Technology is a vague term with multiple meanings. For example, a refrigerator is a technology, and now that many interface with smart devices, they can actually “communicate” with the humans who need to restock them. But to understand how technology functions in an organizational context, there needs to be a more specific definition that reflects issues relevant for our field. In keeping with the communicative constitution of organization (CCO) perspective, this chapter uses a definition that encompasses communication with technology but also considers that information (referred to as data in the discussion of big data later in the chapter) is a key structure found in organizational life. Computer-mediated communication (CMC) is a term commonly used in several communication fields. Although CMC does combine the concepts of communication and technologies, the term information and communication technologies (ICTs) is used throughout this chapter because it more closely aligns with organizational communication.

ICTs define the tangled nature of technologies that enable and constrain communication as well as various forms of organizational information. This approach assumes that ICTs—while not openly biased—are not necessarily neutral objects: Information and communication are inherently entwined with power and control (Beniger, 1989). This means that that ICT use can influence and be influenced by a host of organizational variables and processes, including organization/organizing type, hierarchies, policies, individual preferences, job roles, and coworkers.

In the past decade, exciting changes have occurred in how organizational communication scholars study technology: We have embraced prior calls to move beyond studying how communication happens through ICTs (Rice & Leonardi, 2014) and we now study how communication and organizing happen around ICTs (e.g., Bimber, Flanagin, & Stohl, 2012; Ganesh & Stohl, 2010; Leonardi, 2009; Stephens & Ford, 2016; Stephens, 2018). This has helped the sub-discipline of organizational communication contribute to the growing perspective that technology is an integral part of the communicative constitution of organizational life. When organizational communication scholars study technology, we use our field’s theoretical assumptions and frameworks to guide our research, but we also build on theories found in other disciplines. Thus, today we focus less on specific technologies and their features, which will likely change over time, and more on structures and processes that will shape and are shaped by communication technologies.

Therefore, the frame used in this chapter to understand the role technology plays in organizational communication is the following: Organizational life is lived, and communication is shaped, through and around ICTs. This framework follows the communication-
organization spiral guiding this book and reflects the mutual enabling and constraining relationship between communication and organization seen in ICTs. For example, in some organizations, email (an ICT) is understood by the communication practices that shape its use, but it also constrains communication because it is not feasible or advisable to copy many people on every email. Furthermore, email can be a flexible ICT for asynchronous communication; people can read and respond at their own leisure. However, users can become too dependent on the convenience of asynchronous email communication and thus use it as a substitute for much needed face-to-face communication, sometimes under the wrong circumstances. Here we can see how daily communication through and with ICTs and enduring organizational structures enable and constrain one another over time.

Because it was not always this way in studies of technology and organization, this chapter begins with a historical perspective on ICTs and organizational life. The early theorizing around ICTs began in the field of management, but organizational communication scholars quickly joined these efforts and created a robust set of early conversations to address the explosive growth in communication technology in organizational contexts.

This chapter is organized as follows. First, we provide an overview of the three foundational perspectives on understanding ICTs’ use in organizational life. Second, we discuss organizational communication research in understanding the adoption and diffusion of ICTs into organizational practices at the individual and organizational levels. Third, we explore the various ways scholars have studied communication with and through ICTs in organizational processes. Fourth, we examine how cultures manifest in the integration of ICTs into organizational life. Finally, we conclude with a reflection of the ways organizational communication scholarship and ICTs help us answer the three central questions of communication, organization, and the communication-organization spiral guiding this book.

Historical Perspective on ICTs and Organization

Many organizational scholars have focused on how technology can structure communication (e.g., Barley’s, 1986, work on CT scanners). With the 1980s growth in forms of communication technologies, it was also important to develop an understanding of how the material devices functioned for communication. Between the 1980s and early 2000s, developing theories and empirical studies progressed from viewing technology as being the key deciding factor in how communication should happen to a more social constructivist view, where other people are a dominant influence in using technology to communicate. This chapter adopts a waves metaphor (following Stephens & Mandhana, 2017) to explain these shifting perspectives. We begin with a focus on the technology-deterministic wave.

The Technology-Deterministic Wave

Imagine a time when organizations did not rely on email and smartphones to coordinate and communicate. Although ICTs like computers, documents, and landline phones have been a part of organizational life for more than 60 years, this is still a young and rapidly changing area of study. In the early 1970s the telecommunication field began explaining the presumed magic present in face-to-face communication that did not exist as fully when communicating over the telephone and videoconferencing. The theory of
social presence (Short, Williams, & Christie, 1976) identified that magic and defined it as the “degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships” (p. 65). More recently, Lee (2004) added to our understanding of presence as “a psychological state in which virtual objects are experienced as actual objects in either sensory or nonsensory ways” (p. 27). Short and his colleagues (1976) placed ICTs on a continuum of their ability to convey social presence. There was an assumption that some tasks required a high degree of social presence, so communicators should match their tasks and ICTs. Notice that this is not an organization-specific theory, but it forms the foundation for the next major theoretical development around ICTs in the field of management.

