INCOSE

Systems, Humans and Knowledge: the inconvenient tripod

Prof John Powell

November 2012

Scope

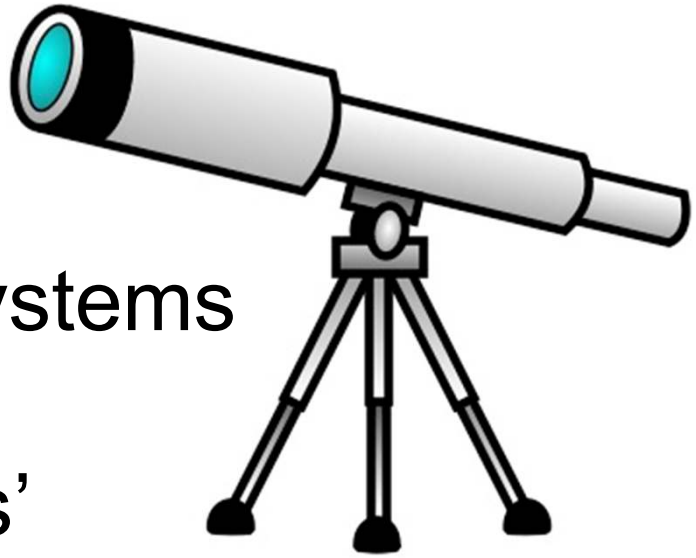
Conventional approaches to systems

Specification and design

Hybrid systems

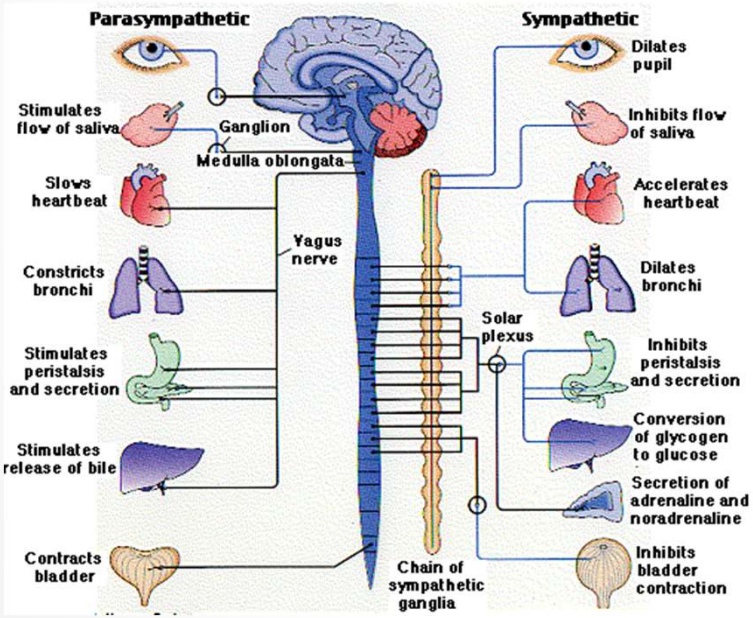
Types of knowledge in systems

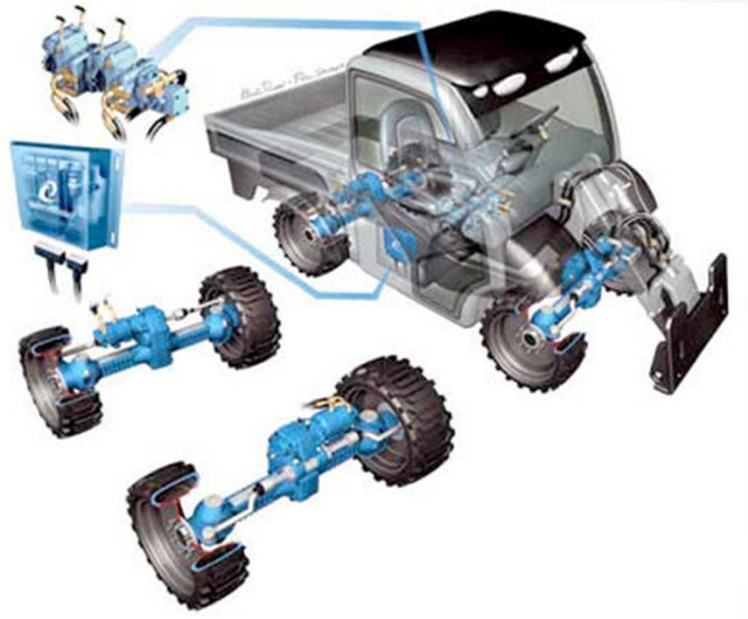
Designing for ‘hybridness’



