Theorizing Universal Socio-technical Mechanisms

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Abstract

The aim of designing and managing workplaces as socio-technical systems, is to deliver balanced outcomes of both efficiency and well-being. However, in a world where digital workplace technology and digital ecosystems are rapidly evolving, upholding *a balance* has become increasingly difficult. The present situation conveys that the social system seems unable to absorb and adjust to the high rate of IT-investments and deployments of digital technologies. At the same time, we see low job-engagement and high IT-project failures. To improve the situation of unexploited human and economic potential, I suggest embracing a socio-technical systems philosophy rooted in critical realism. Ontologically, the philosophical perspective sees a dynamic interplay between universal generative socio-technical mechanisms, that can trigger self-organization, if activated synchronically. Having these mechanisms in mind when deploying new technologies can bring about a new dynamic with balanced outcomes.

Keywords

Socio-technical perspective; critical realism; generative mechanisms; self-organization

1. Introduction

Socio-technical systems theory resides, ontologically, in the domain of structural theories of regulation and stabilization. The theory assumes that productive work-systems rest in a state of equilibrium between the social-human side; and the technical-structural side; and that this balance is enabled through design and management. This line of thinking is widely recognized as the IS-community's axis of cohesion [1]. One of the main tenets in socio-technical work-systems is to achieve both economic and humanistic objectives [1, 2, 3]. To ensure this, another doctrine holds that technical innovation must be developed and implemented in recognition of the organizational characteristics, while humans on the other side, must adapt themselves to new ways of working, made possible by the new technology [4].

Traditionally, in socio-technical systems philosophy, the processes (i.e. mechanisms) that trigger a stable and productive outcome from a work-system have been labeled technical institutionalization and technical socialization [4]. Technical institutionalization is the process of generalizing value and behavior patterns, through innovation of technology, to the entire work-system, while technological socialization is the process through which the work-system then channels and shapes the behavior of the individuals, and integrates them into a common culture [4].

The way these processes influence each-other, have given name to yet another important tenet in socio-technical systems, namely the safeguarding of a reciprocal balanced relationship between the technical side and the social side of the work-systems, so that these processes are seen as beneficial and resulting in both productivity and well-being [5].

When scrutinizing IS-research papers [1] and practical approaches to planned IT-changes in work-systems [3] it becomes evident that the development of the social-side of organizations, putting forth humanistic objectives, have had a lesser focus in later years. As such, instrumental outcomes and economic gains have been favored [1-3]. Accordingly, in the pursuit of establishing effective work-systems with profitable outcomes, managers and IS-researchers have looked at the more tangible side of costs and the potential of efficiency and competitiveness from information processing technologies [1-3]. With the recent urgency for implementing new digital technology, reaping the benefits of market

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data and data-driven decision-making, the focus on IT-infrastructure and IT-investments has risen sharply [6]. Yet, the failure rate from IT-projects are at a staggering high percentage of 83,9 % according to the Standish Group Survey in 2019 [7]. At the same time, employee-engagement and job-satisfaction are low, just 15% of the entire workforce feel highly engaged and 76% experience high stress levels [8]. These numbers indicate that rapid implementation of an increasing amount of digital technology into work-systems does not result in job-engagement and well-being. Neither do they result in successful IT-projects. Some researchers indicate that digital transformation has created a situation where the social side seems unable to adapt as rapidly [3]; and that the vital reciprocal relationship has been broken, rendering work-systems out of balance [3]. With research not providing sufficient knowledge of how to enable balancing dynamics [1-3], organizations are risking to lose knowledge on how to further develop the organizational capabilities they need in the future to establish sound workplaces [3].

As an IS-researcher, I find it paramount to aid [1, 2, 3, 9] in reintroducing socio-technical thinking into the present world of digital work. Henceforth, this paper is a suggestion to how managers and researchers can apply a socio-technical philosophical perspective rooted in critical realism (CR), that draws attention to how digital interventions into work-systems must trigger processes with results of both efficiency and well-being.

2. Mechanisms in IS-research

As suggested in [1], a way to restore balance is to theorize about mechanisms that bring about the link between humanistic and instrumental outcomes in a synergistic manner [1]. Mechanisms explain "the cause of something"; and what 'enables' or 'leads to' an outcome [10, p.104.]. In continuation, mechanisms have the property of serving as theoretical tools and have the valuable property of abstraction [11].

