

Knowledge Management for Self-Organised Resource Allocation

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My thesis in one sentence...

Making information available for socially-productive purposes is a necessary condition for fair, inclusive and sustainable collective action and self-governance.

Contributions

The use of **Knowledge Management** principles, excerpted from studies of classical Athens, for the development of **fair, inclusive and sustainable self-governed systems**

1

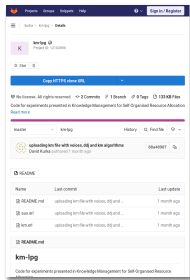
Operationalisation of three of the KM Design Principles

2

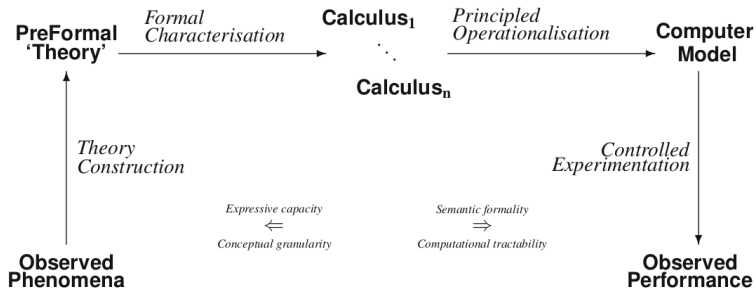
Development of four distinct **algorithms**, for four relevant problems of self-governance

3

Introduction and specification of a general platform for multi-agent system simulation in Erlang

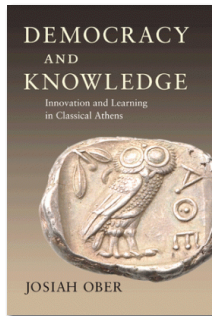


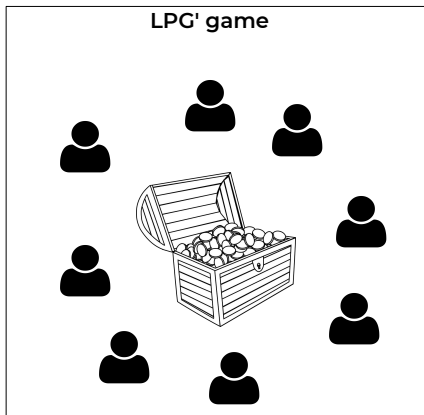
Socially-Inspired Computing Programme



Knowledge Management Processes

- Inspiration: classical Athenian democracy
- Knowledge Management : = making information available for socially productive purposes
- A diverse collective can not only more readily and rapidly reach a 'right' decision, but can also act on it effectively
- 3 Processes: Knowledge Aggregation, Knowledge Alignment and Knowledge Codification
- 8 KM Design Principles





Knowledge Management Abilities



Voices of Justice



Distributed
Distributive Justice



Principled Violation
of Policy



Disobedience as
mechanism of
change

- **Voj** - Principle 6: Opinion formation and diffusion
- **DDJ** - Principle 7: Allocation policies definition
- **PVP** - Principle 8: Appropriate response for non-compliance
- **Disob** - Principle 8: Protection against tyranny

Voices of Justice

Problem

How individual opinions can be formulated and diffused, so to produce a coherent feedback of a system's state?

KM Design Principle

6. Epistemic diversity; Distributed social knowledge; Reliability of experts

Key Ideas

Affinity, Trust, Influence

Findings

Coherence, Robustness, Resilience



Distributed Distributive Justice

Problem

How a fair and sustainable resource allocation policy can be defined in a decentralised way?

KM Design Principle

7. Recognition of valuable and diverse input; Filtering process for assessing relevant information

Key Ideas

Legitimate claims, Trust, Reputation

Findings

Efficiency, Fairness, Robustness

Appendix

Smart-contract: no head, asynchronous



Principled Violation of Policy

Problem

What are appropriate processes to respond to non-compliance (norm violation)?

KM Design Principle

8. Bright-line rules against violations; Hierarchy of punishments (ruler's perspective)

Key Ideas

Flexible norm and monitoring

Findings

Cost-effective monitoring, graduated sanctions, adaptive enforcement, justice perception and policy justification



Disobedience as a Mechanism of Change

Problem

How members can be protected against tyranny (power violation)?

KM Design Principle

8. Bright-line rules against violations; Hierarchy of punishments (people's perspective)

Key Ideas

Norm violation + policy violation as legitimate expression

Findings

Obedience or oppression, justified disobedience, cycles of change



Publications

- Kurka, Pitt, *Voices of Justice*, eCAS 2016
- Kurka, Pitt, *Distributed Distributive Justice*, SASO 2016
- Kurka, Pitt, *Smart-CPR*, SASO^ST 2017
- Kurka, Pitt, *The Principled Violation of Policy*, eCAS 2017
- Kurka, Pitt, Lewis, Patelli, Ekart, *Disobedience as a Mechanism of Change*, SASO 2018
- Kurka, Pitt, Ober, *Knowledge Management for Self-Organised Resource Allocation*, **TAAS 2019**
- Kurka, Pitt, Lewis, Ekart, *Civil Disobedience and Institutional Self-Regulation*, Cognitive Systems Research, to be submitted

The Big Picture

- Historical and sociological descriptions can be **abstracted and operationalised** as to enable inclusive and sustainable collective action and self-governance
- The return arrow: could we use our models to **inform our public understanding of politics?**
- Towards **Computational Comparative Politics:**

The study of political institutions, regimes and processes and **their comparative representation in algorithmic form**, as a basis for dynamical analysis (e.g. evolutionary game theory), computer simulation, and system engineering

- Evolution of Human Behaviour workshop, ALife 2019