Building Catchment Resilience

Modelling

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Aim: Stakeholder Engagement in Catchment Systems

- ***Multiple Stakeholders:***

  - Government, Landholders, Scientists, etc…

- *Very different **objectives per stakeholder:***

  - *Government*: Improve water quality…
  - *Landholder*: Maximise crop profit…
  - *Scientist*: Understand natural systems…

- **Objectives can compete**, e.g.:

  - Minimise sediment transport, but also
  - Minimise nutrient runoff, but also
 - Minimise implementation cost, etc…

Decision Support System: Stakeholder Engagement

- Australian Rivers Institute (GU):
  - Catchment Model Construction
  - Model Solution Production

- Water Technology:
  - Flooding Impact of Model Solutions

- ViseR Group (QUT):
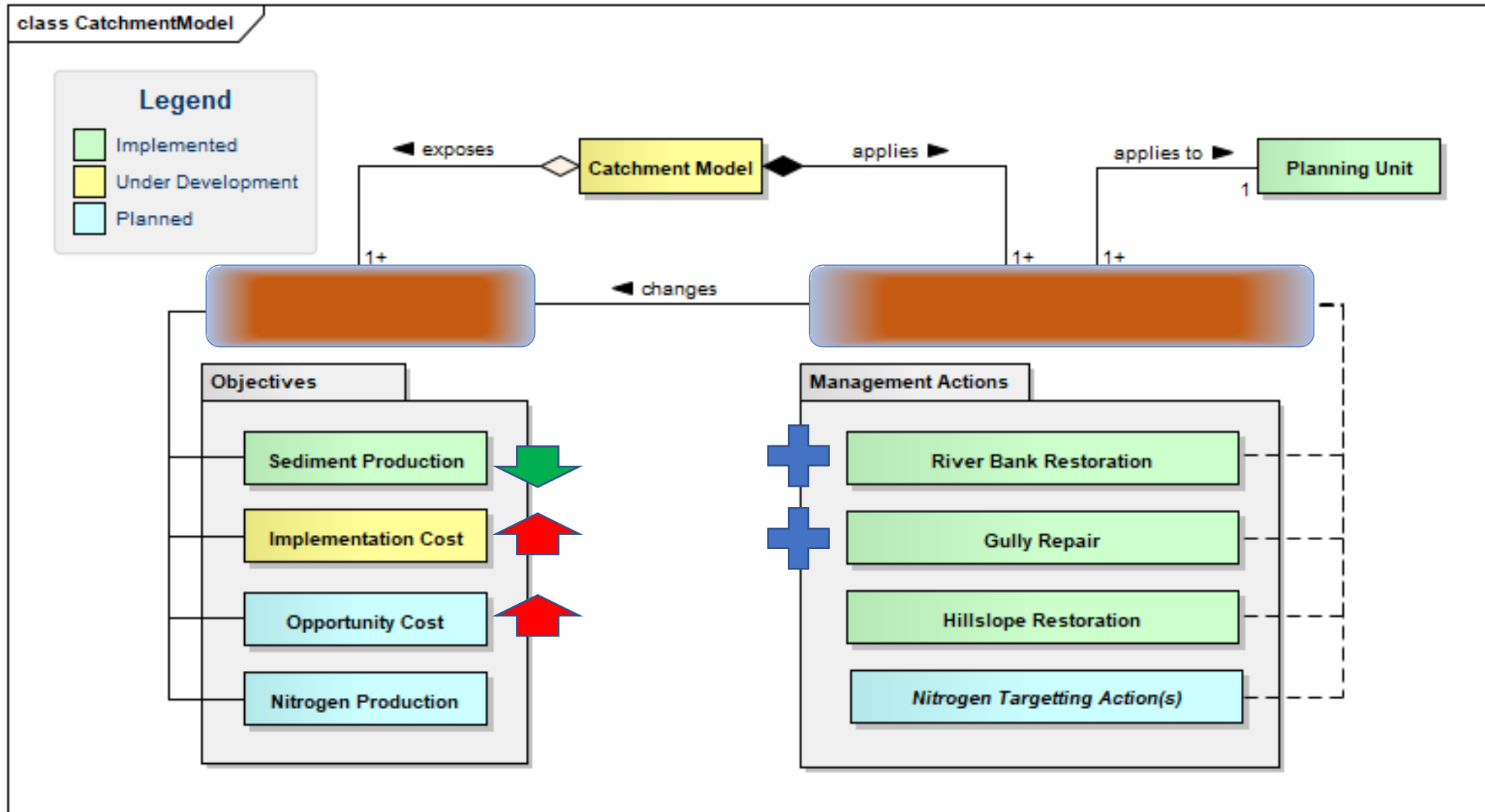 - Scenario/Flooding Visualisation
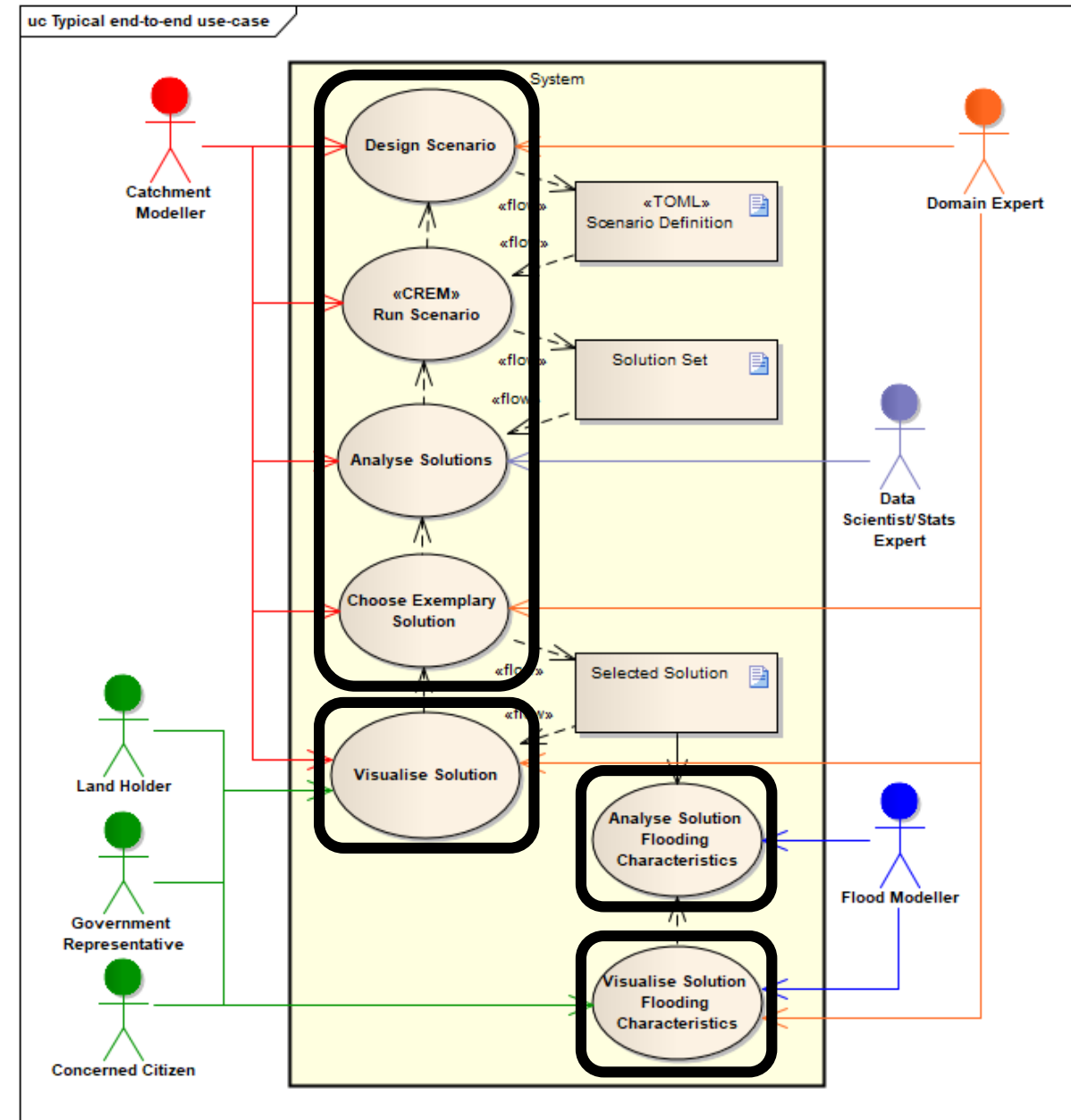
The Spatial Framework

- Laidley creek (~480 km^2)

- Digital Elevation Model (1m^2)

- River Data: Land usage, etc.

