

ICT and Organizational Change

A Commentary

Wanda J. Orlikowski

JoAnne Yates

Massachusetts Institute of Technology

This special issue of *The Journal of Applied Behavioral Science* addresses a critical issue in the study of modern organizations—the relationship between information and communication technology (ICT), on one hand, and organizational change, on the other. The editors of the special issue have assembled a rich set of articles considering this topic. In this commentary, we first briefly note several common themes across the articles, themes that we believe characterize increasingly agreed on approaches to the topic. Next, we highlight three themes that appear to a greater or lesser extent in the articles and that exhibit what we consider particularly important and promising approaches to studying ICTs in organizations: making systems workable, dealing with materiality, and focusing on practice. We end by highlighting how these three themes interrelate.

COMMON THEMES

Several themes emerge from most of these articles, suggesting some agreement on directions for development. Many of the articles, for example, look beyond the single

Wanda J. Orlikowski is the Eaton-Peabody Chair of Communication Sciences at the Massachusetts Institute of Technology (MIT) and a professor of information technologies and organization studies at MIT's Sloan School of Management.

JoAnne Yates is Sloan Distinguished Professor of Management and a professor of communication, information, and organization studies at MIT's Sloan School of Management.

THE JOURNAL OF APPLIED BEHAVIORAL SCIENCE, Vol. 42 No. 1, March 2006 127-134

DOI: 10.1177/0021886305285130

© 2006 NTL Institute

firm to broader institutional fields or networks. In her theoretical piece on extending theory around technological frames of reference, Davidson suggests expanding consideration of context “outside the organizational ‘box’” and into the broader organizational field. The other authors (e.g., Constantinides & Barrett; Piotti, Chilundo, & Sahay) take up this issue empirically, exploring how the institutional arrangements within which organizations operate influence their interactions with ICTs.

Most of the articles also take up issues of power. Some do this in the broader field or network, as when Wagner and Newell look at power relations between their focal organization and its enterprise resource planning (ERP) vendor, or when Constantinides and Barrett note the ICT supplier’s lack of the authority necessary to obtain the needed resources and commitment. Others look at power within the adopting organization, as when Harley, Wright, Hall, and Dery examine interpretations of ICTs by managers at different hierarchical levels and with different jobs within each of their sites.

A third frequently addressed theme is the need for research to take into account the temporal, processual aspects of the interaction between ICTs and organizations. Davidson recommends that researchers emphasize framing as an ongoing dynamic process in which frames shift over time rather than emphasizing frames at a single point in time. Wagner and Newell examine the emergence of new social orders around ICT artifacts as resulting from a dynamic change process.

In addition, the articles commonly focus on participants’ interpretations around ICTs. Davidson’s theoretical article is built around technological frames of reference, an explicitly interpretive theory. Harley et al. examine how managers interpret the influence of introducing an ERP system to two organizations, whereas Piotti et al. focus on the subjective and intersubjective meanings that influenced the development and deployment of a health information system in Mozambique. Bridgman and Willmott use a discourse theory that conceptualizes objects as acquiring identity only through interpretation and discursive articulation.

The themes mentioned so far are important but by no means unique to these articles. Now we turn to three other themes that emerged as particularly important and/or useful from our point of view. The first, an emphasis on making systems workable, appears in varying forms in many of the articles. The second, a focus on the materiality of ICT systems, is taken on primarily by a single article and remains undeveloped or underdeveloped in the others. The third, a focus on practice, we argue, is occasionally mentioned but never adequately developed in any of the articles. We will consider each of these three themes in the following sections.

MAKING SYSTEMS WORKABLE

One key theme, the need to set aside the “ideal” world and focus on making ICTs workable, is central to Wagner and Newell’s piece and appears tangentially in several other articles as well. We see this pragmatic stance as a relatively new and important thrust in studies of information technology (IT) and organizations that gets beyond noting the ever-present problems and barriers to envisioned ICT use and focuses instead on ways to make systems workable in practice.

Wagner and Newell highlight this theme the most clearly in their title—“Repairing ERP: Producing Social Order to Create a Working Information System”—and throughout the article. Most researchers assume that successful systems require common goals for all participants. These two authors adopt a different viewpoint however. They claim that participants need to produce the social order necessary to create a workable system, but they follow Fuller (1978) in asserting that such social order can be created either through common aims or through reciprocity. They note that even when stakeholders begin with common aims, differences are likely to emerge over time. Thus, understanding the role of reciprocity—a norm that recognizes that favors given by one party obligate the other party to unspecified future repayments—can help parties find a workable solution that recognizes their interdependence over time. Although we would hesitate to assert that common goals and reciprocity are the only mechanisms for creating social order around ICT systems, we agree that at least these two mechanisms exist and that the former has dominated discussions of ICTs and organizations.

