

## **An Integrated Modelling Framework to Assess Flood Risk under Urban Development and Changing Climate**

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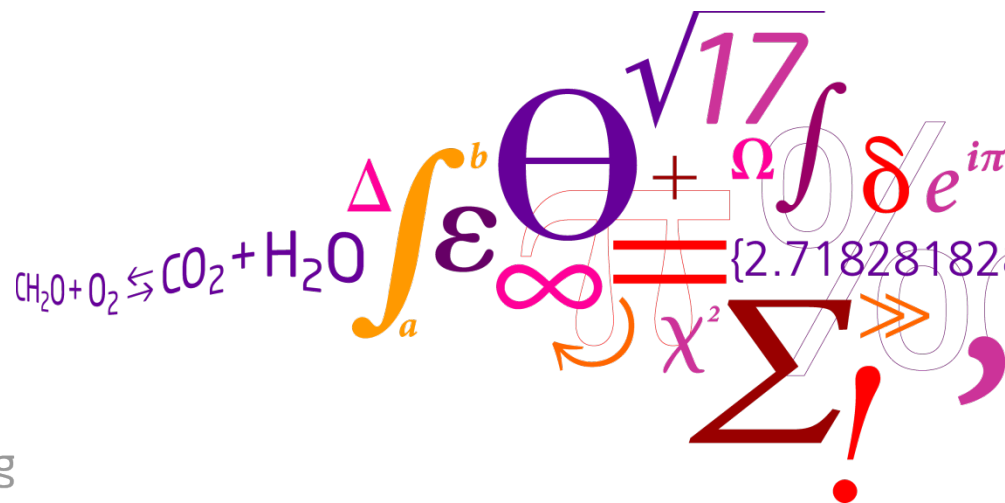
# An Integrated Modelling Framework to Assess Flood Risk under Urban Development and Changing Climate

Löwe, R.<sup>1</sup>, Urich, C.<sup>2</sup>, Sto. Domingo, N.D.F<sup>3</sup>, Mark, O.<sup>3</sup>, Arnbjerg-Nielsen, K.<sup>1</sup>

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# Planning for long-term

What do we want, and, how to get there?

## Social Barriers

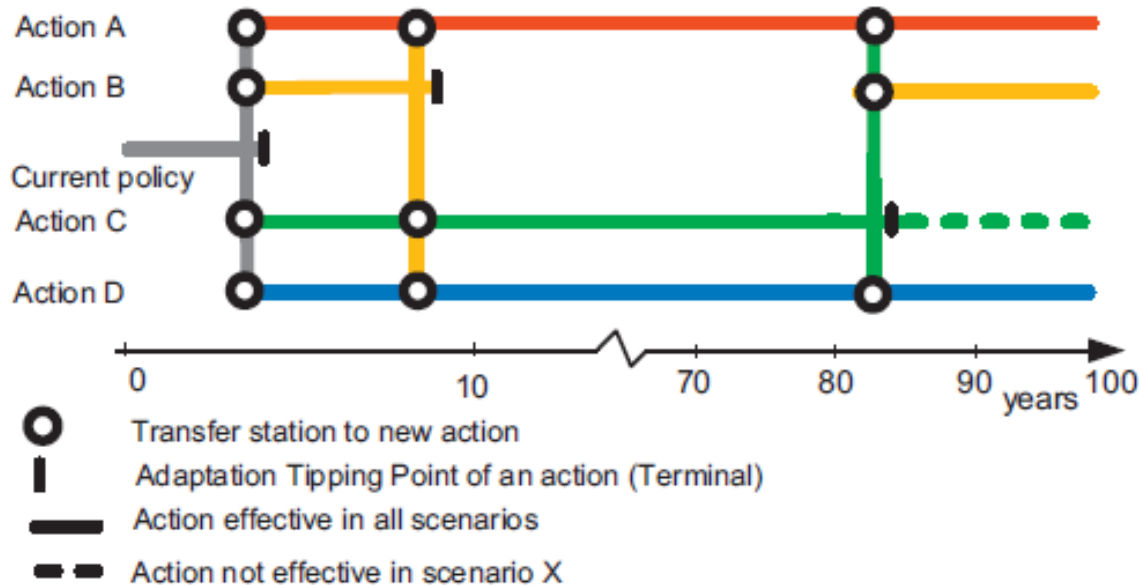
- community preferences
- stakeholder preferences
- institutional framework



