen within a policy cycle



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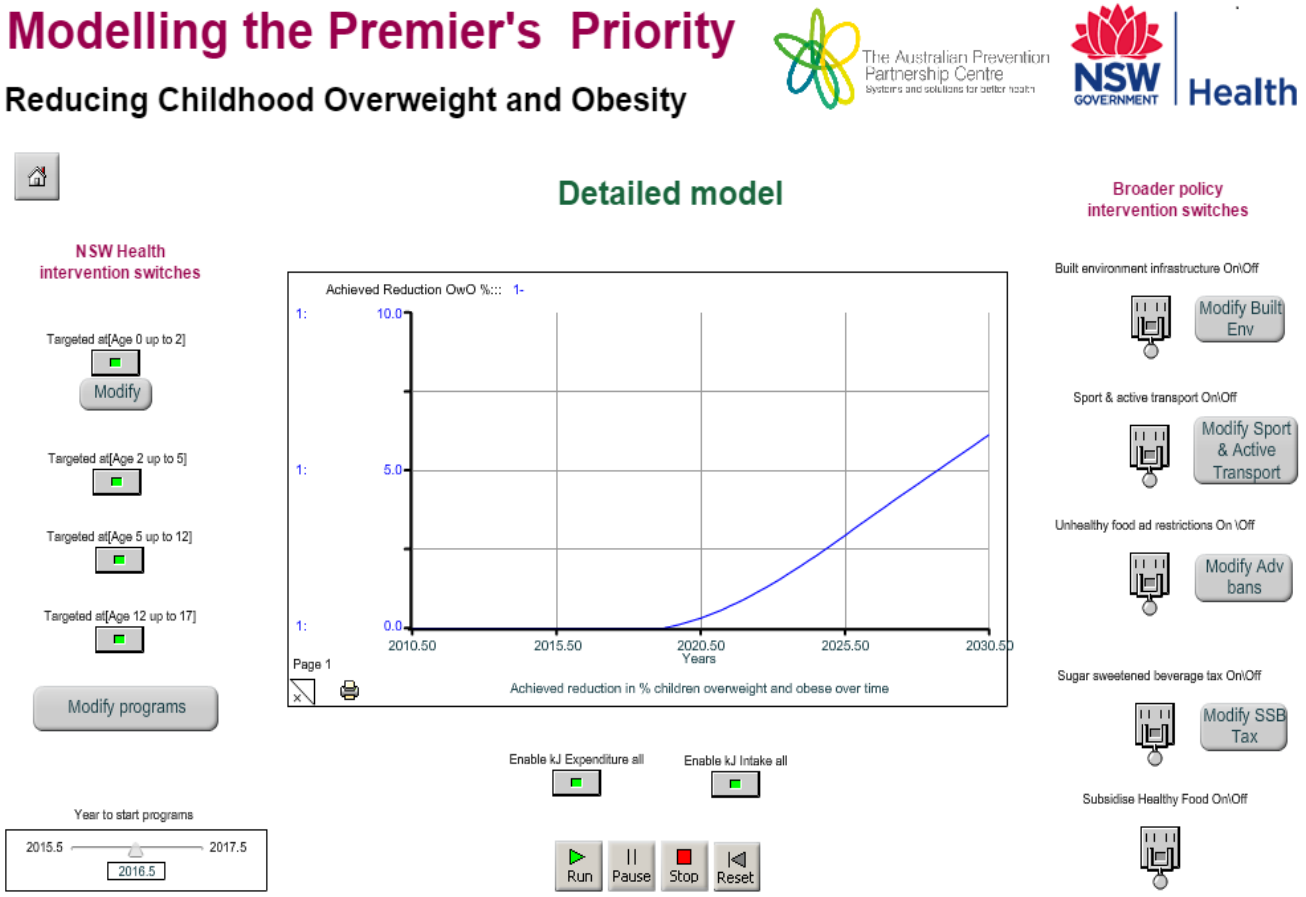
NEW SOUTH WALES HEALTH

- CHILDHOOD OVERWEIGHT AND OBESITY-

How to achieve the premier's target for reducing childhood overweight and obesity?

The Australian Prevention Partnership Centre
Systems and solutions for better health

- Policy partners and collaborators:
  - NSW Health
    - Centre for Population Health
    - Office of Preventive Health
  - NSW Department of Premier and Cabinet
  - Multidisciplinary academic and clinical stakeholders



Modellers: Mark Heffernan, Geoff McDonnell, Ante Prodan

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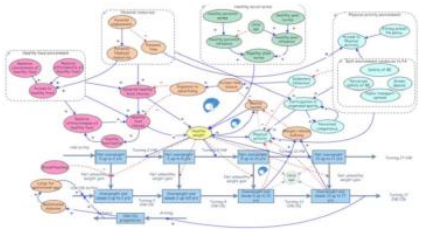
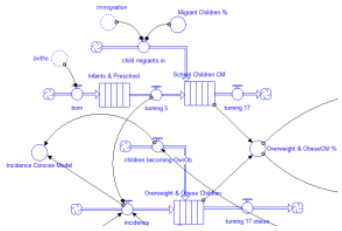




Modelling the Premier's Priority

Reducing Childhood Overweight and Obesity

The Australian Prevention Partnership Centre
Systems and solutions for better health

NSW GOVERNMENT Health

Detailed model

NSW Health intervention switches

Targeted at[Age 0 up to 2]

Modify

Targeted at[Age 2 up to 5]

