CfP: ***Foundations, Modeling and Design of Complex Social-Technical Systems***

Apologies for X-postings

Symposium or Affiliated meeting at the 15th Congress of Logic, Methodology and Philosophy of Science (CLMPS 2015); University of Helsinki, Finland, 3—8 August 2015.

Organizers: DLMPS commission on the Philosophy of Technology and Engineering Sciences

The notion of socio-technical (ST) system was introduced by Eric Trist, Ken Bamforth and Fred Emery while working at the Tavistock Institute in London during the postwar reconstruction of the British coal mining industry. Their version of the term referred primarily to the interplay between human and technological factors in working environments within organizations. Besides this intra-organizational meaning of the term, a second connotation of ST-systems has emerged, primarily in engineering and managerial contexts. It refers to large, often infrastructural systems embedded in society as a whole such as the various worldwide transport systems (railway, traffic, aviation, and waterway), large energy grids, water supply, sewage networks and the internet with its social media, etc. This societal, extra-organizational version of the ST-system notion is rooted within systems engineering, and users of the notion focus on the design and management of large and complex ST-systems (CST). These CST-systems are different from engineering systems because, besides being large and complex, they are deeply intertwined with social reality made up by human individuals (in various roles such as multi-purposed users, operators, service men, inspectors, etc.), groups of human beings (such as action groups, organizations, legislators, governments etc.), and other more general structures of social reality (such as norms and value systems, legislation, regulations, monetary systems, states, etc.). Consequently, explanation and prediction of CST-system features and their optimization require an overall integrative approach toward the study of socio-technical phenomena. CST-systems display deep uncertainty, emergence of high level features, and developments on various levels within different time scales. In his 2012 C.L. Miller Lecture, MIT's Dr. Joseph M. Sussman, has called for CST-systems to become the subject of a new field of scientific inquiry because many of today's global problems are intrinsically CST-system-related. He mentions the following examples: climate change, energy/environment, developing megacities, global economy, national security, productivity and mobility. Moreover, the global problem related CST-systems are there to stay—and are even likely to increase their impact. If we want to make progress regarding these problems, we have to study them. The goal of this symposium is to increase our theoretical understanding of CST-systems, and augment our ability to control and optimize them. To that end we encourage readers to send in philosophical and foundational papers concerning (1) identification, (2) conceptual questions, (3) knowledge acquisition, and (4) design/optimization of CST-systems. The following are among the examples of questions and issues we consider relevant.

Ad (1) *Empirical examples and classifications*.
- Empirical descriptions of what can be considered clear examples of CST-systems (beside those referred to above also the media (Trist) and university systems (Bucciarelli & Kroes) are mentioned).
- Why do empirical observations about these examples suggest these to be CST-systems rather than other systems (engineering, hybrid, human-technological, large scale, systems of systems—the various roles of human beings in the loop?)?
- What CST-system classification emerges from those empirical descriptions (e.g., Trist: work systems, organizational, macro-social)?

- Does the empirical inventory suggest a distinction between intra- and extra-organizational notions of ST-systems (differences power distributions)?

Ad (2) *Conceptual and definition related issues*.
- What are characteristic features of CST-systems beside those mentioned above (no, or more than one overarching function; being monolithic; evolutionary; geographic topology; hybridity; feedback loops; collective action; distributed intelligence; trust; voluntary and collaborative interactions; multi-level value-systems, etc.)?
- How do these features conceptually distinguish CST-systems from its competitor notions mentioned in (1), and can we even reasonably define CST-systems using these features?
- How does the notion of CST-system relate to other systems notions (instrumental, social, dynamic, developmental, physical, technical, intentional, etc.)?
- Is the CST-system notion perhaps even ill-conceived? Are they not just too large extrapolation systems thinking to say something scientifically sound about them (too many mechanisms, functions and contingencies to gather knowledge about and to be fruitfully optimized, let alone to be designed from scratch)?

Ad (3) *Knowledge acquisition*.
- How are we to delineate specific CST-systems empirically?
- What levels of interaction are to be distinguished within CST-systems and what are appropriate classifications of their constituents and their mutual relations?
- How should we cope with the multi-layeredness of CST-systems?
- What general roles of (groups of) human beings should be identified?
- How should we choose within the enormous diversity of natural, engineering and social science methodologies within CST-system studies?
- Which are the most appropriate explaining mechanisms within CST-systems (Bunge)?
- To what extent do CST-systems allow for formal analysis and explanation (differential equations, multi-agent modeling, logical structure), and does it make sense to look for dynamic descriptions?

Ad (4) *Design and optimization.*
- What methodologies do we need to cope with specific design problems of CST-systems (the design commission is established "on the fly," design seems always a question of redesign, they seem to evolve rather than to be designed)?
- What are the prospects of identifying general underlying rules or regularities with the solution of individual CST-system design problems that will be of general use for other CST-systems?
- Is it legitimate regarding safety, uncertainty and risks and the openness of the system, to consider persons and even organizations possible components of a system just like nuts and bolts?
- How can we integrate multi-leveled value systems into CST-systems optimizations?

Contributors to the symposium are encouraged to submit an abstract of 300 words prepared for review by the DLMPS commission. Accepted contributed papers will be allocated in total 30 minutes (20 min for the presentation + 10 min for discussion). Proposals are to be submitted to S.D.Zwart@tudelft.nl.

Deadline for submissions: January 3rd 2015
Notification date: January, 21th 2015
For the rules regarding multiple presentations, please consult the official CLPMS 2015 website: http://clmps.helsinki.fi/cfp.php.