## Future uncertainties

- Societal preferences, government agendas,...
- Climate change
- Urban development

# Planning for long-term



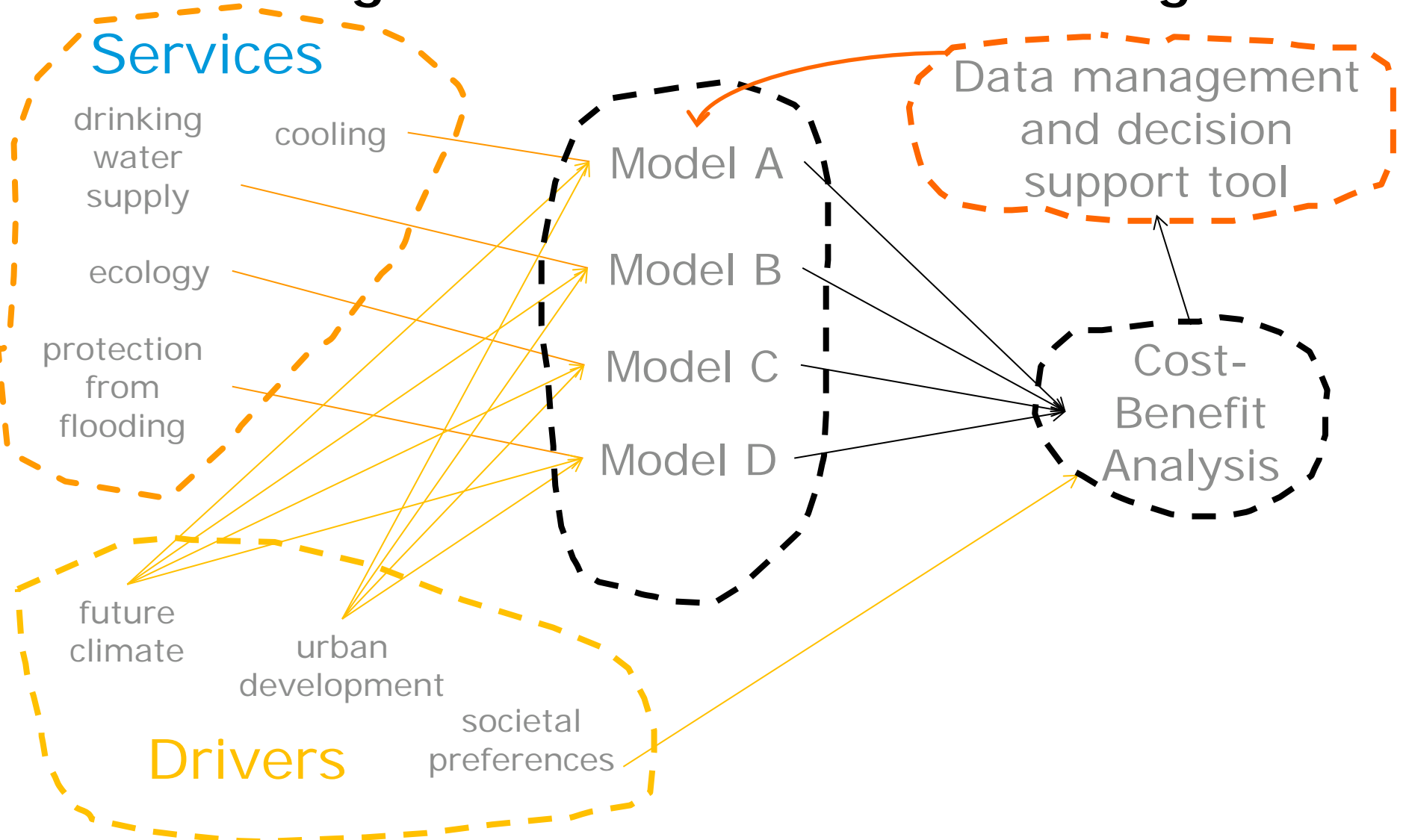
Adaptation Pathways Map

Path actions	Relative Costs	Target effects	Side effects
1 ○	+++	+	0
2 ○○	+++++	0	0
3 ○●	+++	0	0
4 ○●	+++	0	0
5 ●	0	0	-
6 ●○	++++	0	-
7 ●●	+++	0	-
8 ●●	+	+	---
9 ●	++	+	---