A popular stream of mechanism-research explains cause-and-effect relationships and use mechanisms as mechanistic accounts of explaining that if X is present, it will lead to Y [10]. The mechanisms of technical institutionalization and technical socialization serve as such accounts in relation to explaining the outcomes of sound social norms and general behavior patterns, as a response to technological implementations [4].

Lately, theorizing of mechanisms in IS-research have adopted the perspective of CR. In CR philosophy, self-reinforcing mechanisms explain why certain observable events came to be, but they cannot predict them [11]. As such mechanisms hold a nature of generative capacity, as they contingently might produce a certain outcome if triggered by and in the system. Ontologically, mechanisms in CR are non-mechanical (i.e. does not predict a specific outcome), and thus they are different from the more mechanistic mechanisms theorized in sociology [10] and socio-technical systems theory [3]. Examples from IS-research are [11-16]. In [11] they uncovered three key generative mechanisms that contingently caused and explained how a digital infrastructure in a Scandinavian Airline company evolved successfully due to interacting mechanisms of: Adoption; Innovation; and Scaling. Likewise, in [12] they found three generative mechanisms to impact ERP-implementation in a digitalization transformation process in healthcare, namely: Standardization, Alignment and Convergence. In addition, in [13], they theorized three generative mechanisms that enabled speed and efficiency of digital innovation within an internal digital platform. These mechanisms were: Modular Upgradability; Economies of Substitution; and Reproduction. Summative, these studies uncover the interaction of self-enforcing generative mechanisms triggered in the system through the introduction of enterprise wide technical systems in different organizational contexts and explain outcomes that exhibit efficiency and productivity.

A few IS-research papers exist, that uncover generative mechanisms that bring about humanistic effects in a socio-technical system. In the work of [14-16] they explain the activation of generative mechanisms of divergence and technological individualization, afforded by malleable and mobile communication and collaboration technology (i.e. UCC), catering to individual autonomy and flexibility at work. These outcomes have a documented impact on well-being and job-engagement [17].

The existing generative mechanisms in [11-16], can act as a stepping stone to further theorizing, as these generative mechanisms contingently can enable each-other and produce balanced outcomes. In

the next section I introduce the concept of universal generative mechanisms that can bring about the link between humanistic and instrumental outcomes in a synergistic manner.

3. Towards a socio-technical philosophy model rooted in critical realism

In figure 1, a simplified, yet often applied understanding of CR within the IS-discipline, is presented. In [18], CR is explained in terms of its ontological view of reality that is existing independently of humans and it is stratified in three domains of reality. There is the domain of the real, the actual, and the empirical. Often these strata are portrayed as an onion, see figure 1. The outer ring – the domain of the real - contains mechanisms, events, and experiences (i.e., the whole of reality); The middle ring is the domain of the actual and consists of events that do (or perhaps do not) occur. It includes the inner circle – the domain of the empirical – which are those outcomes that are observed or experienced [18].

In figure 1, I place the generative mechanisms theorized from IS-research [11-16], in the outer circle. In the middle circle I place the actual events of various IS-implementations studied in [11-16], and in the inner circle, I place the observed outcomes from these events. The one-way arrows present how the mechanisms produce outcomes through their generative capacity.

