

## **Materiality: Challenges and Opportunities for Communication Theory**

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Increasingly, communication researchers are issuing calls for attention to the role materiality plays in communication processes (e.g., Boczkowski, 2004; Boczkowski & Lievrouw, 2008; Leonardi & Barley, 2008; Leonardi, Nardi, & Kallinikos, 2013; Lievrouw, 2013). Resulting in part from the challenges of studying new communication and information technologies, this new focus on materiality offers opportunities for communication researchers to theorize beyond communication through, with, and, in some cases, without a medium to think about the material structures of mediation itself. In this chapter we propose a model for thinking through the communicative roles and functions of the materiality of everyday objects, by using one type of objects, documents, as an extended theoretical example of the importance of materiality for communication.

We argue that documents' material functions are distinct from (and occasionally orthogonal to) any textual or symbolic meanings those documents may convey. Without understanding the importance of material roles and functions for meaning, communication scholars cannot explain fully how people communicate with, through, and around everyday objects. While our field has a rich theoretical toolkit for understanding the meaning and meanings of things and representations, we struggle to make sense of what things can do in social settings. Material processes in communication have been undertheorized in contemporary

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communication scholarship, and when material processes have been addressed in our field, it has usually been through the lens of the social and cultural meanings and framings of those objects (Lievrouw, forthcoming). Our model focuses on the instrumental and functional roles objects play in social interactions, group settings, and institutional contexts. This essay extends current communication theory on the material processes of communication by providing a detailed model for understanding documents’ material roles, identifying the emergent tensions among them, and tracing dynamics of the social practices around, through, and with documents in these interactions. We include three key roles for objects in communication in this model: documentation, circulation, and conversation.

Documents—from the ephemeral to the contractual—serve as a useful example of everyday materiality. Our view sees documents as both mediated through a web of everyday objects to form “work-oriented infrastructure” (Nicolini et al., 2012; Star & Ruhleder, 1996) and as mediated through communication processes. Of course, documents convey textual and symbolic meanings and interpretations. Our goal here is to map a set of theories for scholars to begin including the communicative work that is accomplished through documents’ material affordances, and hopefully by extension, through the material affordances of other kinds of artifacts. Documents are interesting because they are widely studied as texts, and yet relatively ignored materially as artifacts that operate in social settings. Documents must often serve multiple, conflicting roles, such as documenting decisions, establishing patterns of circulation among people and artifacts, and providing the material “sites” for ongoing conversations. While the use of documents as representing symbolic communication—what documents mean and “say”—is widely addressed in scholarly literature, documents’ instrumental functions are also important for understanding the full complexity of artifacts within communication.

A media lens on documents focuses on their crucial roles in creating, stabilizing, and disseminating information. Documents form the basis of modern bureaucratic authority (Weber, 1947), the means of “control through communication” (Yates, 1989), and tools of “working knowledge” (Davenport & Prusak, 1998). As both tools of the process of organizing and products of that process, documents serve multiple roles within organizations and groups—as records or archives of decisions (what we term *documentation*), as communiqués connecting people and ideas across space and time (what we term *circulation*), and as tools of “epistemic cultures” (Knorr Cetina, 1999), or things to think with and through in what has been termed “sites of conversation” (Taylor & Van Every, 2000). Yet, the importance of materiality across these roles is often neglected, especially during the introduction of new information technologies and in organizational efficiency efforts when documents are framed as simply neutral artifacts that deliver neutral knowledge and information (Sellen & Harper, 2002).

Documents are a particular type of organizational artifact embedded in particular institutional contexts and social routines, and become “artifacts of modern knowledge practices” (Riles, 2006, p. 7). Our focus on documents emerges from an ethnography of information sharing in contemporary construction, where contract documents define the teams, building plans, and specifications communicate the workflow, sketching is a key visual communication technique, and new information technologies have disrupted long-established document practices (Dossick & Neff, 2011; Neff, Fiore-Silfvast, & Dossick, 2010). In our empirical work we define documents in a broad sense to incorporate paper documents, digital documents, and other material artifacts of organizing, such as logs, drawings, lists, meeting minutes, memos, sketches, and agendas. Documents can be intended as ephemeral tools for communication, such as quickly written notes or messages, or as durable records, as in the case of documents intended for legal

purposes. In the process of studying a site as it struggled to replace paper documentation practices with new communication information technologies, we came to think through documents' material affordances, durabilities, and malleabilities. In this essay we focus on theories of documents' functional roles, and, as such, address here primarily these material affordances of paper documents.