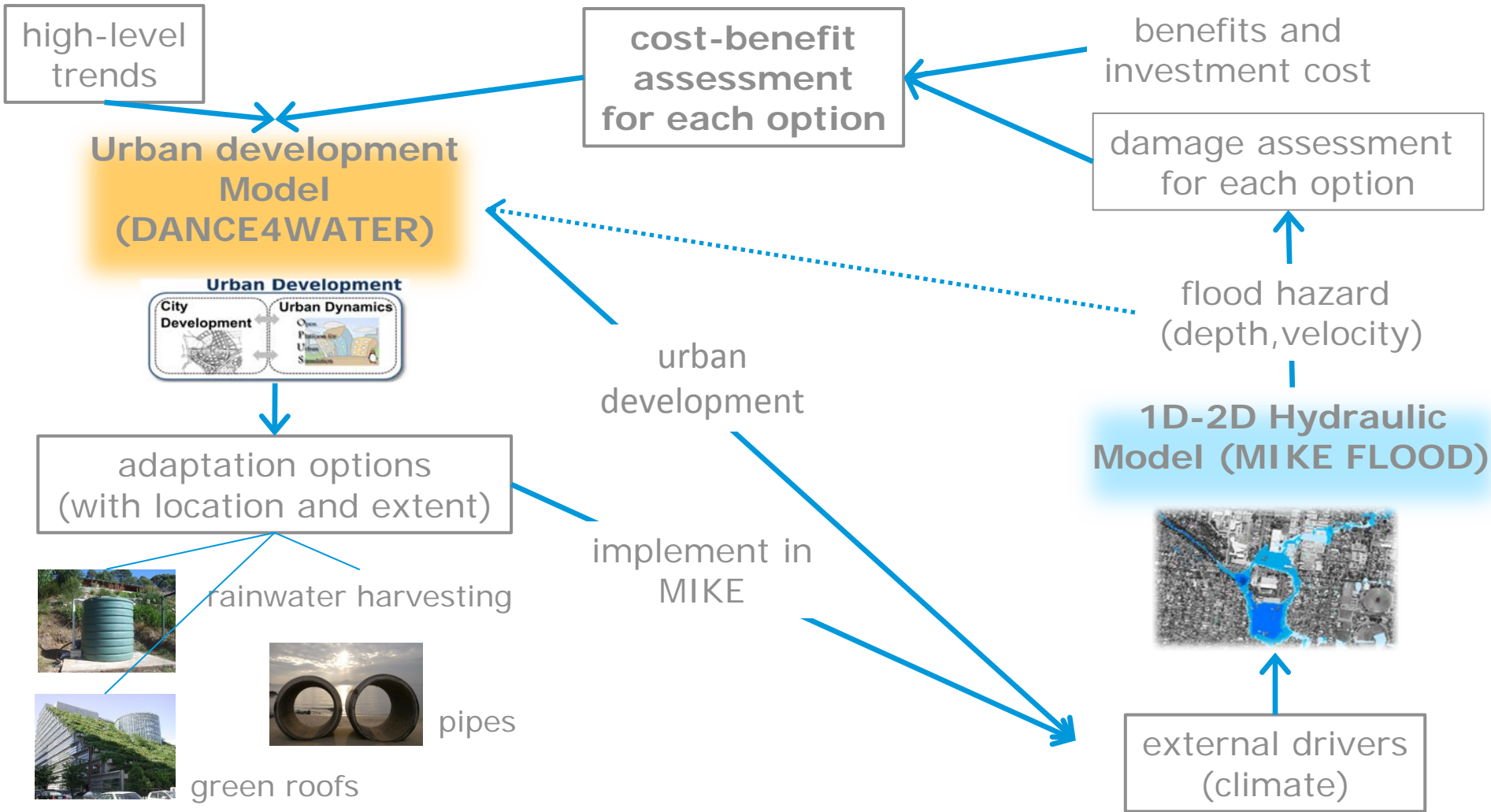
Scorecard pathways

from: Haasnoot, M., Kwakkel, J.H., Walker, W.E., ter Maat, J., 2013. Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Glob. Environ. Chang.* 23, 485–498. doi: 10.1016/j.gloenvcha.2012.12.006