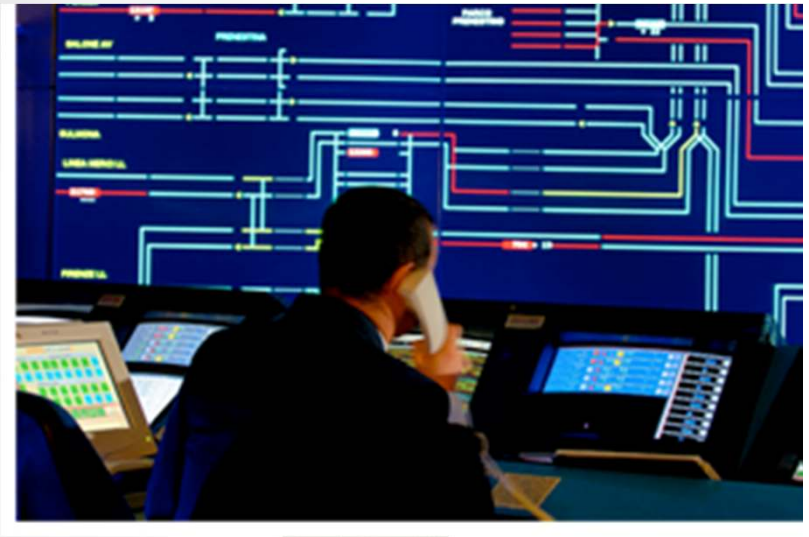
Conventional system design

A collection of interacting components…

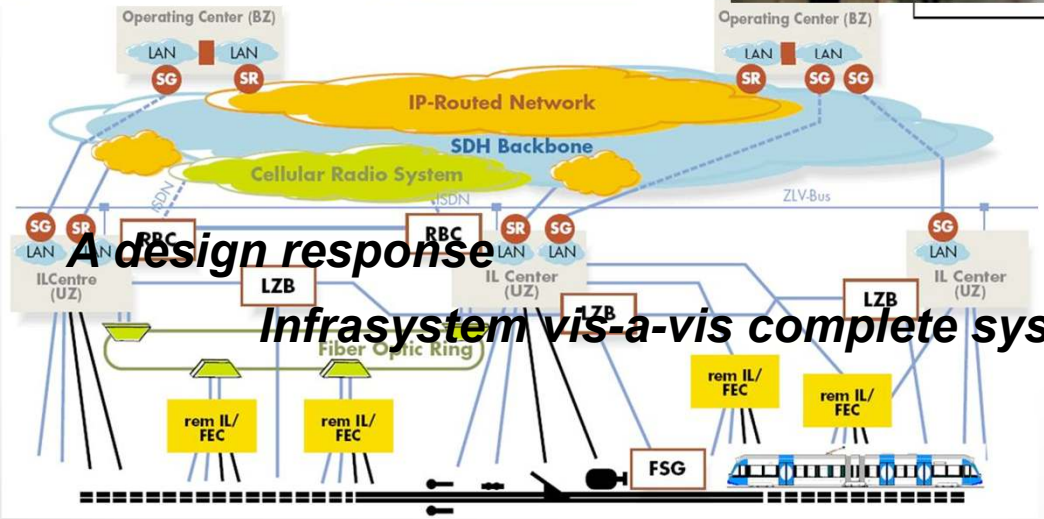




Specification and design



Operation & Maintenance



A design response

Infrasystem vis-a-vis complete system

Hybrid systems

Systems where the human is a peripheral

… or a component

Types of knowledge

Data, information, knowledge, know-how, wisdom..

Explicit vs tacit knowledge

exo-knowledge (about the system)

