The 2 Feedback Loop Axiom and its Implications for OR, Systems Thinking and Wicked Problems in Planning and Crime Prevention

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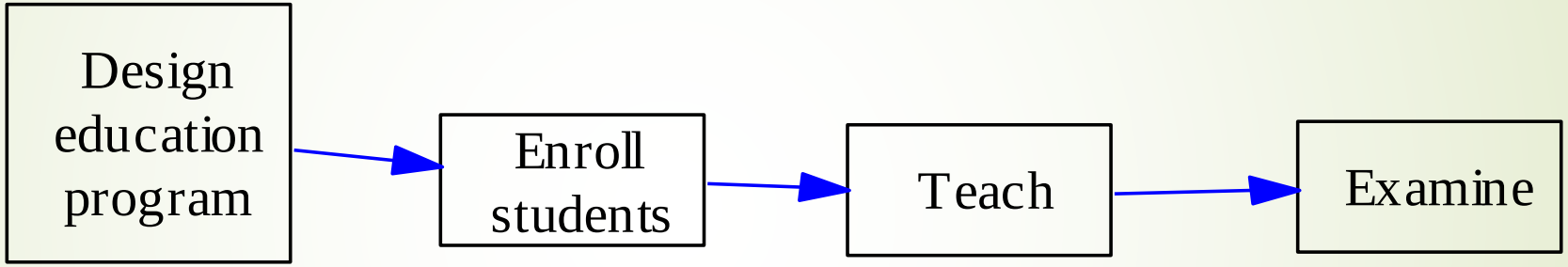
Design Out Crime and CPTED Centre

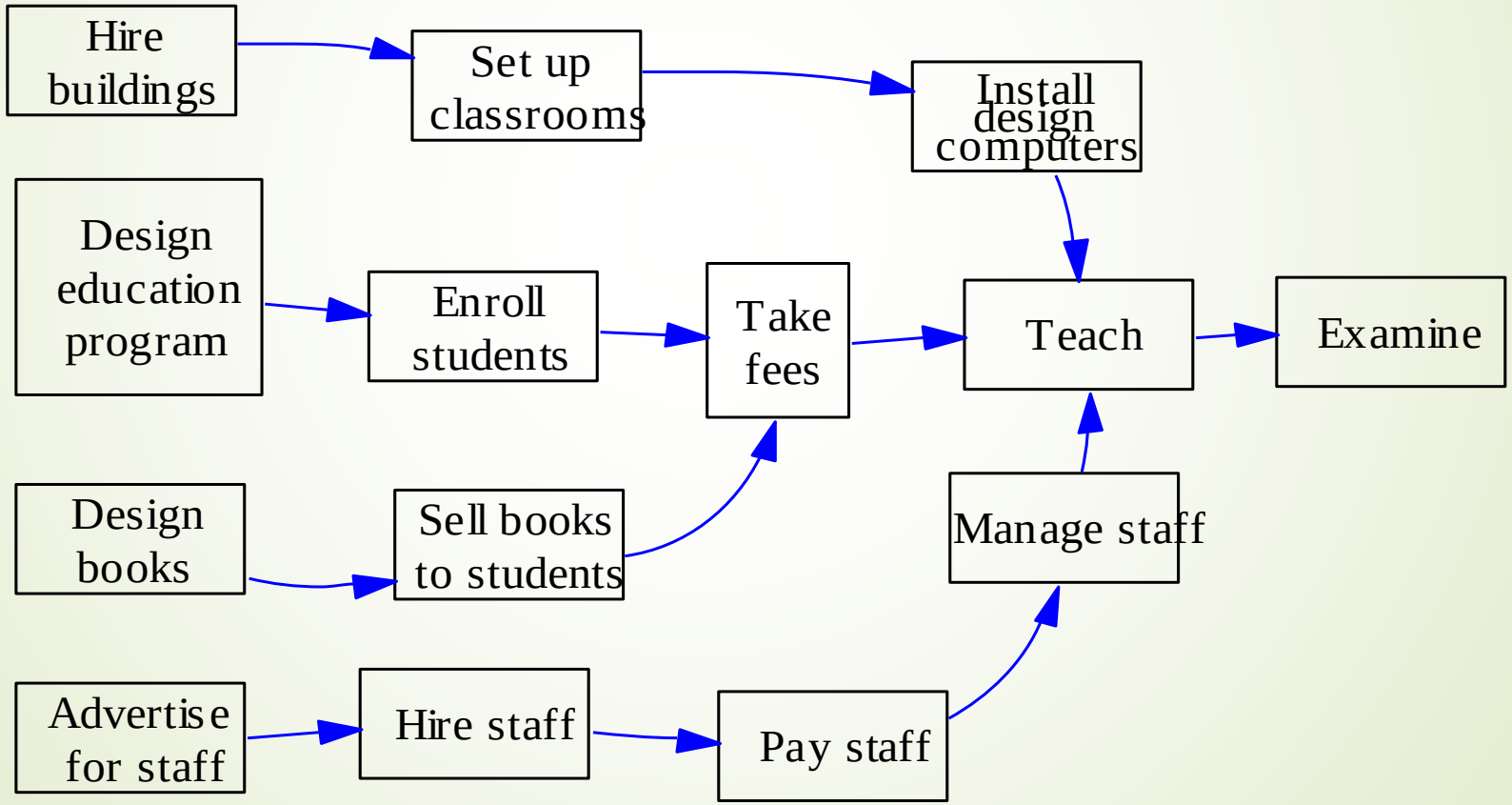
SIMPLE system

- SIMPLE system – few elements, few links, maximum 1 feedback loop.



