

Exploiting self-organisation in techno-social systems



David Hales

www.davidhales.com

Delft University of Technology
(Currently visiting University of Szeged, Hungary)

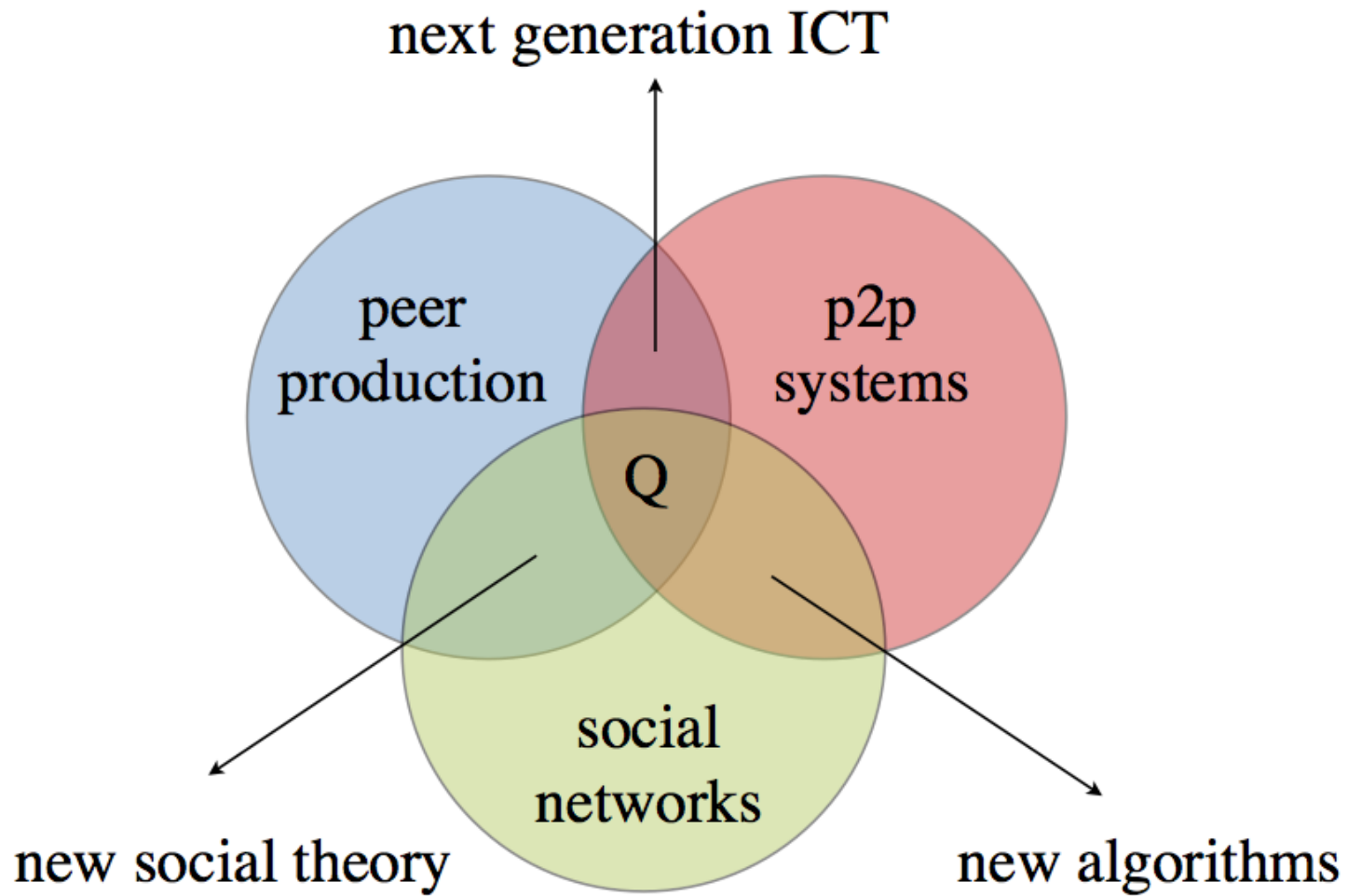
Trends

- Recent trends
 - Peer Production (wikipedia, open source)
 - Social Networks (facebook)
 - Peer-to-Peer (P2P) systems (bittorrent, skype)
- Related themes
 - Communities not individuals (social)
 - Sharing, giving, social production without traditional economic incentives
 - New kinds of “commons” new kinds of tools for managing those commons



Quality Collectives

“QLectives can be defined as cohesive and cooperative resource sharing communities directed towards the peer production of commonly defined high quality artifacts, services and experiences.”



