**EDITORIAL**

# Enacting Accountability in IS Research after the Sociomaterial Turn(ing)

**Ulrike Schultze[1], Gijs van den Heuvel[2], Marko Niemimaa[3]**
[1]Southern Methodist University, USA, uschultz@smu.edu
[2]Tilburg University, The Netherlands, g.g.a.vdnheuvel@tilburguniversity.edu
[3]University of Jyvaskyla, Finland / University of Agder, Norway, marko.i.niemimaa@jyu.fi

## Abstract

Sociomateriality represents an emergent philosophical stance that instantiates an ontological turn towards relationality and materiality in information systems (IS) research. As an emergent perspective or way of seeing, sociomateriality has significant implications for researchers and the practices they employ. If we accept that the ontological, epistemological, and methodological assumptions we enact in our research shape the realities we perceive and create, questions around researchers' accountability for the realities they produce need to be addressed. The sociomaterial turn(ing) in IS challenges our deeply held assumptions about what constitutes reality. What are these challenges, and how are they being addressed in sociomaterial research? And what implications for accountability in IS research more generally does a turn towards relationality and materiality hold? The objectives of this editorial are: (1) to sensitize IS researchers, irrespective of their ontological and epistemological persuasions, to the field's turn(ing) toward relationality and materiality; (2) to provide insight into the practices of data generation, analysis, and presentation through which this turn(ing) is being enacted in sociomaterial theorizing; and (3) to contemplate the implications of this turn(ing) for the accountability of IS research more generally.

**Keywords:** Relationality, Materiality, Ontology, Entanglement, Performativity, World-Making, Research Ethics

## 1 Introduction

Sociomateriality advances a relational ontology for research in IS, as well as an epistemology that recognizes the role of materiality in everyday life (e.g., Cecez-Kecmanovic et al., 2014a; Jones 2014; Scott & Orlikowski, 2013). Introduced by Suchman (2002, 2007) and developed primarily by Orlikowski and Scott (2007, 2010; Orlikowski & Scott, 2008) in IS, sociomateriality explores alternatives to the IS field's taken-for-granted assumptions around the human-technology relationship. It is thus particularly relevant to theorizing our interaction with contemporary technologies that unsettle presumed boundaries, such as

those between work and life (Symon & Pritchard, 2015), the real and the virtual (Schultze, 2014a), as well as human and artificial intelligence (Panourgias, Nandhakumar, & Scarbrough, 2014).

Exploring the interaction with contemporary technologies, it quickly becomes evident that more and more of these technologies are no longer mere tools over which users have unidirectional control. Mobile phones have become devices that demand constant attention and form an inseparable part of the self (Symon & Pritchard, 2015). Learning algorithms transform applications from passive code into intelligent agents that beat us at our own games (Steiner, 2012) and shape our musical tastes (Karakayali, Kostem, & Galip, 2018). And cognitive computing systems represent a radical shift in the

unilateral relationship between users and tools (Schuetz & Venkatesh, 2020). These technological changes demand a better understanding of emergent user-technology interactions, as well as materiality's role in producing organizational outcomes.

Sociomateriality offers IS research the necessary concepts to theorize these emergent human-technology configurations (Orlikowski, 2007; Schultze, 2017; Suchman, 2002), in which "it is not clear who makes and who is made in the relation between human and machine" (Haraway, 1991, p. 177). To illustrate, Schultze and Orlikowski (2010) draw on a study of identity enactment in virtual worlds, noting that individuals attribute agency to their avatars. This suggests that their virtual bodies not only represent the users, but also perform who their "owners" are and might become (see also Schultze, 2014a). For example, by roleplaying a character that was tougher than her "real life" self, one of the research participants maintained that her virtual self was teaching her to stand up for herself in actual life. The entanglement and hybridity of this cyborgian identity enactment call for theories and methods capable of studying phenomena as "practices that enact fragile boundaries, relations, entities and identities that are always in the making" (Schultze & Orlikowski, 2010, p. 820).

We argue that the IS discipline is responding to these calls by adopting a philosophical stance that embraces a relational ontology and an epistemology sensitive to the materiality of phenomena. Increasing interest in sociomaterial theorizing is apparent in the field. A literature search (see Appendix A) reveals that 219 IS articles published from 2009 to 2019 included the terms "sociomaterial," "sociomateriality," "socio-material," or "socio-materiality." In IS conference proceedings, the count was 266. This reflects a significant increase since Jones (2014) conducted a similar literature search, which yielded 146 articles in IS and organization studies journals and 64 IS conference papers, and is suggestive of a sociomaterial turn(ing) in IS.

The increasing interest in sociomaterial theorizing is inevitably influenced by the spate of special issues on sociomateriality in *MIS Quarterly* (Cecez-Kecmanovic et al., 2014a), *Information and Organization* (Kautz & Jensen, 2013; Leonardi, 2013; Mutch, 2013; Scott & Orlikowski, 2013), the *Scandinavian Journal of Information Systems* (Bratteteig & Verne, 2012; Kautz & Jensen, 2012), and *SIGMIS Database* (Hassan, 2016). Furthermore, there have been several edited volumes (e.g., Carlile et al., 2013; De Vaujany & Mitev, 2013;

Leonardi, Nardi, & Kallinikos, 2012) on topics related to sociomateriality, as well as dedicated workshops (e.g., AIS SIGPHIL, 2013; IFIP, 2016, 2018) to discuss the foundations, concepts, and implications of this emergent perspective.

Given that an agreed-upon definition of sociomateriality has thus far remained elusive, we conceptualize it as a philosophical stance. [1] A philosophical stance is a "pragmatically justified perspective or way of seeing" (Boucher, 2014, p. 2320) that has methodological implications. As both a position and a posture (Van Fraassen, 2004), a stance signals enactment and commitment (Fayard, Gkeredakis, & Levina, 2016), rendering it more grounded than a cognitively held belief.

We conceptualize sociomateriality as a philosophical stance comprising three levels: ontology (i.e., assumptions around what reality *is*), epistemology (i.e., assumptions about how reality can be known), and methodology (i.e., assumptions about the practices enacted to generate valid evidence that supports research claims). Reflective of an *ontological* turn toward relationality, sociomateriality entails a dramatic change in the conceptualization of phenomena. Essential separations between agential subjects (e.g., humans) and passive objects (e.g., technology) are challenged and replaced with notions of relationality, inseparability, performativity, practices, and materiality (Jones, 2014).

This ontological turn has implications for *epistemology*. Established epistemologies, i.e., positivist, interpretive, and critical modes of constructing knowledge (Orlikowski & Baroudi, 1991), are challenged by relationality. For instance, how can we produce knowledge when there are multiple realities (rather than a single reality that is constructed differently by different stakeholders) and agencies that are distributed across people and things (rather than limited to humans)? These epistemological implications of the sociomaterial turn(ing) further demand the adaptation of *research methods*. Practices of data generation, analysis, and re-presentation aligned with sociomateriality tend to rely on material-discursive practices as the unit of analysis and seek ways of preserving the entanglement, performativity, and materiality of phenomena.

The focus of this editorial is the significant shift in the ontological, epistemological, and methodological positions of IS research effected by a sociomaterial turn(ing). Our objectives are (1) to sensitize IS

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[1] Following Van Fraassen (2004), we conceive of a "stance" as both a position and a posture: "In one literal use this English word denotes a person's *standing place* or vantage point, advantageous or even indispensable to a certain purpose, for the possibility of its pursuit (e.g. as a mountaineering term for a ledge or foothold on which a climber can secure a belay). In another equally literal use it denotes the person's *posture*, the configuration of the body—again, one advantageous or even indispensable to a certain purpose, such as to perform a specific athletic feat" (p. 174, emphasis in original).

researchers—irrespective of their ontological, epistemological and methodological preferences—to the field's turn toward relationality and materiality; (2) to provide insight into the practices of data generation, analysis, and re-presentation of the research through which this turn is being enacted in sociomaterial theorizing; and (3) to contemplate the implications of a sociomaterial turn(ing) for the accountability of IS research more generally.

Gerundifying the "turn" toward relationality and materiality and thereby conceptualizing it as a process (i.e., "turning"), is intended to signal that the enactment of this emergent philosophical stance itself is in a state of becoming. As a turning, sociomateriality implies neither an abrupt change in the direction of IS research nor a rejection of extant philosophical traditions. Instead, like prior turns in IS (Cecez-Kecmanovic, 2016; Klein, 2004), we conceive of the sociomaterial turn as one that not only grows out of and extends extant research traditions, but also challenges their ontological, epistemological and methodological assumptions.

