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KNOWLEDGE ECOSYSTEMS: A Theoretical Lens for Organizations Confronting Hyperturbulent Environments

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1 CONJECTURE

Adopt the viewpoint of a U.S. citizen and recall the contribution of knowledge exchanges (or lack thereof) to the major events of the last 6 years: incorrect estimates of the Al-Qaeda threat prior to the 9/11 attacks, failing to apprehend the culprit behind the anthrax events of 2001, inadequate response to Hurricane Katrina in 2005. Repeat investigations and comprehensive certifications by the U.S. General Accounting Office all report the same theme: more than sufficient knowledge existed to mitigate these events, but the knowledge was in a highly distributed and fragmented form across multiple departments, agencies, and the White House (Kean and Hamilton 2004; U.S. GAO 2003, 2004a, 2004b, 2006a, 2006b).

According to the **knowledge-based theory of the firm**, knowledge is the most strategically significant resource of an organization (Alavi and Leidner 2001; Argote and Ingram 2000). Capturing and sharing knowledge of expert and innovative employees provides a strategic advantage influencing performance outcomes (Nonaka 1994; Singh 2005). However, in order for distributed, heterogeneous knowledge bases to be intentionally leveraged as a strategic asset, an organization not only needs to identify what its employees know (and do not know) so it can appropriately target the transfer of knowledge, but also needs to discern when such knowledge will be valuable both now and in the future. To perform these feats with any certainty, an organization has to predict future events and knowledge needs.

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Thus, there is a temporal dimension to knowledge. Knowledge can be time sensitive, potentially losing its relevance as environments change. Relaying information facilitates the exchange of tacitly stored knowledge (Galbraith 1982). Such exchanges allow humans to relay thoughts, to relay perceptions of the environment, and to adapt. Knowledge exchanges allow interindividual awareness of reality, opportunities, environmental changes, and trends. Ultimately, knowledge exchanges allow humans to become more “fit” to their environment (Clippinger 1999; Cummings 2004).

Knowledge itself may rapidly **lose its relevance due to hyperturbulent environments** involving rapid changes in human systems. Compared to “ordinary” turbulent environments, hyperturbulent environments require greater interindividual knowledge exchanges to adapt. Examples of such environments include 9/11, the anthrax events of 2001, and Hurricane Katrina in 2005. As confirmed by documented investigations, these historical events are examples where sufficient knowledge existed (and insufficient exchanges occurred) to mitigate negative outcomes. Organizations that must confront such seemingly chaotic environments include those involved with intelligence gathering and public health emergency response, to include the U.S. Central Intelligence Agency, U.S. Centers for Disease Control and Prevention, and the Federal Emergency Management Agency.

I contend that **organizations like the CIA and CDC represent the future of business**. Both organizations comprise globally distributed individuals, who must exchange time-sensitive knowledge to deal with hyperturbulent environments, increase organizational adaptedness, and increase organizational survivability (Clippinger 1999; U.S. NIC 2000, 2003).

Both the CIA and CDC must confront hyperturbulent environments in which organic, information-intensive changes occur rapidly with little warning. Moreover, no one individual harbors sufficient knowledge to either mitigate negative outcomes or capitalize on positive opportunities. Within these organizations, interindividual exchanges must transcend physical group proximity, social networks, and the institutions themselves (Daft and Weick 1984; U.S. GAO 2003; Kerr et al. 2005, 2006).

For these organizations, it may be **nearly impossible** (unless organizations assume omniscience) to discern in advance not only what knowledge is known and not known by their employees, but what knowledge is worth capturing for both present and future reuse, when such reuse will be appropriate, and when creating entirely new knowledge will be required. Under such circumstances, attempts at top-down management of knowledge are infeasible, since hyperturbulent events confronting an organization are too dynamic and organic. An organization cannot discern deterministically what knowledge is valuable in its employees rapidly enough to keep pace with environmental changes (Bray 2006; Carley and Lin 1997).

Instead, my contention here is that such organizations can **cultivate indirectly a knowledge ecosystem** that both fosters knowledge exchange opportunities among employees and allows dynamic (versus statically defined) knowledge exchange activities to occur and evolve as environmental circumstances require (Heckscher and Donnellson 1994). Such an approach frees an organization from the nearly impossible task of identifying what knowledge its employees have, need now, and will later find valuable. Rather, ecosystem-framed solutions require pragmatic approaches to maximize interindividual knowledge exchange opportunities and “seed” positive behavioral antecedents.

2 IMPLICATIONS

For academic theory, knowledge ecosystems bridge ongoing research regarding complex adaptive systems with theories of organizational learning. Complex adaptive systems literature supports the premise that bottom-up (i.e., grassroots) approaches are more resilient to volatility (Anderson 1999; Clippinger 1999). This literature also suggests that bottom-up approaches will cultivate emergent knowledge exchanges that **should prove more optimal than directed, top-down alternatives** (Heckscher and Donnellson 1994). As researchers, we should seek to test these theories.