Many ICTs were not ubiquitous in the 1980s, and most of them had distinct features that allowed scholars to categorize these technologies into what was considered their inherent communication potentials. As these communication tools diffused into organizations, management scholars created new theories to help managers optimize their time and use them effectively, building theories around information and media richness (Daft & Lengel, 1984, 1986). Management scholars and social psychologists often focused on organizational environments as being uncertain (Weick, 1979), unpredictable, and having vast information-processing needs (Daft & Lengel, 1984). Media richness theory (MRT)—the popularized term from the original work on information richness—became a logical, structured roadmap for managers needing to make difficult ICT use decisions.

Richness is a set of properties that an ICT possesses, with four criteria that determine an ICT’s richness (capability to convey robust details): (1) Feedback timeliness; (2) multiple cues available for interpretation; (3) language variety; and (4) personal focus. Face-to-face (FtF) communication is considered the richest medium because of access to immediate feedback, nonverbal cues, language variation, and emotional message tailoring to make the conversation more personal. Much like the continuum found in social presence theory, a continuum of ICTs ranges from richest (i.e., FtF) to leanest (i.e., print documents).

Since the goal of MRT was to help managers be more efficient in handling complex organizational realities, the theory also proposed that managers should match their communication needs with the ideal ICT, following an optimizing strategy. Imagine these two examples of a mismatch in communication needs and efficiency in communicating:

- You walk seven blocks to a person’s office to ask for a copy of a report that is available online. When you get to her office, you spend 30 minutes chatting about a basketball game, and walk back to your office, spending an unnecessary hour.
- Your colleague sends you a text message asking why you are rejecting a proposal to restructure your department and lay off four of your staff. You roll your eyes and respond, “duh!” Seven text messages later you realize that your colleague was concerned about his friend losing her job.

MRT suggests considering two main things about the task before choosing the ICT to use. First, is the request meant to answer a question (reduce uncertainty)? If so, a leaner ICT, possibly email, would be the best match to optimize efficiency. Second, is the request complex enough that emotions will be involved and you will need to interact to determine how to respond (an equivocal task)? In this situation, using
a richer medium, like FtF communication will likely be needed to take advantage of the features inherent in a rich ICT.

Building on MRT, Trevino, Lengel, and Daft (1987) expanded this theory to align with a symbolic interactionist framework, highlighting ICTs as carriers of symbolic meaning. For example, a written letter symbolizes formality. These types of extensions, and some of the early empirical comparison research, reveal the incompleteness of a rational task-matching ICT framework. Rice’s (1992) comprehensive comparative studies provided direct tests of social presence theory and MRT. While FtF was consistently ranked the highest in richness and social presence, the continuum broke down with added gradations of new ICTs.

**Multidisciplinary nature of early theorizing and empirical work.** While much of the early research on ICTs was conducted in the field of management, organizational scholars across disciplines were regular contributors to these bodies of literature. For example, Rice conducted many empirical tests of early theories (e.g., Rice, 1992, 1993), and communication scholars Fulk and Poole were regular coauthors with management professor DeSanctis. Together, these partnerships created some of the most foundational theoretical works in organizational communication and technology, grounded in a multidisciplinary perspective. Fulk partnered with Steinfield to edit one of the most grounding books in this area: *Organizations and Communication Technology* (1990). She engaged in several additional partnerships that yielded a pivotal contribution with the social influence model (Fulk, 1993; Fulk & Boyd, 1991; Fulk, Schmitz, & Steinfield, 1990). DeSanctis and Fulk’s (1999) edited book, *Shaping Organization Form: Communication, Connection, and Community*, set the stage for the explosive use of ICTs and how they shaped (and were shaped by) organizational life. DeSanctis and Poole (1994) embraced a more structurational approach, explaining that different groups use ICTs differently. This research developed into adaptive structuration theory (see Chapter 3). Therefore, it was natural to begin considering the social aspects of ICT use.