With the IS discipline's turn(ing) as a continuous process, its indeterminacy implies that "*after* the turn(ing)"—as articulated in this editorial's title—refers to the pursuit and imitation of, as well as the commitment to the tenets of sociomaterial theorizing. "After" is thus not meant as a temporal marker. In this way, we signal a core assumption underlying our editorial, namely that all IS researchers' accountability is likely to be affected by the discipline's sociomaterial turn(ing). This editorial thus seeks not only to identify some of the emerging practices of accountability in sociomaterial IS research, but also to consider their implications for accountability in IS research more generally.

This editorial is structured as follows: We begin by describing sociomateriality in terms of its *ontological* turn toward a relational ontology and analysis of materiality. We then outline what it means to be accountable as a researcher, especially when a relational ontology is adopted. This is followed by an outline of the sociomaterial turn(ing) at the *epistemological* level, specifically how sociomateriality compares to interpretive ways of knowing. To explore the implications of sociomaterial theorizing for researcher accountability, we then turn to the *methodological* questions of how to account for phenomena and the researcher's role in world-making when a sociomaterial stance is enacted. The editorial concludes with reflections on the implications of the sociomaterial turn(ing) for IS research in general, as well as an accounting of this editorial's performativity and world-making.

# 2 The Ontological Turn(ing) of Sociomateriality

To illustrate the sociomaterial turn(ing), we develop a conceptual space for positioning sociomateriality against other established philosophical stances in IS research. Drawing on Orlikowski & Scott (2008), we define these stances along two axes: ontology (substantialist vs. relational) and analysis (social vs. sociomaterial). Figure 1 demonstrates the relative positions of four philosophical stances as enacted in IS research (e.g., Robey, Anderson, & Raymond, 2013).

**Substantialist versus Relational Ontology:** A substantialist ontology, as defined in sociology (e.g., Emirbayer, 1997), represents a view of reality composed of independent substances and things, with fixed boundaries and essential properties. Substantialism thus largely underlies the ontological positions of discrete entities and mutually dependent ensembles proposed by Orlikowski and Scott (2008).

A relational ontology, in contrast, makes practices (rather than entities) the primary unit of reality (Slife, 2004). Humans and things are regarded as mutually constitutive and inseparable in action. This implies that their identities, boundaries, and properties are brought into being in situated action contexts. On the relational ontology pole of the x-axis, human actors and things are thus "not taken as given and preexisting before entering into relations" (Cecez-Kecmanovic et al., 2014a, p. 566). Slife (2004) provides a compelling illustration of this by comparing a weak relational perspective (i.e., substantialist ontology) with a strong one (i.e., relational ontology):

> From a weak relational perspective, such objects are thought to be "objective" because they transcend their relations to their concrete situations and supposedly retain their identities across all contexts. A tennis racket is a tennis racket, whether it is used for firewood or returning a serve. However, from a strong relational perspective, [if] a person dying of frigid temperatures, for instance, discovers a cache of wooden tennis rackets, the rackets are firewood. Only an abstraction from this deadly situation allows the person to identify the fuel that provides life-giving warmth as something used in a game. All things, in this sense, are concretely dependent upon, rather than independent of, their contexts. (p. 159)
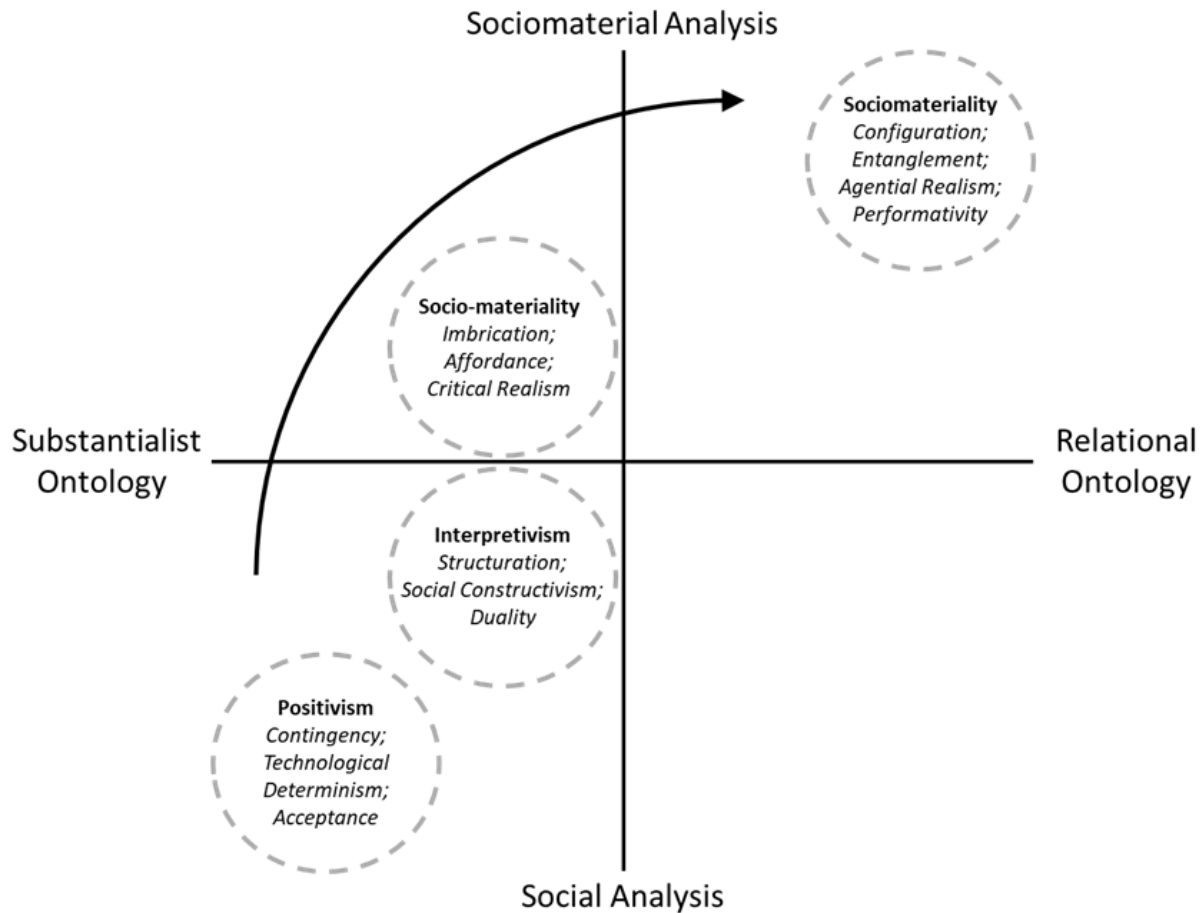
**Figure 1. Visualization of the Sociomaterial Turn(ing)**

**Social versus sociomaterial analysis:** A key assumption of a substantialist ontology is that humans are fundamentally distinct from material (e.g., spaces, bodies, things) because of their innate capacity to think and act with intention. This has led to human-centric research, which has failed to theorize materiality explicitly (e.g., Orlikowski & Iacono, 2001; Robey et al., 2013). Instead, it has limited its focus to the social construction of phenomena and attended primarily to social structures (e.g., norms, roles), human psychology (e.g., perceptions), and human behavior (e.g., IT use). On the social analysis pole of the y-axis, human activity is thus positioned as the driver of change, leaving material passive (Orlikowski & Scott, 2008).

In contrast, sociomateriality recognizes the active role that materiality plays in the production of reality (Orlikowski & Scott, 2008). However, active materiality is not regarded in opposition to human agency on the y-axis; rather, active materiality is seen as distributed and situated, requiring an analysis of the entanglement of social and material agencies. In this way, the sociomaterial nature of phenomena is acknowledged:

> *To distinguish a priori "material" and "social" ties before linking them together again makes about as much sense as to account for the dynamic of a battle by imagining, first, a group of soldiers and officers stark naked; second, a huge heap of paraphernalia—tanks, paperwork, uniforms—and then claim that "of course there exists some (dialectical) relation between the two." No! one should retort, there exists no relation whatsoever between the material and the social world, because it is the division that is first of all a complete artefact. To abandon the division is not to "relate" the heap of naked soldiers with the heap of material stuff, it is to rethink the whole assemblage from top to bottom and from beginning to end. (Latour, 2004, p. 227).*

**The Sociomaterial Turn(ing):** Informed by Orlikowski and Scott (2008), Robey et al. (2013), and Jones (2014), the four philosophical stances—positivism, interpretivism, socio-materiality, and sociomateriality—are placed on the conceptual space created by these two axes (Figure 1).

*Positivism,* which tends to embrace linear causality (e.g., variance studies) and contingency theory (e.g., technological imperative), reflects a substantialist ontology (discrete entities that exist independently of human perception) and a human-centric analysis (agential humans, passive technology). Observable phenomena are classified into subjects versus objects, meaning versus matter, etc. according to their more or less essential and distinguishing properties. The researcher and the object of interest are regarded as independent, thus rendering inquiry value free (Orlikowski & Baroudi, 1991). Orlikowski and Iacono (2001, p. 121) also note that positivist research in particular has not "taken technology as seriously as its effects, context, and capabilities." To the extent that material is theorized in positivist research, it is black-boxed and viewed as relatively passive and inert.