This is not to dismiss the textual and symbolic roles documents play in communication. Documents form the basis of shared understanding. Documents provide an important source of shared texts, establishing the surfaces for conversation and the coordination of organizational activity (Taylor & Robichaud, 2004; Taylor & Van Every, 2000). In other words, documents can give people a starting place for conversation, decision making, and action. Documents often integrate multiple conversations, perspectives, and dimensions (Pratt & Rafaeli, 2006, p. 285). For example, Kaghan and Lounsbury (2006, p. 275) describe the need for articulation work around a written contract both to provide a record of a legitimate "meeting of minds" while also helping to move the team forward. Similarly, meeting minutes can serve as a record to account for multiple interdependent agendas, as a legal record of decisions of the participants, and as a logistical tool for coordinating future action. Once created, documents such as contracts and meeting minutes can then be appropriated as a tool of authority to hold others accountable for tasks, both mediating and materializing distributed authority. How, then, do the material affordances of documents provide a way to think through these different functions? We saw many times through the course of our ethnography the need to reconfigure information among verbal, digital, and paper forms to serve different needs for different constituencies. There was a heightened awareness that written documentation was always also legal documentation. How, then, do the material roles documents play serve to communicate meaning in social settings?

Does theorizing a role for materiality challenge existing communication theories or provide a useful extension at a point in time when scholars are grappling with how to think about materiality in a wide range of settings?

Our chapter proceeds as follows: First, we cover the existing theory on documents and material artifacts in organizations and teams to produce a typology of document roles and to propose a descriptive model of the material process of communication. Then, we present the theoretical implications of our model of document roles for bringing a lens of mediation to our understanding of the roles of material artifacts in organizations. People’s social and material practices with, around, and through documents reflect and constitute the material structures of mediation. Thus, a lens of mediation reveals the importance of the social and material functions of documents, beyond just its textual meanings, in the process of communication.

### **A Typology of Documents’ Roles**

Reading the literature on communication and institutions, documents’ material roles include three key functions: (1) documentation, (2) circulation, and (3) conversation. First, documents stabilize situations, groups, and organizations through the practices of recording and documenting. They are the material outcome of “communities of conversationalists” (Taylor & Van Every, 2000, p. 32), which provide a record of a meeting of minds (Kaghan & Lounsbury, 2006). Second, documents define circulation patterns and pathways within the organization—both the document distribution pathways and the ways people circulate around them. Documents carry information across contexts while “enforc[ing] humans to follow specific organizational pathways” (Cooren, 2004, p. 388). As such, a single document can embody multiple social courses of action (Harper, 1998). Third, documents activate the process of organizing by being

the basis for multiple conversations among actors. Rather than functioning solely to document what is known, documents acting as sites of conversation are the material technologies that shape the process that Kuhn and Jackson (2008) call "accomplishing knowledge," in which people frame, reframe, and resolve problematic situations in order to realize a capacity to act (p. 461). Documents make problems and solutions visible and thinkable, functioning as "epistemic objects" (Knorr Cetina, 1999). Thus, documents can be both a way of communicating knowledge and a means of knowing (Whyte et al., 2008). In the rest of this section, we draw from the literature to characterize and define each of these roles in turn, and in table 13.1 we summarize the communication literature around each of these three functions.

**Table 13.1: Document Roles Defined in the Literature**

<b>Role</b>	<b>Documentation</b>	<b>Circulation</b>	<b>Conversation</b>
Definition	Documenting decisions and history	Circulating among organizational actors	Conversing at a material site
Documents are . . .	<p>Records of a "meeting of minds" (Kaghan &amp; Lounsbury, 2006)</p> <p>material outcomes of "communities of conversationalists" (Taylor &amp; Van Every, 2000, p. 32)</p> <p>organizational memories (Ewenstein &amp; Whyte, 2009; Hutchins, 1995; Latour, 2005)</p> <p>"response[s] to a query, pure function" (Riles, 1996, p 27)</p>	<p>"institutionalized template[s] for social interaction" (Orlikowski &amp; Yates, 1994, p. 542)</p> <p>bureaucratic procedures, configurations of power (Becker &amp; Clark, 2001)</p> <p>multiple social courses of action (Harper, 1997)</p> <p>"socially legitimated agents" (Taylor &amp; Van Every, 2000, p. 32)</p> <p>"impersonal form[s] of social intelligence based on paper" (Mukerji, 2011, p. 243)</p>	<p>"Talking things" (Levy, 2005, p. 23)</p> <p>"epistemic objects" (Knorr Cetina, 1999, p. 190)</p> <p>sites of organizational communication, informal interaction and "shared Talk" (Taylor &amp; Van Every, 2000; Bechky, 2003)</p> <p>"metaindexical", "reference and collaboration grounds" (Henderson, 1999, p. 54)</p> <p>"holding ground[s] and negotiation space[s]" (Henderson, 1999, p. 54)</p> <p>conscription and inscription device[s] (Henderson, 1999)</p> <p>"social glue" (Henderson, 1999, p. 6)</p>