Empirically, Wagner and Newell examine the implementation of an ERP system in a university (Ivy) partnering with an ERP supplier (Vision). Before the project began, it seemed that the Ivy project team and Vision had common goals, but as time passed, it became clear that the goals were not as congruent as Ivy’s project team had assumed. Based on extensive fieldwork (including interviews, observations, etc.), they learned that the project team, rather than allowing the effort to fail, decided to make some compromises on their side and in return received concessions from Vision. The result was that after a period of stalemate, the system was made workable, if not ideal, for both sides. This outcome was achieved through Ivy’s retention of legacy systems that better supported their needs in some areas and the addition of new “‘bolt-on’ tools” that customized the ERP system to faculty needs.

Wagner and Newell argue that focus on the high rate of failure or unmet goals in software projects has painted a more negative picture than is warranted and that more research should study the “‘workarounds and forms of articulation work that enable people to make dynamically complex systems work in practice’ (Orlikowski & Iacono 2001)” (p. 51). Indeed, Gerson and Star’s (1986) notion of articulation work, “that is, reconciling incommensurate assumptions and procedures” (p. 257) present in every specific context, seems applicable here. No system, Gerson and Star argue, would need only the specified work; all systems need unspecified articulation work to make them operate in practice. Wagner and Newell go beyond that notion to say that researchers should spend less time studying problems that make systems fail and more studying what is and can be done to make them workable in practice, a more realistic and practical goal than eliminating all incongruities or incommensurate assumptions or procedures. Davidson argues similarly that interpretive incongruence is not necessarily problematic, suggesting that it may be beneficial during times of change to highlight conflict or avoid the imposition of a dominant understanding of the technology.

Piotti et al. address the workability theme in their recommendations. As they note, “Given the interconnected nature of the HIS [Health Information System], it becomes important not to be too ambitious and radical to design from scratch but to approach it in an incremental manner, making changes at the margins (North 1990)”

(p. 106). Thus, they reject what they call the “construction approach” in favor of the “cultivation approach,” which “implies an inherent need for flexibility both in the technical systems and in the institutional structures that provide the space and incentives for emergent changes to develop” (p. 106). In a less developed country such as Mozambique, the need for flexibility to make the HIS workable is especially clear.

This very important theme also comes up briefly and in different forms in two other articles. Harley et al. refer to “shadow systems” such as spreadsheets that managers created at the two Australian organizations the authors studied to work around the ERP system’s perceived rigidity. Without such shadow systems, they believed, the ERP system couldn’t handle the specifics of their organizational context and the contradictory demands placed on middle managers. Similarly, Constantinides and Barrett refer to boundary formation that allows the integration of tools across multiple parties through the creation of a common space for negotiation (cf. Kellogg, Orlikowski, & Yates, in press) without enforcing shared understandings or common goals. In particular, they claim, “CreteTech’s introduced ICTs were integrated in the habits of action of an initial community of healthcare professionals [who] then, in turn, combined and modified these habits” (p. 84). Only by doing so could they create a workable system. The subsequent breakdown of this workable system highlights the contingent status of ICT systems and the ongoing maintenance required to keep them in running order. As Orlikowski and Iacono (2001) note, ICT systems are “made up of a multiplicity of often fragile and fragmentary components, whose interconnections are often partial and provisional, and which require bridging, integration, and articulation in order for them to work together” (p. 131).

We find this emphasis on workability in practice to be very important for understanding ICT use. Around us, we can see many systems that implementers do not consider unmitigated successes but that nevertheless work. And it is difficult to find any instances in which systems can be adopted without any adjustments to fit the specific context (indeed, based on Gerson and Star’s [1986] notion of articulation work, we would argue that such instances do not exist). Understanding the mechanisms by which people and organizations make them workable is an important new research thrust and one likely to be helpful to practitioners as well. We applaud and encourage such a focus.

As a way of advancing a focus on the workability of systems in practice, we suggest that researchers pay particular attention to two additional interrelated themes: materiality and practice. Both underlie all the articles in this issue, but both deserve more careful consideration and development.

DEALING WITH MATERIALITY

All of the articles refer to the material properties of technology, but most do not directly address the implications of these for their case studies or approaches. Indeed, adequately addressing materiality has been an ongoing and long-standing concern in organizational research. As numerous commentators have observed (Barley, 1988;

Jones, 1999; Orlikowski & Iacono, 2001; Robey & Boudreau, 1999), the challenge is how to articulate a view of technology's material properties without reifying them through a form of contingent determinism (Bridgman & Willmott, 2006 [this issue]; Woolgar & Grint, 1991) and without reducing them to the social (Berg, 1997; Button, 1993).

