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GLOBAL ORGANIZATIONAL NETWORKS:
EMERGENCE AND FUTURE PROSPECTS

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The closing years of the 20th century brought a burst of theory, research, analysis and social commentary that established the network as the most important emergent organizational structure and the preeminent metaphor sense-making by academics and practitioners alike

Consider, for example, the following developments:

- The network was asserted to be a new form qualitatively different from two polar forms recognized in neoclassical economics, market and hierarchy (e.g., Powell, 1990).

- Postbureaucratic models were founded on the logic of networks, nodes and interconnectedness (e.g., Reich, 1991; Quinn, 1992; Nohria &Eccles, 1992).

- The traditional concept of the linear value chain was supplanted by the new notion of value networks, or "constellations" (Norman & Ramirez, 1993).

- Small and medium-size firm networks drew intense interest as competitive resources in specific industries (Grabher, 1992) and/or regional forces, such as the Emilian model in Italy (Brusco, 1982) or the cross-industry networks in the Valencia area of Spain (Ybarra, 1989).

- Traditional East Asian business networks such as the Japanese *keiretsu*, Korean *chaebol*, Indian *House*, and Taiwanese family business were rediscovered by commentators and brought to the forefront as examples of network enterprise systems (e.g., Castells, 1996).

- The model of embedded networks was introduced to explain the competitive dynamics of organizational clusters (e.g., Gomes-Casseres & Leonard-Barton, 1997).

- Global interconnections became the prime defining feature of globalization itself (e.g., Held, McGrew, Goldblatt & Perraton, 1999; Monge & Fulk, 1999).

- A heated debate focused on whether transnational economic networks would replace the nation-state as the primary world power (cf. Strange, 1996 vs. Hirst & Thompson, 1996).

This "netization" of the dialog about organizations is producing a new paradigm by which to make sense of the global world order. What does the future hold for theory, research and analysis under the new network paradigm?

This manifesto looks at the etiology of the rise of networks, and then builds upon this history to identify several promising areas of theory and research for understanding the trajectory of networks in the new millennium. The paper concludes by identifying methodological issues in studying organizational network processes.

Etiology: Looking Forward Backward

How did the network become so significant to the global organizational landscape? What forces coalesced to privilege this particular social form? Two preeminent explanations are (1) the deployment of advanced communication and information technology in the 20th century, and (2) institutional restructuring.

Interpenetration of technology and network forms. Technological determinist logic argues that technological developments in communication and computing were both necessary and sufficient for organizational form changes (e.g., Huber, 1990.). Social determinist logic argues, by contrast, that social and organizational factors both constrain and channel the process of technological development (e.g., MacKenzie & Wacjman, 1985). An alternative perspective proffers that changes in both organizational interconnectedness and technological development feed upon each other (Barley, 1990; Fulk & DeSanctis, 1999; Weick, 1990). All perspectives converge, however, in deeply implicating technology in organizational form changes.

Institutional restructuring. The institutional perspective sees both technology and organizational form developments as constrained by the cultural and economic context of the time, as was true, for example, in the differential emergence of industrial age organizations in France vs. England (Winter & Taylor, 1999). Castells (1996) argues that the new flexibility of network systems and advancing technological innovation created a level of flexibility in organizational arrangements necessary for institutional reforms involving deregulation, privatization, and weakening the social contract between worker and employer. Such capitalist restructuring fed the underlying network processes while simultaneously building on them.

Communal capabilities. Neither perspective fully addresses the qualitative changes in functionality of communication technologies that occurred when they were integrated with computing. When the telephone was introduced in the United States early in the 20th century, a political decision was made to create a broad infrastructure to which essentially all persons had access regardless of ability to pay. (This attractive, comprehensive market also spurred considerable innovation in technological developments; Friedlander, 1999). Such an extensively connected network would seem to make possible national-level network organizations. Certainly, decentralization of US organizations followed universal telephone service (Pool, 1983). Yet, the essential features of traditional bureaucratic organization remained. It wasn't until three-quarters of a century later that the true network forms began to emerge. One explanation for this delay is that network forms awaited true globalization in access to telephone services outside of the United States. Another is the natural lag in institutionalization of technology due to an initial period of experimentation in different markets (Friedlander, 1999).

An even more fundamental explanation centers on the incapability of the telephone infrastructure to support *emergent* linkages. In connective networks such as the

telephone, communication contacts are prespecified by callers when they dial a number. The integration of computing facilitated *emergent* contacts over the same hardware network--through electronic bulletin boards and forums, shared databases, and extensive capability to broadcast messages. The term "communality" has been used to describe the functionality provided by systems that allow people to exchange information through a shared node or database (Fulk, Flanagin, Kalman, Monge & Ryan, 1996). With communal systems, senders need *not* know which specific person might need the sender's information, and receivers need *not* know ahead of time which persons might hold such information. Communal systems serve as information marketplaces where information and people get linked in ways that no one might have been able to prespecify ahead of time. Network ties wax and wane--exactly the kind of flexibility and emergence that characterizes the discussions of 21st century network organizations.