Role	Documentation	Circulation	Conversation
Documents function to . .	<p>inscribe, translate, and generate meaning (Ewenstein &amp; Whyte, 2009; Hutchins, 1995; Latour, 2005)</p> <p>stabilize organizational hierarchy, control information and communication flows, and produce distributed authority (Benoit-Barné &amp; Cooren, 2009; Marvin, 1987; Yates, 1989)</p> <p>maintain organizational authority and accountability (Cooren &amp; Fairhurst, 2009; Cooren &amp; Taylor, 1997; McPhee, 1985; Weber, 1947)</p> <p>maintain or redistribute occupational divisions and control (Bechky, 2003b; Yates, 1989)</p>	<p>“enforce humans to follow specific organizational pathways” (Cooren, 2004, p. 388)</p> <p>guide and mediate the interactions of a group of people (Ashcraft et al., 2009, Corrent &amp; Taylor, 1997)</p> <p>“anticipate and enable certain actions by others” (Riles 2006, p. 21)</p>	<p>“accomplish . . . knowledge” (Kuhn &amp; Jackson, 2008, p. 461)</p> <p>enable people to explore what is unknown, contingent, and emergent (Cooren, 2004; Cooren &amp; Fairhurst, 2009; Ewenstein &amp; Whyte, 2009; Knorr Cetina, 1999; Star &amp; Griesemer, 1989; Taylor &amp; Van Every, 2000)</p> <p>embed or inscribe knowledge, represent ambiguity and incompleteness, move between “focused reasoning and free association” (Ewenstein &amp; Whyte, 2009, p. 22)</p> <p>“capture an idea, enlist group participation, and represent the larger picture” (Henderson, 1999, p. 53; Bechky, 2003a)</p> <p>support problem solving across organizational boundaries (Bechky, 2003a, 2003b)</p> <p>represent and constitute a world recursively (Putnam &amp; Cooren, 2004, p. 324; Orlikowski, 2000)</p>

### Documenting Organizational Decisions

Documents comprise organizational records. Documents inscribe, translate, and generate meaning, embodying organizational memory or local knowledge across time and space

(Ewenstein & Whyte, 2009; Hutchins, 1995; Latour, 2005). They serve as “immutable mobiles”



(Latour, 1987, pp. 226–230). As documentation, documents function to mediate organizational practices of producing authority and accountability and to constitute and maintain a source of organizational order (McPhee, 1985). Scholars have long studied documents' and other artifacts' roles in establishing and maintaining this order (e.g., Gagliardi, 1990; Pratt & Rafaeli, 1997; Kaghan & Lounsbury, 2006). As Weber (1947) reminds us, documents are one of the central communication structures necessary for bureaucratic authority. As a result of the role of documenting, documents define and stabilize organizational hierarchy, control information and communication flows, and produce distributed authority in organizational contexts (Benoit-Barné & Cooren, 2009; Marvin, 1987; Yates, 1989). Documents have affordances that enable them to dislocate interaction and stabilize specific schemas of action, extending into tools of organizational authority and accountability beyond the local interaction to mediate action elsewhere in space or later in time (Cooren & Fairhurst, 2009; Cooren & Taylor, 1997).

### **Defining Organizational Circulation**

We define the circulation role of documents in two ways: (a) the movement of documents across organizational contexts and among stakeholders, as well as (b) the movement of stakeholders in relation to documents. Documents have both formal and informal circulation pathways that define knowledge boundaries. For example, who's in and who's out is defined in part through documents. People also gather around physical documents; libraries and plan rooms are places for both formal and informal gatherings associated with documents. In these ways, documents are genres of organizational communication that are "socially recognized types of communicative action," which can serve as an "institutionalized template for social interaction—an organizing structure" that recursively influences the community's ongoing organizational

actions and the genres of organizational communication (Orlikowski & Yates, 1994, p. 542).

Documents represent, reinforce, and challenge the distributed authority of a team or bureaucracy, guiding interactions even as they encapsulate the past (Ashcraft, Kuhn, & Cooren, 2009, p. 29).

People often produce, circulate, and evaluate documents in anticipation of what that document will do or mean and these actions are often based on previous experiences with documents. How people think documents will be interpreted and received does not necessarily fit with actual practices. Suchman (2007) explains this as "the relationship between structures of action and the resources and constraints afforded by material and social circumstances" (p. 177). Architectural plans, as an example, "achieve their prescriptive efficacy through the contingent labors that they presuppose but leave unspecified" (Suchman, 2007, p. 200). In other words, how people communicate through or with documents is not magically inscribed by a document itself; rather, it is the mediating material structures and labor that make documents function in social interaction.

Thus, it is the social and communicative practices around documents that possess the power to structure patterns of team, group, and organizational communication. Building on Latour's (1994) theory of mediation, Cooren and Taylor (1997) suggest that "non-human actants," such as documents, can mediate the interactions of a group of people, transforming those interactions into a macro-level organizational actor, such as a firm. Vaughan (1997) shows in the case of the shuttle *Challenger* that the moment when objects no longer work is a key opportunity for observation—when the complex social networks and organizational structures in which objects are or cease to be embedded can be more readily seen. Collectively, the circulation of documents can begin to structure an organization, as theorists from the Montreal School of organizational communication have argued. Documents become the "socially legitimated agent

or spokesperson that creates the structuring of the community of work into what we usually think of as 'the organization'" (Taylor & Van Every, 2000, p. 32).