Wagner and Newell are interested in "the emergence of new social orders around the IT artifacts that resulted from a dynamic change process" (p. 45), whereas Constantinides and Barrett concentrate on "large-scale ICT innovation as it is manifested in networks of power" (p. 77). Neither article, however, unpacks terms such as *IT artifacts* and *ICT innovation*, focusing instead on the evolving social and political dynamics playing out in their research sites. Similarly, Harley et al. suggest that their labor process approach affords "foreground[ing] the material impacts of change on the organization and experience of work" (p. 59). Their analysis, however, primarily focuses on the reactions of various managers to the implementation of ERP systems without specifically addressing the materiality of these systems.

Of all the articles, Bridgman and Willmott tackle the issue of materiality most directly, proposing the application of a discursive approach to address the materiality of technology without disconnecting it from its social aspects. They critique an approach proposed by Orlikowski and Barley (2001) to invigorate institutional theory by integrating a focus on the material properties of technology. Drawing on Laclau and Mouffe's (1985) discourse theory, Bridgman and Willmott argue that it affords a perspective on material properties as articulated in discourse. In this view, "extradiscursive reality only has meaning through discourse." As Hardy and Phillips (2004) note, it is not the case that discourse "reveals" a preexisting reality but rather that "concepts are discursively attached to particular forms of an ambiguous material world, which can only be understood with reference to prevailing discourses" (p. 302).

We think Laclau and Mouffe's (1985) discourse theory offers an interesting opportunity for thinking about the materiality of technology. However, what remains unclear from Bridgman and Willmott's discussion and their Inland Revenue–Electronic Data Services case study is how to analytically address materiality that is not discursively engaged by particular communities. In their case study, Bridgman and Willmott show how the deployment of computer terminals in local tax offices was discursively constituted as part of a change management initiative that espoused a rhetoric of "empowerment." But the operation of the software and the delivery of information to these terminals were also shaped by such properties as the clock speed of the chips, the speed of data transfer, and the physics of visual displays. Without imputing any essentiality to these properties—indeed, such properties would be temporally and contextually contingent—we nevertheless note that they would have some material consequences for users of the ICT even though neither the staff nor the researchers engaged them. Similarly, Piotti et al. focus on the complexity of integrating health information systems across multiple and interconnected health organizations in developing countries; they do so, however, without addressing the influence of the telecommunications infrastructure on the flow of information across districts, health facilities, and people. In a country that does not have a dense or reliable telecommunications net-

work, such material issues would seem to be particularly germane even when not discursively articulated by the relevant communities. How to adequately address such materiality remains an important analytical challenge.

The discursive approach proposed by Bridgman and Willmott is a welcome addition to the theoretical tool kit available to organizational scholars, and we encourage its further development and application to the question of ICTs and organizational change. Along with other recent developments in conceptualizing materiality—for example, Jones's (1999) adoption of Pickering's (1995) notion of a "mangle of practice," Orlikowski's (2000) notion of "technologies-in-practice," and Hutchby's (2001) appropriation of the notion of "affordances"—scholars have a number of promising avenues to pursue in advancing our knowledge of what Bridgman and Willmott term *technology in organizations*.

FOCUSING ON PRACTICE

Most of the articles emphasize the importance of attending to what people do with technologies in practice. In this regard, studies of ICTs and organizational change have come a long way from the 1970s and 1980s when abstracted variance models were the norm and field studies drawing on interpretive accounts and observations of ongoing actions were both infrequent and discounted. Most of the field studies described by the empirical articles in this issue offer at least some account of what actors (at various levels within and across organizations) are doing with the technology "on the ground" and over time. We believe that such approaches are particularly valuable as they afford the possibility of accounting for the messy, dynamic, contested, contingent, negotiated, improvised, heterogeneous, and multilevel character of ICTs in organizations.

Such a situated and ongoing view of technology-mediated organizational change is well served by an even more explicit focus on the everyday practices of key actors. As evidenced by the empirical studies in the articles, contemporary work, communication, and temporal and spatial practices are increasingly technological as regional ICTs such as health care networks, enterprise-wide ICTs such as ERP systems, and individual digital tools such as e-mail, instant messaging, and personal digital assistants become widespread. A focus on people's everyday practices entails examining in detail the micro-level interactions that shape and are shaped by technological and institutional conditions and consequences. Indeed, as Barley and Kunda (2001) note, detailed studies of what people do allow us to "articulate relations between work practices, situational contingencies, and organizational patterns" (p. 85). As technologies are thoroughly integrated with work practices and situational contingencies, we can echo their recommendation to focus on detailed studies of what people do with technology in organizations.

