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DIGITAL WORK: A RESEARCH AGENDA

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Introduction

We have been invited to discuss "digital work" and to propose a research agenda for the next decade or so. We value the opportunity to share some thoughts on this important area. In doing so, we will begin with a reconceptualization of the phenomenon that is at stake here, offer some specific examples, and then close by considering some possible future research directions that we hope will be both useful and generative.

The phenomenon: What is digital work?

The term "digital work" suggests that we are able to differentiate work that is dependent on digital technologies from "other work" that is not. We argue that in order to develop a contemporary research agenda for management and organization studies we must take a different route because the "digital" no longer serves as a useful separable feature distinguishing a type of work. Work today always entails the digital; even where the work itself doesn't directly involve a computing device, most contemporary work relates to digital phenomenon. What we mean by this is that most work practices involve digital technology to a greater or lesser extent — whether through digital networks that transfer email, cellular communications, and webpages or the computers that process financial transactions for global funds flow, facilitate writing and editing of documents, and handle logistics so parcels can be delivered on time.

Although office, manufacturing and service work have been through more intense processes of digitisation that are more easily called out as "digital," we contend that such easy categorizations have blinkered us from realising the relational processes through which all work has become "cyborgian" to use Haraway's (1991) term. For instance,

consider coffee production. Smallholder coffee farmers in Colombia now keep track of coffee prices and sales levels in real time via mobile tablets, while their counterparts in Rwanda get up-to-date satellite imagery on local weather conditions delivered to their mobile phones (Amirtha 2015). But whether or not these farmers regularly monitor data feeds, their livelihoods are inextricably bound to the global supply chains and world commodity markets that operate through computing platforms. Or consider the work of cleaning hotel rooms. Hotel cleaners' everyday practices may not directly engage digital technology, yet their activities are surely configured by it as the quality of their cleaning becomes subject to online user-generated commentary. These reviews posted on social media websites such as TripAdvisor will elicit praise or rebuke from hotel managers while also impinging on their job security (as social media reviews and ratings influence room bookings that affect the financial position of the hotel and its staff levels).

Work is "a doing," it is performed. As Weick (1969) suggests, we are better served by talking in terms of verbs rather than nouns. So our focus is on the dynamic and situated activities that constitute work*ing* rather than static or abstract tasks that make up "the work." As a doing, work is configured by its performance through the specific actions, voices, bodies, rooms, documents, tools, infrastructure, etc., that constitute it. As these specificities change, so does the work. Over the years, considerable attention has been paid to how certain kinds of work are reconfigured through different technologies. As we have argued above, all work is today being reconfigured *in relation* to digital technologies, and so it is important for us to draw attention to and craft accounts of the critical issues that this raises. But how are we to do this and what kind of research agenda are we calling for?

One way of embracing this relational ontology that we have found most useful in our recent studies is to take practice seriously (Schatzki et al. 2001). Adopting a practice

approach calls on us to make people's everyday doings (Feldman and Orlikowski 2011) central to the way that we frame our research questions. Doing so draws attention to ways in which work is an enactment, an accomplishment constituted in practice. It also calls upon us to bring materiality into our accounts because to separate this out would be to impose a false dichotomy on the flow of practice. Or put another way, work is materially enacted in practice. Thus our research questions become oriented toward analysing how the doing of work is configured by specific materializations through specific technologies in particular times and places. And to understanding the ways in which these specific materializations are consequential, in other words how, when, where and for whom/what they make a difference in the world.

For example, let us return to coffee production. It is no coincidence that over 90 percent of coffee production occurs in developing countries while it is mainly consumed in the industrialized north. The specific materializations of commodity production in the global south are significant — from the weather and soil conditions to the political and economic apparatuses of colonialism and capitalism that have historically configured mechanisms and locales of land ownership and subsistence farming. These make a difference to how the global coffee supply chain is enacted through practices and technologies of harvesting, procurement, export, transportation, packaging, distribution, and selling that move the beans from the plants to espresso machines around the world. Similarly, the cleaning of hotel rooms is specifically materialized in practice through the particular corridors, carts, appliances, beds, linens, cleaning supplies, uniforms, staff bodies, scheduling rosters, and labour regulations that are implied in its enactment. These organizing apparatuses and their materializations are consequential for the performance of the work. For instance, the cleaning carts may be too heavy for some bodies to push, frequent train delays on a subway route create time

pressure, and the move to eco-friendly cleaning products may mean fewer allergic reactions and improved morale.