Documents, as bureaucratic procedures, can establish and reinforce spatial configurations of power, such as the distancing between administrators and subjects, as well as produce an objective basis for intimate knowledge (Becker & Clark, 2001). Mukerji (2011) suggests subtle changes in the design and practices of paperwork in seventeenth-century France enabled documents to circulate among very different contexts of contracted technical expertise and official political power, allowing documents to function differently in different settings. That is, the communicative power of documents can only be understood in the contextually mediated networks in which they travel and the pathways people travel around them.

### **Establishing Sites for Conversation**

Documents become tools for collaboration and knowledge production by acting as sites for conversation, enabling people to explore what is unknown, contingent, and emergent (Cooren, 2004; Cooren & Fairhurst, 2009; Ewenstein & Whyte, 2009; Knorr Cetina, 1999; Star & Griesemer, 1989; Taylor & Van Every, 2000). Conversation is conceptualized by Taylor and Van Every as the site of organizational communication, as the interaction and shared talk that represent and become the process of organizing. Documents are "talking things" (Levy, 2005); organizational tools and micro-material that people talk and think with, through, and around. Examining the use of visual representations among engineers, Henderson (1999) describes a visual culture whose way of seeing the world "is explicitly linked to actual material experience in rendering that world" (p. 9). Whether documents are capturing an idea, enlisting group participation, or representing the larger picture, in visual cultures documents are the primary

means of communication, to the extent that "participants find it difficult to communicate about the design without them" (Henderson, 1999, p. 53; Bechky, 2003a, 2003b). It is often when problems arise or knowledge needs to be shared or generated that teams enroll documents as sites for conversations. Examining the use of artifacts among engineers, technicians, and assemblers in a manufacturing firm, Bechky finds that knowledge is embedded in their respective occupational contexts of drawing work for the engineers and concrete work of building the machine for the assemblers, making it challenging to accomplish understanding between the two groups. The drawings and machines become useful in problem solving across occupational boundaries as they are enrolled as sites for informal interaction that helps develop common ground and shared understandings. Interaction through sketches or drawings enables their use as a "reference and collaboration ground to unite all these various forms of knowledge for negotiation" (Henderson, 1999, p. 54); the documents quickly become the "social glue between individuals and groups" (Henderson, p. 6).

As teams use documents to establish sites for conversations, they become a means for organizing, acting as epistemic objects for individuals to think with and as the locus of collective knowledge production and distributed cognition (Hutchins, 1995; Henderson, 1995, 1999; Knorr Cetina, 1999; Whyte et al., 2008). It is the conversations with, through, and around documents, in which organizing is made present, local, and emergent. To function as the starting point for further conversation, documents must be flexible and malleable and are by definition incomplete. Documents functioning this way not only embed or inscribe knowledge but also must represent ambiguity and incompleteness, which may be useful for supporting tasks that move between "focused reasoning and free association" (Ewenstein & Whyte, 2009, p. 22) and for problem solving across occupational boundaries (Bechky, 2003a). In the engineering context, documents

are used as both conscription and inscription devices, simultaneously serving to capture information interactively and bridge knowledge boundaries as a boundary object (Henderson, 1999). Documents as sites for conversation are what Henderson (1999) calls "meta-indexical," meaning they have the ability to serve as "a holding ground and negotiation space for both explicit and yet-to-be-made-explicit knowledge" (p. 199). Not only do documents in this role both represent and constitute a world recursively (Putnam & Cooren, 2004, p. 324) and form what Orlikowski (2000) might call "technology-in-practice," providing both the representation of what is possible and knowable and the material structures for the interactions around possibilities and knowledge (p. 410).

### **Tensions Among Document Routines and Organizational Needs**

While one role may at times be more dominant than others, collectively, documents fulfill all three roles simultaneously. For example, tension arises when an organization becomes fixed in rigid documentation and formal circulation procedures. Documents fall into what Stohl and Cheney (2001) term "the formalization paradox," where "actors try to formalize a process that at its very heart needs to be informal and adaptive to changing situations" (p. 368). The material affordances of documents mean that their roles in providing sites for conversation and for circulating information can often be in tension with the formal, documenting functions of the paper trail. This tension between the need for institutionalized routines and formalized practices and the need for a range of informal, improvised, and spontaneous organizational actions is mediated and materialized in documents and the work people do with documents.

