Rationality and Power: the “gap in the middle” in ICT

Position Paper Overview

Objective IST-2007.8.4

FET proactive

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Socially Intelligent ICT

- Increasingly distributed ICT:
  - Open – anyone can join
  - Adaptive – changing over time
  - Massive – 10m's of components
- Required to behave in a socially intelligent way
- Coordinating and cooperating to satisfy users needs

The Rationality Gap

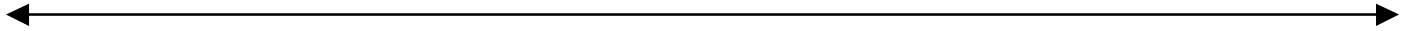
- Distributed systems designers often assume users and components:
  - Behave altruistically
  - Behave in an economically rational way
- But open systems can't assume altruism: we don't live in "hippie world"
- Rational action theory relies on assumptions that don't hold either

The Rationality Gap

Gap in the middle

Bounded Rationality
learning / adaptation

Altruistic — Rational



The Power Gap

- Distributed systems designers often assume users and components are:
  - Centrally administered or controlled
  - Are completely independent and autonomous
- But central control is not possible in massive open systems
- Complete autonomy is rare because components are interdependent

The Power Gap

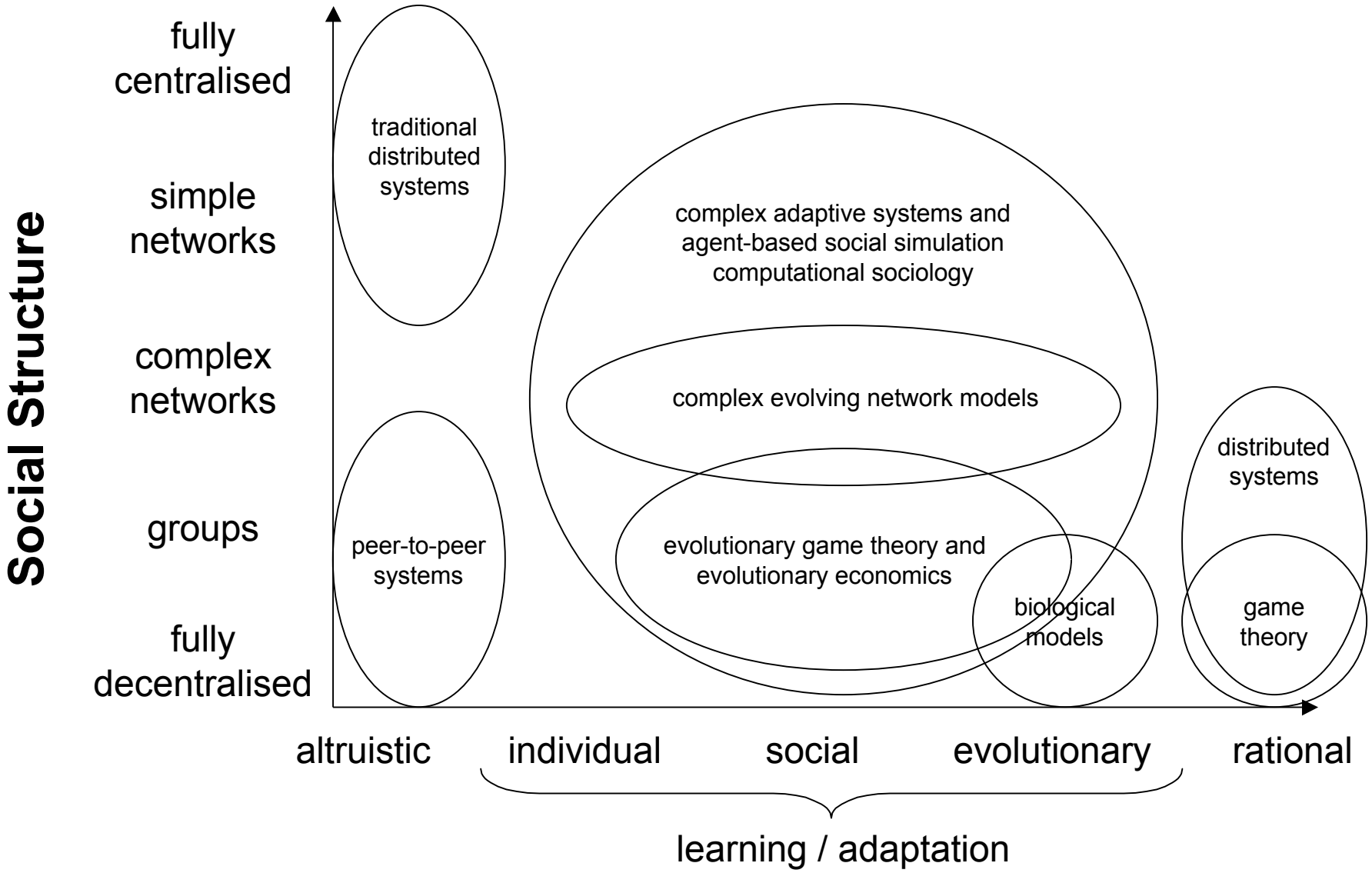
Gap in the middle

Complex and changing
social structures

Central Control — Complete Autonomy

Complexity Science to the Rescue!

