

## Chapter 2

# Sociomateriality & Design

The aim of this book is to create a theoretical foundation for how we can combine the insights from sociomateriality with the interests of design and vice versa. This means that we need to start to unpack both sociomateriality and design to study their foundations and then identify a common ground to create the new entity of Sociomaterial-Design. In this chapter we will introduce sociomateriality and design, while identifying the common ground between these—namely the practice-based interest.

### 2.1 Practice

A deep-seated concern for *practice* unites sociomaterial scholarship and design research despite their stark differences in analytical level, scope, and audience. Following “the practice turn” (Schatzki et al. 2001; Reckwitz 2002) the concept of practice refers to a nexus of doings, artefacts, and sayings carried by a specific form of practical understanding. Going beyond people’s mere doings, a practice lens highlights the routinized and performative character of actions in which objects are constituted, bodies shaped, subjects treated, and the world is understood. But what is practice and what is the practice approach? Reckwitz (2002) makes a distinction between “practice” (praxis), meaning the “whole of human action,” and “a practice” (praktik), which is a particular type of “routinized behavior,” and our concern here is the latter (Reckwitz 2002, pp. 249–250). The practice approach is thus about exploring people’s routinized behavior when engaged in practice. The practice approach specifies that we cannot open up people’s heads and look inside to see what they think and, as such, there are distinct differences between cognitive science and the practice approach. However, the reluctance to open up people’s heads does *not* mean that practice research refuses to think about mental activities. Quite to the contrary, mental activities are very important in practice research. The practice approach insists that mental and bodily activities cannot be meaningfully separated, but instead comprise one entity in which people perform the routinized bodily/mentally activities, making the practice. This means that we do not have access to “see”

what people think, but instead have to study how their mental activities become manifested in practice. The bodily activities are, thus, mental activities at the same time and when we study practice, we study both together. A practice is a “routinized way in which bodies are moved, objects are handled, subjects are treated, things are described, and the world is understood” (Reckwitz 2002, p. 250). Practice is immediately social, meaning that behavior and understanding—which appear in practice—are carried out by multiple different bodies/minds that together form the routinized engagement. People might be placed at different locations or at different points in time, but still share a practice together. When practice conceptually consists of both bodily and mental activities, there cannot be any rigorous distinction between what is “inside” or “outside” the mind and body (Ibid, p. 252). When we learn how to engage in social practices, we enter particular communities of practices (Wenger 1998) that have particular routinized behaviors for the inclusive bodies/minds that are already members. Entering a practice is thus a process where learners move from legitimate peripheral participation towards full participation (Lave and Wenger 1991), which is a product of the training the body/mind in certain ways.

Practices are routinized bodily activities: as interconnected complexes of behavioral acts they are movements of the body. A social practice is the product of training the body in certain way: when we learn a practice we learn to be bodies in a certain way. (Reckwitz 2002, p. 251)

Practice is what practitioners do. Practice is the professional engagement, performed repeatedly and regularly by practitioners to establish or maintain proficiency within professional fields. Learning the “rules of practice in any given community entails a series of encounters with objects involved in the practice” including tools, texts, technologies, and symbols (Bowker and Star 2002, p. 294). Members of communities of practice develop together a shared repertoire of resources, or a shared practice, that are used when participants engage in practice and perform their activities. Creating the shared repertoire takes time and requires engagement from the practitioners in terms of participation and negotiation (Wenger 1998). Referring to Heidegger, the Dreyfus brothers (Dreyfus 1997) discuss skillful practitioners’ engagements with artefacts in practice. They write: “In our normal everyday coping we deal with ready-to-hand equipment without any thought at all. This skillful dealing may be general and routine, but, as our skill model makes clear, it can be as specific and subtle as the response of a chess grandmaster to a complex chess position” (Dreyfus 1997, p. 27).

When we investigate a practice (e.g., healthcare practice) with the aim of designing for that practice, we do it to “dismantle the common-sense conceptions of cooperative work, take them apart, unpack and disclose the hidden practices of articulation work, and thus give us access—analytically and conceptually—to the intricate ways and means of the production of social order in cooperative activities” (Schmidt 2011, p. 4). Investigating practice includes unpacking what might go unnoticed by the practitioners, however hugely important those practices could be for the fundamental structure of the work (Star and Strauss 1999), while carefully being aware of the possible impact (both positive and negative) of us shedding light on these formerly opaque practices (Suchman 1995).