*Interpretivism* recognizes reality as socially constructed. The social world (e.g., organizations) is not given but produced in and through human actions and interactions, meaning that social entities cannot exist apart from humans. The sensemaking and interpretation of social actors (including researchers) are indispensable to interpretive research. A single reality, that is, an "intersubjective construction of the shared human cognitive apparatus" (Walsham, 1995, p. 75), is assumed. While interpretive research (e.g., structurational studies) tends to focus on practices and processes, it nevertheless typically prioritizes entities over relations; objectified phenomena are brought into relationships of interdependence and mutuality (Orlikowski & Scott, 2008). Even though this implies a move toward a relational ontology, materiality frequently vanishes from view, crowded out by a preoccupation with social constructions. To the extent that technology or the material is theorized in interpretive research, it tends to be regarded as constraining or enabling (i.e., mediating) human action.

*Socio-materiality* advances a focus on materiality by explicitly theorizing the relationship between people and technology through concepts such as imbrication (Leonardi, 2011; Vinther & Müller, 2018) and affordance (Bernardi, Sarker, & Sahay, 2019; Fayard & Weeks, 2014). These theoretical positions preserve the discreteness of entities (Niemimaa, 2016b). Indeed, a key tenet of critical realism, which is not only associated with the concepts of imbrication and

affordance (Volkoff & Strong, 2013) but also reflective of the socio-material stance (Jones, 2014)[2], is that there exists a reality independent of humans that causes events, which humans can then observe or experience. However, the realm of the "real" that underpins all events cannot be directly accessed; it can only be inferred through theories and social constructions. Hyphenating socio-materiality (Hassan, 2016; Robey et al., 2013) captures the clear distinctions that are preserved between the real and the observed, matter and meaning, human and material agency, etc. in this philosophical stance.

*Sociomateriality,* which instantiates a relational ontology, recognizes that phenomena do not exist independently of their relations. In other words, people and things (or nature and culture) are inseparable as they "lack independent, self-contained existence" (Barad, 2007, p. ix). Phenomena (social entities, technologies) only exist in their entangled enactment, brought into being in practice. Conceptual frameworks generally seen as exemplifying this philosophical stance in IS research (e.g., Jones, 2014; Cecez-Kecmanovic et al., 2014a), include agential realism (Barad, 2007) and actor network theory (Callon, 1986; Latour, 2005; Law, 1992). Furthermore, in the sociomaterial stance, materiality is seen "not [as] a thing but a doing" (Barad, 2007, p. 183). Terms such as "materialization" and "mattering" denote materiality's processual and agentive nature (Barad, 2007).

Having briefly outlined the fundamental dimensions of a relational ontology and sociomaterial analysis that characterize the sociomaterial turn(ing) in IS, we now explore the issue of accountability in research.

# 3 Accountability in Sociomaterial Research

While ethical guidelines around research are based on deontological ethics and typically outline the duties (i.e., tasks) and roles that researchers need to comply with to be deemed responsible professionals (Harrison & Rooney, 2012), accountability refers to an individual's liability to give an account of his or her judgment, actions, and omissions during the research process. To be accountable is to be answerable for decisions made, actions taken, and effects produced. Guided by virtue ethics (Harrison & Rooney, 2012), which focuses on human qualities (e.g., honesty, integrity, empathy, and a sense of social responsibility) that are deemed desirable in people fulfilling a certain role, individual accountability depends on a virtuous person who has been habituated to act and feel in ways reflective of wisdom. Accountability thus draws on an

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[2] Jones's (2014) distinction between weak and strong sociomateriality respectively reflects our distinction between

the hyphenated and nonhyphenated forms of sociomateriality.

individual's whole being, which makes it difficult to codify. In contrast, governing research by means of ethical guidelines demands consciously making decisions about how to comply with norms of ethical behavior, which tends to foster a check-the-box mentality.

There are three reasons why we focus on accountability with respect to the sociomaterial turn(ing). First, ethical guidelines are difficult to define when research practices are in the formative stage. Requirements such as securing participants' informed consent notwithstanding, relying on individuals to provide an explanation of their highly situated decisions and actions during or after the research process is likely to be more effective than ethical guidelines as a means of assessing the quality of research pursuant to an emergent philosophical stance like sociomateriality.

Second, since sociomateriality rests on the ontological premise that reality is brought differently into existence through our engagement with the world, researchers adopting a relational ontology are essentially engaged in world-making (Law & Urry, 2004). As the wave-particle duality of light highlights, the instruments of observation (or apparatuses) used to study a phenomenon bring the phenomenon into being in a particular way (Barad, 2007). The act of observing is thus not a neutral view from nowhere (Haraway, 1988), but a situated, worlding performance of a phenomenon-researcher-instrument configuration. As a part of the world-making configuration, the researcher is answerable for the situated reality she has coproduced. Suchman (2002, p. 96) explains:

> *The fact that our knowing is relative to and limited by our locations does not in any sense relieve us of responsibility for it. On the contrary, it is precisely the fact that our vision of the world is a vision from somewhere—that it is inextricably based in an embodied, and therefore partial, perspective—which makes us personally responsible for it.*

Third, even though giving an account suggests a highly individual practice in which the researcher is assumed to have considerable agency (e.g., making distinctions to "cut" phenomena from their entangled relationships), it is important to note that, as part of a configuration of disciplinary discourses and materialities through which phenomena are brought into being, the researcher does not control world-making. On the contrary, she must relinquish control over the production of reality and become aware of her entanglement within the situated practice of worlding in order to give an account:

> *We are responsible for the cuts that we help enact not because we do the choosing*

> *(neither do we escape responsibility because "we" are "chosen" by them), but because we are an agential part of the material becoming of the [world].* (Barad, 2007, p. 178)

Thus, accountability is a social and disciplinary responsibility as well as an individual one. Additionally, as the researcher is part of the material-discursive configuration of observation, the researcher, as a human actor, is mutually constituted with the phenomena produced in this way.

## 4 Epistemological Implications of the Sociomaterial Turn(ing)

In order to focus on the epistemological differences that are most illustrative of the sociomateriality turn(ing) in IS, we compare interpretivism (e.g., Walsham, 1993, 1995) and sociomateriality. These two philosophical stances exhibit much convergence, which supports our contention that the sociomaterial turn(ing) is characterized by both continuity and divergence. Our wager is that the similarities among interpretivism and sociomateriality make their distinctions all the more instructive. Table 1 summarizes key epistemological differences between interpretivism and sociomateriality.

**Epistemological primacy versus inseparability of ontology and epistemology:** How reality can be known and what knowledge is produced are key concerns in interpretive research. Emphasis is frequently placed on detailed descriptions of the researcher's dispassionate enactment of collecting, analyzing, and representing data (Holtkamp, Soliman, & Siponen, 2019). In this way, the researcher's limited involvement in the representation of the reality constructed by the research participants is demonstrated. Such pursuits of methodological purity indicate that accounting for the researcher's role in the reality she or he produces is concerned with epistemological issues—accuracy, truthfulness, and transparency of knowledge-making (e.g., Klein & Myers, 1999).

In contrast, sociomateriality asserts that ontology and epistemology are inseparable; questions of knowing cannot be separated from questions of being (Savransky, 2016). Given the intertwined and entangled nature of phenomena, as well as their entanglement with the sociomaterial research practices, sociomateriality is concerned about what reality research produces. Accounting for the reality that a study produces might include explicating when, how, and why entangled phenomena were separated (i.e., cut apart or cut from the whole) to produce temporarily bounded, analytical entities. Importantly, enacting such cuts is not the purview of the researcher as intentional agent; instead, the agency to produce reality lies in the material-discursive practices of research, of which the researcher is a part.

**Table 1. Epistemological Stances: Interpretivism versus Sociomateriality**

| Interpretivism | Sociomateriality |
|---|---|
| **Epistemological primacy:** Concern over knowledge making with emphasis on methodological purity and rigor | **Inseparability of ontology and epistemology:** Concern over world-making enacted through practices of knowledge production |
| **Socially constructed objects as units of analysis:** Objects, which are the starting points of theorizing, are brought into relationships of interdependence with each other | **Material-discursive practices as units of analysis:** Doings and saying of sociomaterial configurations, which produce reality, are the focus of analysis |
| **Representation:** Researcher is accountable for accurate representation of reality | **Performativity:** Researcher is produced in research practice and accountable for world-making |
| **Researcher as interpreter:** Agential researcher's subjectivity plays a role in knowledge produced | **Researcher as entangled in research practices:** Researcher is implicated in knowledge production as part of the sociomaterial practices of research |

**Socially constructed objects versus material-discursive practices as units of analysis:** With its focus on interpreting meaning that people make and through which they construct reality, interpretive research tends to start with socially constructed objects (e.g., organization, technology, trust) that are then brought into recursive relationships with each other. This is evident in the interdependence of agency and structure in practice theories, including, for example, structuration theory (Giddens, 1984). In contrast, the unit of analysis in a sociomaterial stance is the doings and sayings of entangled configurations through which phenomena are produced. An important tenet of sociomateriality is that phenomena emerge and are brought into being through their enactment; they do not preexist their relations with other phenomena.

