7. Social enhancement - Insights from Computational Social Science, Complex System Theory, and Global Systems Science

*By Dirk **Helbing** (ETHZ) with contributions from a roundtable discussion and insightful discussions with Yvonne **Hofstetter** (UAS Bonn-Rhein-Sieg), Sarah **Spiekermann** (Vienna University of Economics and Business), Jeroen **Van den Hoven** (TU Delft), Isamu **Okada** (Soka University), Chang-Won **Ahn** (Daumsoft), Lorenzo **Fioramonti** (University of Pretoria), Hans J. **Herrmann** (ESPCI Paris – PSL), Jose Jacob **Kalayil** (INTEGRO Infotech & Consulting), Indra **Spiecker** (Goethe University Frankfurt), Ranga **Yogeshwar**, Sanjana **Hattotuwa** (University of Otago – NZ), edited by Martin **Müller**.*

Key Concepts

Computational social sciences is an area of science in which computational tools and digital data are used to investigate sociocultural phenomena. **Complex systems theory** studies how relationships between the components of a system relate to the overall behaviour of the system. It is applied in a range of areas such as weather prediction, social movements, the spread of diseases or financial recessions and more.

Design for values is a process by which constitutional, societal, cultural and moral values are incorporated into the design of new technologies or institutions. It considers factors such as sustainability, human well-being, privacy, democracy, justice, inclusivity, trust, accountability, and responsibility.

The **tragedy of the commons** is a situation in a shared-resource system where individual users, acting independently according to their own self-interest, behave contrary to the common interest of all users by depleting or spoiling the shared resource through their collective action.

Scientific Anticipatory Brief abstract

In complex systems like our economy or society, interactions between system components such as individuals, computer systems, and companies, can lead to unexpected “emergent” outcomes. Some of these outcomes, such as self-organized co-operation or social order, can be favorable, but some can be “tragedies of the commons,” as in the case of environmental destruction or depletion, or climate change.

Next-generation technologies will have a strong and disruptive impact on those system components. Depending on the choices made, these technologies could be a threat to future societies, particularly in a world faced with grand societal challenges. However, they could also be used to support social interactions and empower citizens in their society. Understanding and modeling complex systems can be used to reduce problems and risks. Such models can guide proactive measures that can avoid or mitigate potential trouble or harm.

Those technologies have the potential to facilitate co-ordination and co-operation by unleashing the power of immaterial network effects, such as social capital or culture. They can also avoid traffic jams or crowd disasters. Related approaches are aimed at digital assistance and “social enhancement“ in the spirit of “design for values”. They could certainly help to overcome “social dilemmas“ and, thereby, considerably improve systemic performance, and reduce environmental and resource-related conflicts.

Note that combinatorial networking effects may dominate over the exponential increase of artificial intelligence, and the expected “singularity”. In complex self-organizing systems, the network structure and interactions can largely determine the character of the system. This effect that can be used for good.

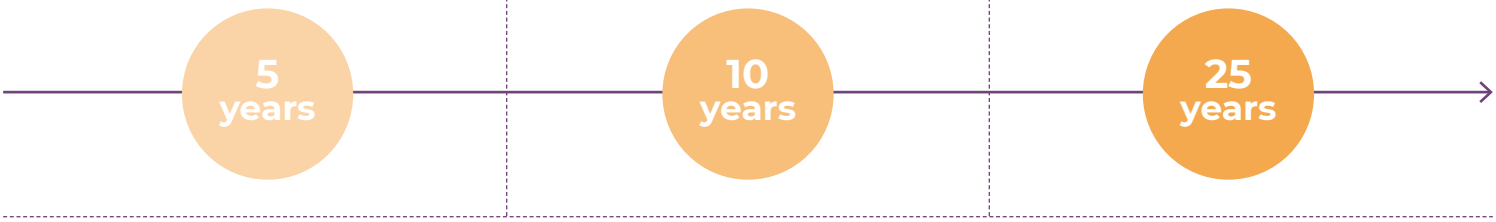
When it comes to the organisation of society, democracy is a common framework to involve citizens and civil society in shaping the future. Digital technologies can be a means of upgrading democracy and strengthening human rights, for example, by “design for values”. Typical elements of democracy, such as distributed organization, diversity, pluralism, and participation, support systemic resilience, because they are the very features that allow societies to cope with crises. Participatory resilience and sustainability, for example, can strengthen civil society and boost transformation, in the sense of anti-fragility.

Ideas and demonstrators for a democracy 2.0, 3.0, 4.0 etc. have been developed over the years (see, for example, the “nervousnet” and “social mirror” concepts for a next generation digital network). Moreover, innovative frameworks such as MOODs (Massive Open Online Deliberation) and City Olympics could be ways to find new forms of political decision-making and collective action, connecting local to global goals while supporting diverse collective approaches. This would favor resilience and build upon collective intelligence. Resilience can in fact be increased by a number of measures, including redundancies, diverse solutions, decentralized organization, participatory approaches, solidarity, and digital assistance – solutions that should be locally sustainable for extended periods of time..

Drawing on the latest findings from computational social science and complex systems theory, this Scientific Anticipatory Brief presents potential trends for smart techno-socio-economic environmental systems of the future. It appears that social innovations are currently much more pressing than technological innovations, because smart techno-social systems of the future should serve the needs of people and nature in a more symbiotic and balanced way.

Detailed table overview of trends at 5, 10 and 25 years

7. Social enhancement
Example of breakthroughs



Cross-cutting themes are: **design for values, social governance innovation**, and **decentralized network effects**. Combinatorial networking may dominate over the exponential increase of artificial intelligence, 'deep' technologies and the expected "singularity".

5 years

- One-stop shop digital platform solution for informational self-determination
- A Peace Room to manage global affairs based on a more participatory approach, a new kind multilateralism unleashing collective intelligence

10 years

- New Social Media platforms 2.0, which promote coordination, cooperation, and truth by design, and support collective intelligence and collective action
- City Olympics to boost participatory, scalable mass innovation across the planet

25 years

- An ecosystem of digital democracy platform tools supporting digital democracy and combinatorial innovation
- A new socio-technical operating system to manage our world in a more sustainable and resilient, participatory way. This should include a socio-ecological finance/incentive/coordination system accessible on fair terms to all.