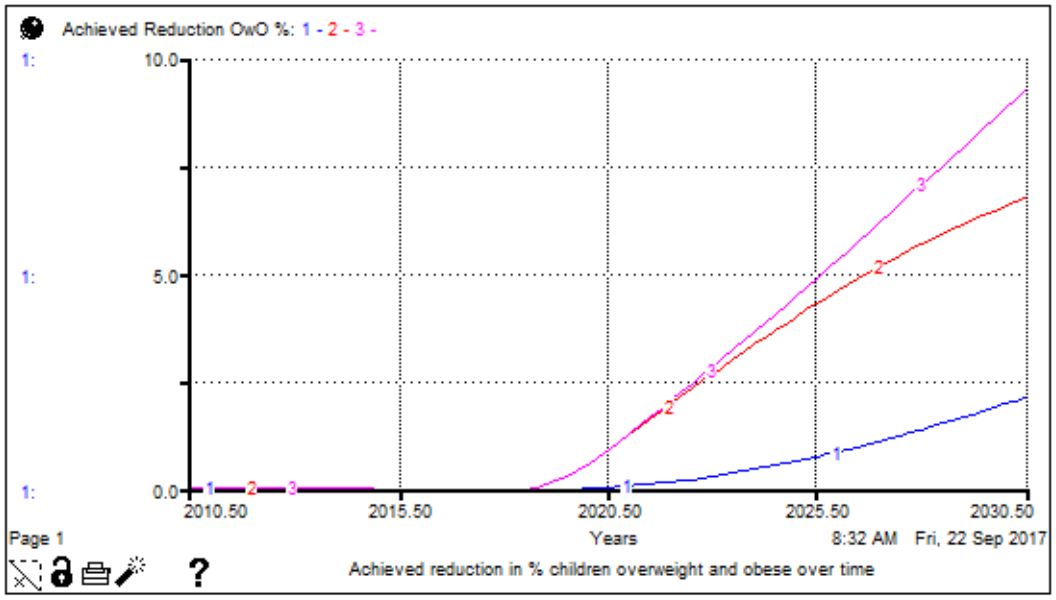
Targeted at[Age 5 up to 12]

Targeted at[Age 12 up to 17]

Modify programs

Year to start programs

2015.5 — 2016.5 — 2017.5



Enable kJ Expenditure all

Enable kJ Intake all

Run | Pause | Stop | Reset

Broader policy intervention switches

Built environment infrastructure On\Off

Modify Built Env

Sport & active transport On\Off

Modify Sport & Active Transport

Unhealthy food ad restrictions On \Off

Modify Adv bans

Sugar sweetened beverage tax On\Off

Modify SSB Tax

Subsidise Healthy Food On\Off

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ACT HEALTH

- DIABETES IN PREGNANCY -

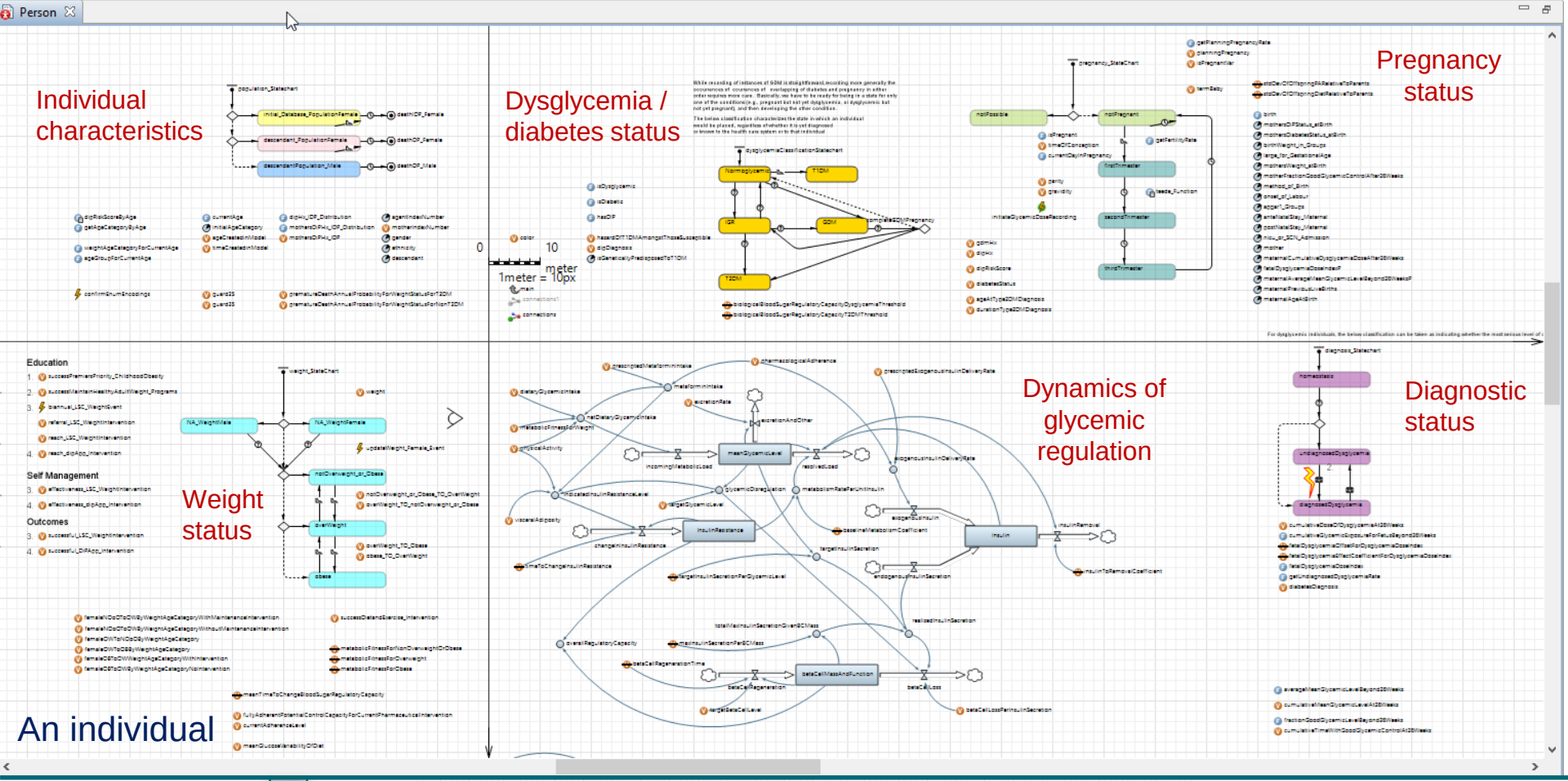
ACT Health – Diabetes in pregnancy tripartite model