Problem

- How to engineer such systems?
- Real people and communities are a major part of them
- What theories do we have?
- What experiments can we do?
- Trial and error current approach: “nobody knows nothing”

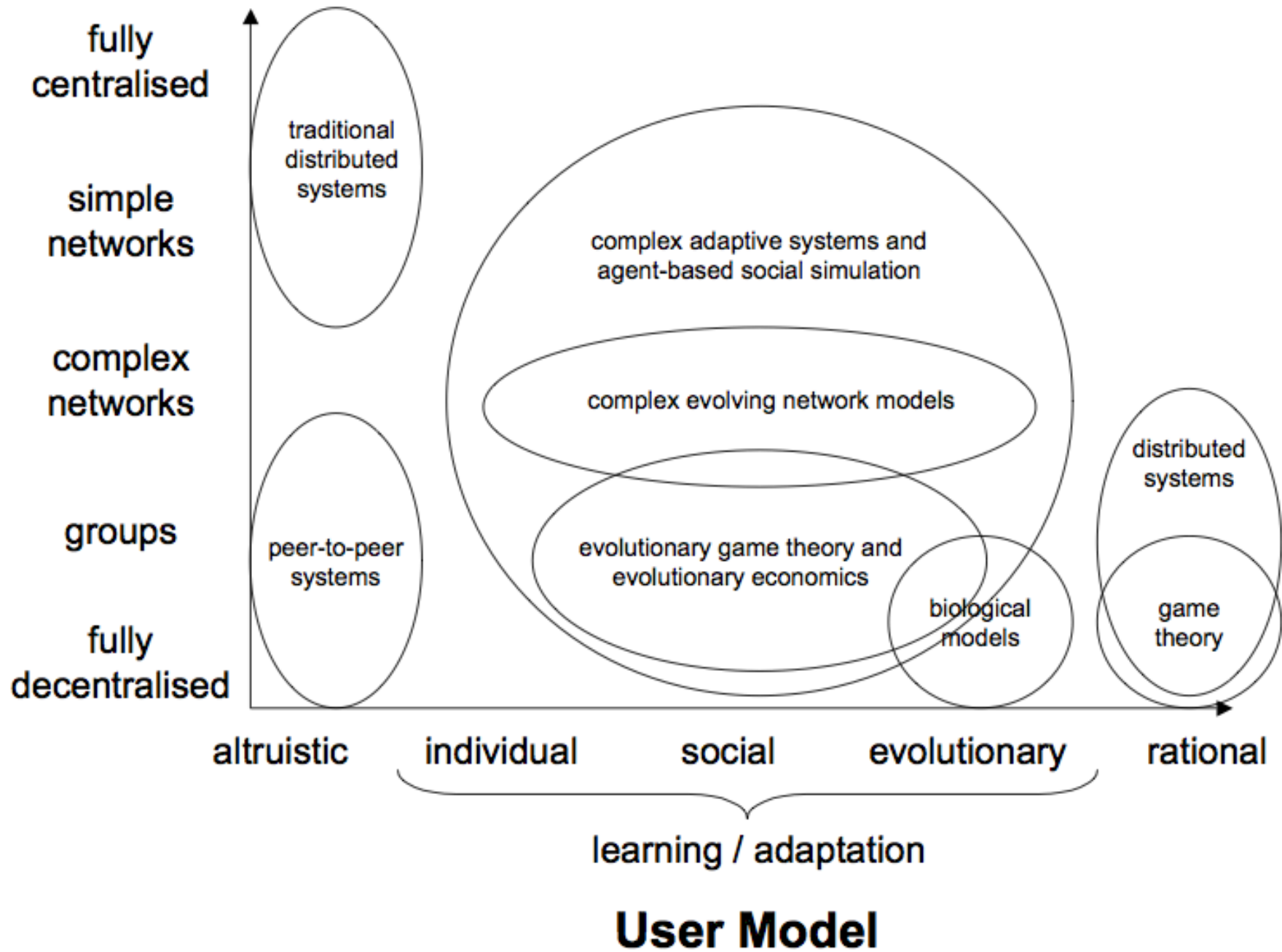
Social approach

- Such systems are social from the start
- Social structures are dynamic not static – they have a history
- The dynamics of the structure are part of the “game” of interaction
- Group formation processes important
- Cultural evolution, cultural group selection
- Memetics