Artefacts and objects take important parts in practice. Routinized practices do in many situations include professional embodied engagement with multiple artefacts. Entering the ED, we quickly notice the wide range of artefacts (analog as well as digital) that are part of the routinized practices that are the work of the healthcare professionals. Artefacts are “necessary components of many practices—just as indispensable as bodily and mental activities” (Reckwitz 2002, p. 252). Technologies are embedded parts of practice. Studying practice must take into consideration the “routinized body/knowledge/things-patterns” which together makes the entity (Reckwitz 2002).

Routinized social practices occur in the sequence of time, in repetition; social order is thus basically social production. For practice theory, then, the ‘breaking’ and ‘shifting’ of structures must take place in everyday crises of routines, in constellations of interpretative interdeterminacy and of the inadequacy of knowledge with which the agent, carrying out a practice, is confronted in the face of a ‘situation.’ (Reckwitz 2002, p. 255)

When we refer in this book to “practice” as part of our analysis, we refer to two types of professional practice: *research practice* and *healthcare practice*. Since one of our purposes in writing this book is to illuminate the interdisciplinary research practice of sociomaterial-design, we have an explicit interest in *research practices*, as does the work that Ada and Alan do. When we talk about research practice, we are referring to the activities of Ada and Alan reading books, journals, and research papers; discussing their work with others; writing their research; and analyzing data and design technologies, in addition to the other activities that go into the varied practice of academic research. Research practice includes the practices by which Ada and Alan collect allies, both inside the laboratory and in society (Latour 1987). The aspect of Ada and Alan’s research practice that concerns us in the book is the practice they interact with and research, namely healthcare practice. Because of their different disciplines and the particular natures of their research interests, Ada and Alan interact with the healthcare practice in different ways—and this divergence in interaction is where our interest resides. Ada and Alan are both professional experts in research practice and, despite their interdisciplinary differences, they share common repertoire of resources, even though the tools, texts, and symbols have different uses. Healthcare practice is the professional practice of healthcare workers involved with performing the activities of diagnosing, treating, and preventing illnesses. The healthcare practices that concern us in this book entail, in particular, the practices ongoing in EDs and, even more specifically, in the EDs of North American pediatric hospitals. However, while our interest here is specific, the findings we can draw from the studies are of a much more general nature and are applicable to other settings (see in particular the chapter titled “Sociomaterial-Design beyond Healthcare”).

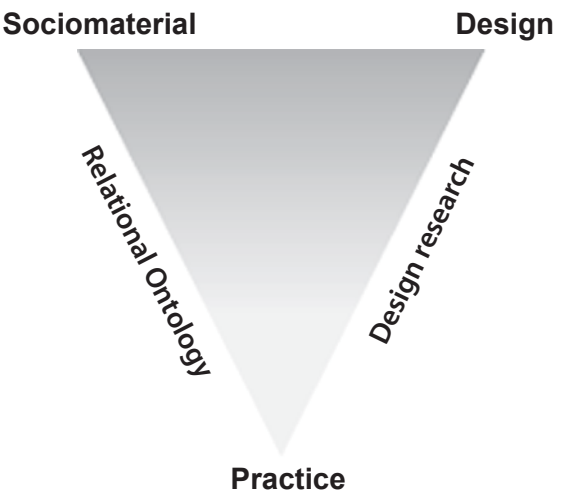
Practice, thus, in this book is the common denominator between sociomateriality and design and serves as the foundation on which we can build our new entity, sociomaterial-design. Sociomaterial research and the design research would not exist without the organizational practices that they strive to conceptualize and support. Without practice there would be little to design for and study, whether in the ED, the science lab, or on the stock exchange floor. In doing so, our analytical focus becomes the “shifting” and “breaking” of structures within the healthcare work when

new technologies enter the scene and become part of what constitute the practice in emergency work. Alan and Ada are both directed at the practices produced by the medical infrastructure and setup of the hospital and they both share an interest in improving these practices, despite their very different approaches.

The *sociomaterial* literature builds on a relational ontology assuming that this *practice* nexus does not simply mediate *a priori* objects and subject, organizational structures, or rules. The entities found at the nexus of practice are not given in advance and carry no inherent properties (Orlikowski and Scott 2008). Rather, they are performed (Barad 2003) or enacted (Suchman 2007). The subject and object do not merely *interact* by exerting force upon one another; instead they emerge out of their encounter through *intra*-actions. Following this line of thinking, practices are always both social *and* material—even purely discursive practices. In sociomaterial practices, the material phenomena are inseparable from the apparatus of bodily production (Haraway 1991; Suchman 2007, p. 286).