The lens offered by knowledge ecosystems also links findings from social dilemmas research (Dawes et al. 1986; Frey and Iris 1996). Social dilemmas involve situations where individuals confront a shared situation in which each receives a higher personal payoff for defecting rather than cooperating as a group, but cumulatively all individuals would be better off if they cooperated rather than defected. **Deciding whether to exchange knowledge is akin to social dilemmas:** (1) should an individual contribute knowledge to the group, with a future possible return, or (2) should an individual opt not to contribute and free ride?

When it comes to exchanging knowledge, each individual may potentially receive a higher personal payoff for defecting rather than cooperating and exchanging knowledge, but cumulatively all group members would be better off if they cooperated. Most government managers run the risk of having parts of their divisions subsumed by other divisions if they choose to be transparent as to their budget and projects, and openly share knowledge with other organizations. **The current benefits of defecting outweigh the benefits of collaborating.** Other government divisions may claim these projects fall into their sphere of influence or represent work that they are already doing (Kerr et al. 2005, 2006).

If, however, a sufficient number of government divisions equally make the same decision to openly share knowledge and collaborate, all individuals in the organization will ultimately benefit (Kling 1991; Wade-Benzoni et al. 1996). Organizations need to find ways to encourage fewer individuals to defect from exchanging knowledge, and instead opt to collaborate; ergo, researchers need to discover methods of cultivating vibrant knowledge ecosystems.

Past research into social dilemmas supports the premise that technology not only enables individuals to exchange knowledge, but also mediates human perceptions with regard to the opportunities and motivations surrounding the exchange of knowledge. Experiments show that allowing electronic communication among individuals improves the rate of contributions in a social dilemma scenario (Dawes et al. 1986; Orbell and Dawes 1991). Intriguingly, the treatment of costly communication, where individuals must pay to communicate with each other, is itself sufficient to encourage individuals to contribute more to the public good of the group than defect (Ostrom et al. 2002).

Technology both facilitates knowledge exchanges and provides opportunities not afforded by physical proximity to collaborate. Extrapolating from social dilemmas research, I posit that the mere existence of these opportunities to exchange knowledge or ideas can reshape whether or not human individuals actually **deem such exchanges worthwhile**. Knowledge exchange opportunities influence human motivations, which in turn influence knowledge exchange behaviors and processes, which ultimately shape outcomes, including organizational performance.

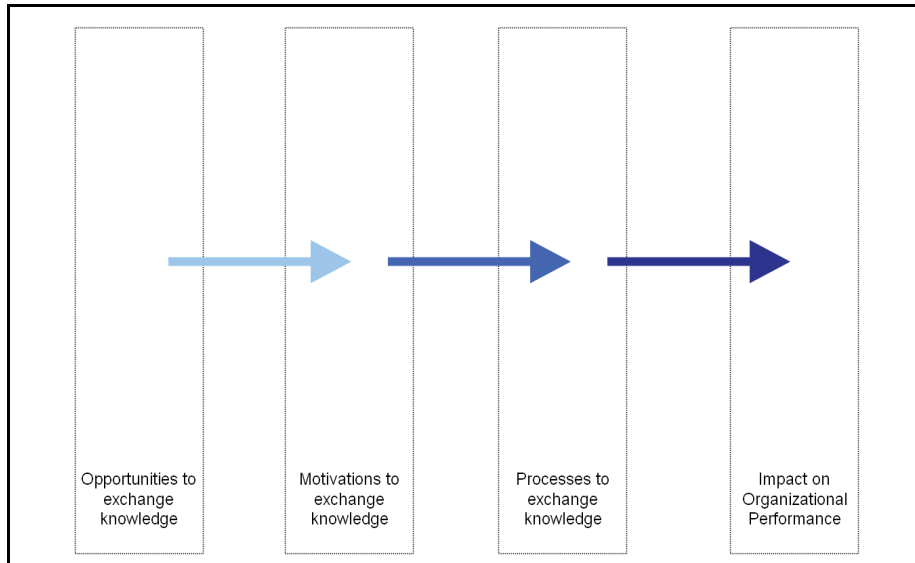


Figure 1. The Key Steps to Designing a Knowledge Ecosystem

Cumulatively, if top-down knowledge management is indeterminate and not possible for hyperturbulent environments, perhaps instead researchers should piece together a puzzle by uncovering (1) who had opportunity, (2) who had motive, and (3) how was it done regarding method? These three questions establish knowledge exchange opportunities, behavioral antecedents, and knowledge exchange activities for individuals comprising an organization (Daft and Weick 1984). These three factors form the pieces of the puzzle that promote cultivation of a knowledge ecosystem. For governments and business alike, the vibrancy of their knowledge ecosystem determines the veracity and relevance of organizational knowledge. The challenge for us, as researchers, will be to clarify how best to design such ecosystems, further discern the role of technology as an intervention, and to determine what influential variables determine positive or negative performance outcomes.

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