**Representation versus Performativity:** Indicative of the substantialist ontology, interpretivism is founded on the idea that social constructions can be represented as symbols (e.g., words, diagrams), which then provide direct and unmediated access to the meanings they seek to reflect. In contrast, people and things, as well as space and time, are indeterminate and only temporarily brought into being as distinct entities (e.g., human vs. nonhuman) in sociomateriality. Practices of representation (e.g., naming, categorizing and modeling) are key to bringing phenomena into being. Representations thus do not only reflect, but also perform reality (Suchman, 2002). The notion of *performativity* captures this (Schultze, 2014a).

**Researcher as interpreter versus researcher as entangled in research practices:** The interpretive researcher acts as an interpreter of the meanings others attribute to events and phenomena, as well as to their own experience (Walsham, 1995). As an interpreter, the researcher is assumed to have agency, e.g., the ability to choose how to interpret others' constructions of events.

This implies that researcher subjectivity inevitably plays a role in the constitution of reality and the construction of knowledge. In contrast, the sociomaterial researcher is entangled in the configurations (i.e., apparatuses—Barad, 2007) that enact the research practices of objectification, classification, and measurement that produce phenomena. This implies that the researcher is not an independent knowledge-generating agent but is herself constituted as a particular actor in the situated enactment of a sociomaterial practice.

Having outlined key epistemological differences between the philosophical stances of interpretivism and sociomateriality, we now turn our attention to the latter's methodological implications. In particular, we focus on the practices that sociomaterial researchers enact to account for empirical phenomena in sociomaterial ways, as well as for the realities that are produced through these practices.

# 5  Emerging Practices of Accountability in Sociomaterial Research

In light of the conceptual complexity of sociomateriality (Kautz & Jensen, 2013; Leonardi, 2013; Mutch, 2013) and the lack of methodological guidance for conducting sociomaterial theorizing (Cecez-Kecmanovic et al., 2014a; Mueller et al., 2012), we now provide concrete illustrations of the emerging practices through which sociomaterial research accounts for phenomena following the key tenets of this philosophical stance, namely *entanglement* (e.g., Scott & Orlikowski, 2014), *performativity* (e.g., Cecez-Kecmanovic, Kautz, & Abrahall, 2014b), *materiality* (e.g., Hultin & Introna, 2019), and the *researcher responsibility for world-making* (e.g., Schultze, 2017).

**Table 2. Practices of Accountability in Sociomaterial Theorizing**

|  | Data generation | Data analysis | Data re-presentation |
|---|---|---|---|
| Accounting for entanglement of phenomena | Decentering humans in observations (Niemimaa, 2016a, 2017)<br><br>Recounting researcher's own lived experience (Bødker, 2017; Prasopoulou, 2017) | Focusing on boundary work (Faik et al., 2019)<br><br>Engaging in dialectic analysis (Schultze, 2016; Utesheva et al., 2016)<br><br>Experimenting with language (Mazmanian et al., 2014) | Enacting alternative genres of representation (Bødker, 2017; Humphries & Smith, 2014) |
| Accounting for performativity of practice | Applying imagination to complete data (Hultin, 2019) | Analyzing material-discursive practices (Nyberg, 2009)<br><br>Contrasting the performativity of apparatuses (Orlikowski & Scott, 2014) | Mapping sociomaterial configurations over time (Cecez-Kecmanovic et al., 2014b) |
| Accounting for materiality of phenomena | Exploring the relationship between physical and digital matter (Østerlie et al., 2012) | Comparing material enactments of practices (Beane & Orlikowski, 2015) | Presenting images of the material situation (Hultin & Mähring, 2014; Østerlie et al., 2012; Schultze, 2014b)<br><br>Inviting the reader to reenact the process of materialization (Almklov et al., 2014) |
| Responsibility for the researcher's world-making | Accounting for the researcher's own becoming (Hultin, 2019) | Analyzing ethical disturbances (Dale & Latham, 2015) | Comparing the performativity of apparatuses (Mengis et al., 2018; Østerlund et al., 2020) |

The enactments of accountability in sociomaterial research range from self-reflective accounts of the researcher's role in worlding (e.g., Dale & Latham, 2015; Hultin, 2019), to reliance on methods that account for phenomena such that their relationality and materiality is preserved (e.g., Almklov, Østerlie, & Haavik, 2014; Faik, Thompson, & Walsham, 2019; Nyberg, 2009).

Table 2 provides a summary of a nonexhaustive set of emerging practices that enact data generation, data analysis, and data re-presentation (i.e., presenting research findings) in ways that account for the realities that are produced.

## 5.1 Accounting for Entanglement of Phenomena

Entanglement refers to ontological indeterminacy whereby entities such as technologies and people "lack independent, self-contained existence" (Barad, 2007, p. ix). With entities being entangled and mutually constitutive such that their boundaries, identities, and properties are only brought into being when enacted, a key challenge for sociomaterial researchers is to notice, analyze, and represent phenomena in fluid, emergent and relational ways.

### 5.1.1 Data Generation

Data generation is primarily a constructive practice: observations are described and classified, participants are asked about their experiences and their answers are recorded and transcribed, and emotions are expressed and labeled. Language, which thingifies and enacts well-worn distinctions that constrain researchers' ability to see, conceptualize, and describe phenomena, is unavoidable in data generation. Generating data in a way that accounts for the relationality of phenomena thus demands confronting the substantialist tendencies of language.

**Decentering humans in observations:** In his study of large-scale infrastructures, which he defined as amalgams of humans, nonhumans, and technologies, Niemimaa (2016a, 2017) faced the challenge of seeing agency in distributed ways. This required decentering agency from humans and avoiding an entity-centric view of technology. To accomplish this way of seeing and understanding events in the empirical setting of a power grid's network operation center (NOC), Niemimaa actively reflected on *how* he was observing, not just *what* he was observing.

During his observations of the everyday practices of technicians who operate the power grid from the comfort of their office space—sitting in their rolling office chairs, juggling multiple monitors and

keyboards while simultaneously talking on the phone with a headset—Niemimaa continuously reminded himself to notice the entanglements of meaning and matter and the distributed agencies of different sociomaterial configurations. In this way, Niemimaa sought to provide an account of infrastructure as indeterminate and entangled.

**Recounting the researcher's own lived experience:** To generate data on what it means to be entangled with technology, some IS researchers are turning to their personal encounters with experiential computing as a source of data (e.g., Bødker, 2017). The autoethnographic method, where "the researcher is the epistemological and ontological nexus upon which the research process turns" (Spry, 2001, p. 711), affords this highly personal and self-revelatory approach to data generation.

Prasopoulou (2017) relies on autoethnography to explore "the lived experience in the Internet of Things (IoT) in order to capture how humans, digital devices, and data become entangled through daily use" (p. 288). To generate data on the nature of technology adopters' physical, emotional, and cognitive entanglement with wearables, she draws on her own everyday experiences with a fitness tracker. Attending to her affective and embodied responses, Prasopoulou is able to generate data at a level of granularity and intimacy that would be virtually impossible to access in a third party. Furthermore, by limiting the need for language to mediate the experience in all its complexity, she preserves the indeterminacy of experiential computing. Her account of fitness tracking as a human-technology entanglement is accomplished by making herself vulnerable.

### 5.1.2 Data Analysis

Preserving the entanglement and indeterminacy of phenomena during data analysis lies in tension with the reductive and objectifying tendencies of theorizing, which entails enacting "cuts" to develop temporarily stable patterns in the empirical reality captured in and through the data. Nevertheless, we find a number of practices that sociomaterial researchers are enacting to resolve this apparent contradiction.

**Focusing on boundary work:** Faik et al. (2019) studied openness in bureaucratic organizations, specifically the Moroccan government, from a relational perspective in order to question taken-for-granted organizational boundaries. To ascertain how "the heterogenous actor networks [that] generate the different boundaries, and maintain or reinforce them" (p. 685), the authors sought to "unblackbox" boundary work. This focus rests on the assumption that entities such as organizations are not given but rather effortful accomplishments enacted by (re)producing distinctions. Faik et al.'s analysis yielded two opposing

processes of boundary making: hybridization (integration) versus demarcation (separation) of entities. It is by focusing on boundary work, i.e., practices of making distinctions that cut discrete entities out of the ongoing flow of events, that researchers account for the situated and enacted nature of organizational phenomena.

