Collaborative Sciences Center for ROAD SAFETY

Safe Systems Summit

Redefining Transportation Safety

From Safe Systems to systems safety

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The Kinetic Energy “Safe System” Model

Causation: Physical injury results when the magnitude of the biologically relevant dose of energy delivered to a tissue is beyond the limits compatible with the tissue’s physiological function.

Intervention: Control the energy I.e. Safe Roads and Roadsides; Safe Vehicles; Safe Road Use (behavior)

Note:

- The designers of the system are responsible for the level of safety within the entire system.
- Road users are responsible for following the rules for using the road transport system set by the system designers.

Upgrading the Pacific Highway

Status of dual carriageway - July 2018

Global application: The Decade of Action

"The Decade of Action for Road Safety 2011–2020, officially proclaimed by the UN General Assembly in March 2010, seeks to save millions of lives by building road safety management capacity; improving the safety of road infrastructure; further developing the safety of vehicles; enhancing the behaviour of road users; and improving post-crash response.

Guided by the Global Plan, the Decade of Action offers a framework for policy, practice and advocacy to help countries achieve the Sustainable Development Goals."

https://www.who.int/roadsafety/decade_of_action/en/

Figure 3: Number of countries where a change in the number of road traffic deaths has been observed since 2013*

*These data represent countries that have seen more than a 2% change in their number of deaths since 2013, and excludes countries with populations under 200 000. The income levels are based on 2017 World Bank classifications.

Global status report on road safety 2018: summary. Geneva: World Health Organization; 2018 (WHO/NMH/NVI/18.20).

TECHNICAL PROBLEMS	ADAPTIVE CHALLENGES
Easy to identify	Difficult to identify / easy to deny
Often lend themselves to quick and easy solutions	Require changes in values, beliefs, roles, relationships, & approaches
Often can be solved by an authority or expert	People with the problem do the work of solving it
Require change in just a few places; often contained within organizational boundaries	Require change in numerous places; usually cross organizational boundaries
People are generally receptive to technical solutions	People often resist even acknowledging adaptive challenges
Solutions can often be implemented quickly	"Solutions" require experiments and discoveries; can take a long time to implement and cannot be implemented by edict

*(Heifetz and Laurie, 2002)

Vision Zero

In October 1997, the Road Traffic Safety Bill founded on Vision Zero was passed by a large majority in the Swedish parliament.

- The Vision is that eventually no one will be killed or seriously injured within the road transport system (Ministry of Transport and Communications, 1997).

- The Vision is an expression of the ethical imperative that life and health can never be exchanged for other benefits within the society

Systems thinking

Is a way of approaching challenges, in which we consciously seek to

- Delineate systems of interest
- Expand our field of vision about causes and consequences
- Describe the structure of the system
- Use qualitative and quantitative models to make explicit the assumptions about the system and explore system behavior

Systems thinking in action

Example 1

Road Safety – What is the Policy Question?

Question framed according to public health approach

"How do we stabilise and then reduce the forecast level of road traffic fatalities around the world by 2020?"

