Grassroots R&D, Prototype Cultures and DIY Innovation: Global Flows of Data, Kits and Protocols
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Societies of Artefacts

Academic Contribution
medium (0) Agreement
mid term (>1 year) Duration
impacting (10) Importance

Future belongs to innovation that simultaneously and directly connects politics with design, community building with prototype testing, and offers an experimental setting for following the impact of emergent technologies on society. This trend is embodied by the global rise of alternative R&D places existing outside of the government funded universities or even corporate R&D labs. In them innovation is becoming an active expression of citizenship as much as it is a human pursuit to understand nature and create resilient and efficient tools. Hackerspaces, FabLabs, Makerspaces, DIYbio labs, Citizen science projects based on Participatory Monitoring and Crowdsourcing of Data represent these alternative approach to R&D that combines decentralized approaches to management and policy with P2P, open science and open innovation approaches based on open source hardware and software infrastructure. These social as well as technological experiments and prototypes define new niche markets and enable global and sustainable exchanges that have a potential to empower various communities. Global and alternative innovation networks are developing around Do-It-Yourself (DIY) and Do-It-With-Others (DIWO) subcultures, such as Direct to consumer (DTC) genomics, DIYbio labs, DIYgenomics, Clinical trials 2.0, Hackerspace hackathons, Maker fairs and FabLabs competitions. Communities of people monitoring, sharing and making sense of various scientific data and technological practices are exploring these new global networks around low-tech DIY and open science protocols. Maker and hacker communities around the world prototype future gadgets and tools with open hardware platforms and feed the needs of various grassroots open labs for affordable equipment that offer opportunities for entrepreneurship. These low-tech and open source strategies are paradoxically inspired by both EU alternative squat cultures and the American spirit of entrepreneurship. The global and alternative R&D places are made possible by informal networks around the globe that enable very different flows of knowledge and expertise from the official industry and academia. They are becoming testbeds for new models of public participation in Science and Technology but also new models for policy making in which political deliberation merges with design iteration and embraces citizen science

paradigms of research. We are entering an age of global flows of open data, DIY kits and citizen science protocols.

It is almost tautological to state that "societies of artefacts" should be based on social relationships, but this a challenge yet to be fully addressed. It requires an inter-disciplinary investigation by social and computer scientists to explain how social and socio-cognitive relationships between people can be represented in a computational theory and used as a basis for engineering societies of artefacts. In particular, this research programme should investigate the principles of social intelligence and social networks that underpin the specification and regulation of open, decentralised, and adaptive systems, and provide corresponding mechanisms for run-time self-regulation and self-management. This will involve study of the innovative intersection of norm-governed systems, voting algorithmics, game theory, opinion formation, belief revision, judgement aggregation, and social computational choice [PKSA06], as well as a formal characterisation of socio-cognitive principles of trust, forgiveness, and affect. It will also need to leverage results from the mathematical study of social networks: a particular area of study here is the interaction of aggregation rules, social networks, and intended outcomes, for example in reaching consensus, avoiding dominance, maximising utility, minimising inequality, and so on [Dra06, DG09]. A successful outcome would serve to establish the logical and computational foundations of a common theoretical framework for the executable specification with respect to runtime "social services" provision, as a basis for performing secure and reliable service discovery, composition, optimization, adaptation and deletion.

References:
[DG09] M. Draief and A. Ganesh. Spread of epidemics and rumours with mobile agents. In European Consortium for Industrial Mathematics Symposium (ECMI 2008), to appear, 2009.

[Dra06] M. Draief. Epidemic processes on complex networks. Physica A: Statistical Mechanics and its Applications, 363(1):120-131, 2006.

[PKSA06] J. Pitt, L. Kamara, M. Sergot, and A. Artikis. Voting in multi-agent systems. Computer Journal, 49(2):156-170, 2006.

Theoretical Foundations of Socio-Cognitive Systems
Jeremy Pitt

Societies of Artefacts

Academic Contribution
medium (0) Agreement
long term (>3 years) Duration
challenging (15) Importance