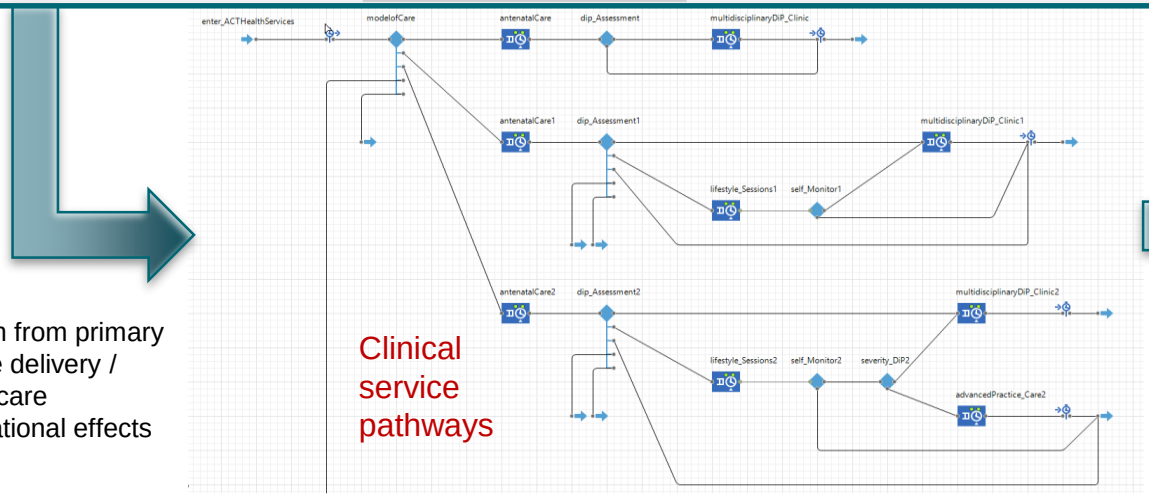
Project aim:

- To develop a dynamic simulation model to inform the best investments for prevention and management of diabetes in pregnancy
- To be able to test both clinical and population health interventions

Modellers: Nate Osgood, Geoff McDonnell, Yang Qin, Anahita Safarishahrbijari, Allan McLean, Winchell Qian

The Australian Prevention Partnership Centre
Systems and solutions for better health





- Spans the continuum from primary prevention to service delivery / alterative models of care
- Explores intergenerational effects of DIP

INTERACTIVE INTERFACES

Interactive user interfaces

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Modelling strategies to address smoking in Queensland

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The Australian Prevention Partnership Centre
Systems and solutions for better health

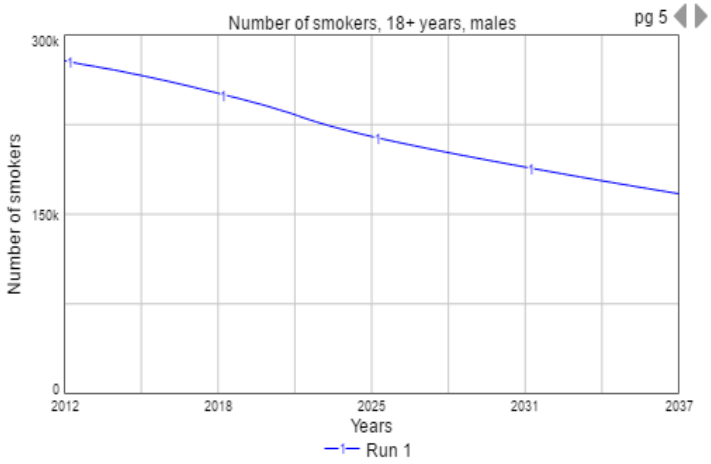
Queensland Government

A decision-support tool for reducing smoking-related harm

Model sectors

- Population
- Smoking prevalence
- Initiation
- Cessation and relapse
- Mental health
- E-cigarettes
- Smoking-related disease
- Release notes