*Design* research strives explicitly to improve *practice* through the theory-driven design of information technology (IT) artefacts (Bannon and Bødker 1997; Aarts et al. 2007). While most designers do not subscribe to a praxiological approach as articulated in “the practice turn,” they nevertheless approach practice as a nexus of doings, artefacts, and discourses enacted in routinized ways over time. This entails a process approach where the nexus is constantly being constructed and re-constructed as it is designed, built, sold, and used (Simonsen and Robertsen 2013). In this way “practice” is important for both Ada and Alan, and therefore can serve as the first element in the scaffolding that supports sociomaterial-design. Before we delve deeper into the literatures on sociomateriality and design, we need a second element to build our scaffold, namely the socio-technical research, which to this date has been critical in the development of the intersections between human agency and design (Fig. 2.1).

**Fig. 2.1** Sociomaterial, Design, Practice



## 2.2 Socio-technical

When we are creating the links between the ontological understanding of sociomateriality and design, we need to think about a common ground on which the two distinct different disciplines can engage. Therefore, we need to re-visit the foundations on which technology design began to incorporate the social aspects of work within the agendas of design. We need to build upon our sociomaterial ontological understanding from this perspective. We need to address the design interest of fields such as computer-supported cooperative work (CSCW) and participatory design (PD) in the perspectives of sociomateriality. Basically, we will address the discussion that emerges when Alan meets Ada, and Alan begins explaining the sociomaterial agendas at the healthcare conferences that they both participate in.

When Alan starts to talk about the ontological foundation of sociomateriality with Ada, some of the concepts sound familiar, while others are totally new to her. The idea that technology and the social organization of work have to be understood as one is very familiar to Ada and a major part of the theoretical foundations of her work. Ada is used to labelling this approach the socio-technical approach to system design. However, in the discussions it is clear that Alan insists there is a difference between socio-technical approaches and sociomateriality. Therefore, let's start by investigating what the socio-technical approach entails.

The story of socio-technical design is closely allied with action research. This is more a philosophy than a methodology. It describes a process and a humanistic set of principles that in our context is associated with technology and changes. It can be used to contribute to most problem-solving in work situations, providing that both the innovators and recipients are willing to use a democratic approach. (Mumford 2006, p. 317)

The socio-technical approach is more than 50 years old and was first introduced by The Tavistock Institute of Human Relations (Trist 1981), which also created the fundamental agenda behind action research (Rapoport 1970). Both the socio-technical approach and action research have been critical to the development of design research; for instance, these created the foundation for Soft Systems Methodology (Checkland and Holwell 1998) and Reflective System Development (Mathiassen 1998). What was special with The Tavistock Institute was that they engaged in the development of research with a strong link to practical circumstances in the world. Their interest began with immediate problem situations that they wanted to address while identifying and developing ways in which such situations can be solved at a more general level. One famous example is the desire of therapists and researchers to develop new methods to assist war-damaged soldiers in regaining their mental health and returning to civilian life (Mumford 2006, p. 319). In this case, researchers collaborated with therapists in developing new methods, while at the same time applying the methods in practice. This continuing interest in solving an immediate problem while also developing research is the basic premise for the socio-technical approach. Studies of workers and employees were strong during socio-technical research that occurred in the 1970s. One example is the study of the organization of work in mines and how changing the work situation impacted the miners' job satisfaction. Within the realm of wanting to impact the world in a positive way, the socio-technical approach was concerned with how employees, management, processes, and organizations interacted and how the material matter of the work matters for the workers (Leonardi et al. 2012, p. 39).