Challenges to the appropriation of authority embodied within documents arise when people circumvent, subvert, disregard, or adapt these documents for purposes other than those

initially intended. However, while a document may shape, structure, or even direct organizational activity, its particular agency is not necessarily predetermined by its creators. We propose that rather than remaining fixed or immutable across interactions, documents often need to perform as a “medium of cultural persistence” (Cooren & Taylor, 1997, p. 247), while still maintaining a degree of plasticity and *interpretive flexibility* in both content and circulation that allows them to adapt to the needs of a local interaction or conversation. Dossick and Neff (2011) termed this tension between “clean tech” approaches to sharing information and the “messy talk” that is often required for knowledge creation. That is, to fulfill the multiple roles required for organizing, documents must move from formal to informal, from synchronous to asynchronous and from fixed to fluid and back again, depending on the task at hand. However, these aspects are in tension across the three document roles. For instance, documents need to serve as technologies of accountability (documentation and circulation) and as tools of local, emergent, distributed knowledge production (conversations), revealing a tension between the representation of work processes and the contingent nature of the work itself (Bardram, 1997; Bowers, Button, & Sharrock, 1995; Suchman, 1987, 2007; Turnbull, 1993). Bowker and Star (1999) describe this tension as the dual need for a global ordering system of classification (documentation and circulation) and the emergent local interaction issues (conversations) that continually thwart them.

## **Discussion**

The process of organizing depends on the capacity of documents to record actions, circumscribe the organization, and support collaboration. These three functions follow from documents’ material capacities to act in social and communicative settings.

Understanding the roles that documents play in organizations shows how documents are active participants in the constitution of organizations. People do not merely push paper; paper, in the form of materialized organizational roles and routines, begins to push the people around it. This is, as Ashcraft and colleagues (2009) phrased it, how “various human and non-human agencies constitute organization through co-participation in communication” (p. 37). One need not subscribe fully to actor-network theory to begin to take seriously the ways people face material affordances and constraints from and with their documents and see that documents materially perform communicative functions within social settings that are not necessarily dependent on their textual or symbolic meanings. People gather around documents to talk. They pass documents around and in doing so circumscribe their groups, social movements, and organizations. And the material act of committing something to paper serves a powerful function for documenting and stabilizing conversations and their conversationalists.

Our work suggests that organizational failures and inefficiencies around documents have deep roots in the material and cultural practices and routines of document roles. Such examples do not represent breakdown of organizational routine but rather the opposite, an indication of the process of people organizing.

### **Roles and Fixity**

Though malleable to some extent, genres of documents have a social, routinized fixity in their roles. Once documents are cast into a particular role, people need to exert effort to recalibrate or recast them into different ones. This tempers the notion of documents serving as boundary objects through their “interpretive flexibility.” It is not merely how different people interpret information conveyed by documents differently that is the distinguishing characteristic for

documents' social lives. Rather, the practices and routines around documents are key. How documents move through organizational and group circuits and what roles they play in those circuits could very well answer many of the thorniest problems in collaboration, problem solving, and information sharing.

Practically speaking, this means that innovation around documents may also happen in large part in material terms. For example, in teams we studied, people worked with, through, and around the routinized document structures to negotiate among the tensions that emerged as documents were called upon to serve multiple roles—logs were turned into agendas, whiteboards made into archives (Fiore-Silfvast, Neff, & Dossick, 2011). Our research shows that the organizational roles documents play for complex problem solving must simultaneously meet the needs of formal and flexible written communication. For example, maintenance personnel have relied on distributed professional knowledge networks of people who are uniquely qualified to provide the right kind of information because they have both personal experience with the buildings and an understanding of their context (Javernick-Will & Levitt, 2010). These knowledge networks developed around and relied upon paper documents such as drawings, operations manuals, and maintenance records. Not only were these paper documents effective medium for conversation, but they also functioned as social resources of organizational communication and circulation, and this may in some ways explain why paper persists as part of building maintenance records years after proponents declared paper records would be replaced with digital ones (Anderson, Dossick, & Neff, 2012). As Brown and Duguid (2000) assert, "Readers and writers have made [paper] a powerful resource for making, shaping, warranting, interpreting, and even protecting information," thus creating a social resource around paper (p.



244). By observing how people negotiate the tensions between document material roles, we gain a view of the material process of communication within social settings.

Research on materiality within the field of communication presents a challenge to thinking about communication as situated exclusively within human meaning. The material affordances and constraints of everyday objects serve powerful functions in the communication process, and communication theory needs to take up this challenge by expanding our notion of mediation to include things that are not necessarily thought of as media. This theoretical move may require new ways of conceptualizing agency within communicative actions, and it will almost certainly mean that communication scholars need to revisit and revise existing theories on sociomateriality, such as actor-network theory and cultural-historical activity theory, to better serve the theoretical needs within our discipline. Our model for documents represents only a start on this work and represents a call to action for other scholars to join us. Developing such theories of materiality for communication as a discipline, however, will expand our ability to address the powerful roles materiality plays in meaning making and organizing and help scholars make sense of the transformation of the material practices and processes as communication and media technologies change.