# A Modelling Framework to Assess Strategies

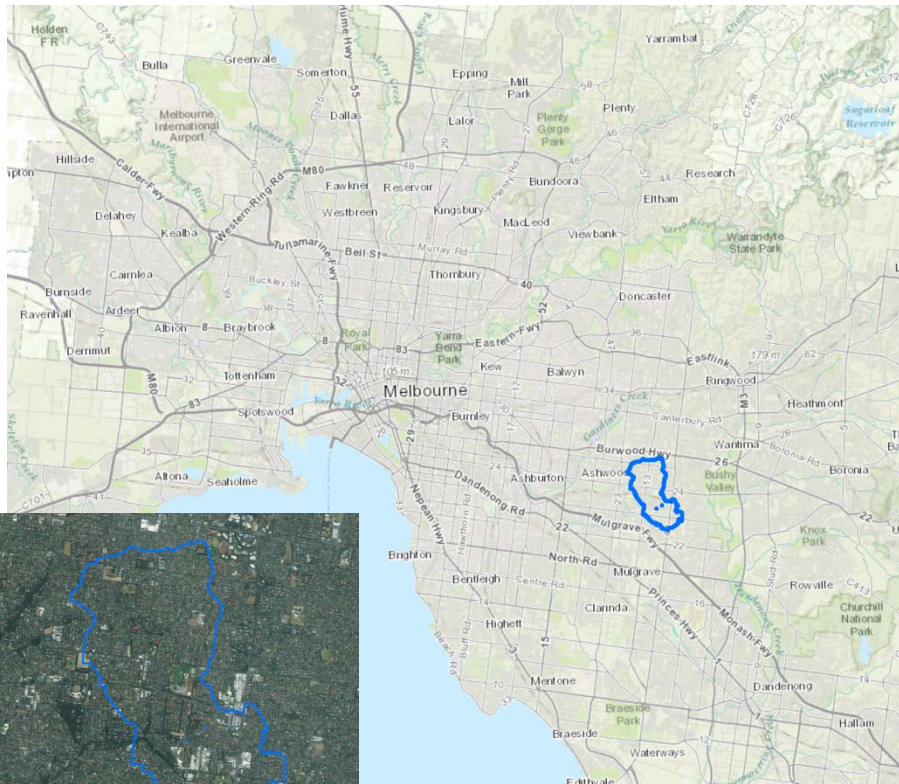


# A Modelling Framework to Assess Strategies



# An Australian Case Study

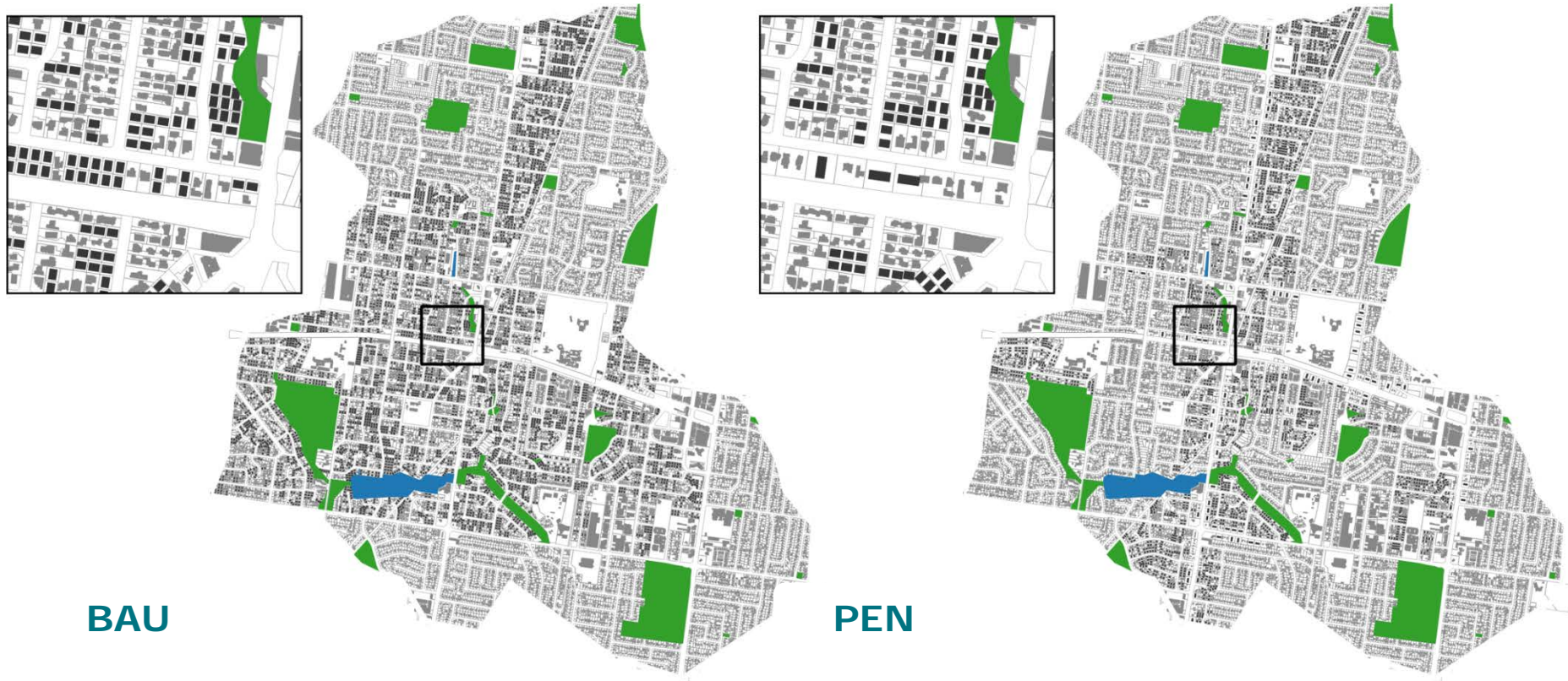
## Scotchman's Creek Catchment



- 780 ha
- residential, strong densification 1963 to 2010 and on-going
- urban development scenarios: business as usual (BAU), no development in flood prone areas (PEN)
- urban development here as change of impervious area and vulnerability