Questions

- How are dynamic social structures formed and maintained?
- How do users actually behave?
- User behaviour / structure feedback both micro -> macro and macro -> micro (and don't forget the meso)
- Individual rational models of user behaviour rarely directly applicable

Social / Admin. Structure



Some directions

- **Evolutionary theory:** reciprocal altruism, kin, group and cultural group selection
 - How +ve social behaviors / strategies / norms emerge through evolutionary processes
- **Common pool resource theory:** Ostrom's CPRG
 - How people govern common resources collectively and productively
- **Social contract theory:** Rawls' "Theory of Justice"
 - Using reason to derive just social norms / laws that others subscribe to rationally
- **Economics, markets, peer production, symbolic interactionism, ethnomethodology...**

Socially inspired design patterns?

- Active research area we focus on in QLectives
- Socially inspired design patterns for P2P:
 - Direct reciprocity (e.g. TFT in BitTorrent)
 - Indirect reciprocity (e.g. credit / points systems)
 - Group selection (e.g. evolving communities)
 - Altruistic punishment (e.g. self-policing)
- See ***QLectives deliverable D2.1.1*** for details on www.qlectives.eu

User Models

- We need realistic models of how users behave when embedded within given ICT systems
- A priori theoretical models tend not work – users rarely behave “rationally” in the sense of maximising some simple utility
- Empirical measurements suggest its complex – heterogeneous, adaptive, but progress can be made
- Need large-scale deployments / measurements – an empirical / experimental approach

Empirical Stuff

- **Public and Private BitTorrent Community measurement studies** - scraping and processing vast amounts of data
- *Meulpolder, M., D'Acunto, Capotă, M., Wojciechowski, M., Pouwelse, J.A., Epema, D.H.J., Sips, H. J. (2010) Public and private BitTorrent communities: A measurement study. International Workshop on Peer-to-Peer Systems (IPTPS) 2010, San Jose, California, USA*
- **Ethnographic studies of private communities** - joining communities, observing and talking to people
- Nazareno Andrade et al (forthcoming)

Significant works

- Recent empirically informed works suggest possible new ways to understand and build socio-technical systems:
 - **Elinor Ostrom**, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, 1990
 - **Manuel Castells**, *The Information Age: Economy, Society and Culture Vol. III.*, Blackwell, 2000
 - **Yochai Benkler**, *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, Yale University Press, 2006

Elinor Ostrom 1990

Ostrom identifies eight "design principles" of stable local common pool resource management:

1. Clearly defined boundaries (effective exclusion of external unentitled parties);
2. Rules regarding the appropriation and provision of common resources are adapted to local conditions;
3. Collective-choice arrangements allow most resource appropriators to participate in the decision-making process;
4. Effective monitoring by monitors who are part of or accountable to the appropriators;
5. There is a scale of graduated sanctions for resource appropriators who violate community rules;
6. Mechanisms of conflict resolution are cheap and of easy access;
7. The self-determination of the community is recognized by higher-level authorities;
8. In the case of larger common-pool resources: organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level.

Rawls' "veil of ignorance" approach

- assume we wish to specify the kind of society that is just and good
- but we stand outside the society and don't know what role we ourselves would play
 - we are ignorant of what endowments, knowledge, capacities and position we would hold
- what rules / norms would we accept as just and fair? i.e. what would we accept as “collective good”

Designing a socially int. system

- We wish to specify the requirements of a system that will structure interaction between peers
- the protocol could run on diverse devices with diverse goals, capacities and user behaviour
- but we need 1 billion users of the system to make it a success (and get rich)
- What collective goals will we define such that many different devices and users would accept and run it?
 - “do no evil”? or “make the world a better place”? or “from each according to his abilities to each according to his need”?