The specific materializations of work today include digital platforms operated by complex algorithms and continual streams of data. So for example, when the hotel cleaner's haste to finish her shift means she doesn't thoroughly scrub the shower, this results in an angry TripAdvisor review by the guest who checked into the 4-star hotel expecting the rooms to be spotless. The cleaner's work practice on the ground is now deeply connected to the digital platform of TripAdvisor that accepts and displays guest commentaries while incorporating them algorithmically to update the hotel rankings. Or when knowledge workers switch their information search habits from browsing reference materials in libraries to using websites, they contribute to the user profiles being accumulated about them by digital platforms, thus changing the specific data, products, and advertisements that the platforms' algorithms will show them, in what order, and in what form.

These digital reconfigurations of work by what we might term "algorithmic phenomena" have the potential to profoundly transform how work is done. Algorithms depend on "IF-THEN" code that use inputs to execute defined steps that produce specific outputs. Algorithmic phenomena are different to what we have encountered in prior studies of work and technology. While early computers incorporated algorithms, those algorithms were simpler, more stand-alone, more easily understood, more bounded in their inputs, and more contained in their outcomes. They were used to manage procedural tasks, filtering and organizing data in order to carry out relatively discrete functional transactions such as payroll and inventory management, bills payable and bills receivable. It was still possible to imagine the tasks getting done without the algorithms; indeed manual versions of the computerized procedures were often

practiced side-by-side or in exception mode. But now algorithms are embedded at multiple layers in the organization, operating through interconnected enterprise-wide systems such as the platforms provided by Oracle, IBM, and SAP. The TripAdvisor platform is not the first algorithmic phenomenon in the travel sector (prior examples include travel booking systems and yield management systems), but it is particularly significant because it is connecting up the hospitality industry more dynamically with the practices of travellers.

Nowadays for many kinds of work, it is simply not possible to envision the work being performed without the influence of complex, dynamic, and interconnected algorithms. These contemporary algorithms are largely not available for scrutiny. As Introna (2015, p. 9) notes, "they seem to operate under the surface or in the background." There are two reasons for this. First, most algorithms are proprietary and not available for direct inspection. Second, because algorithms depend on inputs, examining the static code will not tell us what the executing code will dynamically perform. Given their "inscrutability and executability" (Introna 2015, p. 9), algorithms can only be understood dynamically in action. This raises important challenges for our possibilities of studying contemporary work.

Digital Reconfigurations

Digital work in the way we intend it here refers to work practices that are being reconfigured through the operation of digital platforms, algorithms, and the processing of multiple, diverse kinds of data. We want to argue that our existing ways of conceptualizing digital formations (Latham and Sassen 2005) and the tools that we

employ for studying "digital work" are not sufficient if we are to understand the generativity with which they are inextricably intertwined. To understand why, we take a brief historical review of the research that has been done on technology and work in the management literature.

Many of the studies of technology and work in the 1980s and 1990s were focused on debunking the technological determinism that dominated earlier organizational models of both work and technology. Drawing on social constructivism, ethnomethodology, and structuration theory (Bijker et al. 1984; Pinch and Bijker 1984; Barley 1986; Suchman 1987; Woolgar and Grint 1991; Orlikowski 1992; Prasad 1993; DeSanctis and Poole 1994; Heath et al. 1995; Barrett and Walsham 1999), researchers aimed to theorize the socially embedded and emergent nature of technology at work. Social structure, human agency, power, culture, institutions, and temporalities came significantly to the fore in these accounts (Orlikowski 2000; Schultze 2000; Scott and Wagner 2003; Boudreau and Robey 2005; Pinch 2008). The logic here is that technology is not valuable, meaningful, or consequential by itself; it only becomes so when people engage with it in their everyday work.

This research was strongly influenced by the call to focus on "work" made by Steve Barley and Gideon Kunda in 2001. In a widely cited essay, they argued that our understanding of organizations was hampered by "contemporary organization theory's tendency to distance itself from a detailed understanding of work and how it may be changing" (Barley and Kunda 2001, p. 79). They noted that the shift away from an industrial economy poses important challenges for documenting and analyzing "what people actually do — the skills, knowledge, and practices that comprise their routine work," concluding with a call "for a mode of scientific inquiry that rests on close empirical observation of the phenomena that we hope to explain and a recognition that

emerging social developments cannot be neatly compartmentalized by the boundaries of established specialties" (p. 90).

In the 2000s, the primacy of practices (Schatzki et al. 2001; Knorr Cetina and Bruegger 2002; Reckwitz 2002) became especially salient as scholars emphasized the criticality of human sayings and doings in everyday work. The presumption here is that life is only ever lived through ongoing practices and what is needed is a deeper understanding of how practices are central to the performance of work. While the turn to practices in work studies was valuable, something remained amiss and that something, as Latour (1992, p. 225) observed, was materiality — or as he put it "the missing masses." Thus, even as researchers became more careful observers of the everyday doings of work, the ways in which those doings were configured through technology — or materiality more generally — was overlooked.