**Engaging in dialectic analysis:** By conceptualizing boundary work as a dialectic process, i.e., one in which the opposing poles of hybridization and demarcation are also mutually constitutive (Benson, 1977), Faik et al. (2019) preserve the dynamism and temporary stabilization that entanglement implies. However, they do not theorize the dialectic nature of boundary work explicitly. Similarly, Utesheva, Simpson, and Cecez-Kecmanovic (2016), in their study of a newspaper company's identity metamorphoses initiated by digital technology, conceptualize identity in dialectic (i.e., both-and) terms. Even though they elaborate on identity being simultaneously assigned *and* enacted, static *and* dynamic, as well as inherent *and* emerging, Utesheva et al. do not offer insight into the dialectical dynamic of organizational identity.

In contrast, Schultze (2016) completes a dialectic analysis of identity work in the virtual world Second Life, which relies on the constitutive entanglement of users' physical and digital embodiments to make the virtual "real." Leveraging Boland's (1992) "engine of inquiry," a dialectic framework that affords the tracing of movement between the opposing poles of a contradiction (e.g., real vs. virtual), Schultze describes the identity work in the liminality of virtual worlds as the enactment of cuts between reality and virtuality in a wave-like, oscillating motion that keeps these phenomena's meanings and boundaries unsettled. By conceptualizing the dialectic relationship between the virtual and real as a mechanism that repeatedly challenges distinctions that had previously been drawn (thus denying their permanence), Schultze offers an account of cyborgian identity as entangled and indeterminate.

**Experimenting with language:** The thingifying nature of language not only makes it challenging to perceive and describe phenomena in entangled ways during data generation, but it also limits the ways in which phenomena can be theorized. Playing with language is one approach to dealing with this issue. Mazmanian, Cohn, and Dourish (2014) develop their own analytical language of "re/con/figuration" to analyze technology use in one of NASA's space exploration missions. The authors play with the multiple meanings of the root term "figure" in order to advance a language better able "to portray a mutually constitutive relationship [between the social and the material] with precision and dynamism" (p. 843).

In the space mission, figures and figuring form a key part of daily life. "Numerical figures, mathematical figures, graphical figures, algorithmic figures" (p. 831) allow engineers to produce a relationship between "here" (on earth) and "there" (outer space). By using the concepts "figuring," "configuring" (figuring with), and "reconfiguring" (figuring with again and again), the authors are able to describe three different occasions in the space mission that reconfigure sociomaterial practices. With the generativity of this wordplay and novel relations that these new concepts afford, Mazmanian et al. account for the sociomaterial entanglements that constitute space exploration.

### 5.1.3 Data Re-Presentation

Both the generation and writing up of data are representational practices. However, a key difference between them is that the primary consumer of the former is the researcher(s) conducting the study, whereas other researchers and practitioners are the target audience of the latter. Once again, the substantialist tendencies of language constitute a key challenge to re-presenting phenomena as entangled and indeterminate.

**Enacting alternative genres of representation:** Genres, i.e., typified communicative acts that are characterized by an agreed-upon substance and form in response to a recurring situation (Yates & Orlikowski, 1992), are performative. They not only present research results but also regulate what phenomena can legitimately be studied, how they can be studied, and what can be written/said about them (Avital, Mathiassen, & Schultze, 2017). Bødker (2017) wrote his auto-ethnographic study up as meditations to capture the felt-ness and affect of computing in everyday life. In this way, he sought to account for "things often deemed excessive, irrelevant, hard to capture or indeed so subtle that they seem to be beyond (or below) proper scholarly interest" (p. 278).

Humphries and Smith (2014) provide another example of using alternative genres to account for the entangled, indeterminate nature of human-machine configurations. They enact a practice of narration in which an object (in their case, a Xerox printer) is presented as the subject and given a voice in order to illustrate how technological material is entangled in organizational discourse. By freeing themselves from the strictures of the academic journal genre, these researchers are able to account for their empirical insights such that the entangled nature of phenomena is preserved.

## 5.2 Accounting for Performativity of Practice

The concept of performativity highlights that representations of any kind (e.g., words, models,

diagrams) not only reflect but also enact the reality they purport to re-present (Suchman, 1995). Performativity trains our focus on the ontological primacy of doings and sayings. Discrete objects, which are produced in and through the enactments of material-discursive practices, are secondary. A performative perspective thus explores how and out of what sociomaterial configurations a given phenomenon (i.e., effect) is produced in and through practice.

### 5.2.1 Data Generation

To gain insight into the performative nature of sociomaterial configurations, researchers need to attend to material-discursive practices, sociomaterial configurations, and the realities they produce. A key challenge with translating sayings and doings observed in the field into data, is preserving the situated and performative nature of these practices.

**Applying imagination to complete data:** In her study of the performative nature of the sociomaterial configurations that constitute the Swedish Migration Board, Hultin (2019) compares three distinct architectures of the reception area. She complemented her interview and observational data with intuition and imagination (Bergson, 1999). Looking at photographs of the reception area of the past (a repurposed police station), she "imaginatively inserts [herself]" (p. 100) into the situation by relying on her own experiences with similar application processes and similar spatial arrangements. Based on these conjured memories, she reenacts the thoughts, feelings, and identities the material arrangements in the photographs produce. From this vividly imagined experience, she then infers the relationships that asylum seekers and migration officers might have enacted within a given sociomaterial configuration. Hultin thus accounts for the performativity of a particular spatial arrangement by drawing on her own life experience to reenact in her imagination what effects it might have produced.

### 5.2.2 Data Analysis

A key challenge in theorizing the performativity of practices enacted in an empirical context is to preserve their situatedness and complexity. Furthermore, sociomaterial configurations can never be fully identified; their analysis is limited to what they produce. This, however, is made more challenging by the temporary and contingent nature of phenomena.

**Analyzing material-discursive practices:** In his study of call center practices, Nyberg (2009) analyzes the language the call center operators used to show how the social and material elements of a call center are ontologically intertwined, dynamically enacted and continuously (re)configured. Focusing particularly on the "cuts" (i.e., distinctions) that the operators enact by

referring to the call center system as "it," "he," "stupid," "caring," "frustrating," etc., and how these cuts differentially (re)produce the call center as a certain type of configuration (e.g., with agential systems and passive representatives), Nyberg accounts for not only the performativity of language, but the multiple realities that are dynamically (re)enacted at any time. While these enactments of realities are performed in a given context, Nyberg stresses that they rely on the citation of established discursive practices. By highlighting that the realities enacted thusly are not unique and one-off, but that their recurrence generates patterns of differential becoming, Nyberg is able to account for both the situatedness and abstractness of doings and sayings.

**Contrasting the performativity of apparatuses:** Interested in the performative outcomes of different hotel evaluation apparatuses (one online and one offline), Orlikowski and Scott (2014) contrast two rating services: the Automobile Association (AA) and TripAdvisor. The authors illustrate the performativity of their rating practices, respectively labeled formulaic and algorithmic apparatuses, by identifying the different realities they produce. The formulaic apparatus with its highly stable, scientifically formulated rules and categories that are applied by accountable professionals produce organizations (e.g., hotels) that are attuned to managing by and conforming to defined standards and criteria, consumers that are informed by and conditioned to act according to these defined standards and criteria, and assessments that are auditable. In contrast, an algorithmic apparatus produces hotels that are focused on and micromanaged by continuously shifting assessment processes and criteria, consumers that are empowered by existing valuations and their capacity to produce new ones, and assessments and accountabilities that cannot be located. By contrasting these apparatuses and exploring how they produce distinct phenomena (e.g., hotels, consumers), Orlikowski and Scott account for the situated and performative nature of practice.

### 5.2.3 Data Re-Presentation

The language trap again poses challenges re-presenting the performativity of sociomaterial configurations and the multiple realities they produce in practice.

**Mapping sociomaterial configurations over time:** By drawing on actor network maps to visualize how different actors' alignments with and oppositions to other actors shift and transform during the course of an IS implementation project, Cecez-Kecmanovic et al. (2014b) reveal the changes in the configuration of a network of actors (i.e., systems, organizational groupings). They also tie the performativity of these configurations to the production of an online system's success and failure. Through the use of timelines, the authors further map the temporal trajectory of the actor

network. In this way, they provide an account of the distinct realities that are produced by different network configurations at different points in time.