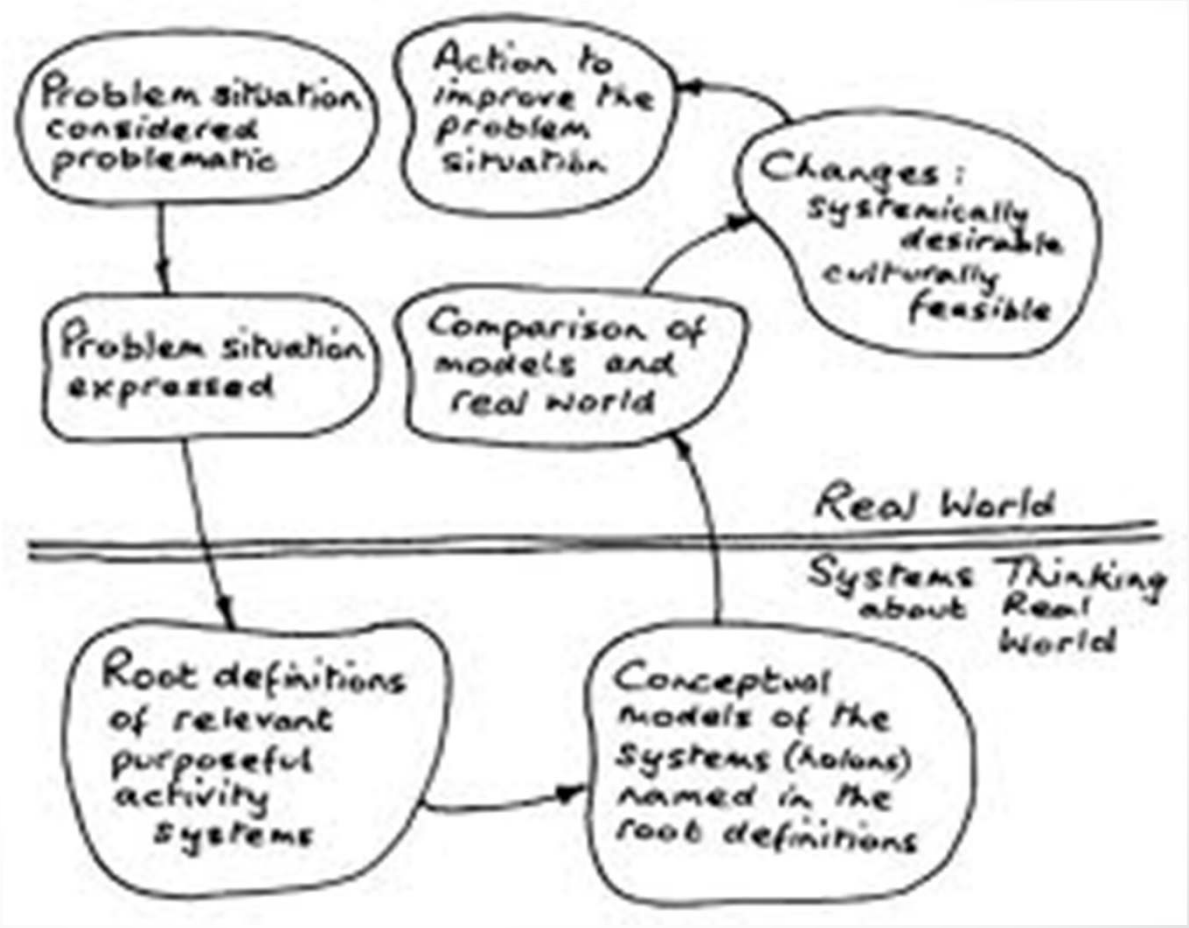
endo-knowledge (used in the system)

Designing for 'hybridity'