Question reframed in terms of the systems approach

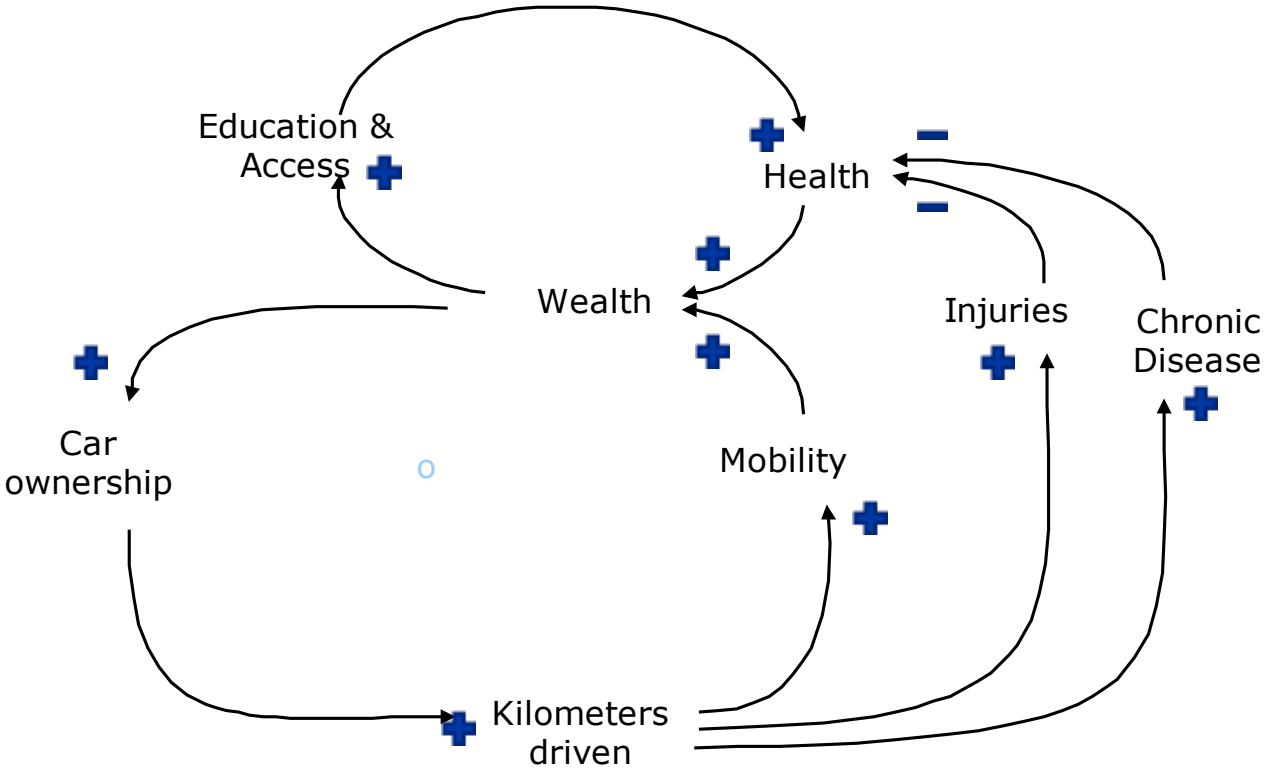
"What are the features of a land use—transportation system that optimise the health and wellbeing of the population?"

McClure, R., Adriazola-Steil, C., Mulvihill, C., Fitzharris, M., Bonnington, C.P., Salmon, P., Stevenson, M.R., Simulating the dynamic effect of land use and transport policies on the development and health of populations. *American Journal of Public Health* 2015 Apr;105 Suppl 2:S223-9.

