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# **The Roots of the Sociomaterial Thinking in Information Systems Research: a view on history and methodology**

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## **ABSTRACT**

Researchers who want to adopt a sociomaterial approach often find themselves confused regarding research methods. The paper argues that this confusion can only be clarified through understanding the history and emergence of the sociomaterial thinking. The paper briefly reviews the roots of the sociomaterial thinking in the reference discipline of sociology and information systems. It invites researchers to seek methodological guidance from the wealth of knowledge that have been accumulated over the years.

## **1. Introduction**

There is a methodological uncertainty surrounding the sociomateriality approach in information systems. Scholars have expressed concerns when adopting the sociomateriality approach regarding their data collection and analysis methods. This is surprising since versions of the sociomaterial thinking are dated back to the 1980s in Sociology and was adopted in information systems research from the 1990s following decades of sociotechnical thinking.

This paper briefly reviews the history of the sociotechnical and sociomaterial thinking in information systems. The objective is to invite researchers to seek methodological guidance from the accumulated knowledge and excellent research that has been published for decades.

The following section offers a brief overview of the sociotechnical roots in information systems research. Section 3 reviews the background and roots of the sociomaterial thinking in information systems research. Section 4 briefly presents Actor Network Theory (ANT) and Agential Realism thinking. Section 5 offers a conclusion to the paper.

## **2. The sociotechnical roots in IS research**

The relationship between the social and technical aspects in organisations has been the concern of IS research since the very early days of the sociotechnical approach (Trist and Bamforth 1951). In their seminal and founding work, Trist and Bamforth (1951) examined the disputed –at that time- semi-mechanical method of coal mining named the “longwall method” (consisting of mechanical conveyors and coal-cutters) which replaced a manual method named “hand-got method”.

Their study provided a very comprehensive and detailed analysis of the longwall method and how it was changing group structures, interactions and individual roles resulting in the emergence of new forms of organisation. Moreover, they analysed the attitude, emotions and psychological state of employees and the different coping strategies that emerged. They regarded the ‘advanced’ longwall method (at the time) “as a technological system ... and as a social structure consisting of the occupational roles that have been institutionalized in its use. These interactive technological and sociological patterns [were] assumed to exist as forces having psychological effects in the life-space of the face-workers, who must either take a role and perform a task in the system they compose or abandon his attempt to work at the coal-face. His own contribution to the field of determinants arises from the nature and quality of the attitudes and relationships he develops in performing one of these tasks and in taking one of these roles. Together, the forces and their effects constitute the psycho-social whole which [was] the object of the study” (Trist and Bamforth 1951, p. 5 - as in original). They concluded “it was impossible for the method to develop as a technological system without bringing into existence a work relationship structure radically different from that associated with hand-got procedure” (ibid, p. 9). This

significant study became a founding stone in the crafting of the sociotechnical paradigm in information systems research.

Regarding research methods, Trist and Bamforth (1951) provided in-depth comprehensive analysis that included diverse technological, social and emotional aspects. They included an analysis of the longwall method, the work structure and organization, the groups' dynamics and interactions, and workers' emotions and attitudes, and they analysed the emergence of the relationship between them over the two years of the study.

Kuhn (1970, p. 175) defines the paradigm as “the entire constellation of beliefs, values, techniques, and so on, shared by members of a given (scientific) community”. In this context, over the years and through the work of many scholars, “much IS research has grown up around sociotechnical topics [emphasis added]...” (Chiasson and Davidson 2005, p. 399) forming the sociotechnical paradigm in IS research. This paradigm “underlies much of IS research where the human and the technical must each be considered ...” (Beath et al. 2013, p. iii).

### **3. The sociomaterial roots in IS research**

The sociotechnical approach was initially grounded in systems thinking and was mainly focused on organizations and work design, human relations, emotions and attitudes. It aimed to understand and find possible combinations of all these aspects that could achieve efficiency and people's satisfaction (Mumford 1966; Mumford 1976; Mumford and Banks 1967). It advocates that “as technology becomes more complex, so does human nature.” (Cooper and Foster 1971, p. 473) and hence “any production system requires both a technology –machinery, plant layout, raw materials—and a work-relationship structure that relates the human operators both to the technology and to each other. The technology makes demands and places limits on the type of possible work structure, while the work structure itself has social and psychological properties that generate their own unique requirements with regard to the task to be done” (ibid p. 467).

As the information systems field developed and grew, its theoretical foundation went well beyond the systems thinking to include diverse theories from different reference disciplines (Baskerville and Myers 2002). This diversity of theoretical grounding enriched the sociotechnical approach in the information systems field and arguably made it more specific to the information systems field. One of the main reference disciplines that informed the sociotechnical thinking in information systems is sociology. Different branches of Sociology have informed the IS field for decades, including Science and Technology Studies (STS), and feminist studies to name a few.