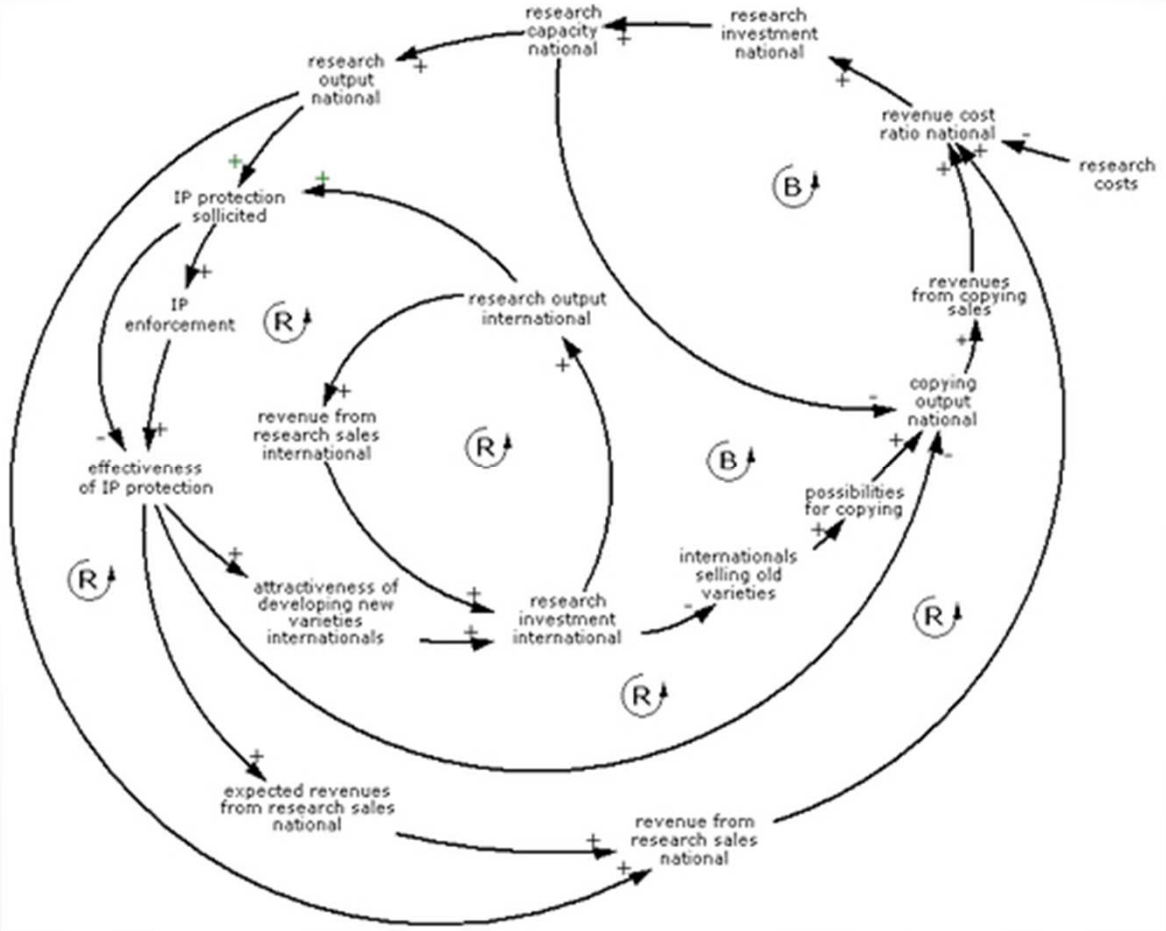
'concurrent' design

Hybrid systems approaches

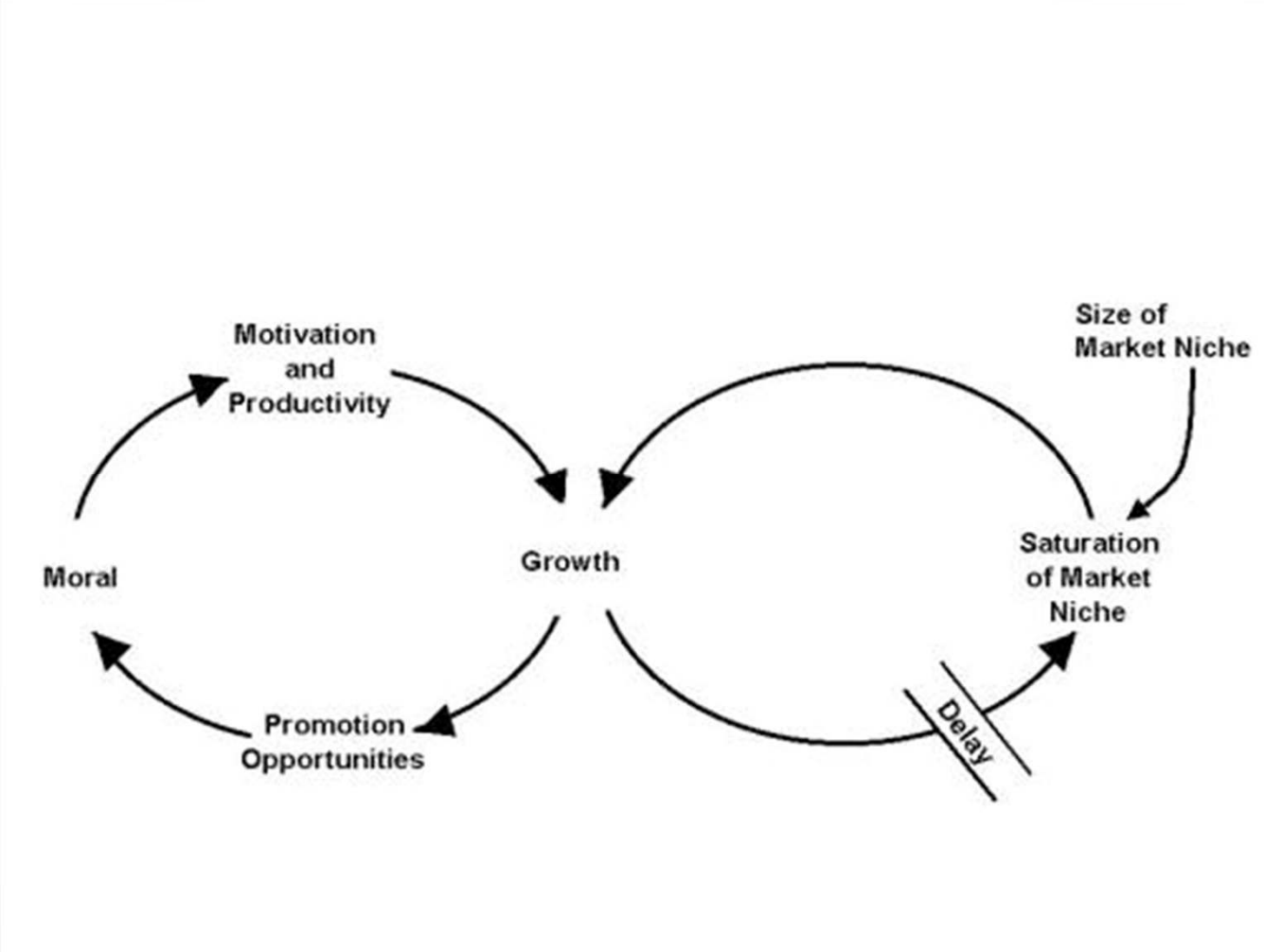
SSM (Checkland)