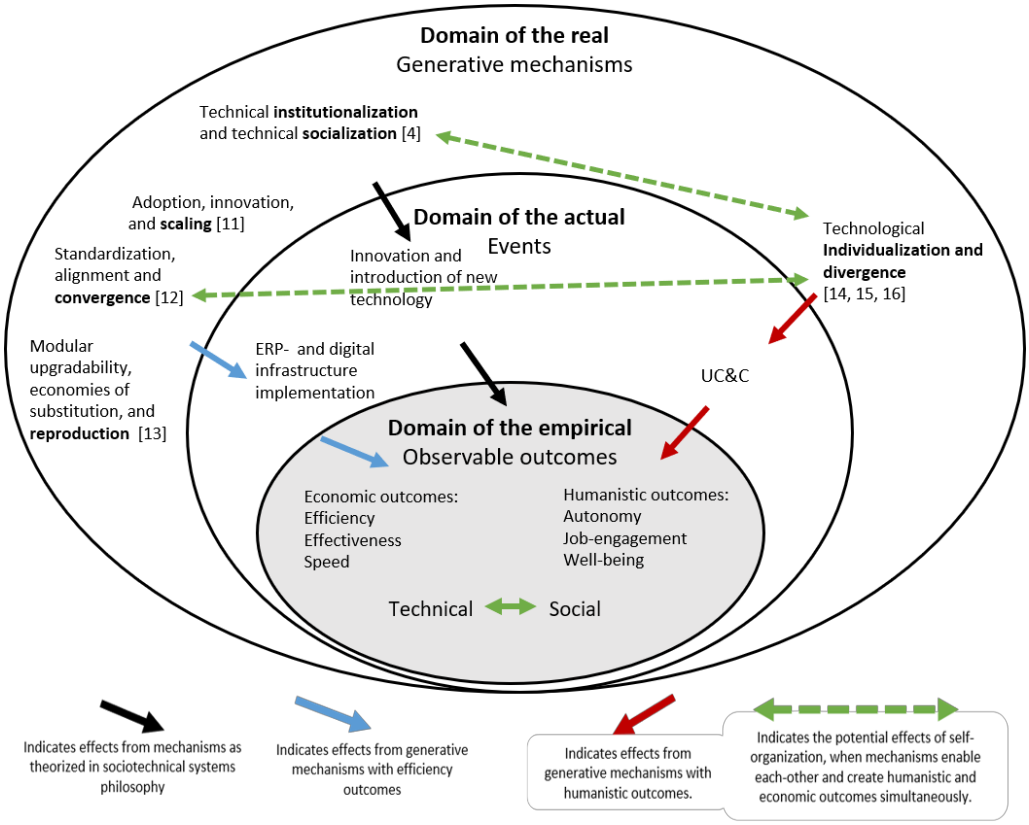

Figure 1: A model of socio-technical system philosophy rooted in critical realism

In the next section I explain in detail the green double-ended arrows, that are labeled universal socio-technical generative mechanisms as they have potential to provide the synergistic link between the generative mechanisms.

4. Self-organization as a core principle – the green arrows

Going beyond the generative mechanisms theorized in prior studies, the more fundamental dynamic of self-organization delivers a promising path forward. Self-organization is a particular part of the synchronic build-up development and evolution of social systems. Self-organization is a "mechanism" that can be interpreted, from a meta-theoretical perspective and from a grand-theory perspective [20].

The synergistic process of integration and differentiation as a meta-theory proceeds as follows [21]

> *" Any system shows a dialectic of integration and differentiation. Agents who differ from each other bring about the formation of a structure that integrates; this structure catches up with the differentiation at hand and, at the same time, conditions a new differentiation of the agents, which brings about a new integration. […]. As long as the increase in divergence is for the sake of convergence and the increase in convergence for the sake of divergence, a system does not fall apart." [21, p.128].*

In a grand theory perspective, self-organizing comes from the synergy between individualization and socialization [21]:

> *"At the highest resolution, social agents, actors, members of societal systems are different individuals. Through their action, interaction, and co-action they bring about the formation of societal relations that condition the generation and utilisation of commons in an integrated way, which allows the individuals to differentiate: the more individuals are "individualised", the better they produce the common good; the better the common good is "socialised", the more individuals can become individuated. That is, socialisation and individualisation precondition each other." [21, p.128].*

Looking at the generative mechanisms from [11-16] in the outer circle of figure 1, we see theorizing of both convergence and standardization processes triggered by enterprise-wide systems initiatives, and divergence and individualization processes from the usage and adoption of more mobile and flexible technologies. We also witness outcomes of an economic and humanistic nature. The green arrows represent opportunities for what can happen if we become better at stimulating the link between these generative mechanisms to release the dynamics of self-organization at our workplaces. To obtain and sustain synergistic effects I suggest the following. When planning or facilitating socio-technical changes, researchers and managers must have *in mind* that convergence from enterprise systems must be for the sake of divergence in other parts of the work-system and vice versa. Standardization of work processes on the other hand must be for the sake of the opportunity to individualize other practices in work and vice versa. Thus, socio-technical change interventions must address how to release and stimulate activation of these more universal generative mechanisms.

Illuminating and stressing "the common good" in work-systems seems pivotal [21]. In the research carried out in [14], they found that 'access to data and information anywhere/anytime' served as such 'a common good' in knowledge work settings. The perception of access to relevant and high-quality information, allowed individuals to individualize work-practices, while also complying with specific standard workflows and input formats to produce the common good.

A few organizational researchers similarly argue for adopting the theory of "the common good" to deliver an organizational re-orientation as a means for departing from a narrow focus on economic value [22]. By adopting such a re-orientation, organizations can develop abilities to respond ethically to the larger challenges in societies and at workplaces. I suggest that IS-researchers and -managers can do the same in relation to enable dual outcomes from the IS and take part in developing a perspective that includes how to stimulate self-organization through the synergistic linking of the aforementioned mechanisms to obtain both economic and humanistic objectives in the digital workplace.