Cecez-Kecmanovic et al. (2014b) further underline these multiple realities by reminding the reader that multiple actors—rather than divergent interpretations of the same actor (e.g., system)—have been performed. To distinguish between two instantiations of the system of interest, namely Emperor, each system's uniqueness is communicated in the way it is referenced, namely, with or without quotes: "The two actors—Emperor and 'Emperor'—were enacted in different relations; they were different relational effects. These were not different perceptions or representations of a single technology but multiple forms of reality performed in these relations" (p. 578).

## 5.3 Accounting for Materiality of Phenomena

Materiality, which is conceptualized as a process of materialization (i.e., the differential and ongoing becoming of phenomena) in sociomaterial theorizing (Barad, 2007), implies that a focus on meaning and sensemaking shifts to understanding how the materiality is implicated in and productive of the phenomena traditionally conceived of as "social." Materiality thus encourages social researchers to broaden their focus from interpretations to the study of configurations that play an active and agentive role in the production of particular phenomena.

### 5.3.1 Data Generation

Generating data on materiality requires researchers to refocus their gaze from purely discursive to also include material aspects of phenomena. This poses difficulties for data generation as researchers need to determine what material matters in the production of the phenomenon of interest, which is likely to require considerable domain-specific expertise (Almklov et al., 2014).

**Exploring the relationship between physical and digital matter:** In their study of deep-sea petroleum production, Østerlie, Almklov, and Hepsø (2012) were interested in how the materiality of an oil flow was performed through different human-technology configurations. Central to their data generation were the authors' "cutting" practices, which enabled them to explore the performativity of different materialities. These cuts differentiated "the material phenomena that the engineers are trying to grasp [i.e., what is oil and what is sand] versus the materiality of the tools from which they approach it [e.g., sensors, visualizations of data analytics]" (p. 86). With these cuts, the authors enacted the "dual materiality" of oil production. By compelling the authors to attend to the configurations of both the physical and the digital aspects of

petroleum production in an environment mediated by technology and the reciprocal relationships between them, the concept of dual materiality helped the authors attend to and account for the materialities of the phenomenon of interest.

### 5.3.2 Data Analysis

Viewing materiality as processual and agentive requires analytic practices that account for the differential becoming of matter and its implications. The challenge is to identify from data "how matter matters" (Barad, 2003, p. 803) in the practices and phenomena under analysis.

**Comparing material enactments of practices:** Beane and Orlikowski (2015) focus on how various material configurations of practices differentially perform coordination in a healthcare setting. To compare the coordination practices of night rounds enacted through a telephone conversation between a resident and physician and facilitating a robot-mediated virtual meeting among the resident, physician, nurse and patient, the authors conduct a finely grained analysis that attends to the temporality and intensity of action (e.g., preparing for a care coordination meeting by visiting the patient or merely skimming the medical record online).

Their analysis shows not only how practices vary across the phone- and robot-mediated night rounds, but the conditions under which the coordination enacted by each was substantially improved or challenged. Specifically, the robot-mediated practice of coordination was an improvement over the telephone-mediated configuration when the resident had prepared for the meeting by collecting information at the patient's bedside. However, robot-enabled night rounds were inferior to their telephone-enabled counterparts when the resident had merely skimmed the medical record prior to the meeting. By quantifying the time, timing, and frequency of the healthcare professionals' actions, the authors are able to account for how technologies matter in the differential materialization of coordination.

### 5.3.3 Data Re-Presentation

Even though materiality does not equate to the concrete and the tangible, the term tends to invoke these connotations. A key challenge in data re-presentation is therefore to continuously demonstrate its processual and agential nature.

**Presenting images of the material situation:** Given the aspiration of sociomateriality to draw attention to how materiality matters, we see some efforts to enrich text-based accounts with visualizations of sociomaterial entanglements. In some instances, images of the materiality of the situation under study are used to make readers aware of the constitutive role

materiality plays in our everyday practices. For example, Østerlie et al. (2012) include photographs of the Detailed Production Optimization room when it is a "hothouse of activity" (p. 90) during a time of crisis, and Hultin and Mähring (2014) offer an image of a digital visualization board to illustrate all the visual cues that, once enacted, afford changes in the work practice of the general surgery in the hospital they studied. Schultze's (2014b) reliance on photo diaries to not only gain insight into but also to communicate the sociomaterial entanglements through which life in virtual worlds is enacted, provides another example of leveraging images to give accounts that preserves the material, relational, and situated nature of phenomena.

**Inviting the reader to reenact the process of materialization:** In their study of engineers' petroleum production practices, Almklov et al. (2014) focus on how sociomaterial configurations, particularly networks of sensors, enact different conceptualizations of situatedness. As a re-presentational strategy, the authors provide visualizations of the well data in order to show how the sensors and information systems jointly produce representations of the oil well's physical materiality in specific ways. By providing highly technical images of the raw data produced through the sensor infrastructure, the authors vividly illustrate how the sociomaterial arrangements of engineers and technologies materialize the wells. The authors thus account for mattering by allowing the reader to re-enact the process of materialization (e.g., gamma rays on an image performing shale), which allows readers to gain a visceral, firsthand experience of how matter matters.

## 5.4 Responsibility for the Researcher's World-Making

Since sociomaterial theorizing highlights that research is performative, in that it creates the world that it seeks to study, and posits that the researcher is part of this worlding apparatus, accounting for world-making also implies contemplating what kind of world we want to create with our research (Schultze, 2017):

> *I believe that what is at stake is more than just the knowledge we make; it's the worlds we would like to make, the kinds of people we want to be, the kind of work we want to do in the world.* (McCoy, 2012, p. 762)

Thus, taking responsibility for one's role in worlding as a researcher and owning the realities that one's knowledge creation enacts, entails negotiating why one reality rather than another is produced, i.e., ontological politics (Law & Urry, 2004). Even though it is individual researchers that are answerable for their theoretical and methodological choices and the realities their research practices generate, these

practices are material-discursive and thus inseparable from the academic discipline they enact.

### 5.4.1 Data Generation

Generating data that allows the researcher to account for her own relationality and practice enactments during the course of a study is made difficult by the researcher's inability to sufficiently distance herself from the apparatus of observation of which she is a part. One approach to deal with this challenge is to trace how the methods and theories through which reality is enacted also produce the researcher.

**Accounting for the researcher's own becoming:** Hultin (2019) explicitly recognizes the implications of a relational ontology for her accountability as a sociomaterial researcher. Being responsible as a researcher, she argues, requires being responsive to the possibilities of becoming,

> *[which] implies thinking critically about the boundaries, constraints, and exclusions that operate through particular sociomaterial practices (Barad, 2007; Schultze, 2017) and of experiencing, accounting, and taking responsibility for, not just what we do with our methods and theories, but what they do to us, to our thinking, action, and the realities we enact* (p. 102).

Hultin (2019) reflected on "how the research created [her] as [she] tried to create it" (p. 100) in order to account for her own becoming as a sociomaterial researcher. In this account, she notes how appreciating her own performativity as a researcher during the course of the study increasingly led her to a decentered view of agency. This translated into increasingly foregrounding the sociomateriality of the immigration practices she was studying and pivoting to interview questions around the material elements of a given practice, thereby relinquishing her earlier focus on the agentive human actor. By accounting for how sociomaterial theorizing changed her understanding of and perspectives on the phenomenon of interest, as well as her research practices, Hultin demonstrates how she responded to the possibilities of becoming and thereby lived up to her responsibility as a sociomaterial researcher.

### 5.4.2 Data Analysis

While there is virtually no limit to the amount of self-reflexive data that a researcher can produce, determining what parts of the material are relevant to generating insights is the key challenge during data analysis (Schultze, 2000). Determining which of the researcher's thoughts, feelings, and experiences matter is made even more challenging in sociomaterial theorizing, given that the researcher is a part of an apparatus rather than an independent agential entity.

**Analyzing ethical disturbances:** To study human-technology relationality, Dale and Latham (2015) argue we should recognize our ethical relationship to things not simply as passive and inanimate objects but as (nonhuman) others. In a reality constituted by relations, there is no clear distinction between oneself as an embodied being and the other. However, the distinctions made between us and others frequently "produce inequalities and hierarchies, relations of domination and exploitation" (p. 171), which raises ethical questions for researchers. These ethical concerns arise because researchers enact cuts (e.g., self vs. other) that have moral consequences. Attending to "ethical disturbances" both during and after their field research, Dale and Latham reflected not only on "what to do, but also what was the 'right' thing to do" (p. 175). By recounting these critical incidents and accounting for the actions they took or failed to take, the authors account for their role in (re)creating distinctions, as well as the inevitable inequalities and hierarchies between the disabled and the able-bodied, between self and other, and between the social and the material.

### 5.4.3 Data Re-Presentation

Accounting for the researcher's role in world-making can take a variety of forms in data re-presentation, which are evident in Hultin (2019) and Dale and Latham (2015) and include confessional writing,. However, other means of accounting for the research apparatus that produced the reality presented in a text are also possible.