Simulation results



Run Reset

Sub-populations

Costs

Accessibility and acceptability of tobacco

Tobacco licensing

Tobacco licensing start 2017 2027 2037

Smoke-free environments

Smoke-free environments start 2017 2027 2037

Age of supply increase

Age of supply increase start 2017 2027 2037

Smoke-free generation

Smoke-free generation start 2017 2027 2037

Affordability of tobacco

Real cost increase start 2021 2029 2037

Real cost increase duration (years) 0 10 20

0

Real cost increase per year

Appeal of tobacco

Mass media campaign start 2017 2027 2037

Campaign duration (years) 0 10 20

1

Mass media campaign exposure

Agency to quit tobacco

Brief cessation interventions

Quit support programs

Quit support target (per year) 5k

Modify interventions

Qld Smoking v1.01, December 2017

Modelling the NSW Premier's Priority

Reducing Childhood Overweight and Obesity

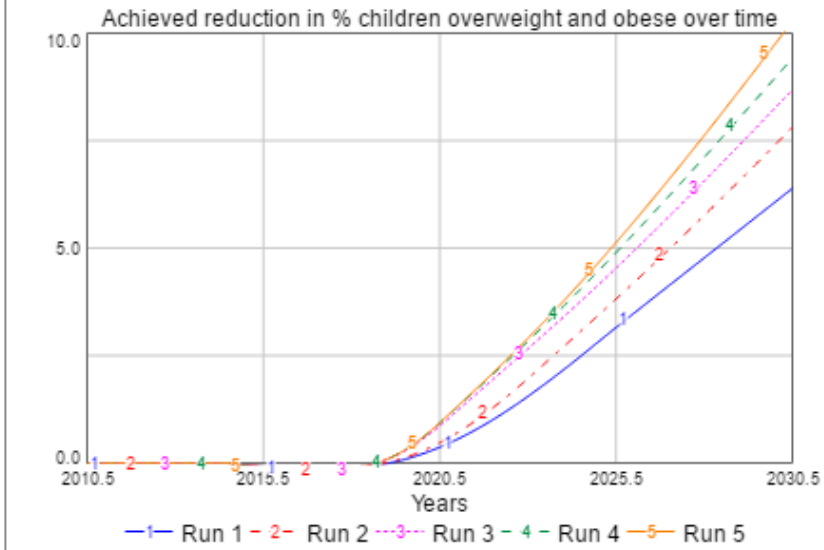
The Australian Prevention Partnership Centre
Systems and solutions for better health

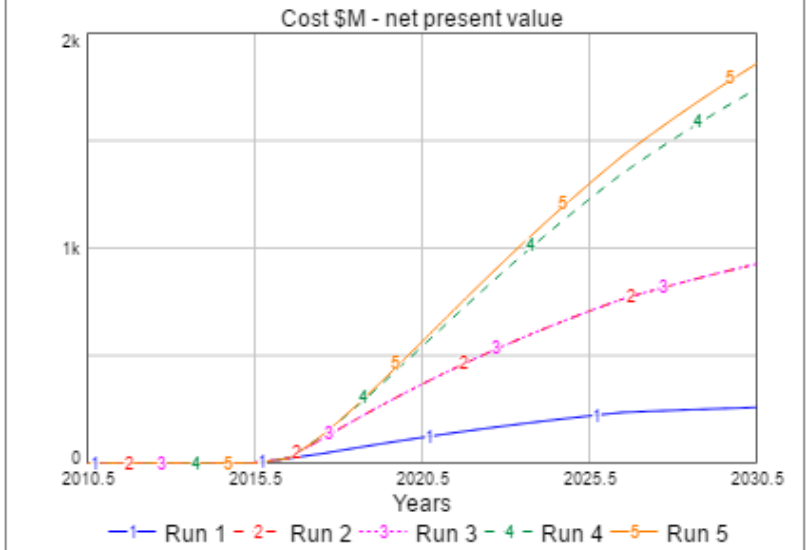
NSW GOVERNMENT Health

- The Nature of the Problem
- Population Structure
- Prevention interventions
- Weight loss interventions
- Key model assumptions
- Cost interface
- Start Stella Live

Stop Stella Live

Export data from graphs





Run | Pause | Stop | Reset

NSW Health intervention switches

Programs targeted at age 0 to 2 — C

Programs targeted at ages 2 to 5 — C

Programs targeted at ages 5 to 12 — C

Programs targeted at ages 12 to 17 — C

60
Max % mothers reached

Broader policy intervention switches

Built environment infrastructure — C

Active Kids program — C

Water fountains — C

Sugar sweetened beverage tax — C

Active transport and sports — C

45
Max % sports voucher take up

Unhealthy food ad restrictions — C

Subsidies for healthy food

Energy intake alone

Energy expenditure alone

Release Notes

OandO V878
TAPPC 22 Dec 2017

Interactive user interfaces

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Background

- The Magnitude of the Problem
- Key question model aims to address
- Indicative Model Structure
- Trans-diagnostic stepped care
- Unfurl the model
- Intervention mechanisms
- Start Stella Live
- Stop Stella Live
- Export data from graphs