System Dynamics

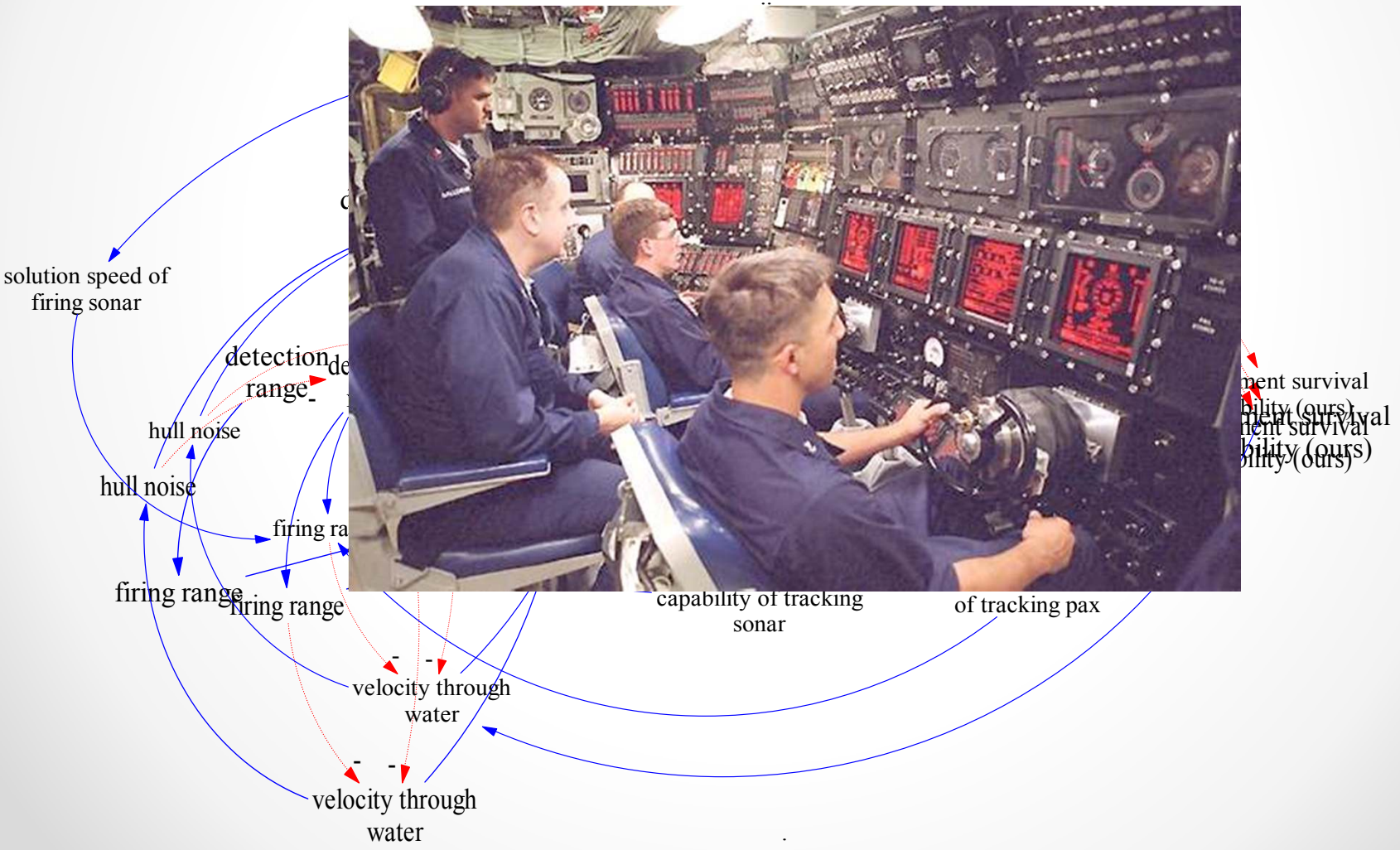


SBKM


Motivation and Productivity
Size of Market Niche
Moral
Growth
Saturation of Market Niche
Promotion Opportunities
Delay