## Bibliography

- Anderson, A., Dossick, C. S., & Neff, G. (2012, July 15). Seeking new social norms: Facilities services organizational isolation in the University of Washington's digital transition. Proceedings of the Engineering Project Organizations Conference, Rheden, The Netherlands.
- Ashcraft, K. L., Kuhn, T. R., & Cooren, F. (2009). Constitutional amendments: "Materializing" organizational communication. *Academy of Management Annals*, 31, 1–64.  
doi:10.1080/19416520903047186
- Bardram, J. (1997). *Plans as situated action: An activity theory approach to workflow systems*. Paper presented at the ECSCW 97, Lancaster, England.
- Bechky, B. A. (2003a). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science*, 14(3), 312–330.  
doi:10.1287/orsc.14.3.312.15162
- Bechky, B. A. (2003b). Object Lessons: Workplace Artifacts as Representations of Occupational Jurisdiction. *American Journal of Sociology*, 109, 3.
- Becker, P., & Clark, W. (2001). *Little tools of knowledge: Historical essays on academic and bureaucratic practices*. Ann Arbor, Michigan: University of Michigan Press.
- Benoit-Barné, C., & Cooren, F. (2009). The accomplishment of authority through presentification. *Management Communication Quarterly*, 23(1), 5–31.  
doi:10.1177/0893318909335414
- Boczkowski, P (2004). The Mutual Shaping of Technology and Society in Videotex Newspapers: Beyond the Diffusion and Social Shaping Perspectives. *The Information Society*, 20, 4, 255-267. doi:[10.1080/01972240490480947](https://doi.org/10.1080/01972240490480947)

- Boczkowski P. & Lievrouw, L. (2008) Bridging STS and communication studies: scholarship on media and information technologies; In E.J. Hackett, O. Amsterdamska, M. Lynch & J. Wajcman (Eds.) *The Handbook of Science and Technology Studies* 3rd ed., (pp. 949-978). Cambridge, MA: The MIT Press.
- Bowers, J., Button, G., & Sharrock, W. (1995). *Workflow from within and without: Technology and cooperative work on the print industry shopfloor*. Paper presented at the the Fourth European Conference on Computer-supported Cooperative, Stockholm, Sweden.
- Bowker, G. C., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: MIT Press.
- Brown, J. S., & Duguid, P. (2000). *The social life of information*. Cambridge, MA: Harvard Business School Press.
- Browning, L. D., Greene, R. W., Sitkin, S. B., Sutcliffe, K. M., & Obstfeld, D. (2009). Constitutive complexity: Military entrepreneurs and the synthetic character of communication flows. In L. L. Putnam & A. M. Nicotera (Eds.), *Building theories of organization: The constitutive role of communication* (pp. 86–116). New York, NY: Routledge.
- Cicmil, S., & Marshall, D. (2005). Insights into collaboration at the project level: Complexity, social interaction and procurement mechanisms. *Building Research & Information*, 33, 523–535.
- Cooren, F. (2004). Textual agency: How texts do things in organizational settings. *Organization*, 11(3), 373–393. doi:10.1177/1350508404041998
- Cooren, F., & Fairhurst, G. T. (2009). Dislocation and stabilization: How to scale up from interactions to organization. In L. L. Putnam & A. M. Nicotera (Eds.), *Building theories*

- of organization: The constitutive role of communication* (pp. 117-152). New York, NY: Routledge.
- Cooren, F., & Taylor, J. R. (1997). Organization as an effect of mediation: Redefining the link between organization and communication. *Communication Theory*, 7(3), 219–260. doi:10.1111/j.1468-2885.1997.tb00151.x
- Cronen, V. E. (2001). Practical theory, practical art, and the pragmatic-systemic account of inquiry. *Communication Theory*, 11(1), 14–35. doi:10.1111/j.1468-2885.2001.tb00231.x
- Davenport, T. H., & Prusak, L. (1998). *Working knowledge*. Cambridge, MA: Harvard Business School Press.
- Dossick, C. S., & Neff, G. (2011). Messy talk and clean technology: Communication, problem solving and collaboration using building information modeling. *Engineering Project Organization Journal*, 1(2), 83–93. doi:10.1080/21573727.2011.569929
- Ewenstein, B., & Whyte, J. (2009). Knowledge practices in design: The role of visual representations as “epistemic objects.” *Organization Studies*, 30(1), 7–30. doi:10.1177/0170840608083014
- Fairhurst, G. T., & Putnam, L. (2004). Organizations as discursive constructions. *Communication Theory*, 14(1), 5–26. doi:10.1111/j.1468-2885.2004.tb00301.x
- Fiore-Silfvast, B., Neff, G. & Dossick, C. S. (2011). From Conversations to Structures: The Material Social Life of Documents in Organizational Communication. International Communication Association Virtual Conference, May 23-June 10.
- Gagliardi, P. (1990). *Symbols and artifacts: Views of the corporate landscape*. Berlin: W. de Gruyter.

- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Hawthorne, NY: Aldine de Gruyter.
- Goodman, R. A., & Goodman, L. P. (1976). Some management issues in temporary systems: A study of professional development and manpower—the theater case. *Administrative Science Quarterly*, 21(3), 494–501.
- Groleau, C. (2006). One phenomenon, two lenses: Understanding collective action from the perspectives of co-orientation and activity theories. In F. Cooren, J. R. Taylor, & E. J. Van Every (Eds.), *Communication as organizing: Empirical and theoretical explorations in the dynamic of text and conversation* (pp. 157–177). Mahwah, NJ: Lawrence Erlbaum.
- Groleau, C., Demers, C., Lalancette, M., & Barros, M. (2011). From hand drawings to computer visuals: Confronting situated and institutionalized practices in an architecture firm. *Organization Science*, 23, 3. doi:10.1287/orsc.1110.0667
- Harper, R. H. R. (1998). *Inside the IMF: An ethnography of documents, technology, and organisational action*. San Diego: Academic Press.
- Henderson, K. (1995). The political career of a prototype: The importance of the visual in design engineering consensus and conflict. *Soc. Problems* 42 274–299.
- Henderson, K. (1999). *On line and on paper: Visual representations, visual culture, and computer graphics in design engineering*. Cambridge, Mass: MIT Press.
- Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.
- Javernick-Will, A. N., & Levitt, R. E. (2010). Mobilizing institutional knowledge for international projects. *Journal of Construction Engineering and Management*, 136(4), 430–441.

Kaghan W. N. & Lounsbury, M. Artifacts, articulation work, and institutional residue. In A. Rafaeli & M.G. Pratt (Eds.), *Artifacts and organizations: Beyond mere symbolism*, Mahwah, N.J: Lawrence Erlbaum.

Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge, MA: Harvard University Press.

Kuhn, T., & Jackson, M. H. (2008). Accomplishing knowledge: A framework for investigating knowing in organizations. *Management Communication Quarterly*, 21(4), 454–485.  
doi:10.1177/0893318907313710

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.

Latour, B. (1994). On technical mediation: Philosophy, sociology, genealogy. *Common Knowledge*, 3(2), 29–64.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network theory*. Oxford, England: Oxford University Press.

Leonardi, P. M., & Barley, S. R. (2010). What's Under Construction Here? Social Action, Materiality, and Power in Constructivist Studies of Technology and Organizing. *The Academy of Management Annals*, 4, 1, 1-51. doi:[10.1080/19416521003654160](https://doi.org/10.1080/19416521003654160)

Leonardi, P. M., Nardi, B. A., & Kallinikos, J. (2012). *Materiality and organizing: Social interaction in a technological world*. Oxford: Oxford University Press.

Lievrouw, L. (forthcoming). Materiality and media in communication and technology studies: An unfinished project. In T. Gillespie, P. Boczkowski, & K Foot (Eds.), *Media Technologies*. Cambridge, MA: MIT Press.

Lindlof, T. R., & Taylor, B. C. (2010). *Qualitative communication research methods* (3rd ed.). Thousand Oaks, CA: Sage.

Marvin, C. (1987). *When old technologies were new*. Oxford, England: Oxford University Press.

McPhee, R. (1985). Formal structure and organizational communication. In R. McPhee & P. K. Tompkins (Eds.), *Organizational communication: Traditional themes and new directions, Vol. 13*. Sage Annual Reviews of Communication Research. Beverly Hills, CA: Sage.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Mukerji, C. (2011). Jurisdiction, inscription and state formation: Administrative modernism and knowledge regimes. *Theory and Society*, 40(3), 223–245. doi:10.1007/s11186-011-9141-9.

Neff, G., Fiore-Silfvast, B., & Dossick, C. S. (2010). A case study of the failure of digital media to cross knowledge boundaries in virtual construction. *Information, Communication & Society*, 13(4), 556–573. doi:10.1080/13691181003645970

Nicolini, D. (2010). Practice as the site of knowing: Insights from the field of telemedicine. *Organization Science*, 22(3), 602–620. doi:10.1287/orsc.1100.0556

Nicolini, D., Swan, J., & Mengis, J. (May 01, 2012). Understanding the role of objects in cross-disciplinary collaboration. *Organization Science*, 23, 3, 612-629.  
doi:[10.1287/orsc.1110.0664](https://doi.org/10.1287/orsc.1110.0664)

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies*, 28(9), 1435–1448. doi:10.1177/0170840607081138