# An Australian Case Study

## *Urban Development*

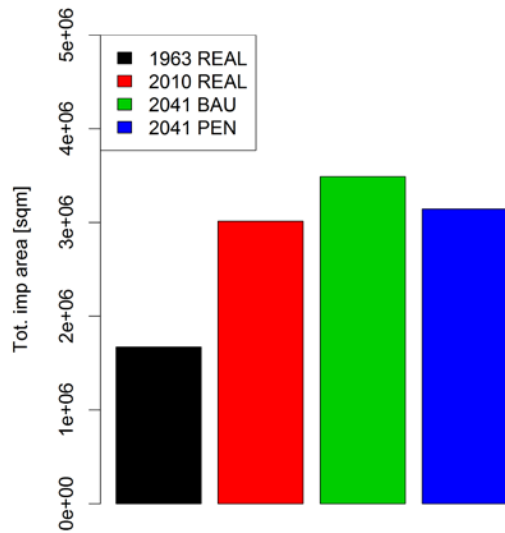


c.f.: Urich, C., Rauch, W., 2014. Exploring critical pathways for urban water management to identify robust strategies under deep uncertainties. *Water Res.* 66C, 374–389. doi:10.1016/j.watres.2014.08.020

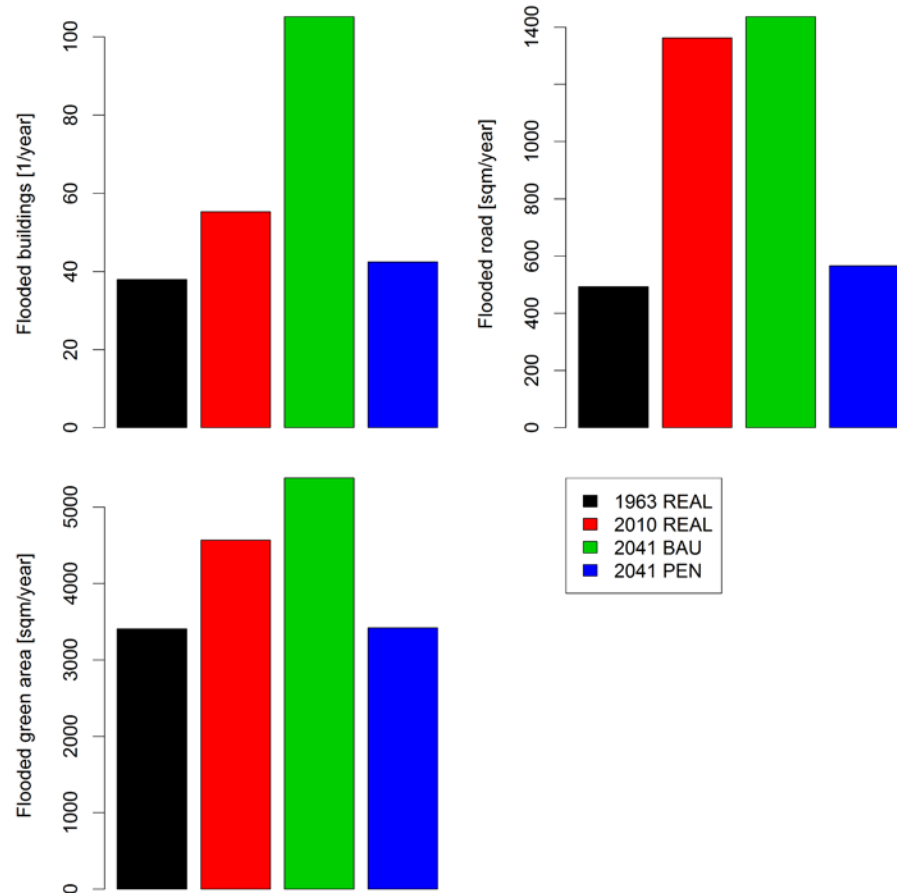


# An Australian Case Study

## Total Impervious Area



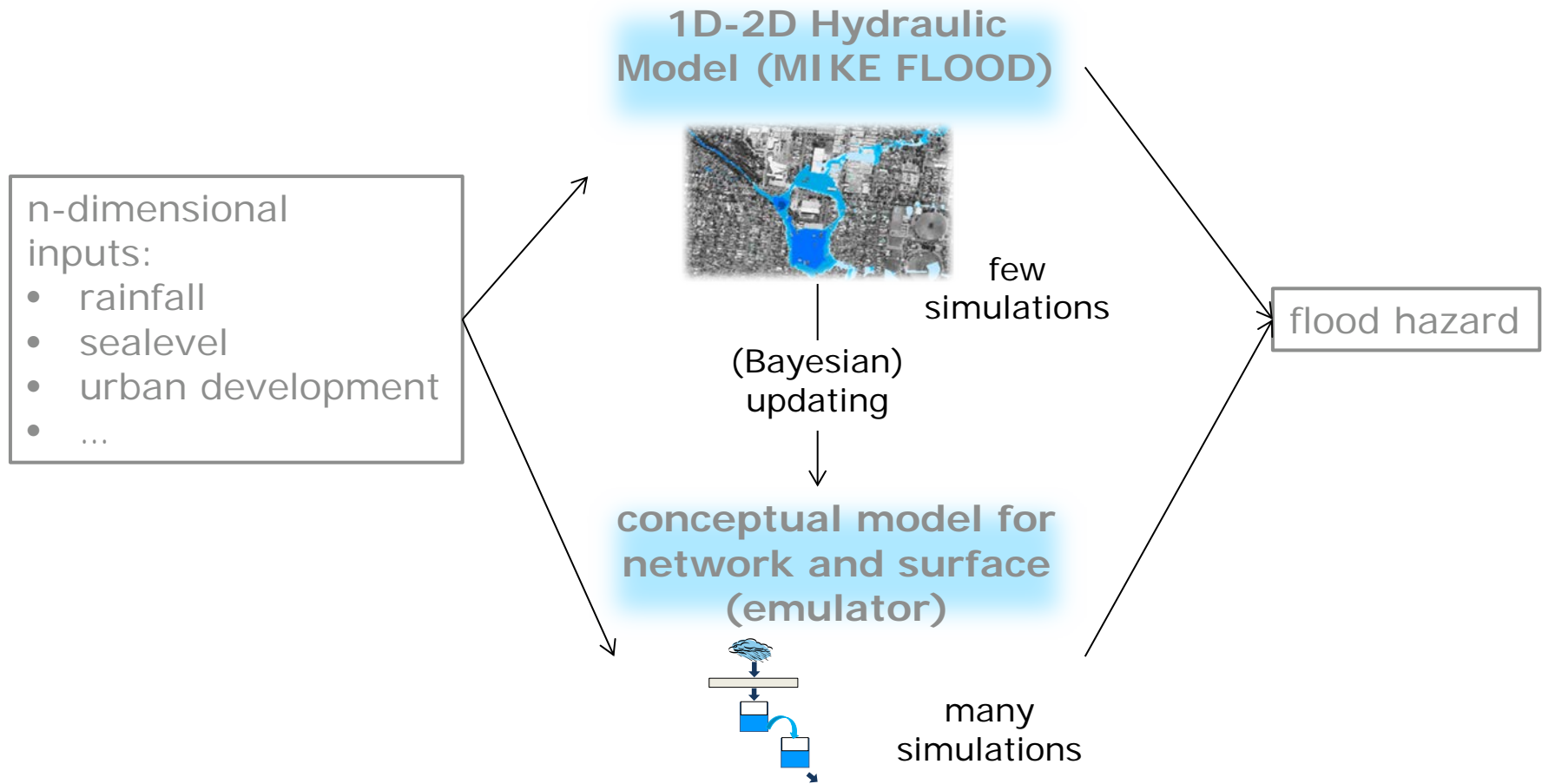
## Expected Annual Damage



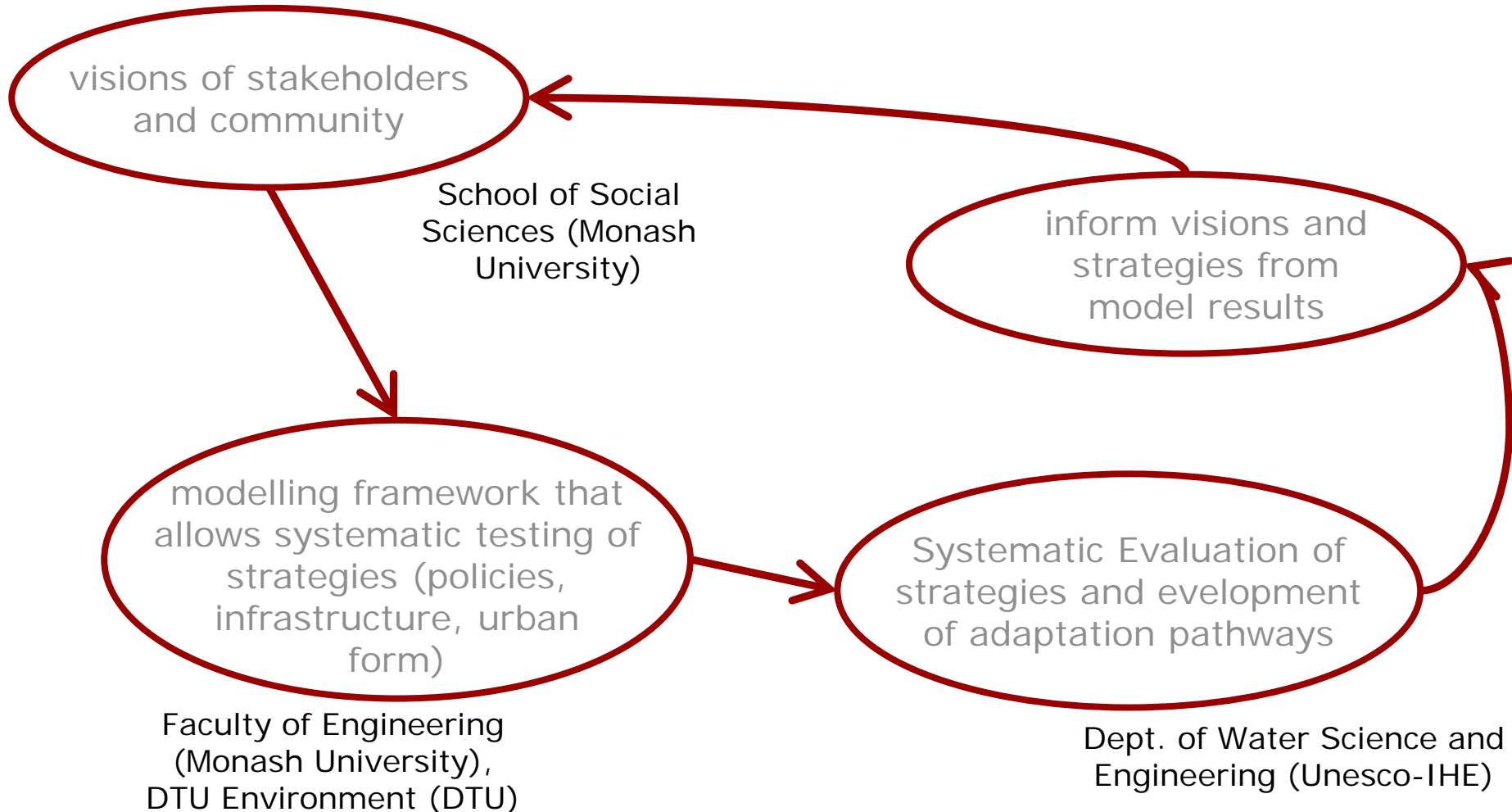
# Open Questions

- urban development in a different context (de-densification, different city structure)
- required complexity for the urban development model
  
- coupling hydraulic and urban development model (excluding waterways as development areas...)
  
- hydraulic simulation: stability, simulation speed

# Emulation of Flood Hazard



# Integration with Other Disciplines



# Thank you!

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