With communality as a key distinguishing feature of third millennium network organizations, what are some key questions for theory and research in the new network paradigm?

- Language "interoperability", a support for communality, will be a key factor in which types of networks dominate. Improvement in translation software and/or continuation of a trend toward using English as the language of global business would facilitate globalization of network systems. Absent these trends, communality is much more likely at the level of language communities (nations, regions) rather than global, network organizations.

- The study of work motivation will increasingly become concerned with network level commitments. Where information resources are dispersed across participants who control their disposition, motivation to contribute to the network becomes a critical variable (Monge et al., 1998). With knowledge and information increasingly being the key substance flowing in organizational network links (Castells, 1996), organizational motivation models must be adapted to consider communal and well as individual motivations to share knowledge (e.g., Kalman, Fulk & Monge, 2000).

- Governance mechanisms will draw the increasing attention of researchers. Consider Castells' (1996: 6) description of the design of control systems for the precursor to today's Internet:

  …the Internet originated in a daring scheme imagined in the 1960s by the technological warriors by the US Defense Department Advanced Research Projects Agency (DARPA) to prevent a Soviet takeover or destruction of American communications…The outcome was a network architecture that, as inventors wanted, cannot be controlled from any center, and is made up of many thousands of autonomous computer networks that have innumerable ways to link up, going around electronic barriers.

The nation-state historically has been a primary source of control for international transactions. Multilateral organizations such as the World Trade Organization attempt to govern how nation-states exert control and achieve coordination. Without entering into the debate on the future of the nation-state, one can argue as do Held et al. (1999: 426) that the increasing extensiveness of organizational networks across national boundaries is linked to opportunities for "more self-organizing and market-driven arrangements, which tend only to receive overt political direction by a hegemonic power at times of crisis." If traditional centers of control have been weakened relative to new global network organizations, who will govern them in the third millennium? Theoretical work on the network as a governance mechanism in itself offers a foundational start (Jones, Hesterly & Borgatti, 1997), and should spur broader questions of how global networks will be governed in the context of weakening traditional control mechanisms in global economic exchange.

- The study or organizational power will increasing focus on control of (a) network nodes (Golden, 1993), (b) network flow (Castells, 1996), and (c) communal resources (Flanagin, Monge & Fulk, 1999). A related concern is the tension between maintaining communally shared resources and pressures toward privatization of resources by subsets of the networks (Fulk et al., 1996; Kumar & van Dissel, 1996).

Theoretical Trajectories

Monge and Contractor (in press) identify ten families of theories that offer potential for explaining emergent networks, including some classic network theory such as structural theory of action (Burt, 1982) and some creative new applications of other such as collective action, cognitive social structures, contingency theories, and evolutionary theories. Of these theoretical traditions, one that holds considerable promise for global network forms is evolutionary theory, specifically the *co-evolution of complex systems*. Coevolutionary premises are consistent with explanations posited to date regarding the rise of the network organization, in that organizational form development is theorized as path and history dependent, recursive and mutually causal with the environment, non-linear, and involves embedded systems (Lewin & Volberda, 1999). Key concepts in the coevolution of complex systems that are particularly relevant for organizational networks are chaos, self-organization, and emergence.

Chaos premises are increasingly being applied to understand hyperflexible network structures. Complex systems on the border between order and chaos ("the edge of chaos"; Prigogine & Stegners, 1984) are posited to be most suitable for uncertain and unpredictable environments (Kauffman, 1993). Chaos principles also rely on the notion of magnification of small changes, similar to what Held et al. (1999) call the *impact propensity* of global networks. With increasing interconnectedness in organizational networks and escalation of the velocity of transactions that flow through them, local events can have major global impacts, and even quite distant events can have local impacts.

Complex systems logic incorporates concepts of *self-organization*. Self-organization appears at the edge of chaos as an adaptive response (McKelvey, 1999), and has been shown to be central to discussions of order in network exchanges (e.g., Kauffman, 1993). Complexity theory offers a base upon which to examine claims such as Held et al.'s (1999) assertion that exchanges in global networks are tending toward more self-organization.

A related concept is that of *emergence*. Complex patterns may arise from a few simple rules for a system coevolving with its environment. Emergence, a concern of network scholars for some time, has begun to garner considerable attention among those interested in coevolution and organizational forms (witness even the creation of a new journal with the title, *Emergence*). With flexible organizational networks that serve as communal resources, emergence and dissipation of links and subnetworks becomes a critical, even defining concern.

Methodological Challenges

Communication network scholars have developed sophisticated methods for identifying and analyzing organizational networks (see Monge & Contractor, 1988; Wasserman & Faust, 1994). Nevertheless, much work remains on tracking network features both over time and in relation to alternative theoretical models of the coevolutionary process. The development of new and highly sophisticated network methods, such as $p*$, which decomposes a network into its component parts as predictors of other outcomes, continues apace (e.g. Wasserman & Pattison, 1996). The challenge will be to extend the capabilities of these methods to track over time processes that are coevolutionary, self-organizing, chaotic, multi-level, emergent and hierarchically nested (Baum & Singh, 1994; Baum, 1999).