Western Sydney suicide prevention decision support tool

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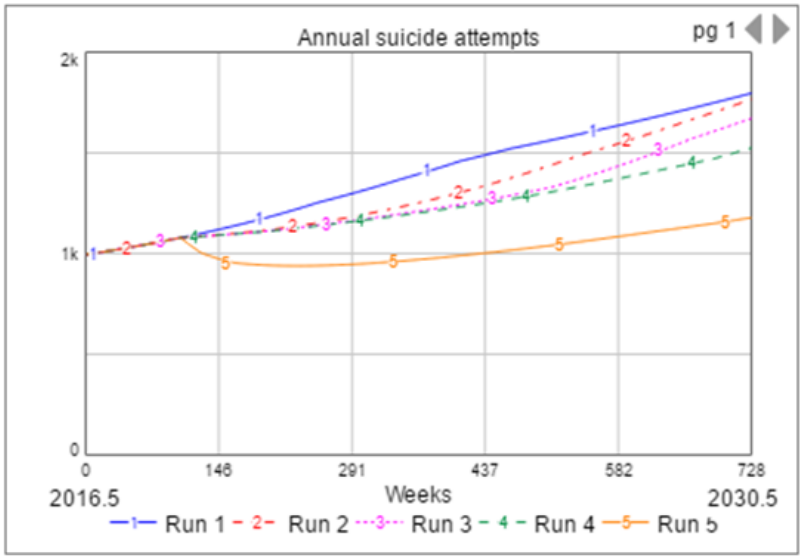
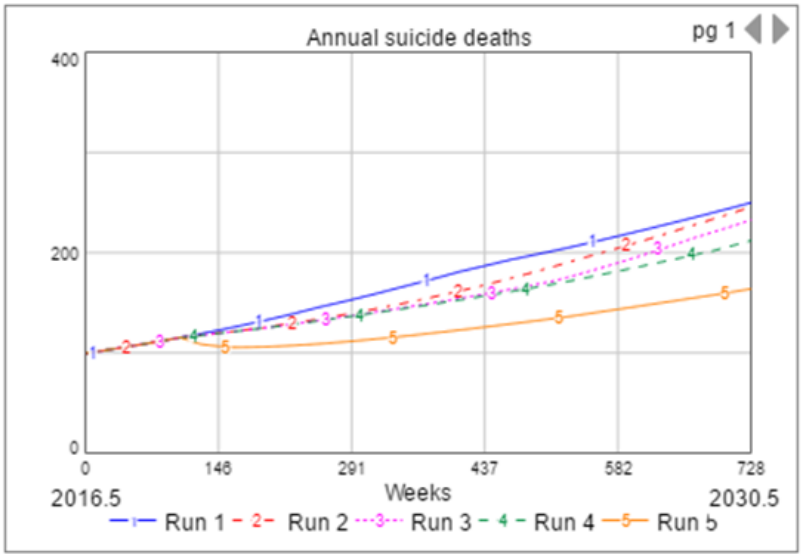




Run | Pause | Stop | Reset

Specific suicide prevention interventions

- Post suicide attempt assertive aftercare Off\On
- GP / Gatekeeper training
- Suicide helpline and call-back service
- Modify community infrastructure spend per annum
- Community Support

Mental health interventions

- Mental Health Hospital to Home Service
- Online / technology enabled care
- Sub-acute community Mx of severe mental disorder
- Headspace
- New intervention to re-engage those lost to services
- Reduction % pa: 45