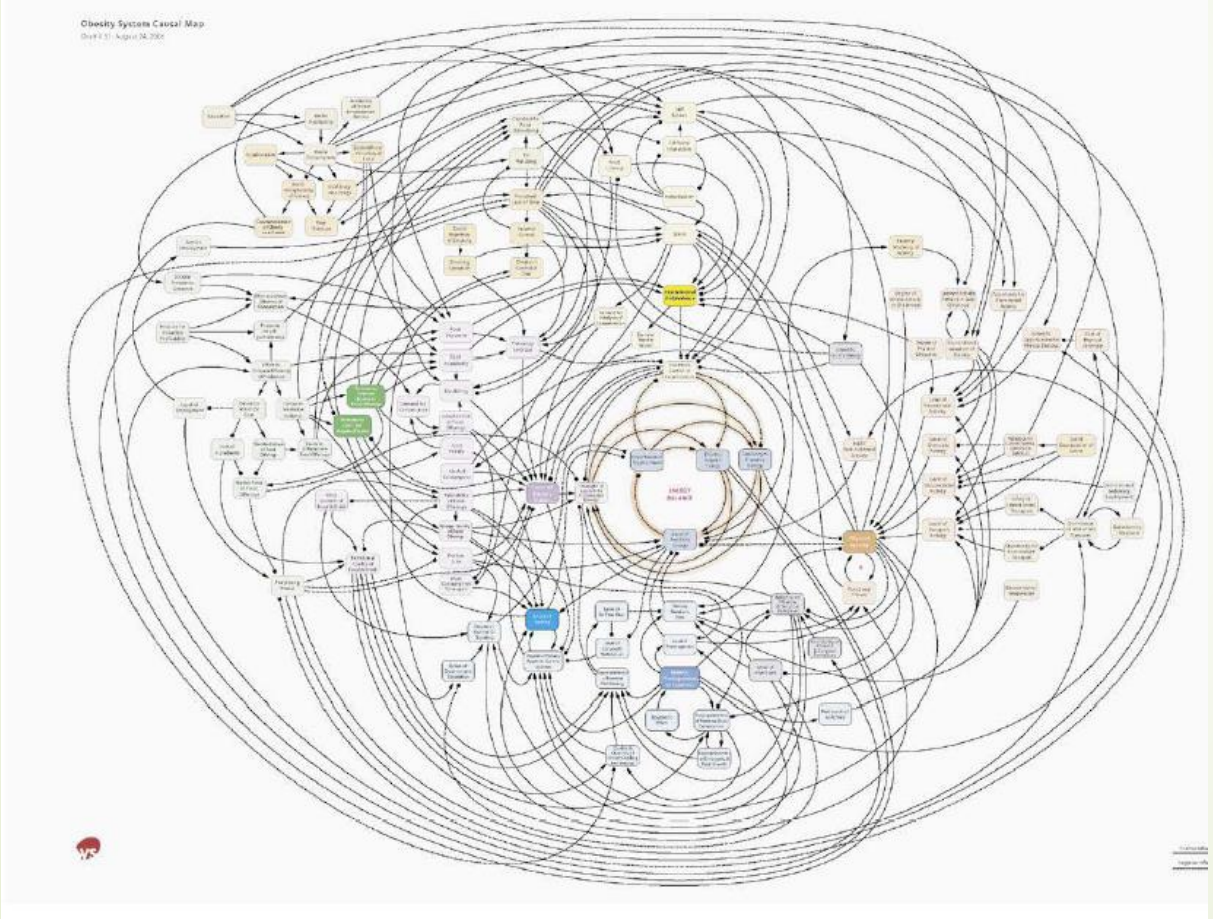
COMPLICATED system

- COMPLICATED system – many elements, many links, maximum 1 feedback loop



COMPLEX system

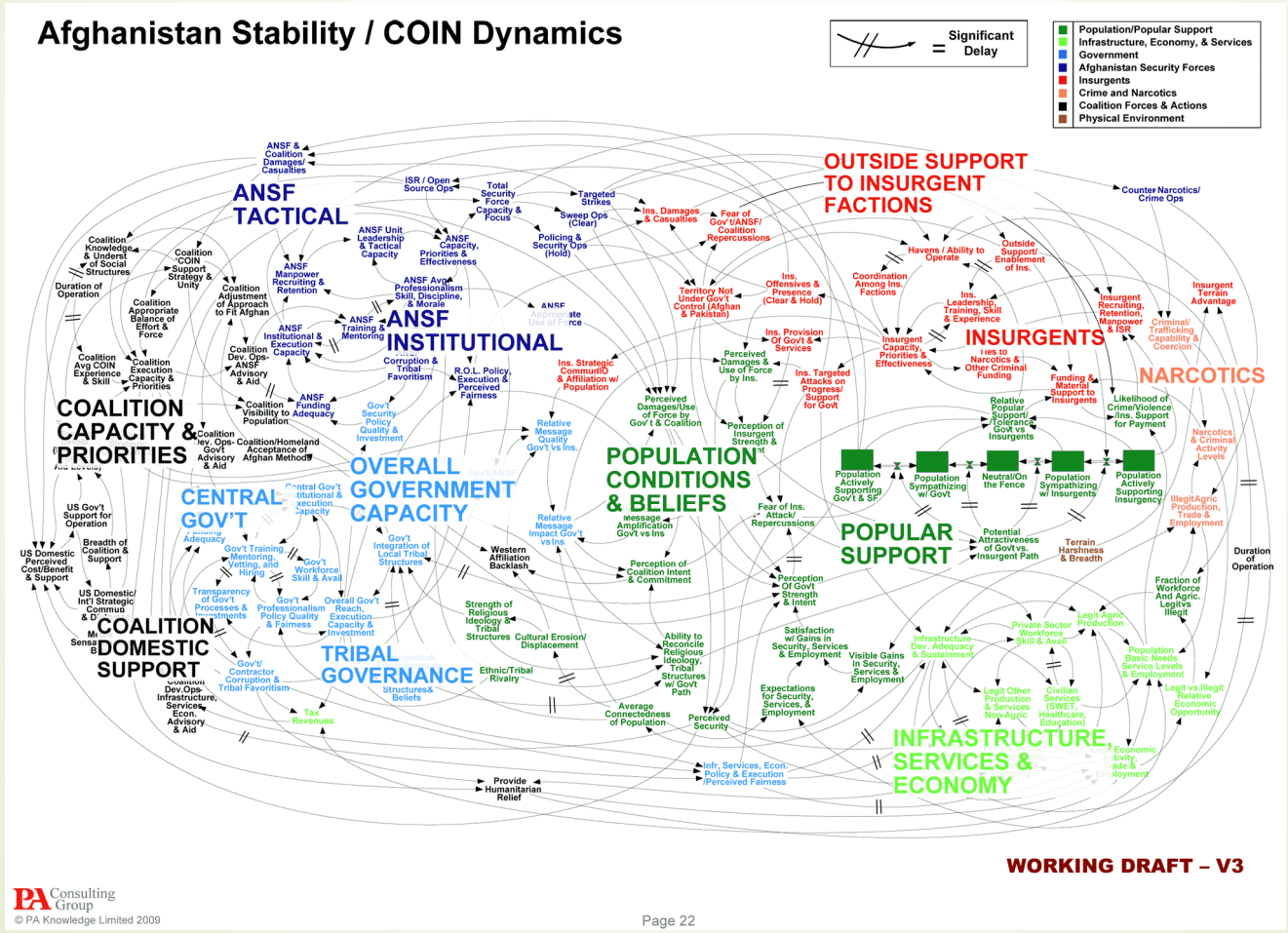
- Any number of elements and links, 2 or more feedback loops.



Obesity treatment causal loop model

COMPLEX system

- Any number of elements and links, 2 or more feedback loops.



Definition:
Human cognitive limit of understanding

- When a person can not correctly predict the outcomes of a situation.
- Beyond that point it is no longer useful to ask a person about a situation. Their answers will be false, mistaken, deluded or second-hand.

2 Feedback Loop Limit Axiom

- There is at least one human cognitive limit of understanding systems.
- People cannot correctly predict the outcomes of systems involving two or more feedback loops, or two or more linked system archetypes.
- At the same time, individuals can be fully self-convinced that they have correctly understood the system although their understanding and prediction of outcomes are demonstrably incorrect.

Implications of 2 Feedback Loop Axiom

- Qualitative data gathered from people about the behaviour of a complex system is intrinsically faulty
- Data gathered from stakeholder groups is similarly intrinsically faulty

Consequences 2 Feedback Loop Axiom for Systems Thinking

- The 2 Feedback Loop Axiom points to problems with validity of :
  - Soft systems methodology
  - System dynamics methods
  - Critical systems heuristics and similar systems methods
  - Hybrid systems methods
  - Beer's VSM (levels 3, 4 and 5)
  - Stakeholder consultations on wicked problems
  - Etc…

Limitations – Operations Research

2 feedback loop for addressing wicked problems

- Gather pictures of views from all stakeholder/expert perspectives
- Identify key elements and relationships between them from each different stakeholder/expert source.