



Variety Dynamics support for System Dynamics

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CONTEXT

System Dynamics has limitations. Problems not yet well addressed in System Dynamics include: modelling the behaviours of structures of power and control; addressing hyper-complex systems with dynamically changing subsystems and system boundaries; identifying best control strategies; modelling ownership changes; biological limits on stakeholder and modeller mental understanding and predictions; ontological and epistemological foundations; asymmetric and dynamic power and control; dynamics of unbounded or incoherent systems; systems with dynamically changing structures; and systems with unknown aspects of the key systemic causal structures.

PURPOSE

Purpose of research was to develop Variety Dynamics to address the above limitations in System Dynamics.

APPROACH

Critical analysis of core epistemological and ontological issues relating to power and control of complex socio-technical systems including development of new conceptual structures, new body of theory, new axioms and appropriate mathematics.

RESULTS

Variety Dynamics has been developed by Dr Terence Love and Dr Trudi Cooper as an epistemologically and ontologically more foundational approach to controlling complex systems, especially focusing on power and outcomes management in hyper-complex situations. It provides new insights about System Dynamics and a basis for extending System Dynamics methods and software tools to provide better prediction of the behaviours of complex systems and guidance for control decisions and design decisions relating to reconfiguration of complex systems. Additionally, it has resulted in a form of Set Theory that includes and extends existing Set Theories, and a new number class of varieties, V .

CONCLUSIONS

The initial work on Variety Dynamics over the last 20 years has resulted in:

- Definition of hyper-complex systems
- 25 axioms that guide understanding and decision making for complex and hyper-complex system
- Changes to design of system dynamics modelling processes and software.
- Tools for direct guidance of control of highly socio-technical complex systems and situations involving power, especially complex and hyper-complex systems characterised by dynamic, complex and asymmetric power and control
- The development of a new form of Set Theory with implications for change in other realms of mathematics, including potentially offering a role as a super-set in which existing set theories such as ZFC, NBG and MK are subsets.
- Improved theoretical foundations for Counterfactual Analysis and Constructor Theory intended as a replacement for theories of physics relating to quantum phenomena and tying together information theories and physical theories.

It is expected further developments will result in new System Dynamics methods and software to better enable the inclusion of socio-technical power relations; design of optimal management strategies; and refine the conceptual understanding of the foundations of System Dynamics.

KEYWORDS

Variety, Variety Dynamics, mathematical Set Theory, power dynamics, hyper-complex systems