Some examples

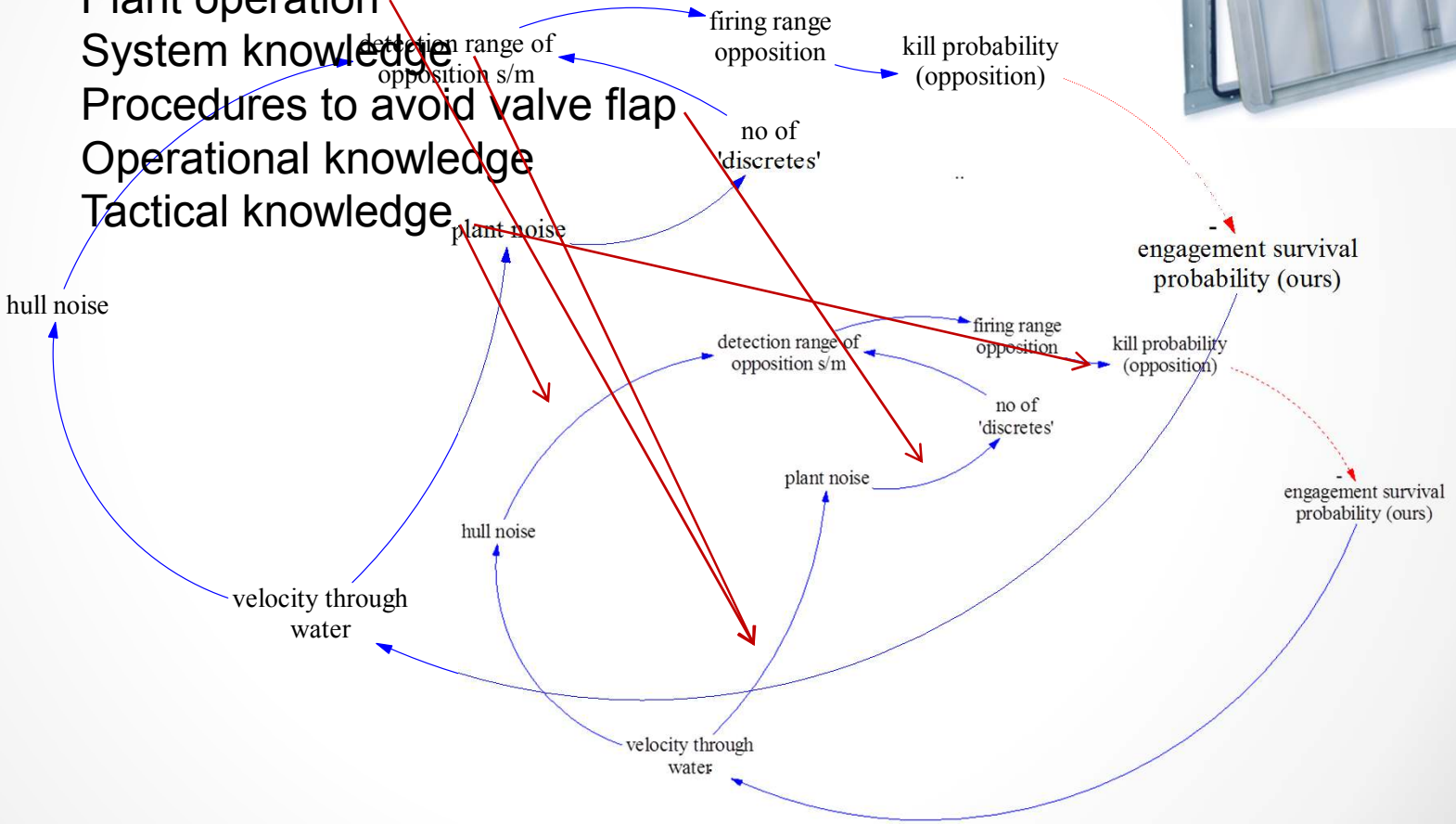
Submarine long range combat