5. References

[1] S. Sarker, S. Chatterjee, X. Xiao, & A. Elbanna. A. Research commentary: the sociotechnical "axis of cohesion" for the IS discipline: its historical legacy and its continued relevance. MIS Quarterly 43 (2019) 695-417. doi: 10.25300/MISQ/2019/13747
[2] E. Mumford. The story of socio-technical design: reflections on its successes, failures, and potential. Information Systems Journal, 16 (2006), 317–342. doi:10.1111/j.1365-2575.2006.00221.x
[3] W. Pasmore, S. Winby, S. Mohrman & R. Vanasse. Reflections: Sociotechnical Systems Design and Organization Change. Journal of Change Management, 19 (2019), 67-85. doi: 10.1080/14697017.2018.1553761
[4] G. Ropohl. Philosophy Of Socio-Technical Systems. Society for Philosophy and Technology 4 (1999) 186-194. Doi: 10.5840/techne19994311
[5] A.S. Lee. Retrospect and Prospect: Information Systems Research in the Last and Next 25 Years. Journal of Information Technology. 25 (2010), 336-348. Doi:10.1057/jit.2010.24
[6] Davis, J. 2019. Rethinking IT tech Investments, Information week. URL: https://www.informationweek.com/strategic-cio/it-strategy/rethinking-it-tech-investments-that-drive-business-growth/d/d-id/1335982
[7] Standish Group, 2019. URL: https://www.opendoorerp.com/the-standish-group-report-83-9-of-it-projects-partially-or-completely-fail/
[8] Korn Ferry. Workplace stress continues to rise. 2019. URL: https://www.kornferry.com/insights/articles/workplace-stress-motivation
[9] P. Bednar & C. Welch. Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems. Information Systems Frontiers, 22 (2019), 281–298. Doi: 10.1007/s10796-019-09921-1
[10] A. Sayer. Method in Social Science. A Realist Approach. (1992), New York: Routledge. Doi: 10.1177/030913259301700339
[11] O. Henfridsson & B. Bygstad. The Generative Mechanisms of Digital Infrastructure Evolution, MIS Quarterly, 37 (2013), 896-931. doi: 10.25300/MISQ/2013/37.3.11
[12] M. Mihailescu, D. Mihailescu, & U. Schultze. The generative mechanisms of healthcare digitalization. Exploring the Information Frontier. In: Proceedings of the International Conference in Information Systems (2015)
[13] R.L.Törmer. Internal Digital Platforms and Generative Mechanisms of Digital Innovation. In Proceedings of the 39th International Conference on Information Systems (2018)
[14] L.H. Fischer & R. Baskerville. Socio-technical Change: The Equilibrium Paradox. In : Proceedings of the European Conference on Information Systems in Portsmouth (2018)
[15] L.H. Fischer. Double-edged Social Mechanisms at Work in the 21st Century' Information System: Opportunities and Challenges". PACIS 2018 Proceedings. 242.
[16] L.H. Fischer & R. Baskerville. Revising the Socio-technical Perspective for the 21st Century: New Mechanism at Work. International Journal of Database Management, 31 (2020). 69-87. doi: 10.4018/JDM.2020100104
[17] S. Dittes, S. Richter, A. Richter & S. Smolnik,S. Toward the workplace of the future: How organizations can facilitate digital work, Business Horizons, 62 (2019), 649-661. doi: 10.1016/j.bushor.2019.05.004
[18] J. Mingers, A. Mutch & L. Willcocks. Critical Realism in Information Systems Research. MIS Quarterly, 37 (2013), 795-802. doi: 10.25300/MISQ/2013/37:3.3
[19] R. Pawson & N. Tilley. Realistic Evaluation. Sage, 1997
[20] W. Hofkirchner. Mechanisms at work in the information society, in: M.S Archer (Ed.) Generative Mechanisms Transforming the Social Order. Springer International Publishing, 2015, pp. 95 – 112. doi: 10.1007/978-3-319-13773-5_5
[21] W. Hofkirchner. On the validity of describing 'morphogenic society' as a system and justifiability of thinking about it as a social formation, in: M. S. Archer (Ed.) Late modernity. Dordrecht: Springer, 2014, pp. 119–141. doi: 10.1007/978-3-319-03266-5_6
[22] A. Argandoña. The Common Good of the Company and the Theory of Organization. IESE Business School Working Paper (2009) No. 777. doi: 10.2139/ssrn.1349027