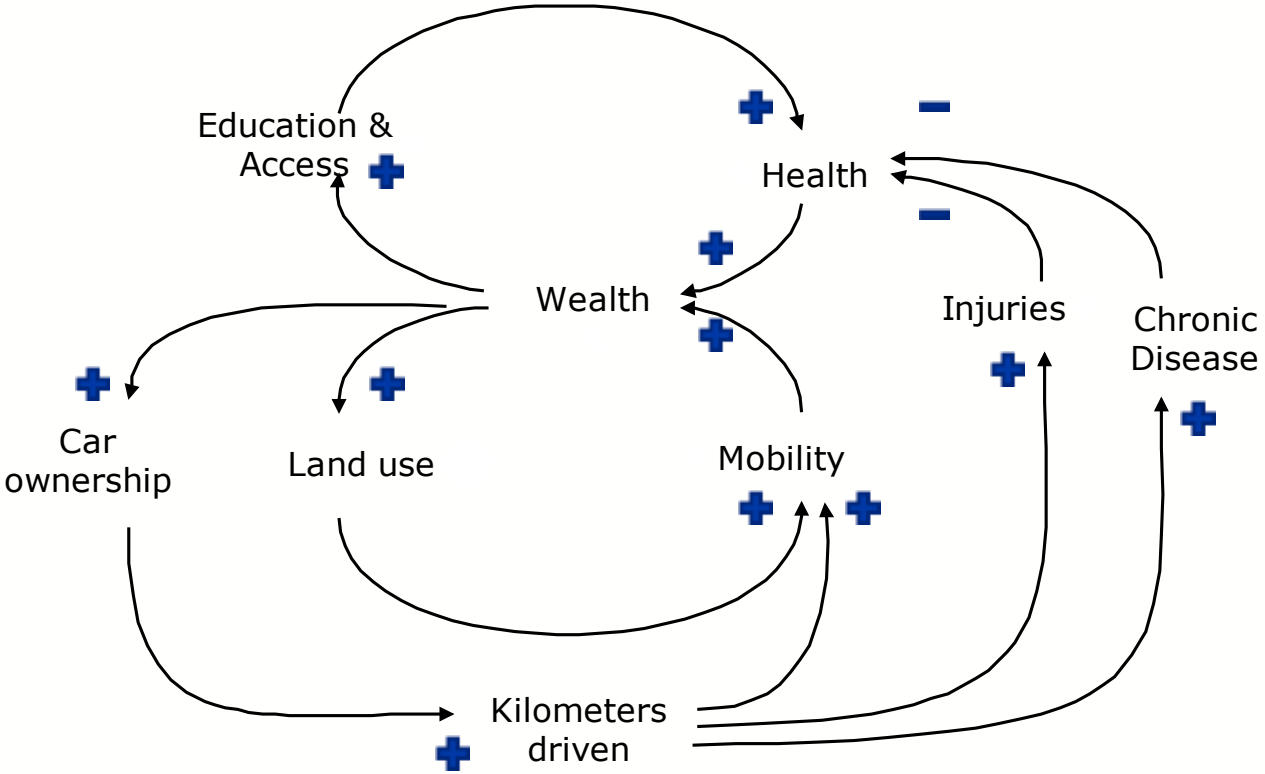
Methodology

- **System Dynamics**
  - Models the effect of gradual change through social growth
  - Makes explicit the consequences of interactions
- **Intent**
  - Is to compare results produced by the model for a range of different policies so as to learn about the dynamics of the modelled system
- **Critical elements of developed model**
  - Relationship between Mobility and Wealth
  - Number of deaths = Deaths/kilometre x no. km driven

Causal Loop Diagram



Causal Loop Diagram



Study Conclusions

- Integrated policy decisions are required
- “Greenfield” sites have greatest potential for benefit
- We need to define the point of interest in terms of mobility, not transport, and maximise “trips” not distance when increasing mobility
- Mode specific infrastructure is critical
- The solution is to shift modes of mobility as much as possible from individualised motor transport to active, mass transport, and e-transport options

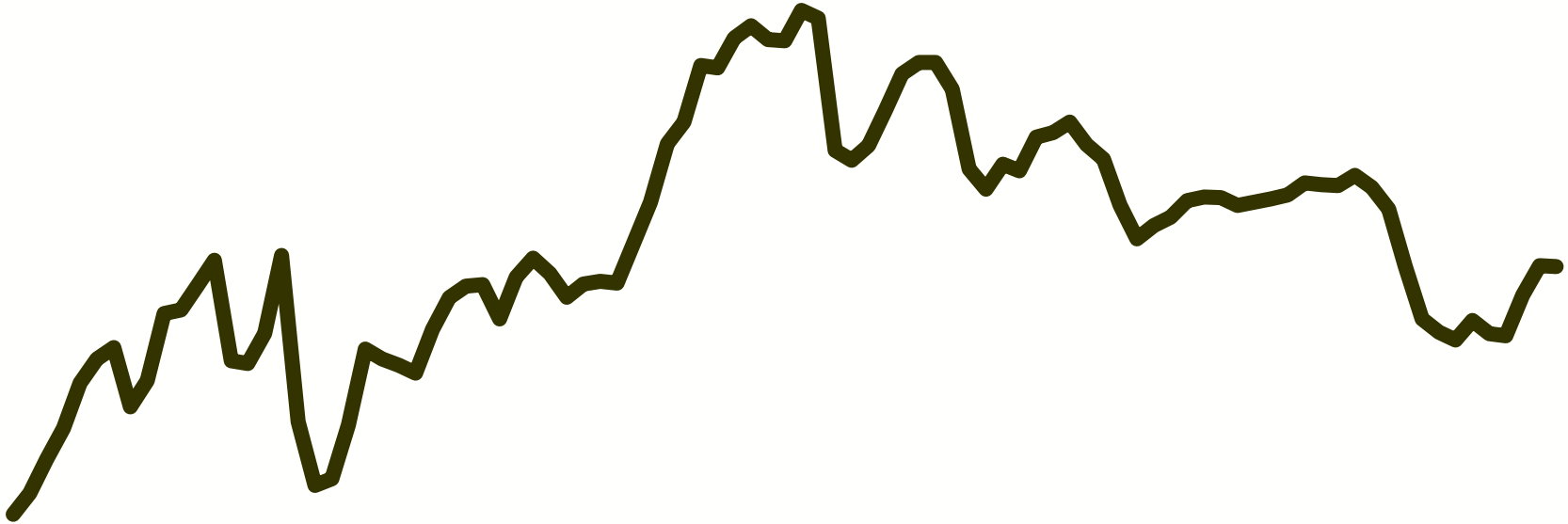
Systems thinking in action

Example 2

By **Charles Purcell**
August 13, 2018 — 3.31pm

"car ownership is one of the last frontiers of personal freedom. It's more than an issue of convenience – it's an issue of pride and pleasure. We are a nation of car lovers, from hotrod to Kingswood.

The car is our modern horse, our personal vehicle to a world of adventure. I don't want the government riding side saddle with me, telling me what to do."