**The Social Construction and Emergent Perspectives Wave**

As more scholars began to question whether the richness and ICT-matching approach provides extensive explanatory value, new theories, models, and perspectives entered the field. These theories claimed that people and social considerations matter more than the ICTs themselves; thus, a wave of social-construction-oriented theories emerged. In their social influence model, Fulk and colleagues (1990) built their claims by relying on theories of social learning, organizational norms, and social-information processing. They certainly included ICT features as part of their model, but they also included considerations like peoples’ experiences and skills in using the ICTs along with task features, and myriad situational factors. Of particular relevance for organizational communication, Fulk identified four social factors that influence ICT perceptions and use: (1) direct statements by coworkers in organizations; (2) vicarious learning—observing others; (3) organizational norms for how ICTs should be evaluated and used; and (4) social definitions of rationality. This socially oriented theory did not lend itself to then-popular quantitative methods and experimental research; yet it garnered support. For example, Fulk’s (1993) measure of social influence was found to predict individuals’ ICT attitudes as well as when they choose to use a particular ICT. Furthermore, research concluded that large enough groups of people need to use specific ICTs to reach critical mass (Markus, 1990) before the technologies will
naturally diffuse widely. Yet, the general feeling was that something was still missing in this ICT-use puzzle. There was growing evidence that individuals, groups, and organizations use what appears to be the exact same ICTs in very different ways. While the social influence model provided some suggestions for why this might be the case, other scholars began exploring this more deeply. DeSanctis and Poole (1994) drew from the macro, societal-level metatheoretical perspective of structuration theory, to develop what they called adaptive structuration theory (see also Chapter 3). They theorized that a combination of technologies and social influences explain why some groups adapt technology in unexpected, novel ways. Their theory has since been used extensively in organizational communication, information systems, and management. Most recently, Barrett and Stephens (2017) used this theory to explain how healthcare workers who create workarounds in their electronic healthcare record (EHR) systems are more likely to view the technology more favorably.

Carlson and Zmud (1999) pivoted away from understanding how people select specific ICTs to expand Fulk and colleagues’ notion of experience, arguing that users can expand their perception of a specific ICT. These scholars, along with researchers like D’Urso and Rains (2008) have tested the value of channel expansion theory and found that as users become more experienced with a given ICT, they will view it as richer. Other scholars, primarily in management, argued that the materiality of ICTs—like features—were so entwined with the social and organizational environment that it was impossible to examine them independently; thus, the concept of socio-materiality emerged (Orlikowski, 2007). In response to these claims, Leonardi (2009) and colleagues (Leonardi & Barley, 2010) pushed back to demonstrate that even though both material and social factors matter, materiality can play a key role in enabling and constraining organizational communication. Leonardi, Nardi, and Kallinikos (2012), in *Materiality and Organizing: Social Interaction in a Technological World*, present a set of edited chapters making the case that scholarship will suffer if we ignore materiality when considering the important role that social considerations play in organizational life.

Up to this point in ICT theorizing, most theories assumed that people used a single ICT for each task, but there was growing evidence that this assumption was false (e.g., Rice, Hiltz, & Spencer, 2004), especially when mobile devices appeared and included multiple ICTs in a single tool. For example, is a smartphone a telephone, email, an Internet-access device, or a texting tool? It serves all these functions, and how users draw from the affordances of these tools further explains ICT use.

**Combinatorial ICT Use Wave**

The third wave of understanding how ICTs are used in an organizational context focused on sequential and simultaneous use. Stephens (2007) developed ICT succession theory to illustrate how people build and expand on the material and social considerations of ICT use when they chain them over time. She and her colleagues further illustrated how this functioned with content analysis and cluster analysis of a large qualitative data set to explain patterns in sequential ICT-use pairs (Stephens, Sørnes, Rice, Browning, & Sætre, 2008). Browning, Sætre, Stephens, and Sørnes (2008), in *Information & Communication Technologies in Action: Linking Theory and Narratives of Practice*, present narratives collected between 1999 and 2003 of combinatorial ICT use in Norway and the U.S., connecting these narratives to
organizational theories that explained and situated their interviewees’ experiences with ICTs.

Simultaneous ICT use also began emerging as people multitasked and multicommunicated in various organizational contexts. Multicommunicating is a theoretically derived term describing what happens when people use technology to carry on multiple conversations simultaneously (Reinsch, Turner, & Tinsley, 2008). Simultaneous conversations are more cognitively taxing than multitasking, or doing two things at once (Reinsch et al., 2008). This practice is often on display during organizational meetings, whether in person or through an online conferencing system.

**Cyberinfrastructure.** Simultaneous and sequential ICT use also occurs in the emerging concept of cyberinfrastructure. Cyberinfrastructure can be understood as an interwoven collection of ICTs, specialized software, computing hardware, remote instruments, big data, high speed networks, virtual processes, organizational policies, and human experts (Kee, Cradduck, Bloggett, & Olwan, 2011; Kee & Browning, 2010). Scholars in this area argue that we need to understand the larger infrastructure in which the ICTs are embedded to avoid studying ICTs out of context. Furthermore, increasingly the use of one ICT is dependent on an infrastructure of many other ICTs and technologies available for combinatorial use. Therefore, to manage effective organizational infrastructure, particularly when organizing virtually, we need to understand when and how technologies are simultaneously and sequentially used to achieve organizational goals.

**Affordances of communication technologies.** Work on the affordances of communication technologies build on the ideas that materiality matters, social parameters are influential, and contemporary tools provide many options. Affordances are material features that individuals and groups can choose to use to accomplish relational communication objectives (Evans, Pearce, Vitak, & Treem, 2017). The concept of affordances did not originate in the field of communication, but organizational-, interpersonal-, and mobile-communication researchers have embraced it because it provides conceptual framing that helps technology discussions move beyond deterministic assumptions (e.g., Evans et al., 2017; Gibbs, Rozaidi, & Eisenberg, 2013; Leonardi, 2013, 2014; Rice et al., 2017; Schrock, 2015; Stephens, 2018; Treem & Leonardi, 2012). While management and information systems scholars have also embraced the concept of affordances, this chapter focuses on contributions by organizational communication researchers.