- 143 Planning Units (2-10 km^2):
  - Water drainage characteristics of the river segments.
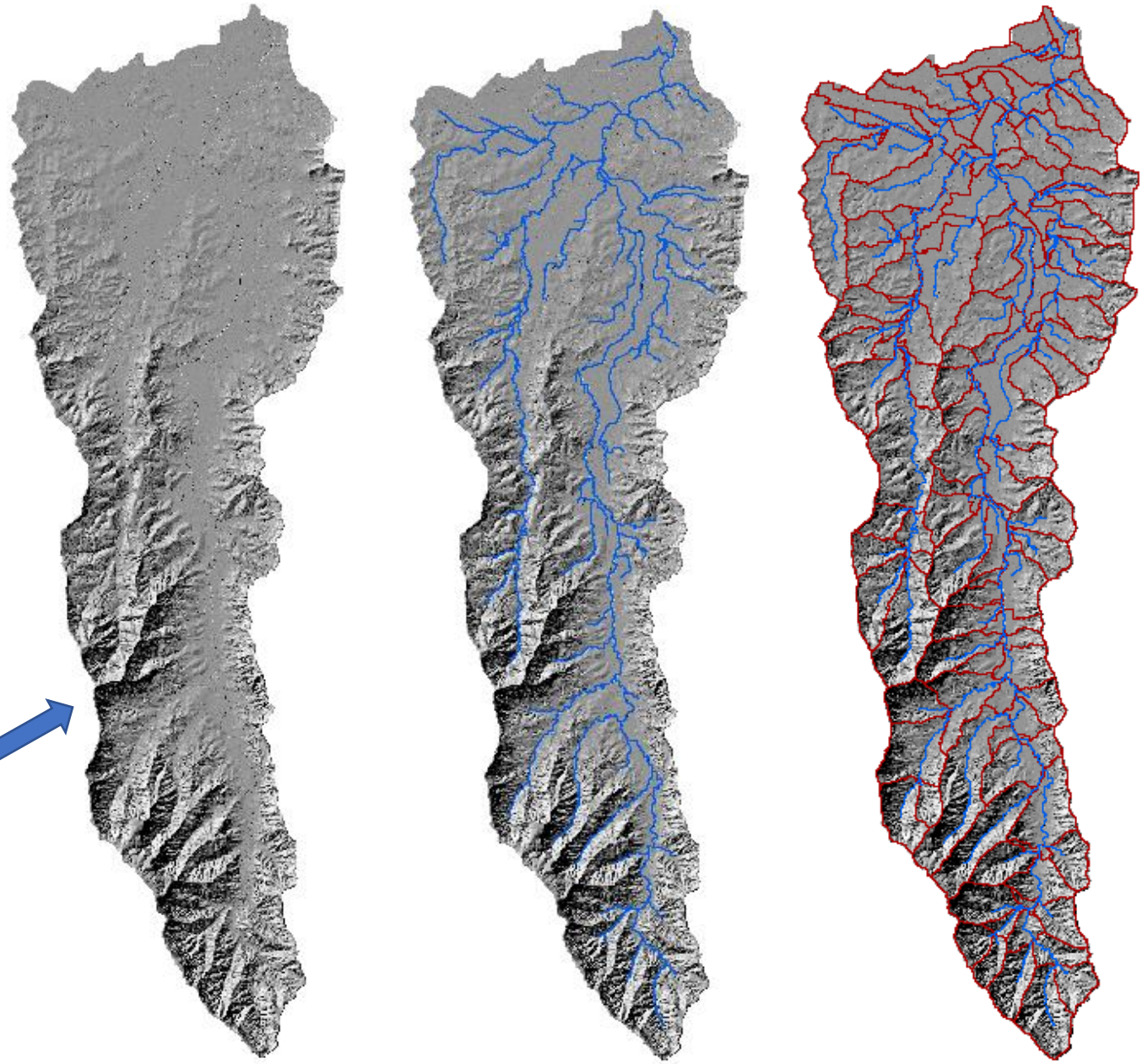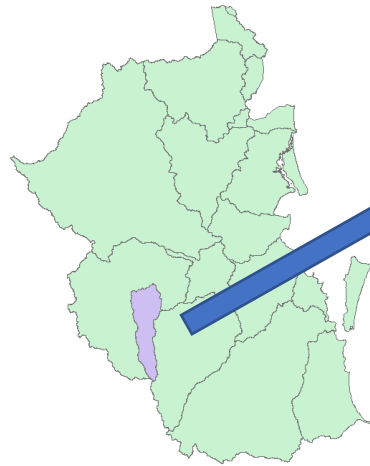
The River Catchment Resilience Model

Multi-Objective Simulated Annealing (MOSA)

- Allows us to explore **several objectives** evaluated at once:
  - Ideally at least one **objective per stakeholder**

- Produces a **set of solutions**:

  - One solution = **set of actions applied** to the catchment along with **measures of how they alter each objective**.

  - Demonstrate _trade-offs between competing objectives_ to stake-holders

  - Help _understand implications_ of management decisions in terms of stakeholder objectives.

Sediment (+)
Nitrogen (-)
Cost (-)

Sediment (+/-)
Nitrogen (+/-)
Cost (+/-)

Sediment (-)
Nitrogen (+)
Cost (+)