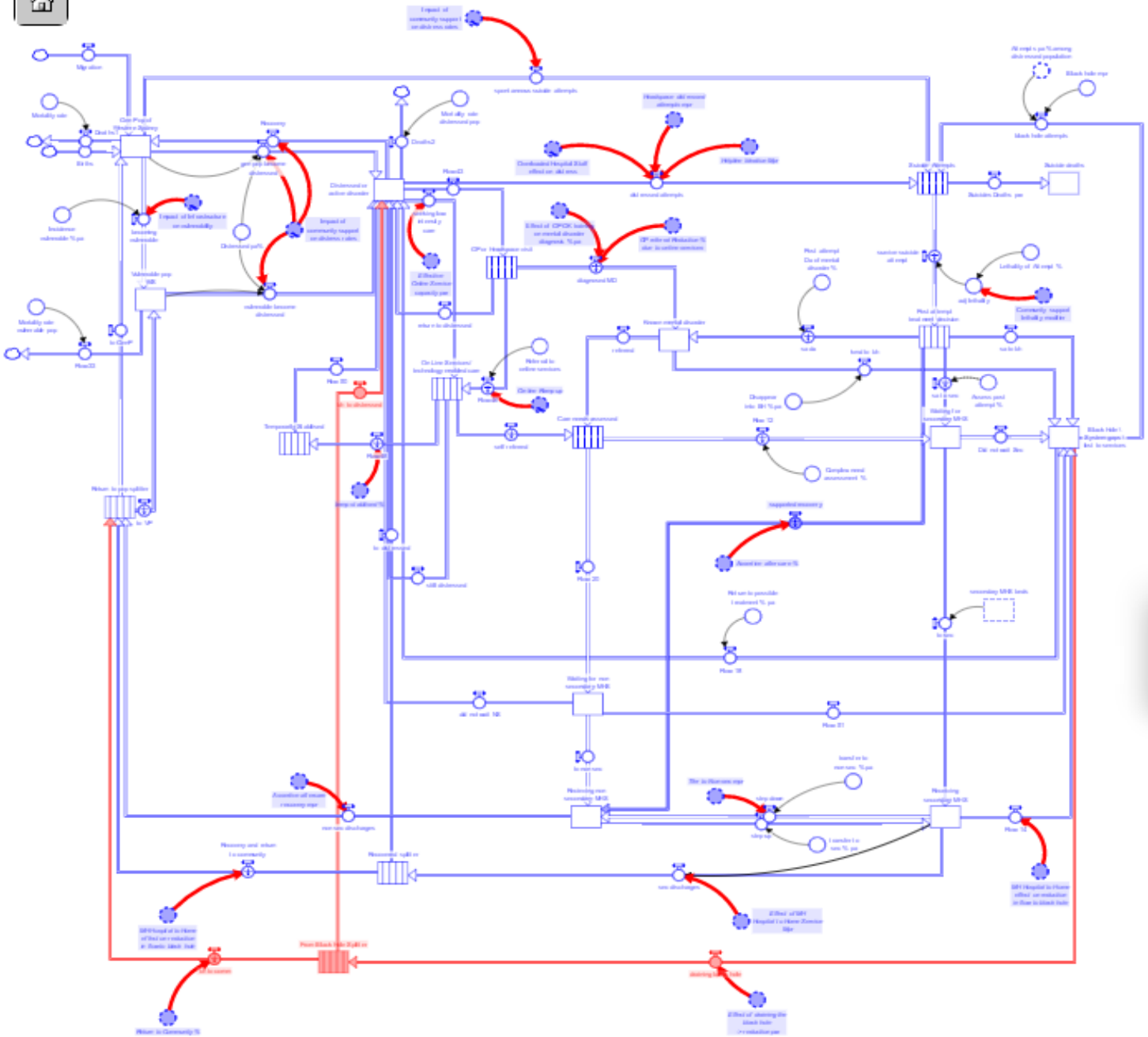
Mental health service planning

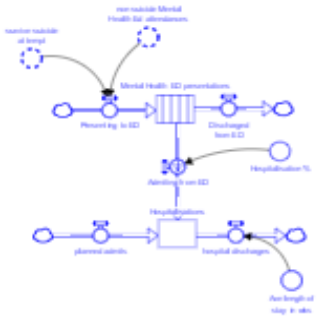
- Modify hospital staffing and training
- Staff increase % pa: 2
- Annual training units: 5
- Modify secondary MH service capacity
- Extra beds pa: 5
- Modify non-secondary MH service capacity
- Extra non-sec practitioners pa: 5
- Grow assessment capacity
- % increase pa: 2

Release Notes

WW V708
11 Jan 2018

Model transparency important





Interventions in the model (red) act to modify the flows between the stocks.

Interactive user interfaces

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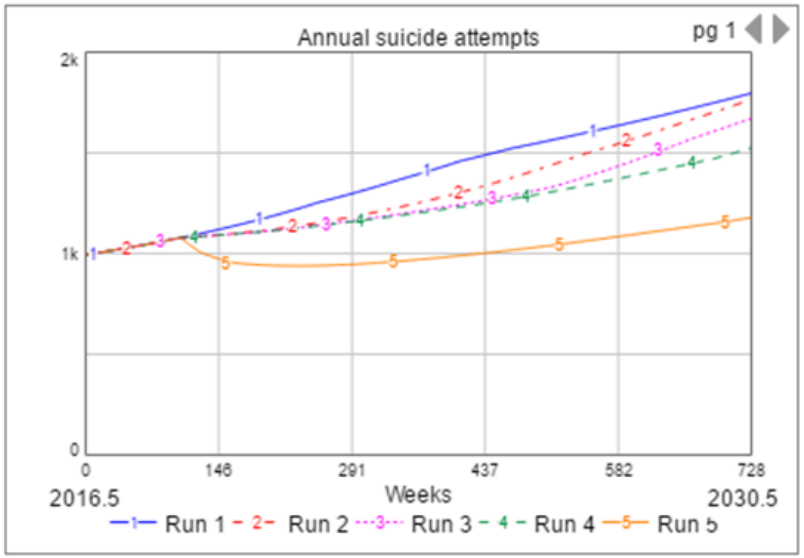

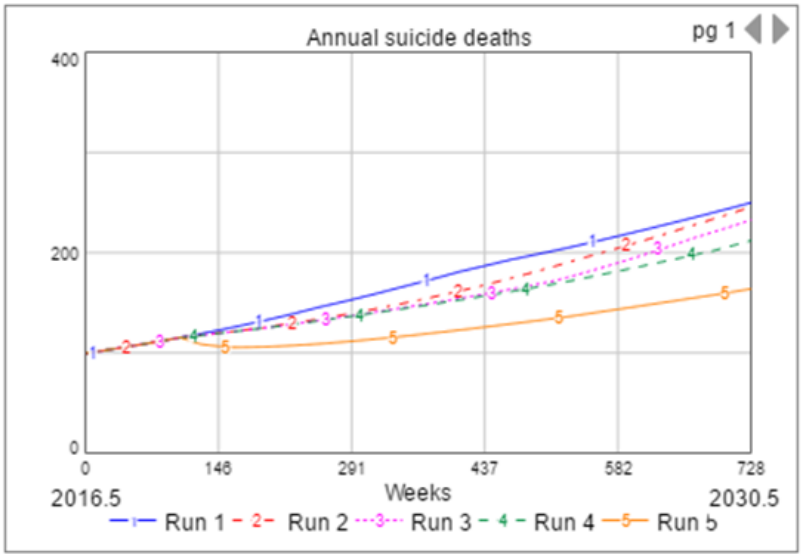

Run | Pause | Stop | Reset

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Release Notes

WW V708
11 Jan 2018

Intervention control panel

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About GP & Gatekeeper Training