Evans and her team (2017) reviewed the literature to date on technology affordances, noting that researchers often identify affordances, but then fail to conceptually develop them. This is actually a strength in much organizational communication research because our scholars are now leading the effort to conceptualize and theorize around affordances of technologies. For example, one group of researchers has focused on the affordances of social media (Leonardi, 2014; Treem & Leonardi, 2012) and linked these concepts to expertise and knowledge-sharing (Ellison, Gibbs, & Weber, 2015; Gibbs et al., 2013). Stephens (2018) has elaborated the affordance of reachability and dimensionalized this affordance into the temporal variables *frequency* and *predictability*. In addition, Rice and colleagues have looked beyond the individual level to argue that there are organizational media affordances that exist beyond an individual ICT and which are associated with practices found in organizational life.

**Enterprise social media.** One area where organizational communication scholars have focused their work on affordances is in understanding enterprise social media. This type
of social media is different from personal platforms, such as Facebook, because they are tools used only by organizational members (the enterprise.) Treem and Leonardi (2012) identified and elaborated four affordances that often exist in social media tools: visibility, persistence, editability, and association. These affordances are not necessarily unique to enterprise social media, but they reflect the relational perspective and the importance of human agency found in and around these forms of technology. Leonardi (2014) further developed the affordance of visibility into a grounded theory that reveals how organizational members experience the tensions of being open and sharing information while also managing their own impressions.

Table of Theories

This chapter has covered a host of theories so far. To facilitate understanding of this breadth of the field, Table 9.1 summarizes them before we move into our next section. Look back into the sections that describe these theories and see if you can find how they build on and diverge from earlier work.

ICT Diffusion Into Organizational Practices

It is not a given that ICTs designed and developed by technologists and software companies will become integrated into organizational life. Many ICTs are tried and rejected, and only some are adopted into organizational contexts. Furthermore, some ICTs become staples, while others are discontinued or replaced by newer ICTs. We now

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<th>Table 9.1 A timeline of ICT use theories situated in organizational life*</th>
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<td>Affordances of Enterprise Social Media</td>
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*Please note that these do not include many of the group-communication, interpersonal, or information-systems theories that are related, but not discussed in this chapter.
turn the discussion to understanding how ICTs are adopted and diffused in modern organizational contexts.

When examining technology through the three lenses of organizational communication (as an organizing process, as an organizing structure, and as an entity), another branch of theoretical and empirical research on structures emerges. This area of research also has a long history, and it can be considered more macro-organizational because most of the scholarship has focused on how organizational entities acquire and deploy technology to enable communication and coordination.

**Adoption and Diffusion**

Adoption is defined as an individual organizational member’s decision to accept, reject, and/or discontinue using a new technology, while diffusion refers to the systemic phenomenon of the spreading of a new technology as it integrates within organizational life (Kee, 2017a). The literature on adoption and diffusion is multidisciplinary, including research from sociology (Ryan & Gross, 1943), marketing (Feick & Price, 1987), public health (Valente & Pumplung, 2007), and most importantly communication (Rogers, 1962, 2003). Everett Rogers, a pioneer in the field of communication, is the key figure who is most identified with diffusion and adoption research, including in organizational communication.

Originally trained in rural sociology, Everett Rogers spent most of his career as a Professor of Communication. Rogers published the first edition of his classic text, *Diffusion of Innovations* (1962), to describe a theory of how innovations are adopted and diffused, as he recognized a striking general pattern documented by researchers across diverse fields. Rogers explicitly defined *diffusion* as a communication process through which an innovation spreads in social systems via various communication channels over time. In the fifth and last edition of his classic text, Rogers (2003) described how the Internet was the fastest adopted and diffused innovation in human history.

**Individual-level adoption.** Diffusion research interested in understanding individual adoption of technologies focused on identifying innovation attributes, such as relative advantage, compatibility, complexity, trialability, and observability perceived by individual adopters (Rice, 2009; Rogers, 2003). Different types of adopters of technology have unique socio-psycho profiles: innovators (2.5 percent), early adopters (13.5 percent), early majority (34.0 percent), late majority (34.0 percent), and laggards (16.0 percent). This line of research helps researchers better understand why some organizational members tend to be the first to adopt and experiment with a new ICT, while some take longer to use it, and others never really get on board.