Performing detailed studies of what people do with technology entails researchers engaging in field studies that rely on intensive (in-depth) and extensive (longitudinal) data collection. Both ethnographic observation of people's everyday and situated activities (e.g., through participant observation and shadowing techniques) and collection of communication records generated as part of those ongoing activities (e.g.,

memos, reports, e-mail archives, instant messaging logs, intranets, Weblogs, knowledge repositories, etc.) lend themselves to detailed analyses of work and communication practices. Interviews are also very useful in such studies, and in some cases, this is the only access that is possible. But we would also encourage researchers to complement their interview-based data approaches with other data sources, sources that afford deeper purchase on actions and assumptions than are available through actors' accounts of their doings and interpretations.

A FINAL COMMENT

Following the “practice turn” (Schatzki, Knorr-Cetina, & Savigny, 2001), organizational scholars have increasingly adopted a more deliberately practice-based view of organizational life. We believe such an approach can offer valuable insights to studies of ICTs and organizational change, in particular helping us address the three inter-related themes we have highlighted here—how to make ICTs (and their materiality) workable in practice—as well as other common themes. Understanding how individuals and organizations make systems workable in practice requires focusing on the micro-level practices of those developing, using, and repairing such systems over time and the ways in which power, social networks, human interpretations, and materiality come into play. Consideration of such issues will, we believe, add significantly to our understanding of how ICTs influence organizations over time.

REFERENCES

- Barley, S. R. (1988). Technology, power, and the social organization of work. *Research in the Sociology of Organizations*, 6, 33-80.
- Barley, S. R., & Kunda, G. (2001). Bringing work back in. *Organization Science*, 12, 76-95.
- Berg, M. (1997). Of forms, containers, and the electronic medical record: Some tools for a sociology of the formal. *Science, Technology, & Human Values*, 22, 403-433.
- Bridgman, T., & Willmott, H. (2006). Institutions and technology: Frameworks for understanding organizational change—The case of a major ICT outsourcing contract. *The Journal of Applied Behavioral Science*, 42, 110-126.
- Button, G. (1993). The curious case of the vanishing technology. In G. Button (Ed.), *Technology in working order: Studies in work, interaction, and technology* (pp. 10-28). London: Routledge.
- Constantinides, P., & Barrett, B. (2006). Large-scale ICT innovation, power, and organizational change: The case of a regional health information network. *The Journal of Applied Behavioral Science*, 42, 76-90.
- Fuller, L. L. (1978). The forms and limits of adjudication. *Harvard Law Review*, 92, 394-404.
- Gerson, E., & Star, S. L. (1986). Analyzing due process in the workplace. *ACM Transactions on Office Information Systems*, 4, 257-270.
- Hardy, C., & Phillips, N. (2004). Discourse and power. In D. Grant, C. Hardy, C. Osrick, N. Phillips, & L. Putnam (Eds.), *Handbook of organizational discourse* (pp. 299-316). Thousand Oaks, CA: Sage.
- Harley, B., Wright, C., Hall, R., & Dery, K. (2006). Management reactions to technological change: The example of enterprise resource planning. *The Journal of Applied Behavioral Science*, 42, 58-75.
- Hutchby, I. (2001). Technology, texts and affordances. *Sociology*, 35, 441-456.
- Jones, M. (1999). Information systems and the double mangle. In T. J. Larsen, L. Levine, & J. DeGross (Eds.), *Information systems: Current issues and future changes* (pp. 287-302). New York: OmniPress.

- Kellogg, K., Orlikowski, W. J., & Yates, J. (in press). Life in the trading zone: Structuring coordination across boundaries in post-bureaucratic organizations. *Organization Science*.
- Laclau, E., & Mouffe, C. (1985). *Hegemony and socialist strategy*. London: Verso.
- Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science*, *11*, 404-428.
- Orlikowski, W. J., & Iacono, C. S. (2001). Desperately seeking the "IT" in IT research: A call to theorizing the IT artifact. *Information Systems Research*, *12*, 121-134.
- Pickering, A. (1995). *The mangle of practice: Time, agency and science*. Chicago: University of Chicago Press.
- Piotti, B., Chilundo, B., & Sahay, S. (2006). An institutional perspective on health sector reforms and the process of reframing health information systems: Case study from Mozambique. *The Journal of Applied Behavioral Science*, *42*, 91-109.
- Robey, D., & Boudreau, M.-C. (1999). Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications. *Information Systems Research*, *10*, 167-185.
- Schatzki, T. R., Knorr-Cetina, K., & Savigny, E. (2001). *The practice turn in contemporary theory*. New York: Routledge.
- Wagner, E. L., & Newell, Sue. (2006). Repairing ERP: Producing social order to create a working information system. *The Journal of Applied Behavioral Science*, *42*, 40-57.
- Woolgar, S., & Grint, K. (1991). Computers and the transformation of social analysis. *Science, Technology, & Human Values*, *16*, 368-381.