- Orlikowski, W. J., & Yates, J. A. (1994). Genre Repertoire: The Structuring of Communicative Practices in Organizations. *Administrative Science Quarterly*, 39, 4, 541.
- Osterlund, C. (2008). Documents in place: Demarcating places for collaboration in healthcare settings. *Computer Supported Cooperative Work*, 17, 195–225. doi:10.1007/s10606-007-9064-1
- Pratt, M. G., & Rafaeli, A. (1997). Organizational Dress as a Symbol of Multilayered Social Identities. *The Academy of Management Journal*, 40, 4, 862-898.
- Pratt, M. G. & Rafaeli, A. (2006) Artifacts and organizations: understanding our "object-ive" reality. In A. Rafaeli & M.G. Pratt (Eds.), *Artifacts and organizations: Beyond mere symbolism*, Mahwah, N.J: Lawrence Erlbaum.
- Putnam, L., & Cooren, F. (2004). Alternative perspectives on the role of text and agency in constituting organizations. *Organization*, 11(3), 323–333.  
doi:10.1177/1350508404041995
- Putnam, L. L., & Nicotera, A. M. (2010). Communicative constitution of organization is a question: Critical issues for addressing it. *Management Communication Quarterly*, 24(1), 158–165. doi:10.1177/0893318909351581
- Riles, A. (2006). *Documents: Artifacts of modern knowledge*. Ann Arbor: University of Michigan Press.
- Schmidt, K., & Wagner, I. (2004). Ordering systems: Coordinative practices and artifacts in architectural design and planning. *Computer Supported Cooperative Work: The Journal of Collaborative Computing*, 13(5–6), 349–408. doi:10.1007/s10606-004-5059-3



Sellen, A. J., & Harper, R. H. R. (2002). *The myth of the paperless office*. Cambridge, Mass: MIT Press.

Sillince, J. A. A. (2007). Organizational context and the discursive construction of organizing. *Management Communication Quarterly*, 20(4), 363–394.  
doi:10.1177/0893318906298477

Star, S. L., & Griesemer, J. (1989). Institutional ecology, “translations” and boundary objects: Amateurs and professionals in Berkeley’s Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science*, 19(3), 387–420. doi:10.1177/030631289019003001

Star, S. L., & Ruhleder, K. (1996). Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces. *Information Systems Research*, 7, 1, 111-134.

Stohl, C., & Cheney, G. (2001). Participatory Processes / Paradoxical Practices Communication and the Dilemmas of Organizational Democracy. *Management Communication Quarterly*, 14, 3, 349-407.

Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Suchman, L. (1987). *Plans and situated actions: The problem of human-machine communication*. New York, NY: Cambridge University Press.

Suchman, L. (2007). *Human-machine reconfigurations: Plans and situated actions*. Cambridge, England; New York, NY: Cambridge University Press.

Taylor, J. R., & Robichaud, D. (2004). Finding the organization in the communication: Discourse as action and sensemaking. *Organization*, 11(3), 395–413.  
doi:10.1177/1350508404041999

Taylor, J. R., & Van Every, E. J. (2000). *The emergent organization: Communication as its site and surface*. Mahwah, NJ: Lawrence Erlbaum.

Turnbull, D. (1993). The ad hoc collective work of building gothic cathedrals with templates, string, and geometry. *Science, Technology, and Human Values*, 18(3), 315–340.  
doi:10.1177/016224399301800304

Vaughan, D. (1997). *The Challenger launch decision*. Chicago, IL: University of Chicago Press.

Weber, M. (1947). *The theory of social and economic organization*. (A. M. Henderson & T. Parsons, Trans.). London, England: Collier Macmillan.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

Whyte, J., Ewenstein, B., Hales, M., & Tidd, J. (January 01, 2008). Visualizing Knowledge in Project-Based Work. *Long Range Planning*, 41, 1, 74-92. doi: [10.1016/j.lrp.2007.10.006](https://doi.org/10.1016/j.lrp.2007.10.006)

Yates, J. (1989). *Control through communication: The rise of system in American management*. Baltimore, MD: Johns Hopkins University Press.

Yates, J., & Orlikowski, W. J. (1992). Genres of organizational communication: A structurational approach to studying communication and media. *Academy of Management Review*, 17(2), 299–326. doi: 10.2307/258774

## RESEARCHERS' BIOS

**Dr. Gina Neff** is an associate professor of communication at the University of Washington. She studies the contemporary economics of media production and the political economy of communication with a focus on work and technology in both high-tech and media industries. Her book *Venture Labor: Work and the Burden of Risk in Innovative Industries* (MIT 2012) examined the risk and uncertainties borne by New York City's new media pioneers during the first internet boom. She also co-edited *Surviving the New Economy* (Paradigm 2007). With Carrie Sturts Dossick, she runs the Project on Communication Technology and Organizational Practices, which focuses on communication technology in the innovation of complex building design and construction. Her work has been funded by the National Science Foundation, and she is currently at work on a three-year project funded by Intel studying the impact of social media and consumer health technologies on the organization of primary care.

**Brittany Fiore-Silfvast** is a doctoral candidate in the Department of Communication at the University of Washington. Her research focuses on the relationship of technology and emerging cultural and organizational forms. Her research projects have examined how media and communication practices are shaped in moments of technological change and through processes of informationalization in arenas such as healthcare, global development, building design and construction, and warfare. She received a National Science Foundation Doctoral Dissertation Research Improvement grant for her study of the social and organizational implications of digital health in the U.S. and India. Also, as part of an Intel funded research project, she studied the social and institutional arrangements around emerging consumer-oriented digital health and wellness tools and the production of new forms of patient and consumer generated data. Her previous work on a National Science Foundation funded study examined collaboration and new technologies in green building design and construction.

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