If one takes a deterministic perspective, the case of ICT adoption and diffusion in organizational contexts can be metaphorically described as *the ripple effect or the domino effect* (Kee, 2017a). However, organizational members have agency. An important concept in diffusion research is *reinvention*, which refers to the repurposing of a technology in creative ways unintended by the original designer. Rice and Rogers (1980) argued that reinvention is natural, showing ordinary users in their adaptation and modification of an innovation as they struggle to give meaning(s) to technology in the organizational contexts of their local problems and cultures. Furthermore, diffusion research also examines how individuals in social networks, especially opinion leaders with many *weak ties* (Granovetter, 1973, see also Chapter 9), naturally spread new technologies within social systems. This body of literature sheds light on how word-of-mouth and interpersonal
communication are more powerful in persuading about the value of a new technology than official advertising messages from vendors and other sources.

**Organization-level adoption.** Organizational communication researchers also study organizational adoption of ICTs, in addition to individual adoption, because of contingent adoption decisions (Rice, 2009). Individuals only have access to an ICT after the organization has adopted it. Moreover, individuals do not always make adoption decisions by personal choice because they can be an organizational requirement. Therefore, organizational adoption of ICTs is key to understanding the relationship between technology and organizational communication.

Organizational adoption of ICTs is usually driven by observations of practices in peer organizations and trends in the industries, such as in the case of early adoption of homepages by many organizations (Flanagin, 2000). More recently, drawing upon institutional theory, Zorn, Flanagin, and Shoham (2011) illustrated that organizational adoption of ICTs is driven by isomorphic pressure—conforming to industry norms. This pressure also stems from the perceived need for achieving organizational power derived from social and institutional legitimacy. Zorn and his team (2011) concluded that isomorphic pressures are most predictive of organizational adoption of ICTs, stronger than other factors such as budget and company size.

When an innovation is adopted and integrated into organizational life, change often occurs. It is human nature to resist organizational change, although some people recognize the need to constantly innovate and adapt to new challenges. Laurie Lewis (2011, 2014) offers an alternative to treating organizational change as a reaction to new technologies. She argues that internal and environmental sensemaking usually occur simultaneously and are mutually influential. In other words, the change in the external environment often influences the change resulting from the adoption and diffusion of ICTs in organizational life, and vice versa. This insight reveals that sensemaking, communication, and interaction during ICT diffusion are complex relationships, especially during reinvention (see also Chapter 21).

**The Future of ICTs and Organizational Life**

**Big Data**

Big data is a relatively new term that describes the immense amount of data (structured, semi-structured and unstructured) that now inundates organizations and outpaces the capabilities of traditional data management tools and practices. Big data is increasingly important for organizational communication. For example, a social network analysis of email exchanges can reveal the most central communicators in the organization (Kossinets & Watts, 2009). Big data is defined often by characteristics such as volume, variety, velocity (Laney, 2001), variability, veracity, and value (Gandomi & Haider, 2015). **Volume** refers to the size of data while **variety** denotes the diversity of data formats. **Velocity** describes data’s production and processing speed, but **variability** expresses the fluctuating and erratic data flow rates. **Veracity** means despite imprecision and inexactitude, big data possess hidden insights. **Value** implies the significance of big data. Although the literature has discussed these six different characteristics, big data is generally defined in industry by what has become known as the “five Vs,” omitting variability (Kee, 2017b).
Kee (2017b) recommends understanding the big data movement through a factory metaphor: data are being generated in a standardized, predictable, centralized, and efficient manner—akin to how goods were produced during the Industrial Revolution. Standardization and predictability can reduce the challenges of big data’s variety and variability. Having centralized data repositories and efficient computing resources to process big data can support big data’s volume and velocity. As noted in Chapter 5, classical management emerged during the Industrial Revolution due to the invention of steam engines and emergence of factories. A re-emergence of classical management principles and practices may inform how big data are integrated into organizational life in the third decade of the 21st century.

Many organizational processes continuously generate data, and in turn, use that data to guide decisions like changes to products, people, and processes. This is one reason we link information with communication when we have addressed technologies, or ICTs, in this chapter. ICTs are dynamic; software is continuously updated; and the latest smartphone today is old news tomorrow.

The future of communication technologies as a part of the fabric of organizational structures will likely be the integration of robots, artificial intelligence, and virtual reality. These technologies are studied in other fields (e.g., Stone, Neely, & Lengnick-Hall, 2018) and in areas of interpersonal communication, persuasion, and human–computer interaction (e.g., Lee & Liang, 2016; Liang & Lee, 2016). Imagine human paramedics and rescue robots working together as a team to save lives during a crisis or disaster. Customers enter an instant messenger chat with an artificial intelligence agent, or chatbot, for screening and pre-scripted answers before being escalated to a human agent. Dispersed workers use virtual reality to enable a robust collaboration as if they are co-located. It is important to consider how these technologies can enable, constrain, and assist humans in their organizational life, as they will be important areas of study for our field.

