Is Sociotechnology still a theory for mining? – 70 years later

<u>*E* Lund</u>¹, J Johansson² and J Lööw³

- 1. PhD student, Luleå University of Technology, 977 54 Luleå, Sweden. Email: <u>erik.lund@ltu.se</u>
- 2. Professor, Luleå University of Technology, 977 54 Luleå, Sweden. Email: jan.johansson@ltu.se
- 3. Associate senior lecturer, Luleå University of Technology, 977 54 Luleå, Sweden. Email: joel.loow@ltu.se

Keywords: Sociotechnology, theory development, human-technology interactions

ABSTRACT

The sociotechnological theory has its roots in Trist and Bamforth (1951) seminal paper from more than 70 years ago. The paper explored a new technical system for mining coal, known as the longwall method, and how this method changed many of the social structures for the workers. In later works Trist (1981), wrote that this paper was a result of one of the first research projects of the Tavistock Institute of Human Relations in London, that would also come to form the scientific journal known as *Human Relations*.

Since then, much work has been devoted towards developing the sociotechnical theory. See Mumford (2006) for an historical overview, or Baxter and Sommerville (2011) and Carayon *et al.* (2015) for examples of use-cases. The sociotechnological theory has two parts to it. On the hand, it offers and theoretical framework for how to understand complex human and technological systems, and on the other side there is a normative part to the theory that makes claims about how work system should be designed according to human principles, see Cherns (1976). The normative claims that the theory makes have been popular but also controversial at times (Mumford, 2006).

In this work, we focus on the theoretical contribution that the theory makes. We present a refinement of the traditional conceptualisation of the sociotechnical system in a technical- and a social subsystem. Instead, we propose a third abstract sub-system, that we refer to as *mediating processes*. This system is located between the technical and the social system and serves as the basis for interactions between humans and technology. The work is based on a previous study about a technological development project for mining. This contribution gives insights how to better perform optimisation initiatives to the overall sociotechnical system in the mining industry.

REFERENCES

Baxter, G. and Sommerville, I. (2011) 'Socio-technical systems: From design methods to systems engineering', *Interacting with Computers*, 23(1), pp. 4–17. Available at: https://doi.org/10.1016/j.intcom.2010.07.003.

Carayon, P. *et al.* (2015) 'Advancing a sociotechnical systems approach to workplace safety – developing the conceptual framework', *Ergonomics*, 58(4), pp. 548–564. Available at: https://doi.org/10.1080/00140139.2015.1015623.

Cherns (1976) 'The Principles of Sociotechnical Design', Human Relations, 29(8), pp. 783–792.

Mumford, E. (2006) 'The story of socio-technical design: reflections on its successes, failures and potential', *Information Systems Journal*, 16(4), pp. 317–342. Available at: https://doi.org/10.1111/j.1365-2575.2006.00221.x.

Trist, E.L. (1981) *The evolution of socio-technical systems: a conceptual framework and an action research program.* Toronto: Ontario Ministry of Labour, Ontario Quality of Working Life Centre.

Trist, E.L. and Bamforth, K.W. (1951) 'Some Social and Psychological Consequences of the Longwall Method of Coal-Getting: An Examination of the Psychological Situation and Defences of a Work Group in Relation to the Social Structure and Technological Content of the Work System', *Human Relations*, 4(1), pp. 3–38. Available at: https://doi.org/10.1177/001872675100400101.