In the past few years, a number of organizational scholars have increasingly begun to consider the importance of materiality in everyday organizing (Orlikowski 2007; Orlikowski and Scott 2008; Introna and Hayes 2011; Leonardi et al. 2012; Carlile et al. 2013). For example, we argue for the importance of a relational, practice-based and post-humanist approach to understanding materiality, which following Lucy Suchman (2002) and Annemarie Mol (2002) we refer to as *sociomateriality* (Orlikowski and Scott 2008)*. This term is intended to capture the way in which the social and the material are inseparable in practice and ontologically indeterminate. If we take this seriously, the primary unit for research is not independent objects with inherent boundaries and properties but phenomena materially enacted in practice. As we articulate below, we believe that adopting this approach going forward can be particularly valuable as it offers generative alternatives for studying contemporary organizing practices, especially digital reconfigurations of work.

Ways forward: Some ideas

In studying sociomateriality — and its assumptions of inseparability and indeterminacy — we draw on two central ideas from Karen Barad's (2003, 2007) agential realism: *entanglement* and *performativity.*

For Barad (2007), *entanglement* is the ontological commitment to holding matter and meaning together. Her position is that **"**To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence" (2007, p. ix). This approach departs from much prior Management Studies and Information Systems literature, which has tended to see reality in separatist terms as given entities and distinct agencies that are attributes of either humans or machines. Entanglement, in contrast, disavows assumptions of prior, strict boundaries between humans and nonhumans or the material and the social, and suggests that these are "ontologically inseparable from the start" (Introna 2007, p. 1).

Taking entanglement seriously requires shifting our primary unit away from separate entities with inherent boundaries and properties. As Suchman (2007, p. 257) notes, "our language for talking about agency, whether for persons or artifacts, presupposes a field of discrete, self-standing entities." She suggests instead that we start with "configurations of always already interrelated, reiterated sociomaterial practices" so as to "respecify sociomaterial agency from a capacity intrinsic to singular actors to an effect of practices that are multiply distributed and contingently enacted" (2007, p. 267). Thus, thinking in terms of entanglement focuses attention on the particular sociomaterial phenomena that are produced in practice.

For Barad, *performativity* refers to the "ongoing reconfigurings of the world" (Barad 2003, p. 818). Drawing on Bohr's view of quantum mechanics, Barad (2007) views reality as ontologically indeterminate. This perspective is in sharp contrast to the more dominant perspective that sees the world as made up of self-standing entities with *a priori* properties, boundaries and meanings. For Barad, specific entities, properties, boundaries and meanings only emerge and become determinate through their enactment in practice. Different practices thus configure different kinds of worlds. They do so through making "agential cuts" — local resolutions to "the inherent ontological indeterminacy" of the world — which are distinct from the "Cartesian cuts" that enact a determinate ontology with independent objects and inherent distinctions, boundaries, and properties (Barad 2003, p. 815). As agential cuts entail different constitutive inclusions and exclusions, they produce and stabilize/destabilize particular distinctions, boundaries, and properties in practice. What is of interest then is to attend to the specific sociomaterial practices through which "local determinations of boundaries, properties, and meanings are differentially enacted" (Barad, 2003, p. 802).

A performative perspective shifts attention "to matters of practices/ doings/ actions" (Barad 2003, p. 802). It is "not about representation of an independent reality but about the real consequences, interventions, creative possibilities, and responsibilities of intra-acting within and as part of the world" (Barad 2007, p. 37). As such, it entails tracing the genealogy of practices that have enacted certain phenomena over time so as to understand how particular distinctions, boundaries and properties have been historically produced, stabilized, and destabilized. In seeing practices as performative, we see that they "do not so much reproduce (in the sense of replicate) the world, but rather in their historical reconfiguration, they *perform* the world. Practices

always have the potential to perform something different" (Scott and Orlikowski 2014, p. 878).

Taking performativity seriously requires focusing on how specific material enactments have reconfigured reality differently through the active inclusions and exclusions that are made in practice. We examine how every enactment in practice entails some things and not others — for example, a teaching practice that is conducted in a tiered classroom will tend to include lecture style pedagogy while excluding the experiential pedagogy of action learning. This material exclusion of one kind of pedagogy is consequential for the kinds of teaching and learning that is possible, and generative for the kinds of teachers and students that are produced. These outcomes are performative, making different worlds.