Communicating With and Through Technology in Organizing Processes

Many of the ICT use theories shared in the historical timeline can and likely do apply to organizing practices. Yet, there are important considerations of contemporary organizing, especially when groups are dispersed, loosely connected, and their communication and coordination practices are displayed visually through organizing software and platforms. When groups draw upon communicative affordances, like visibility found through social media (Leonardi, 2014; Treem & Leonardi, 2012), new connections can emerge and so can opportunities. In their book, Collective Action in Organizations: Interaction and Engagement in an Era of Technological Change, Bimber et al. (2012) illustrate the vital role that ICTs are playing in organizing and coordinating collective action in diverse organizations. While this growing body of research often is addressed separately from ICTs and organizational life, these ideas are becoming entwined, and that is why we put them in conversation with one another. Let us expand this idea and briefly discuss some core literature around networks, emergent groups, and ICT use.

Networks and Organizing

Networks connect people and provide opportunities for communication and organizing (see Chapter 9). Communication networks were rather invisible until ICTs, such as email and social media, became ubiquitous in organizations. Now connections and
information flows are more easily seen and are linked often to the collection of and sensemaking around big data. Shumate and Contractor (2014) define communication networks as “relations among various types of actors that illustrate the ways in which messages are transmitted, exchanged, or interpreted” (p. 449). A unique contribution of this definition is the notion of “multidimensional networks”—networks consisting of different types of human and non-human nodes (e.g., individuals, organizations, and technologies) and different types of linkages (e.g., information transmission, collaborations) (Contractor, Monge, & Leonardi, 2011). Drawing from an earlier example in the MRT section of this chapter, instead of walking seven blocks to a person’s office to ask for a copy of a report (i.e., a person–person link in the form of a communication request), you can download the report directly from the web (i.e., a person–technology link in the form of information retrieval). Both forms of networks are valid, and the latter is multidimensional.

Shumate and Contractor (2014) elaborate on the four types of communication networks in organizational contexts, as well as the three types of infrastructure networks that relate to how ICTs are discussed in this chapter. First, flow networks refer to message exchanges among organizational members, such as emails among coworkers. Second, affinity networks are the socially constructed (positive or negative) relationships among members, such as friendships. Third, representational networks suggest an association to an external audience. For example, when a person lists an organization on his/her LinkedIn profile, the hyperlink suggests an association between him/her and the listed organization. Finally, semantic networks mean shared meaning given to concepts or co-occurrence of words in text. For instance, the ways coworkers come to understand what diversity means and use common words to talk about it reveal the semantic networks in place.

Shumate and Contractor (2014) also describe three types of infrastructure networks that relate clearly to how ICTs are discussed in this chapter. First, technological networks support the message flow among technologies, such as telephone networks and Internet connections. Second, physical networks refer to how close or proximate organizational members are to each other in time and space. For instance, the locations and physical distance between offices demonstrates a physical network. Finally, affiliation networks imply the relation between members and their organizational entities. For example, organizations’ memberships in the same consortium suggest a particular affiliation among them. These communication and infrastructure networks connect members and ICTs in a complex multidimensional web, and provide opportunities for communication and organizing.

**Online and Emergent Groups**

Groups that organize online, rather than in a physical space, are often called virtual groups, online groups, and digital groups. Organizational communication and crisis informatics scholars, as one relevant example, have studied how online groups emerge, organize, and coordinate their actions—often on a temporary basis—using ICTs during disasters and emergencies (e.g., Chewing, Lai, & Doerfel, 2013; Lai, 2017; Smith, Stephens, Robertson, Li, & Murthy, 2018; Starbird & Palen, 2011). Urgent situations are infused with uncertainty; official responses often vary, and community groups want to help (Smith et al., 2018). Starbird and Palen (2011) have coined the term “digital volunteers” to explain how dispersed volunteers self-organize through online platforms,
like social media, to provide a collective response. In addition, ICTs often work hand-in-hand with organizing practices like information sharing, connecting people, and acquiring resources (Chewing et al., 2013). Furthermore, formal and informal groups use ICTs differently depending on the stage of a crisis and the recovery to that crisis (Chewing et al., 2013; Lai, 2017).

Research on online and emergent groups is highly interdisciplinary and extends well beyond organizational communication scholars. Group communication scholars, many of whom also study organizational communication, have focused some of their work in these areas. However, organizational scholars are in an ideal place to understand the role that structure—including ICTs—might play as online groups continue to self-organize and dissolve right before our digital eyes. ICTs play key roles in the global social justice movement, providing opportunities to connect people who are not co-located (Ganesh & Stohl, 2010). These findings have led scholars like Ganesh and Stohl (2014) to call for much more research in this area. They further explain that this is not only of interest to informal or emergent groups, but that as formal organizations become more embedded in a digital space, they could come to resemble the more informal online groups.