### 2.2.1 *Socio-technical Approach to System Design*

For many researchers in Scandinavia who aimed at involving workers as co-designers, the ontological understanding encompassed socio-technical approaches to system design (Mumford 2001)—thereby supporting workers’ practices, as well as, simultaneously, democracy in work (Grudin 1988). The trade union perspective in the late 1970s and the 1980s was very influential in setting the groundwork for socio-technical system design (Mathiassen 1998). Many projects were completed that put bringing in the user and their practices as the main focal point (Carlsson et al. 1978; Bødker et al. 2000; Kensing et al. 2009). Besides focusing on the practices of workers, the main research contribution that emerged from these projects included methods and processes for software development (Andersen et al. 1986; Bødker et al. 2004). Socio-technical approaches stressed job satisfaction, workers’ needs, and skill enhancement—and the focus was to “embrace a user-oriented perspective, by emphasizing that through insights into the work practices in which the IT application should be used and use that as the starting point for implementation” (Berg 1999, p. 89). The dominant driving forces were the aims to focus on democratic approaches, including the user perspective, and to ensure that new technology enabled people, rather than constrained.

Along this approach, the focus on collaborative practice was very strong. Jonathan Grudin quoting Pelle Ehn, who was one of founding fathers of the Scandinavian approach to system design, said at the first CSCW conference in 1988: “All work is cooperative.” The focus on the cooperative aspects of work, the political interest of workers, and the design of technology was critical in all sociotechnical approaches. Now the political interest in bringing in and pointing to the social organization of work and how it was important for system design also became in focus. This strong political agenda in system design came from the reaction to the artificial intelligence (AI) research and the office automation movement (e.g. Hammer 1990), where the focus was on the office procedure efficiency rather than on the satisfaction of the workers. So while CSCW grew out of AI and office automation (Krasner and Grief 1986), it also changed the focus from simple efficiency to include consideration of how people work and collaborate.

CSCW should be conceived of as an endeavor to understand the nature and requirements of cooperative work with the objective of designing computer-based technologies for cooperative work arrangements. The fact that multiple individuals, situated in different work settings and situations, with different responsibilities, perspectives, and propensities, interact and are mutually dependent in the conduct of their work has important implications for the design of computer systems intended to support them in this effort. (Schmidt and Bannon 1992, p. 11)

Within the arena of CSCW, the combined design and sociomaterial agenda was introduced. Being an interdisciplinary research space, CSCW brought together design researchers and ethnographers with the aim of bringing the user perspective (still based upon the democratic agenda from socio-technical approaches) into the design. The most famous CSCW debate from its early years was about The Coordinator (Winograd and Flores 1986; Suchman 1994). At the first CSCW conference in 1986, Terry Winograd presented the design of The Coordinator, a new communications system. Almost 30 years later, The Coordinator does not seem as novel a