Many prior studies of work — because of their theoretical assumption that it is possible to separate out work, technology and organization — have centred on the human. Shifting our attention to material enactments rather than the human in empirical studies of work means we need to give careful thought to our research design and the apparatus employed in its realisation. Ethnographic techniques emerged out the interest to understand the everyday lives of people and their culture. This has led researchers to conduct human-centred investigations so as to generate "emic" understandings that might be portrayed as the "native point of view" (Barley and Kunda 2001, p. 84).

Studying digital reconfigurations through material enactments will require alternative investigations of practice. Mol's (2002) study of atherosclerosis (the thickening and hardening of large and medium-sized arteries) manifests a powerful alternative possibility. She conducts, as she put it, "an ethnography of a disease." She follows the practices of diagnosis and treatment across the hospital and powerfully

shows that what the disease *is* depends on how atherosclerosis is sociomaterially enacted in practice within different sites (e.g., the outpatient clinic, the surgery, the pathology lab). Mol argues that the disease is not a singular, discrete and self-standing entity. Rather it is performed in practice, and performed differently in different practices. For example, in the outpatient clinic, atherosclerosis is diagnosed through the physical manipulation of the patients' legs by the surgeon and a visual examination of the leg's skin colour and texture. It also includes a discussion of pain and walking experiences. In contrast, atherosclerosis in the pathology lab is diagnosed through the physical dissection of arteries removed from an amputated limb and a microscopic inspection of the arterial walls in cross section. These different material enactments of the disease enact different inclusions and exclusions in practice, and thus perform the disease differently. As Mol (2002, p. 35, emphasis in original) notes, "In the outpatient clinic and in the department of pathology, atherosclerosis is *done differently*."

By providing an apparatus for examining entanglement and performativity, agential realism attunes us to phenomena differently, offering tools for making sense of the world and its possibilities in new ways. It allows us to challenge given boundaries, fixed distinctions, and taken-for-granted assumptions. It helps us decentre the human and attend to specific materializations (specific agential cuts) and their consequences in practice. For example, in our study of TripAdvisor (Scott and Orlikowski 2012; Orlikowski and Scott 2014), we do not focus on behavioural studies of online browsing, discursive analysis of guests' narratives, or factor surveys of hoteliers' social media use but rather on the sociomaterial practices that ongoingly enact hotel valuations. We find that a sociomaterial perspective helps us understand why and how a digital platform populated by millions of user-generated data points, instrumentally organized, weighted and prioritized by algorithms makes a different world of travel. We consider how

valuation work is being reconfigured as it shifts from expert-based inspections of hotels to anonymous user-generated reviews on social media websites, and what differences this makes on the ground in hotels. We ask what, how, and who are included and excluded differently through the different valuation practices at work? It helps us see how institutionalized hotel valuation schemes and online review websites not only perform different ratings and rankings, they also configure reality differently — producing different hotels, different hoteliers, different guests, and different phenomena of hospitality.

Thus, rather than assuming that everything begins, ends and centres on humans and the social, we work through the momentum created when we think in terms of holding matter and meaning together. Going forward what this asks of us is that we consider what worlds are being performed through the sociomaterial entanglements that are constituted by the digital reconfigurations of work.

Conclusion

We close our exploration of this research agenda by emphasising that our work as researchers is also always an ongoing sociomaterial practice and thus subject to entanglement and performativity. The knowledge that we produce is always through a research apparatus. As we perform research, the kinds of perspectives, theories, and methods that we practice through orient us to different phenomena in the world. They configure our accounts in specific ways, enacting specific local resolutions within the ontological indeterminacy of the world. This makes a difference, both for the kinds of knowledge that are produced and for their performative effects in the world. As Barad

(1998, p. 102) notes, "Reality is sedimented out of the process of making the world intelligible through certain practices and not others. Therefore, we are not only responsible for the knowledge that we seek, but, in part, for what exists." Thus our choices as to perspectives, theories, and methods matter a great deal, and as Karl Weick (1996) gently reminds us, we should choose our tools wisely and hold them lightly.

While we have focused here on an agential realist approach, we do not believe this is the only way to study digital work. Indeed, as complex and dynamic phenomena, digital reconfigurations will overflow any single disciplinary or theoretical apparatus. A multiplicity and diversity of approaches is to be welcomed, so that we might explore and experiment with different ways of deepening and enriching our understandings of the worlds that are being produced. With that in mind, it matters that we remain open to diffractive interdisciplinary influences and to the possibility of learning and being reconfigured by what is emerging, rather than trying to impose or insist on particular (usually singular) viewpoints on reality. As Annemarie Mol (2010, p. 255) puts it, the point "is not to finally, once and for all, catch reality as it really is. ... Instead it is to shift our understanding and to attune to reality differently."

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