Mechanism

GP and gatekeeper training control panel

Increase in referrals due to GP training %

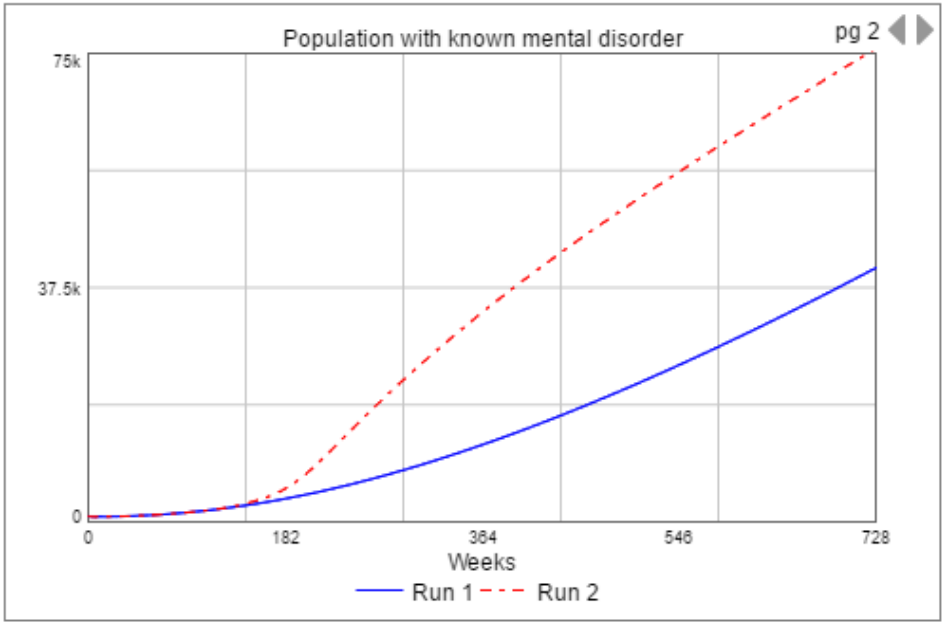
0.0 50.0 100.0

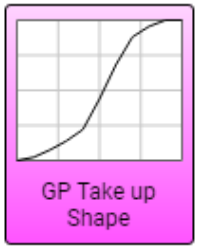
Years to Complete GP training

1.0 3.0 5.0

Week to Start GP Interventions

0 260 520





Run | Pause | Stop

Intervention control panel

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0 260 520

GP and gatekeeper training is aimed at reducing suicidal ideation through referral to services. This includes people who may be thinking about suicide for the first time or have survived a previous attempt.

In the model, this intervention acts to improve mental disorder diagnosis and referral to appropriate care.

The mechanism and estimates of effect for this intervention are informed by expert and local knowledge and:

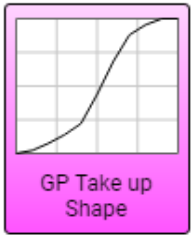
Alison Milner, Katrina Witt, Jane Pirkis, Sarah Hetrick, Jo Robinson, Dianne Currier, Matthew Spittal, Andrew Page, Gregory Carter (2017). *The effectiveness of suicide prevention delivered by GPs: A systematic review and meta-analysis.* Journal of Affective Disorders, 210: 294-302.

Kerry Knox, David Litts, Wayne Talcott, Jill Catalano Feig, Eric Caine (2003). *Ris of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: cohort study.* BMJ, 327: 1376.

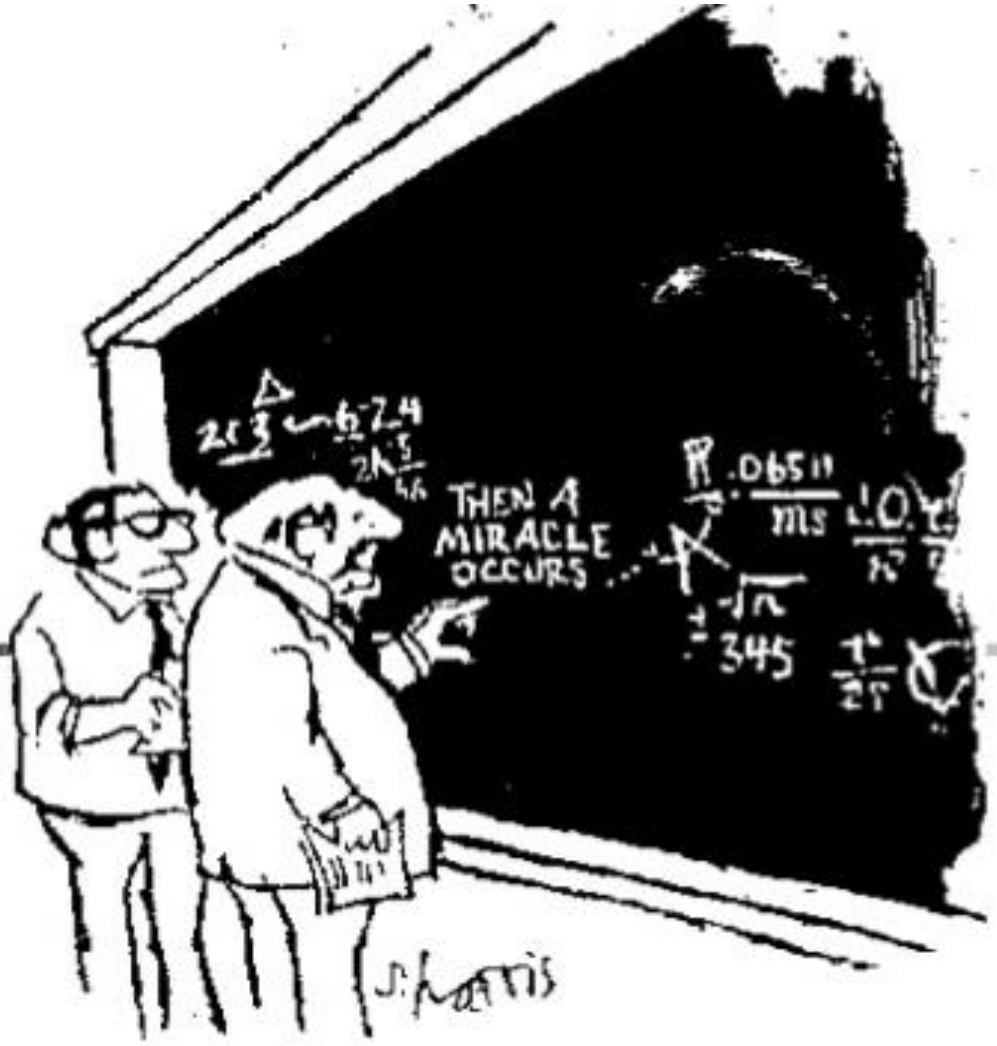
Michael Isaac, Brenda Elias, Laurence Katz, *et. al.* (2009). *Gatekeeper Training as a Preventative Intervention for Suicide: A Systematic Review.* Canadian Journal of Psychiatry, 54(4):260-268.