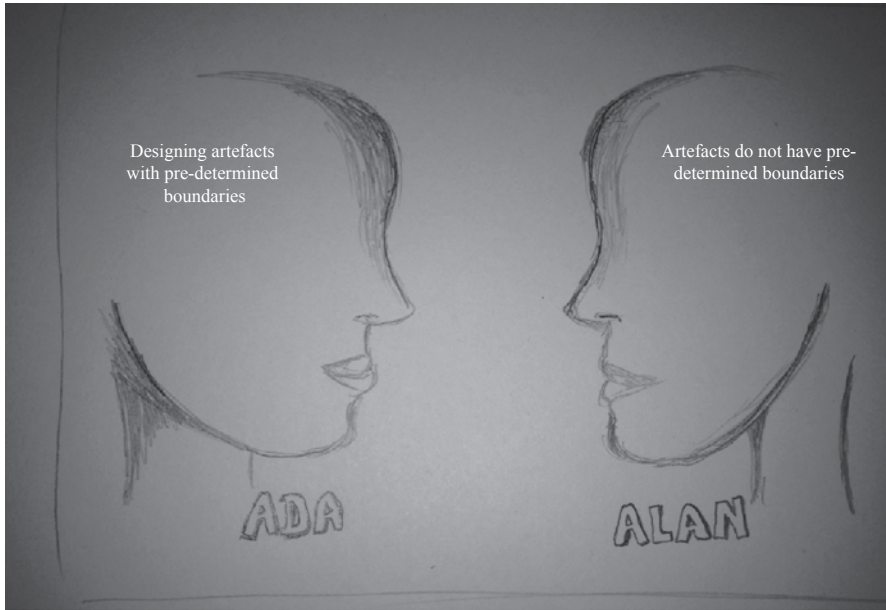


technology, but at that time it was one of the first collaborative technologies built on a theoretical notion of human cognition. The Coordinator is basically an email application that allows users to tag their messages with categories such as “request,” “promise,” or “offer,” and by this practice make it easier for people to respond since their reason for interaction is made explicit (for more details see Flores et al. 1988). At the time, the design approach behind The Coordinator was unique in that it was designed based upon a theoretical understanding of how people communicate. In their book, *Understanding Computers and Cognition* (Winograd and Flores 1986), Terry Winograd and Fernando Flores expressed their approach to system design for communication technologies to be based upon the theories of Speech Act created by Austin (Ibid). While Winograd presented The Coordinator at the first CSCW conference, Lucy Suchman made a critical analysis of the basic foundation for system design that emerged through The Coordinator system. Suchman’s argued that categories and artefacts have politics that become embedded within the design of cooperative systems, if based upon the categories of Speech Act (Suchman 1994). The debate on The Coordinator ended in a special issue of the journal of CSCW, in which well-known researchers were invited to comment (e.g. Grudin and Grinter 1995; Lynch 1995; Orlikowski 1995). However, the debate at that time focused more on the different approaches between ethnography and design, since it was then a huge interest for the community (Blomberg et al. 1993; Blomberg and Karasti 2013). The centre of the debate, thus, concerned the difficulties of embracing ethnography and design and bringing those together (Randall et al. 2007), rather than the fundamental discussion about the political impact of specific theoretical understanding in system design.

### 2.2.2 *What Was Lost in the Coordinator Debate?*

However, if we are to investigate the debate about The Coordinator more closely, we find a much more nuanced perspective and debate that is not related to ethnography and design as such, but instead to the ontological understanding of how we can understand technologies, organizations, and practices. This ontological perspective came from researchers involved in science and technology studies, fields that do not have a design interest *per se* but are concerned with the practices by which technologies are made and interact in the world (Akrich and Latour 1992; Bowker and Star 2002; Suchman 2007). This ontological understanding was the groundwork for what we refer to in this book as sociomateriality.

When Suchman argued that categories have politics, she was referring to Winner’s (Winner 1986) inscribed artefacts, Latour’s study of science (Latour 1987), and Haraway’s cyborg (Haraway 1990). The critical questions in these types of studies include how technologies are made, and how we can trace technology back through history to show how it is not a casual process, but instead an actor network, that makes technology, people, and organizations. Few have revisited this argument about politics in collaborative systems within the CSCW design community (Bjørn and Balka 2007a) and, in general, the argument about politics and technologies tends to be neglected when we talk about system design. Therefore, if we are



**Fig. 2.2** Pre-determined boundaries

to bring together sociomateriality and design, we need to re-introduce the design audience to the debate about politics, entanglements, people, organizations, and technology (Fig. 2.2).

### 2.3 Sociomateriality

Sociomateriality refers to a particular epistemological and ontological understanding of technologies, people, and organizations. It stipulates that people and technologies are constitutively entangled and, to investigate technology, we need to attend to these entanglements in order to then explore the temporal meaning, boundaries, and properties that such technologies entail (Cecez-Kecmanovic et al. 2011). Sociomateriality emphasizes the *importance of material properties* of artefacts and the changes in social practices caused by enacting such technologies. Sociomateriality points to the *inseparability* of the social and the material. What is material and what is social cannot easily be determined, instead they are each part of the same phenomenon, meaning that what is social is also material and vice versa. If we are to study one or the other, we have to also explore how they are related. This leads to the next important characteristic of sociomateriality, namely *relational ontology*. Since we cannot separate the social and the material, we are required to study how they perform together in practice; essentially, how they are intertwined and



entangled in practice. Sociomateriality, thus, specifies that the study of technology is also concerned with the study of *performativity* of artefacts in practice. By exploring performativity, the relational aspects of the sociomaterial entity emerge from its inseparability and the importance of the material properties becomes salient.

While we here provide an introduction to sociomateriality as one coherent approach, it is important to mention that many dispute what makes “materiality” and, thus, debates on sociomateriality are currently ongoing. Does materiality constitute the artefacts, the tangible, the machine, and the nonhuman; or is it the social, the human, the people, and the organization; or, rather, is it the work? And depending upon what it is made of, how can we—and how should we—then study its relations to performativity? Should we study the relations as “the mangle of practice” (Pickering 1995), as “imbrication” (Leonardi 2011), or as “intrinsic practices” (Kaptelinin and Bannon 2012)? Adding to the complexity are the distinct differences between how we can understand materiality of the physical artefact compared with how we can understand digital technologies. Some researchers argue that not all technologies have physical presence (Kallinikos et al. 2013), while others insist that the opposite is true. This inconsistency in the definition of the material properties of technological artefacts makes it difficult to point to sociomateriality as a stable approach; however, it is hoped that this book will play a part in stabilizing sociomateriality. It is not the purpose of this book to unfold all the diverse perspectives on sociomateriality (for an discussion of the diverse perspective we would suggest reading Leonardi and Barley 2010; Jones 2013). Instead the purpose of this book is to explain and demonstrate the fundamentals of sociomaterial-design. Therefore, we will reduce the discussions on sociomateriality to what is required only to establish what the term entails in relation to sociomaterial-design.