**Culture and ICTs**

Throughout this chapter, elements of culture have appeared. Whether in an understanding of how ICT adoption and diffusion is shaped by local culture, in models such as Fulk et al.’s (1990) social influence model or in DeSanctis and Poole’s (1994) adaptive structuration theory, many aspects of culture are entwined with ICTs. In Chapter 1 of this book, a definition of culture is offered: “a negotiated set of shared symbolic systems that guide individuals’ behaviors and incline them to function as a group” (Chen & Starosta, 1998, p. 26). When organizational communication scholars examine culture, we consider more than artifacts, belief, values, and norms; we examine how individuals perceive these cultures as well as they cultural roots of perceptual differences. Next, we address two additional ways notions of culture intersect with ICTs and organizational communication: work/life and occupational differences.

**Work/Life**

Culture considerations infuse the body of communication scholarship known as work/life, and ICTs have helped further complicate issues of agency and boundaries. In their handbook chapter on work/life, Kirby and Buzzanell (2014) highlight the myriad ways ICTs are entwined with work/life concerns and practices. For example, work practices like telework—meaning people who work either fully or partially out of their home—offer clear examples of the cultural complexity present when some employees are not physically present in the workplace. Leonardi, Treem, and Jackson (2010) studied these issues and found workers who used ICTs to work remotely experienced what they termed the connectivity paradox. The ICTs that appear to afford benefits of flexibility and working remotely are negated by the very ICTs that make the telework arrangement possible. In response, teleworkers use ICTs to create the impression they are working just like when they were co-located at a physical office.
Another intersection between ICTs, work–life, and culture concerns mobile communication. Through personal mobile devices, employees and coworkers are reachable regardless of whether it is during their work hours (Bittman, Brown, & Wajcman, 2009; Stephens, 2018). Further, most organizations have adopted some form of Bring Your Own Device to Work (BYOD) policy because some employees, and information technology departments, want people to provide and use their same communication tools for work and personal life (Stephens et al., 2017; Stephens, 2018). Coworkers and managers can pressure peers to be available when the team needs their help, and this expectation can develop into cultural norms (Stephens, 2018). When mobile communication devices enter organizational life, they enable and constrain both communication practices and organizational processes and structures.

**Occupational Differences**

Another culture-related consideration for ICTs and organizational life involves understanding that people in different occupations will often use ICTs in disparate ways. In their book *Technology Choices: Why Occupations Differ in Their Embrace of New Technology*, Bailey and Leonardi (2016) examine the question of technology choices among three different groups of engineers: structural engineers, hardware engineers, and automotive engineers. Although the three types of engineering work are equally complex, they approach their technology use differently. For example, structural engineers minimize the role of computers but prefer to depend on pen and paper, hardware engineers maximize their use of computers, and automotive engineers maintain a balance between relying on computer simulated crash tests versus physical crash tests for automotive design. Their study reveals that technologies are not universal, and workers vary in their embrace of technologies primarily based on their occupations and occupational cultures.

In her longitudinal study of people from 35 different occupations, Stephens (2018) found there were also differences in the policies and cultural practices surrounding ICT-use expectations depending on people’s job roles. People in more powerful or knowledge worker positions had fewer restrictions than people in manual labor or customer service roles. However, in her book, *Negotiating Control: Organizations and Mobile Communication*, Stephens (2018) ultimately finds that regardless of occupation, most people have negotiated control over their communication with their friends and family, and some of those negotiations tie back to work–life issues.

**Conclusion**

Let us revisit the framework used in this chapter: *Organizational life is lived, and communication is shaped, through and around ICTs*. In this chapter, technology use and communication are constitutive components of organizational life, and we narrowed our discussions of ICTs to situate how organizational communication scholars have played an integral role in developing theories and understanding. ICT use is a practice and a process where organizational members use multiple ICTs concurrently and sequentially to achieve myriad goals, such as information, persuasion, or organizing.

*Organization (O)* is conceptualized and used by ICT scholars in myriad ways, and sometimes the same scholars use different approaches depending on the goals of their research. Early researchers—discussed in this chapter as those associated with the technological determinism wave—often viewed this as more of an entity (O3); a place where
technology was used (e.g., Daft & Lengel, 1984). This did not change substantially during the social construction wave, as scholars viewed ICT use as heavily shaped by people in and around organizations (O3). During the third wave, when combinations of ICTs were studied, organization became viewed as a process (O1); this was especially in the case in virtual organizations and as enterprise social media were included in the ICT mix.

Diffusion researchers, as well as many more contemporary scholars, view organization as an organizing process (O1), sometimes considering how organizing occurs in, around, and through technologies over time (e.g., Smith et al., 2018). In that sense, diffusion is inherently organizational in nature, in that it can be understood as an organizing process (O1) in the entity of an organization (O3). For scholars who study big data, organizations and their members are the data sources for pattern recognition, detection, and/or prediction. Organizations are once again treated as an entity (O3), but they also become the target to which conclusions are applied with the goal of improving organizing (O1) and the structures associated with being organized (O2). While in Chapter 1 O3 is understood as the result of O1 and O2, here we see how O3 can feed back to O1 and O2. Furthermore, many researchers discussed in this chapter consider organization as a structure (O2) (DeSanctis & Poole, 1994; Ganesh & Stohl, 2010; Shumate & Contractor, 2014).