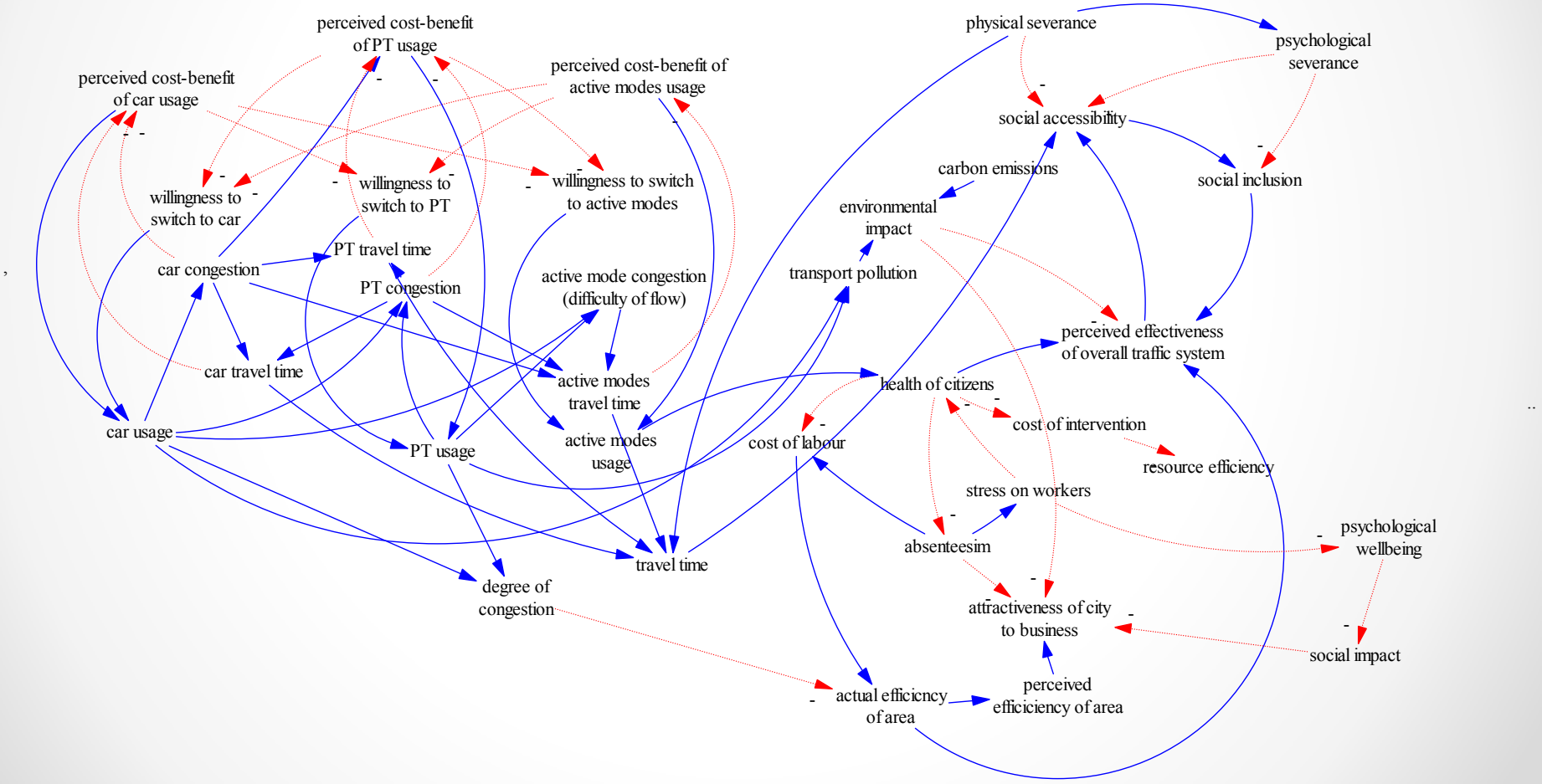
Designing for 'discretes'