The sociomateriality part of sociomaterial-design builds fundamentally upon the work of Lucy Suchman, who is often quoted for her coining of the term sociomateriality (Jones 2013). Since we leave the sociotechnical agenda in Suchman’s hands through her influential work in CSCW (Suchman 1983), we start our examination of sociomateriality by exploring the chapters added in the 2007 reprint (Suchman 2007) of her book, *Plans and Situated Actions* (Suchman 1987). Suchman’s work is interdisciplinary and, argumentatively, has had a huge impact on design the fields such as CSCW, PD, and CHI—making her book a perfect point of departure for sociomateriality and design. While Suchman herself views her work as social science (Suchman 2007, introduction), she provides the capacity to make her work relevant for design, and this provision has been highly appreciated in much design literature (Dourish 2004, p. 70 ff.).

### 2.3.1 Figurations

Suchman’s sociomaterial perspective on design takes its starting point in the figuration of the “user.” When we study the practice of designing technology then, at its core, we find the concept of the “user” (Wilkie and Michael 2009), and if we then

dive into the conceptualization of the “user,” it becomes clear that the “user” is a figuration (Haraway 1990) created by the designers with the aim of getting insights in the “practices of future use” (Suchman 2007). However, if we are to crack open the figuration of the “user,” it becomes evident that the people in practices are so much more than a “user” (Bannon et al. 2012). People are much more than their relation to a technology. “‘The user’ singularizes what is actually a multiplicity and fails to differentiate actors with very different relations to a given artefact” (Suchman 2007, p. 188). If we are to really comprehend the complexities of what we are designing for, we have to reformulate the question: Instead of only defining the “user” through personas or other participatory design techniques, we must concentrate on “the incorporation of the user into the sociomaterial assemblage that comprises a functioning machine” (Suchman 2007, p. 190). Likewise, technologies are also figural, as in made up of tropes and turns of phrase (Suchman 2007, referring to Haraway), which remind us of particular associations of meaning and practice. Technologies are thus forms of materialized figurations, in that they bring together assemblages of meaning and practice in a temporal mode between stabilization and unstable arrangements (Suchman 2007, p. 227). Figurations are dynamic and change form depending upon the multiple practices they engage with. Several empirical studies within healthcare demonstrate this point, for example the study of multiplicity in the diagnosis and treatment of atherosclerosis (Mol 2002) and the study of “cyborg hearts” in telemonitoring of patients with implantable cardioverter defibrillators (Bjørn and Markussen 2013).

This does not mean that we cannot stabilize technologies—we sure can. However, the technology will only be stable in particular figuration at particular time and then will change again at a later time. This ever-changing dynamic is critical for technologies to act as standards bringing together heterogeneous practices, since “every form of stabilization includes (...) the presence of instability” (Suchman 2007, p. 196). Thus, sociomateriality as part of sociomaterial-design forms a theoretical agenda that refuses to separate what is social from what is material; instead, sociomateriality stipulates that all practices are co-constituted by the social *and* the material. Therefore, we need to address our understanding of practice in terms of assemblages and entanglements—which we cannot separate, but instead have to study as they emerge in temporal practice.

### 2.3.2 *Relational Ontology*

This insistence on the relational ontology is not the same as saying that people and technologies only exist in relation to each other (Orlikowski and Scott 2008; Jones 2013). The lone computer shut down and disconnected from all sorts of digital networks and infrastructures still does exist. The point is that to encapsulate the sociomateriality of the computer, we must study the sociomaterial practices, which only emerge in practice where the agency of both the human and the technology operate together. The answer to the question, as to *when* this relational agency emerges between the human and the material artefact, is that this relation emerges in

Sociomaterial-Design

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