Cross to modelling program

'Stupidity on the roads': Police 'bewildered' by behaviour after three deaths in three days

By Sarah Keoghan
April 20, 2019 — 6.25pm

“Yesterday, our officers encountered several cases of what can only be described as stupidity on the roads," he said. “Sadly, some drivers are ignoring common sense and putting their own lives, their passenger’s lives, and the lives of other road uses at great risk of death or injury.”

https://www.youtube.com/watch?v=p6a6EToQsEM

Territory covered!

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- Demystifying systems thinking
- How systems approaches help
- Some examples of systems approaches in use
- A way to think about how to apply systems thinking in practice

Conflicts of Interest: Nil

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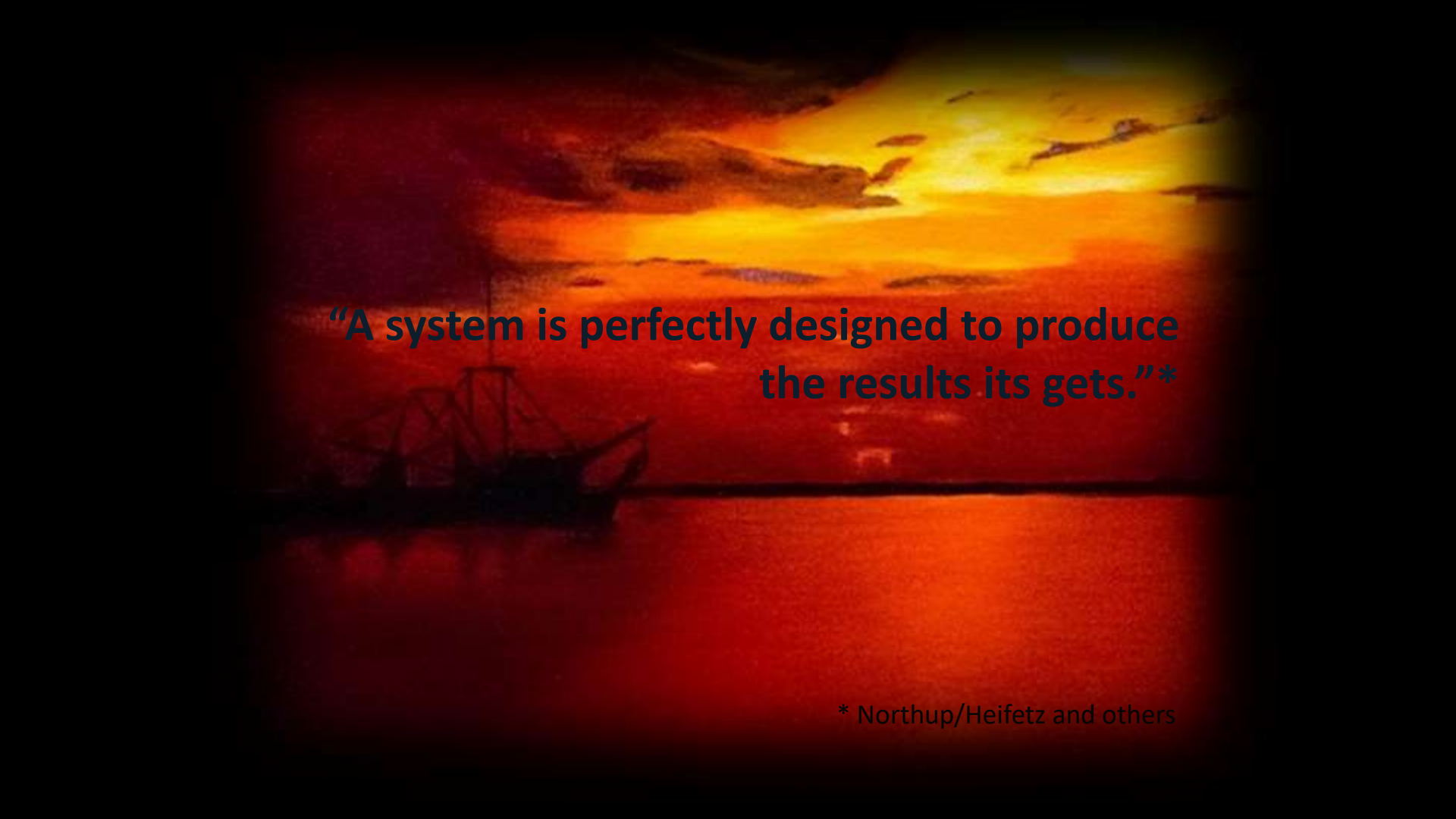
“A system is perfectly designed to produce the results its gets.”*
* Northup/Heifetz and others