Knowledge used:

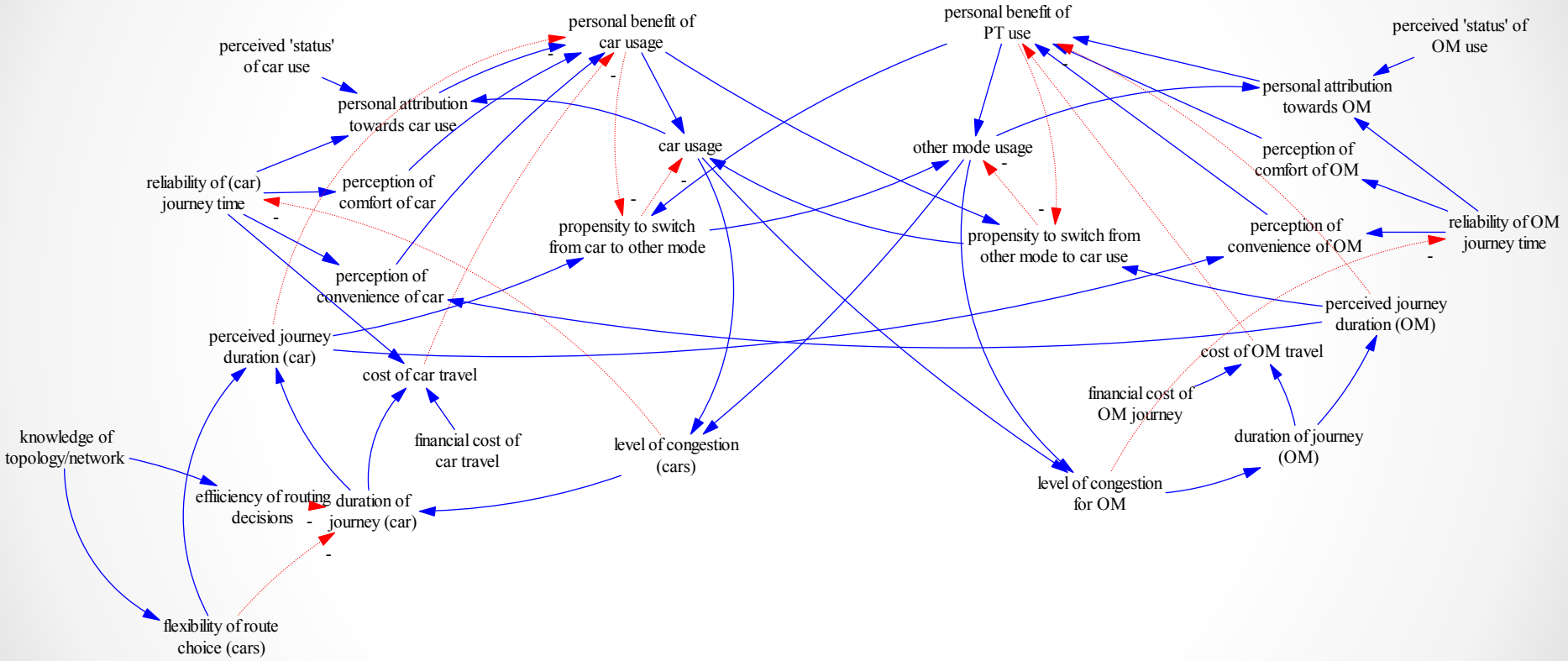
- Plant operation
- System knowledge
- Procedures to avoid valve flap
- Operational knowledge
- Tactical knowledge



Cardiff's Traffic system



Cardiff (model II)



John.Powell@usb.ac.za

Sample conclusions

1. Erect traffic routing boards
2. Display ‘carbon cost’ of journey
3. Instate bus lanes AND display PT and car journey times
4. Alter robot timings to reroute
5. Alter robot timings to inconvenience car users!
6. Water taxis coordinated with ‘bendy buses’.
7. …

Summary

People inhabit our systems but also inhibit them.

Approaches exist which concatenate the tripod of requirements

system

humans

knowledge

Questions?

John Powell

Professor of Strategy, University of Stellenbosch Business School

John.Powell@usb.ac.za

0027(0)21 918 4221