The term ‘sociomaterial’ itself originated in sociology in STS and feminist studies post Actor Network Theory (ANT) through the situated action work of Lucy Suchman (Suchman 2002; Suchman 2003; Suchman 2006; Suchman et al. 2002) and feminist work of Anne Marie Mol (Mol 1999; Mol 2002; Mol and Berg 1998). In 2007, Orlikowski introduced the concept to the Management discipline community in an attempt to highlight to the Management discipline the importance of technology as an integral part of most levels of organizing (Orlikowski 2007). In 2008, Orlikowski and Scott challenged the organization studies and management discipline arguing that while “technology seems to be everywhere in the world of practice”, “technology is largely absent from the world of organizing” in organizational research (Orlikowski and Scott 2008, p. 434). They examined four leading journals in the field of management namely; *The Academy of Management Journal* (AMJ), *The Academy of Management Review* (AMR), *Administrative Science Quarterly* (ASQ) and found that only 4.9% directly addressed the role and impact of technology in organizations. They warned the management discipline that “to the extent that the management literature continues to overlook the ways in which organizing is critically bound up with material forms and spaces, our understanding of organizational life will remain limited at best, and misleading at worst” (ibid, 466).

It is important to note that in this article, Orlikowski and Scott (2008) introduced “sociomateriality” as an “umbrella term” and explicitly state that “*The most prominent body of literature that we are organizing under the*

*umbrella term of sociomateriality belongs to Actor Network Theory (ANT), originally developed by sociologists Michel Callon (1986) and Bruno Latour (1987)*” [emphasis added] (Orlikowski and Scott 2008, p. 456).

Orlikowski (2009) renewed her warning and invitation to the management discipline to take technology seriously, and teamed up with Susan Scott to publish a working paper of their first empirical work in the information systems field. In this research, they note: “The key ideas of a sociomaterial perspective are still emerging but some interesting and provocative directions have begun to appear (Barad 2003, 2007; Introna 2008; Suchman 2007).” In this paper, they turned to Barad (2007) and in particular her articulation of the notion of the *apparatus* (Scott and Orlikowski 2009, p. 5).

Orlikowski’s and with Scott publications served as catalysts for the adoption of the term in organization studies and the IS field. Jones (2014) reviewed 140 journal articles in organization studies and information systems using the term, “sociomateriality”, and found that the “great majority appearing after 2007” and mostly cite Orlikowski’s work (Jones 2014, p. 895-896) showing the influence of this work on organization studies and IS field. A closer look at these journal articles shows that out of those papers reviewed, only 31 appears in IS journals and contains empirical work.

This shows that the use of the term in the information systems discipline is emerging and there is room for interpretation and innovation. It also highlights that Orlikowski and Scott (2008, p. 456) explicitly announced ANT to be “The most prominent *body of literature ...[they] are organizing under the umbrella term of sociomateriality*”. In their later work, they started to experiment and applied post ANT/Feminist ideas of Agential Realism.

The theoretical approach of sociomateriality is mainly based on science and technology studies (STS), Actor Network Theory (ANT) and post

ANT/feminist work. Therefore, a methodological framework for research following this approach has to be consistent with its roots and philosophy.

The roots of sociomateriality have been recently forked into ANT and Agential Realism lenses (and Orlikowski has adopted both as lenses for sociomateriality as mentioned earlier) as the following section discusses.

#### **4. Actor Network Theory (ANT) and Agential Realism as two lenses for sociomaterial research**

While Agential Realism was fully articulated in Barad's (2007) and since started to penetrate the IS field, IS researchers should be minded that Barad's thinking is based on STS and feminist schools of thoughts. ANT is a prominent approach in the STS school of thoughts. It has been widely adopted in the information systems (IS) discipline since 1990s. Its philosophical stance and methods of inquiry are seen to facilitate its practical application, as well as having much to offer IS researchers (Hirschheim 1992; Walsham 1993; Weick 1984). IS researchers adopted it to study IS implementation (Lee and Brown 1994), design and development of IS (Elbanna 2009; Lilley 1998; McGrath 2001; Vidgen and McMaster 1996), project management (Elbanna 2010), infrastructure evolution and development (Atkinson 2000; Bloomfield et al. 1997; Hanseth and Monteiro 1997; Klischewski 2000) and notions of IS success and failure (Cecez-Kecmanovic et al. 2014; Elbanna 2013).

It is acknowledged here that there are ontological differences between ANT and Agential realism regarding the properties and existence of human and non-human. These differences could be understood as revolving around the ontological strength of non-human actors and could be referred to as "weak sociomateriality" and "strong sociomateriality" for ANT and Agential Realism respectively (Jones 2014). Researchers who seek to apply the sociomaterial

approach should find methodological guidance from the large number of studies that have been published in the IS research since the 1990s.

## 5. Conclusion

There is a need for methodological clarity for sociomaterial research in information systems. The paper offers a brief history of the “sociomateriality” approach in information systems research and its origin in the reference discipline of sociology. It shows that the original formation of the term was predominantly based on STS, feminist and Actor Network Theory studies and its later development is based on Barad’s post ANT/feminist theory of Agential Realism that were more fully articulated in her 2007 book. Seeking methodological guidance from ANT studies could be fruitful as it shares similar grounds with Agential Realism however ANT is considered ‘weak’ sociomateriality while agential realism is a step further ontologically and present ‘strong’ sociomateriality.

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