Finally, in keeping with the core questions considered in this book, this chapter acknowledged all three organization perspectives, but focused on how people have some choices in how they communicate, organize, and use ICTs. This chapter has both used and applied the C-O spiral introduced in Chapter 1 to illustrate the complexities of ICT use in organizational life, and to stress the mutual enabling and constraining relationship between communication and organization seen in ICTs. The examples and ideas shared here should illustrate the role that human agency plays as the communication and organization spiral incorporates ICTs into organizational life.

Recommended Supplementary Readings

**Applied**


*A thought-provoking look at how we blame email for our stress.*


*Rich study examining the process of cybervetting—snooping online about employees.*


*An accessible chapter that focuses on human resources and contemporary technology.*

**Historical Theory**


*This encyclopedia entry provides an accessible look at how the foundational theories have changed over time.*


*These books provide a grounding in organizational communication and technology.*

**Important Concepts: Define and Discuss**

- Adoption
- Affordances
- Big data
- BYOD
- Channels
- Combinatorial ICT use
- Cyberinfrastructure
- Diffusion
- Enterprise social media
- Information and communication technologies (ICTs)
- Materiality
- Mobile devices
- Multicommunicating
- Networks
- Online (social) movements
- Social media
- Technology

Also see Table 9.1 for a list of the core theories.

**Discussion Questions**

1. Skim the Internet for five minutes and identify the popular topics being discussed that are related to this chapter. Choose one topic and share how the research literature could help elevate and/or clarify this popular discourse.

2. Choose one theory in this chapter and apply it to your personal use of technology. If you can put it into an organizational context then that will help with the application.

3. Now it is time to debate agency and technology use. Write a 1–2-paragraph argument for how you have agency in your use of communication technologies in organizational life. Next, write a 1–2-paragraph argument discussing the limits and tensions you face concerning agency. You might want to refer to Chapter 1 and examine the communication and organization spiral that is driven by agency.

4. Look through the references in this chapter and notice the variety of publication outlets where organizational communication and technology scholars publish. Identify the top 3–4 outlets and look up those journals online. How do you think scholars decide where to submit their research considering that this is such a multidisciplinary field?

5. In contrast to early management research, summarize and briefly describe the unique contributions by organizational communication researchers to the understanding of technology and organizing.
6. Given the metaphor of ‘factory’ to describe the phenomenon of ‘big data,’ how can classical management or a modified version of classical management guide the organizing processes around data? Discuss the advantages and/or disadvantages of the classical approach.

7. If you were teaching an undergraduate course in organizational communication and technology, what are the top five topics you would cover in the class?

8. If you were covering a unit on technology in an undergraduate organizational communication class, what are the three topics you would include?

Practitioners’ Corner

As a practitioner, you probably find yourself interfacing with ICTs on a regular basis. Here we share two scenarios useful for you to consider outside of a specific situation. By using the material in this chapter to think through these scenarios (often with your team), you can be better prepared to address organizational issues that arise. Finally, we share some take-aways that invite you to consider that not all people in your organization have access or use ICTs in the same ways.

Scenario 1: You have been asked to evaluate a new ICT—e.g., an enterprise social media system or a big data analytics software—for organization-wide adoption. Consider evaluating it with the five innovation attributes of relative advantage, compatibility, complexity, trialability, and observability. Discuss with your organizational decision-makers about the likelihood of the ICT being fully adopted, implemented, and optimized by majority, if not all, of the members. Explore possible ways for reinventions to better fit the ICT to local problems and/or organizational culture.

Scenario 2: Many organizations are complaining about being overloaded with email today. Use media richness theory’s four factors of feedback timeliness, multiple cues available for interpretation, language variety, and personal focus to rate and rank the ICTs available in your organizational life. Evaluate when to use which ICT for a given communication situation. Remember the two factors to consider: Is the request meant to answer a question, otherwise known as reducing certainty? Is the request complex enough that emotions will be involved and you will need to interact to determine how to respond, known as an equivocal task? Work with your team to design a one-page guide of how you might establish rules to help you more effectively, and more meaningfully communicate through ICTs. Could these mutually agreed upon guidelines help you address email overload?

Take-away thoughts: When organizing a diverse group of collaborators (diverse in terms of occupations and job roles), design policies and encourage practices that strike a balance between being universal and being sensitive to cultural differences among occupational groups and/or individuals with different roles in the collective organizational life. Resist the desire to be overly universal at the detriment of becoming a barrier for some occupations and/or roles. Keep in mind that individuals, teams, occupations, and entire organizations vary in how they like to use ICTs to organize, collaborate, and share information. Finally, consider investigating the policies in your organization that encourage and discourage ICT use. Researchers are finding that these policies can marginalize some workers and that not only affects those individuals, but it can harm productivity as well (see Stephens & Ford, 2016 for an example).
References