- It is precisely in these gaps that complex systems are found
  - Bounded rational and adaptive behaviours
  - Complex evolving networks
  - Emergent structures and learning models
- Results and approaches from complex systems science can be applied


Social Structure
fully centralised
simple networks
complex networks
groups
fully decentralised
traditional distributed systems
peer-to-peer systems
complex adaptive systems and agent-based social simulation computational sociology
complex evolving network models
evolutionary game theory and evolutionary economics
biological models
distributed systems
game theory
altruistic
individual
social
evolutionary
rational
learning / adaptation
User Rationality

What to do?

- Bring together leading EU:
  - Distributed systems designers (in the gap)
  - Social / complex systems modellers
- Produce plausible models of both user rationalities and social structures
- Apply them to open problem domains in self-organising ICT

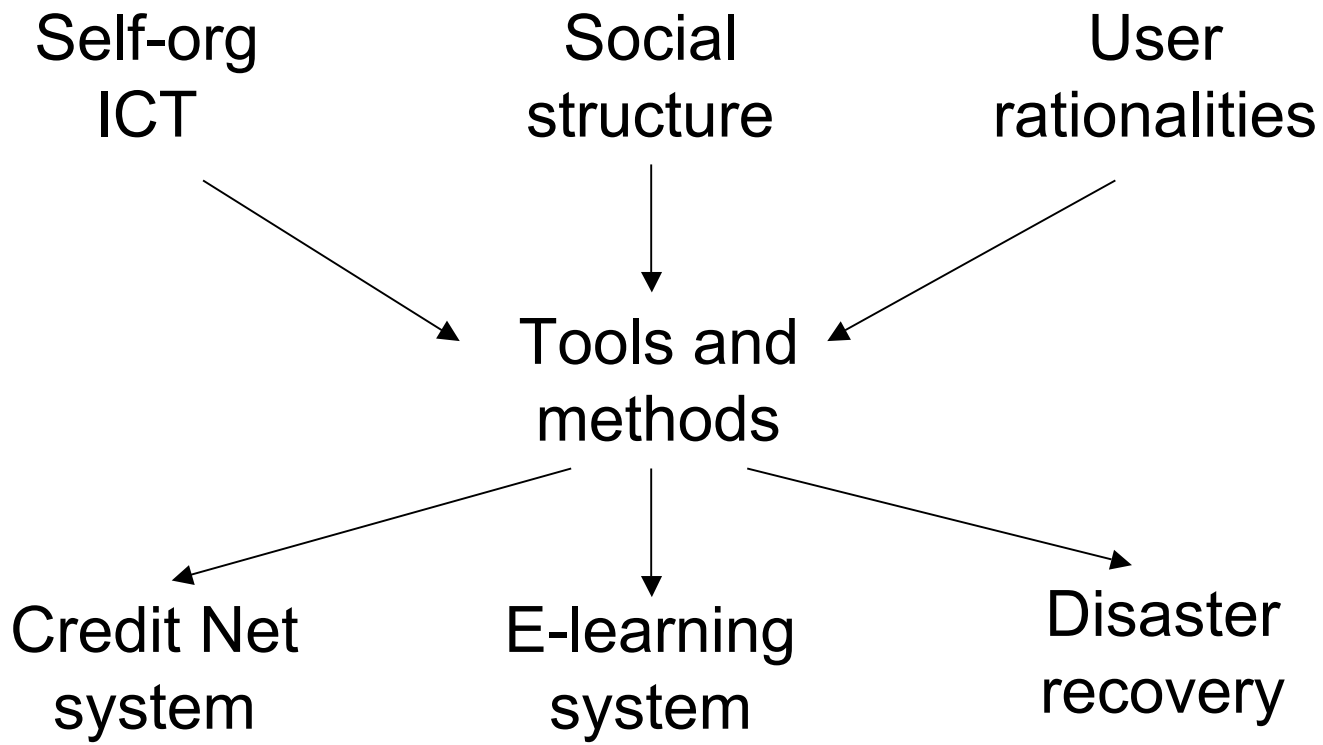
Outputs

- Tools and models for developing next-generation socially intelligent ICT
- Socially intelligent design patterns
- Prototype systems / simulations
- Empirical evaluations from prototype systems

Possible Domains

- Highly robust and bottom up disaster recovery ICT support systems
- Self-organising e-learning systems
- Socially emergent ICT mediated credit networks – money 2.0
- In each case by addressing the gap-in-the-middle => highly robust, self-organising solutions

Areas, methods, applications



Would Need To

- Combine leading EU researchers in:
  - Self-organising ICT: P2P, SOC
  - Social Science / Simulation & Complexity
- By focusing on challenging open problem domains

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