Technological Embeddedness and Organizational Change

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While various theories have been proposed to explain how technology leads to organizational change, in general they have focused either on the technology and ignored the influence of human agency, or on social interaction and ignored the technology. In this paper, we propose a new theory of technology-mediated organizational change that bridges these two extremes. Using grounded theory methodology, we conducted a three-year study of an enterprise system implementation. From the data collected, we identified embeddedness as central to the process of change. When embedded in technology, organizational elements such as routines and roles acquire a material aspect, in addition to the ostensive and performative aspects identified by Feldman and Pentland (2003). Our new theory employs the lens of critical realism because in our view, common constructivist perspectives such as structuration theory or actor network theory have limited our understanding of technology as a mediator of organizational change. Using a critical realist perspective, our theory explains the process of change as a three-stage cycle in which the ostensive, performative, and material aspects of organizational elements interact differently in each stage.

Key words: enterprise systems; organizational change; embeddedness; structure; agency; critical realism; grounded theory

Introduction
The introduction of information technology (IT) into an organization is generally accompanied by changes to organizational form and function. While early research took a deterministic perspective to explain such changes, contradictory results underscored the weakness of such an approach and suggested that greater value would be derived from studying the process of change rather than the (often idiosyncratic) outcomes (Robey and Boudreau 1999). Using a variety of constructivist approaches, various models of the change process have been proposed. These include studies based on structuration theory (Orlikowski 1992, Orlikowski and Robey 1991), institutional theory (Avgerou 2000, Gosain 2004), and actor network theory (ANT) (Latour 1996, Walsham 1997). Not only do these different perspectives present conflicting views about how technology-mediated organizational change occurs, but each in its own way is problematic. Those based on structuration theory or actor network theory tend to focus on the actions of agents, ignoring the technology, while those using institutional theory tend to ignore agency. Furthermore, technology itself is often treated as a unitary object, ignoring each technology's distinctive characteristics, which should be acknowledged in a theory of technology-mediated organizational change. In this paper, in response to the research question "how does technology mediate organizational change," we propose a new theory that addresses the specific role of technology, while also incorporating the effects of agency. In particular, as various organizational elements, e.g., routines and roles, become embedded in the technology, they acquire a material aspect that plays a key role in organizational change.

To develop our theory, we conducted an intensive, longitudinal case study using grounded theory methods to observe the unfolding process of organizational change from a fresh empirical perspective not bound to existing theories. As we collected and analyzed our data, we identified theoretical categories that led us to examine related concepts in the literature. In keeping with a grounded theory methodology, we did not enter the field with a set of predefined theoretical concepts or hypotheses or with a particular body of literature in mind, but instead sought a "practical middle ground" (Suddaby 2006, p. 635) that drew iteratively from the empirical data we collected and from our knowledge of substantive theories that pertained to the theoretical concepts emerging from our data. This avoided Suddaby's (2006) concern that grounded theory should not be an excuse to ignore the literature. During our analysis, we also identified critical realism as an appropriate lens for examining the actions and interactions of stakeholders in their appropriation and use of technology, while simultaneously accounting for the role of technology. Critical realism also incorporates a temporal aspect that fits well with a change process, which by definition occurs over time. For clarity of presentation, we discuss this literature prior to presenting our results, but in reality, we examined it as data collection and analysis indicated its relevance.