Harrod CS, Goss, CW, Stallones L, DiGuiseppi, C (2014). *Interventions for primary prevention of suicide in university and other post-secondary educational settings.* Cochrane Database of Systematic Reviews, 10: DOI: 10.1002/14651858.

Henriksson, S, Isacsson, G (2006). *Increased antidepressant use and fewer suicides in Jamtland county, Sweden, after a primary care educational programme on the treatment of depression.* Acta Psychiatr Scand, 114:159-167.



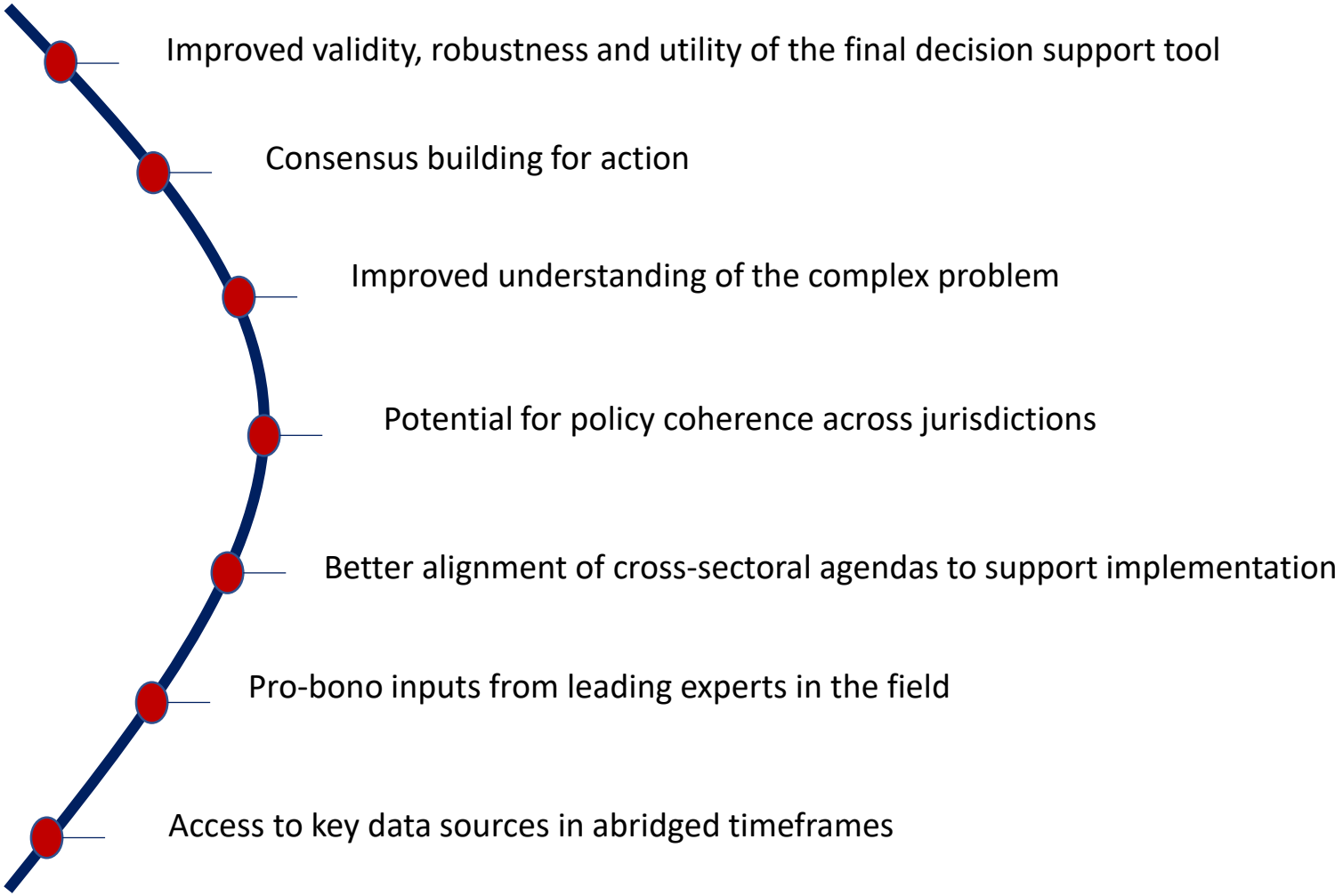
ADVANTAGES OF THE PARTICIPATORY APPROACH



'I think you should be more explicit here in step 2.'

Our Approach | Participatory

Integrated modelling techniques with best available evidence, data and expert knowledge



Use of our models | Driving Change

- To support recommendations in ministerial briefs.
- To inform investment decisions by health and government departments and program commissioning decisions in the primary care setting.
- To facilitate the engagement of broader stakeholders in strategy dialogues and consensus building for action.
- Help set realistic targets for impact / manage expectations regarding progress towards targets set.
- Use as advocacy tools and to add strength to business cases for longer term funding.
- Demonstrate the consequences of disinvestment in programs.
- Help identify priorities for data collection / research.

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Thank you

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