**Comparing the performativity of apparatuses:** Focusing on video-based research practices, which are generally accepted as the de facto way of studying (organizational) spaces, Mengis, Nicolini, and Gorli (2018) demonstrate how different video-recording apparatuses (i.e., camera angles) of the same organizational activity (i.e., providing hospital care), produce distinct phenomena. Contrasting the representations produced by four different camera angles (i.e., apparatuses), the authors note that each video practice privileges specific understandings by orienting attention to different elements ("e.g., focus on the architectural elements of space as physical extension vs. focus on spatial coordination of people in space" [p. 10]) and by qualifying these elements differently ("e.g., focus on how architectural elements shape interaction vs. focus on the symbolic value of architectural elements" [p. 11]).

To represent the performativity of the video-recording apparatuses, the authors use images, sketches, and tables of comparisons to distinguish between the realities each of the four camera angles produced. Similarly, in their study of digital trace data collected from a citizen science project, Østerlund, Crowston, and Jackson (2020) demonstrate how qualitative

versus statistical methods of cutting trace data perform different realities. By making explicit the way in which different apparatuses produce different realities and reminding readers of the stakes involved in enacting a given research practice, these authors are accounting for their role in world-making.

# 6 Implications of the Sociomaterial Turn(ing) for Accountability in IS Research

Sociomateriality enacts a turn toward a relational ontology and materiality in IS. An ontological turn prioritizes questions of what reality is over how we can know it (i.e., epistemological concerns). The introduction of sociomateriality raises new questions that include an academic discipline's accountability for the realities that are generated in and through its research. We identify two areas in which the sociomaterial turn(ing) engenders highly consequential implications for the field of IS: namely, the limits and performativity of language and the ontological politics associated with multiple realities.

## 6.1 Limits and Performativity of Language

*We say, "The wind is blowing," as if the wind were actually a thing at rest which, at a given point in time, begins to move and blow. We speak as if a wind could exist which did not blow. This reduction of processes to static conditions, which we shall call "process-reduction" for short, appears self-explanatory to people who have grown up with such languages.* (Elias, 1978, p. 111-112)

In this editorial, we have noted the "thingifying," process-reducing tendencies of language, which makes representing reality in entangled, emergent, and highly situated ways very challenging (Chia, 2003). Combined with the performativity of language, the theoretical perspective of sociomateriality highlights that our material-discursive practices or apparatuses of observation (of which we, as researchers, are a part) are inevitably tied up with the realities our research produces (Savransky, 2016).

By highlighting the limits and performativity of language, the sociomaterial turn(ing) places demands on IS researchers to reflect on and account for the fundamental role of language in the knowledge they generate. While we have outlined some ways in which prior research has addressed the language trap, it bears pointing out that developing accounts that preserve the entangled and relational nature of phenomena, tends to result in complex and obtuse expressions, as the following analysis of Latour (2010) illustrates.

Latour (2010) describes the situation in which a daughter asks her father, who is trying to quit his smoking habit, what he is doing. He replies that he is smoking a cigarette, thereby attributing agency to himself. She wonders whether the cigarette isn't smoking him, thereby attributing agency to the object. Latour suggests the following as a "middle-voiced," relational account of agency that the father might have given his daughter instead:

*I am effectively held by my cigarette, which makes me smoke it. There is nothing in this resembling a determining action, neither for it nor for me. I do not control it any more than it controls me. I am attached to it and, if I cannot hope for any kind of emancipation from it, then perhaps other attachments will come to substitute for this one.* (p. 58)

This elaborate and equivocal expression of the smoker-cigarette entanglement competes with the simple phrase, "I am smoking a cigarette," which is more readily communicated and understood, despite the distorted reality it performs. We believe that finding ways of dealing with the limits of language so that our texts perform relationality in vivid and dynamic ways—albeit without creating utter confusion and frustration for the research participants and the consumers of the research results—presents a significant challenge for progressing the sociomaterial turn(ing). Nevertheless, it also presents an exciting opportunity for experimentation.

## 6.2 Ontological Politics of Multiple Realities

*If realities are enacted, then reality is not in principle fixed or singular, and truth is no longer the only ground for accepting or rejecting a representation. The implication is that there are various possible reasons, including the political, for enacting one kind of reality rather than another, and that these grounds can in some measure be debated. This is ontological politics.* (Law, 2004, p. 162)

This description of what acceptance of multiply enacted, highly situated realities implies for a field, reminds us that a key question that IS needs to confront in light of the sociomaterial turn(ing) is what kinds of worlds it wants to help produce (Schultze, 2017). In a recent contribution to the Research Perspectives section of *JAIS*, Clarke and Davison (2020, p. 483) note that around 90% of articles published in leading IS journals in 2001, 2008, and 2015 "(1) adopted a single-perspective approach, (2) were committed solely to the interests of the entity central to the research design, and (3) considered only economic

aspects of the phenomena investigated in the research." This suggests that our research is creating realities in which only the interests of powerful actors matter—especially those that play a central role in technology-related interventions. Others' interests are largely ignored. In addition, IS research legitimates a singular focus on the financial implications of technological change.

While Clarke and Davison (2020) advocate for the expansion of stakeholder perspectives in IS research and the reliance on triangulation to gain a more complete understanding of (a singular) reality, we believe that addressing this issue will require a more fundamental debate about the field's ontological politics. Whose reality matters? How does our research prioritize among competing realities/interests? Zuboff's (2018) work on surveillance capitalism suggests that the realities pursued by players in the hub economy (e.g., Google, Facebook, Apple) and those of individuals and societies are fundamentally at odds. Can their contradicting realities be represented on an even footing? Should the field of IS endeavor to present alternative realities? And if so, which ones?

How do we differentially perform the multiple realities that are enacted by the research practices that we perform and that perform us? How does the language we use to re-present these realities (re)materialize notions of agency that privilege humans over things (e.g., natural resources and technology)? And how do these practices contribute to crises such as global warming, as well as meaningful employment in the era of increasingly smart machines (Bailey et al., 2018)?

And what are the implications of anthropomorphizing cognitive computing systems (CCS)? For example, Schuetz and Venkatesh (2020, p. 469) advocate for addressing questions such as "How can CCS effectively persuade people to follow system advice and orders?" Is a world in which agency switches from humans to machines conducive to our ability to live, learn, and work in these emergent human-technology configurations?

Since it appears infeasible that the field of IS can develop coherent and agreed-upon answers to these questions, our goal in presenting them is to illustrate what ontological questions are likely to shape the field's sociomaterial turn(ing). We believe that the ontological politics that these questions highlight will need to be negotiated as part of the IS discipline's turn(ing) toward relationality and materiality, which promises to provide IS researchers with the necessary concepts to theorize both contemporary and future technologies that are increasingly blurring the boundaries between the taken-for-granted entities of people and technology.

# 7 Conclusion

To conclude, we have attempted to account for the reality that we are creating in and through this editorial. Recognizing that our writing is performative, we tackle the following questions: What world of IS research do we want to create through our arguments and expositions? How have we sought to accomplish this? Who is privileged and who is sidelined by the analytical cuts we make by distinguishing among the various philosophical stances and the epistemologies of interpretivism and sociomateriality?

The kind of IS research world that we want to create with our theorizing is one that acknowledges the legitimacy of different ontological positions and that reflects on the continuities and discontinuities between them. For this reason, we conceive of the sociomaterial turn not as a one-time change in direction but as a process of turn(ing). By viewing the introduction of a relational ontology to IS research as an ongoing accomplishment rather than an inevitable shift to new norms and practices, we seek to create a reality where there is a generative and positive hybridization and intertwining of different research traditions.

We envisage a transition to a disciplinary space that embraces multiple philosophical stances and continues to grapple with the many materializations of human-technology entanglements. We imagine performative and generative reconfigurations of this conceptual space, which reorients and sensitizes us to new possibilities and multiple alternative realities. We hope that the philosophical stances that emerge in this idealized world of IS research will be enacted as fluid and dynamic enablers of exploration rather than as normative yardsticks used to challenge the legitimacy of the research practices performed in a given study and the results these practices produce.

With regard to who benefits from the disciplinary landscape that our editorial performs, we believe that it is not just researchers who grapple with the challenges of relationality for whose endeavor our writing will hopefully generate both empathy and legitimacy among their (reviewing) peers, but also the IS discipline in general, as well as society at large. A key contribution of the relational ontology is that it highlights that there are multiple realities and that "things could be otherwise." This means that the complex relationships between people (ranging from individuals to groups) and technology that many regard as defining the field, can be multiply conceived. This affords not only an infinite stream of research opportunities but may also help the IS discipline become less dependent on new technologies as a primary source of new research opportunities. Instead, well-established and widely used technologies such as email and ERP might be explored as novel

sociomaterial configurations (e.g., Wagner, Newell, & Piccoli, 2010).

Society is also likely to benefit from the disciplinary landscape we advance. By advancing an understanding of agency that is neither human-centered nor the property of a technology (or entity), a relational ontology affords a view of technology, as well as of natural resources, as coproductive of agency. Instead of a mobile device or a tree being framed as a tool or a mere resource that human actors can "use," sociomateriality promotes a sensitivity toward all things human and nonhuman being equally valuable and inextricably intertwined in the enactment of situated practice. Furthermore, the performative sensibility of the sociomaterial stance means that attention is paid to what the doing of a sociomaterial configuration (e.g., person-with-a-cellphone) does. Compared to more substantialist philosophical stances,

adverse environmental impacts (e.g., climate change) and alienating technological effects (e.g., AI-based, human-out-of-the-loop decision-making) are more likely to form an integral part of sociomaterial research agendas.

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# Appendix A

To identify sociomaterial studies in IS research and determine whether the increasing interest in sociomaterial theorizing that was reported by Jones (2014) has continued, we conducted a literature search of IS articles and conference proceedings published between 2009 and 2019. In contrast to Jones, who retrieved 146 articles and 64 conference papers, we excluded the organization studies literature and focused exclusively on IS research. The journals included in the search are the AIS Basket of Eight journals, Information and Organization (I&O), Information Technology and People (IT&P), the Scandinavian Journal of Information Systems (SJIS), and SIGMIS Database (DB). The conferences we searched are ICIS, ECIS, ACIS, AMCIS, and PACIS.

For each of the included journals, we searched for articles that contained the terms "sociomaterial," "sociomateriality," "socio-material," or "socio-materiality" in the body of the text (i.e., not only in the references) using the search functionality provided by the journals themselves. This search yielded 253 journal articles of which 219 articles[3] met the inclusion criteria. Excluded from the analysis were editorials that only used the terms to introduce articles in the corresponding issue and reviews that only included the terms in reference to other articles. Using the same search terms, the conference proceedings were searched in the AIS Electronic Library (AISeL). This search resulted in 428 papers of which 266 met the inclusion criterion (i.e., the search terms appearing in the body of the text, not only in the references).

The results of the literature search are provided in Figure A1. Table A1 summarizes the distribution of articles across the 12 IS journals we searched.
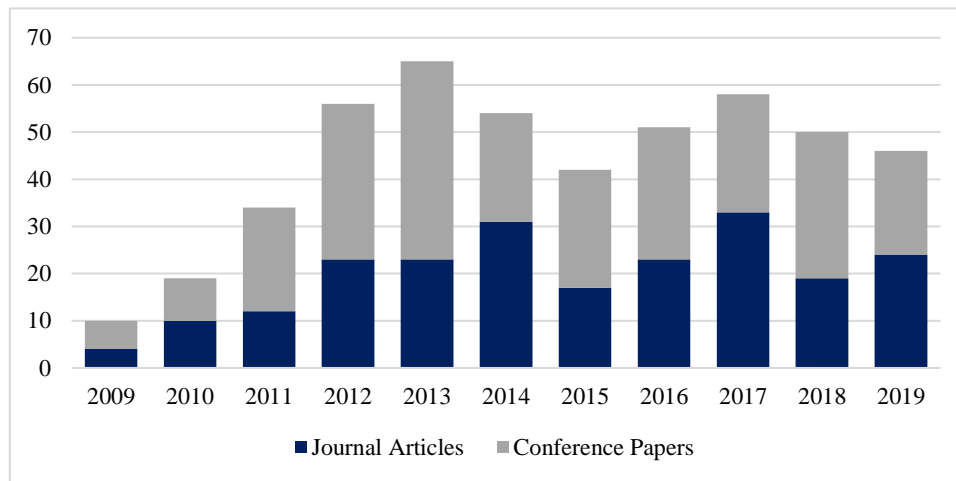


**Figure A1. Sociomateriality in IS Research**

**Table A1. Journal Distribution**

| EJIS | ISJ | ISR | JAIS | JIT | JMIS | JSIS | MISQ | I&O | IT&P | SJIS | DB |
|------|-----|-----|------|-----|------|------|------|-----|------|------|----|
| 26 | 19 | 11 | 20 | 23 | 1 | 14 | 30 | 38 | 9 | 15 | 13 |

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[3] The complete list of references is available from the authors upon request.

Further analysis of the journal articles identified in the literature search revealed that a variety of theories and concepts have been used to enact what the authors label sociomaterial theorizing. Table A2 provides a summary of the theories and concepts employed together with example studies from the IS discipline. While this summary supports the view of sociomateriality as an "umbrella term" (Orlikowski & Scott, 2008, p. 434), it is important to note that the definition of sociomateriality we advance in this editorial does not cover the full diversity of theoretical positions in Table A2. Specifically, we note that some theories and concepts (e.g., critical realism, affordance, imbrication) are typically associated with the philosophical stance of (hyphenated) socio-materiality and others (e.g., agential realism, actor network theory) with (nonhyphenated) sociomateriality. Given the performativity of this editorial, we do not categorize the theories and concepts that have been employed for sociomaterial theorizing thus far, but look forward to seeing how the sociomaterial turn(ing) evolves, i.e., which concepts and theories IS researchers will enact to meet the key tenets of relationality and materiality that we attribute to sociomateriality.

**Table A2. Theories and Concepts Associated with Sociomateriality**

| Theorist | Theory and concepts | Example studies |
|---|---|---|
| Heidegger (1927) | Being; equipment | Riemer & Johnston (2014, 2017); Yang (2016) |
| Merleau-Ponty (1945, 1964) | Phenomenology of perception; embodiment | De Vaujany et al. (2018) |
| Parsons & Shils (1951) | Theory of action; actor; situation of action; orientation | Mueller et al. (2016) |
| McLuhan (1964) | Media theory; figure; ground | Yang (2016) |
| Gibson (1977; 1986) | Affordance theory; affordance | Bernardi et al. (2019); Fayard & Weeks (2014); Leonardi (2011); Zheng & Yu (2016) |
| Bhaskar (1979); Archer (1995) | Critical realism; generative mechanism; morphogenesis | Leonardi (2013) |
| Habermas (1979) | Rational reconstruction | Gaskin et al. (2014) |
| Latour (1987, 1992; 2005); Callon (1986); Law (1992, 2008, 2009) | Actor network theory; actor network; translation; delegation | Cecez-Kecmanovic et al. (2014b); De Albuquerque & Christ (2015); De Vaujany et al. (2018); Ribes et al. (2013) |
| Pickering (1993, 1995) | Mangle of practice; tuning | Eaton et al. (2015); Venters et al. (2014) |
| Massumi (1995); Thrift (2008) | Affect theory; affect | Bødker (2017); Stein et al. (2014) |
| Barad (1998, 2003, 2007) | Agential realism; entanglement; intra-action; performativity; material-discursive practice; diffraction | Hultin (2019); Østerlie et al. (2012); Scott & Orlikowski (2014); Schultze (2014a) |
| Bennett (2001; 2010) | Enchantment; vibrant materiality | Prasopoulou (2017) |
| Taylor (2001; Taylor et al., 2001); Sassen (2002, 2006) | Theory of imbrication; imbrication | Introna & Hayes (2011); Leonardi (2011); Leonardi & Rodriguez-Lluesma (2012); Vinther & Müller (2018) |

## About the Authors

**Ulrike Schultze** is an associate professor in information technology and operations management at Southern Methodist University. Her research explores the complex relationship between information technology and work practices. Drawing primarily on practice theory in her early work on the implications of knowledge management technology and of internet-based self-service technology, her more recent studies of identity work in social media have led her to sociomaterial theorizing. This philosophical stance has also guided her exploration of digital innovation and the sharing economy. She has served on numerous journals' editorial boards and is currently a senior editor at *JAIS* and *Information & Organization*.

**Gijs van den Heuvel** is a PhD candidate at Tilburg University, the Netherlands. His research focuses on information sharing in military organizations and balances on the intersection of organization studies and information systems. He is particularly interested in the sociomateriality of information sharing, organizations, and IT systems. Gijs is currently engaged as a consultant and has worked on information requirements, IT systems, and information architectures for different military and nonmilitary organizations.

**Marko Niemimaa** is an assistant professor at the University of Jyvaskyla and an associate professor at the University of Agder. He is also an adjunct professor at the University of Turku. His research focuses on the organizational aspects and implications of cybersecurity and sociomateriality. His work has been published in top-tier IS outlets, such as *European Journal of Information Systems, International Journal of Information Management, DATA BASE, Communications of the Association for Information Systems,* and *Computers & Security*.