Lewin and Volberda (1999) note that much more sophisticated quantitative methods are needed beyond time series and hazard models. Even where time series methods are used new types of data are needed, such as microstate adaptation sequences (McKelvey, 1997). Event history analysis requires data on technological innovations, as well as regulatory and demographic changes.

A method that offers considerable promise for approaching the ability to model the complexity of co-evolutionary processes is computational organizational modeling (Carley, 1995; Hyatt, Contractor & Jones, 1997; Levitt, Thomsen, Christiansen, Kunz & Nass, 1999). Drawing on theories of networks and interdependence in organizations, such models permit analysis of emergent structures in response to changes, initial conditions, and alternative models of evolutionary processes. Expansion of such models to include components of the other families of theories offers considerable promise (Contractor, Carley, Levitt, Monge, Wasserman, Bar, Fulk, Hollinghead & Kunz, 1999).

Studies in the new network paradigm should not be confined to quantitative ones. Research grounded in premises from structuration theory often offers more in-depth and qualitative windows on understanding the interplay of technologies, contexts and organizational networks. Winter and Taylor's (1999) research on preindustrial, industrial, and protoindustrial developments exemplifies the enormous value of historical research. Weick's (1998) work on improvisation also captures key elements of the fundamental concept of emergence in communal settings.

Conclusion

Exciting new directions await scholars in the area of organizational networks in the new millennium. With the network as the dominant form for organizing economic and social activity and the preeminent metaphor for making sense of organizations, the potential is vast and the vista breathtaking.

References

Barley, S. R. (1990). The alignment of technology and structure through roles and networks. Administrative Science Quarterly, 35, 61-103.

Baum, J. & Singh, J. (1994). Organizational hierarchies and evolutionary processes: Some reflections on a theory of organizational evolution. In J. Baum & J. Singh (Eds.), Evolutionary dynamics of organizations. New York: Oxford University Press.

Brusco, S. (1982). The Emilian model: Productive decentralization and social integration. Cambridge Journal of Economics, 6, 167-184.

Burt, R. (1982). Toward a structural theory of action: Network models of stratification, perception, and action. New York: Academic Press.

Carley, K. (1995). Computational and mathematical organization theory:Perspective and directions. Computational and Mathematical Organizational Theory, 1 (1), 39-56.

Castells, M. (1996). The rise of the network society. Oxford: Blackwell.

Contractor, N., Carley, K., Levitt, R., Monge, P., Wasserman, S., Bar, F., Fulk, J., Hollingshead, A. & Kunz, J. (1999). Co-evolution of knowledge networks and 21st century organizational forms: Computational modeling and empirical testing. Working paper, University of Illinois.

Flanagin, A.J., Monge, P.R. & Fulk, J. (1999). The value of formative investment in organizational federations. Manuscript submitted for publication. URL: http://www.spcomm.uiuc.edu:100/contractor/flanform.htm

Friedlander, A. (1999). Infrastructure: The utility of past as prologue. In Fostering research on the economic and social impacts of information technology: Report of a workshop (pp. 165-187). National Academy Press: Washington, D.C.

Fulk, J. & DeSanctis, G. (1999). Articulation of communication technology and organizational form. In G. DeSanctis & J. Fulk (Eds.), Shaping organizational form: Communication, connection and community (pp. 5-32). Newbury Park, CA: Sage.

Fulk, J., Flanagin, A., Kalman, M., Ryan, T., & Monge, P.R. (1996). Connective and communal public goods in interactive communication systems. Communication Theory, 6, 60-87.

Golden, J. (1993). Economics and national strategy: Convergence, global networks, and cooperative competition. The Washington Quarterly, Summer, 91-113.

Gomes-Casseres, B. & Leonard-Barton, D. (1997). "Alliance Clusters in Multimedia." In D. B. Yoffie (Ed.), Competing in the Age of Digital Convergence (pp. 325-369). Boston: Harvard Business School Press.

Grabher, G. (1993). The embedded firm: One the socioeconomics of industrial networks. London: Routledge.

Held, D. , McGrew, A. Goldblatt, D. & Perraton, J. (1999). Global transformations: Politics, economics and culture. Stanford, CA: Stanford University Press.

Hirst, P. & Thompson, G. (1996). Globalization in question: The international economy and the possibilities of governance. Cambridge: Polity Press.

Huber, G. P. (1990). A theory of the effects of advanced information technologies on organizational design, intelligence, and decision making. In J. Fulk & C. W. Steinfield (Eds.), Organizations and communication technology (pp. 237-274). Newbury Park, CA: Sage.

Hyatt, A., Contractor, N. & Jones, P. (1997). Computational organizational network modeling: Strategies and an example. Computational and Mathematical Organizational Theory, 4, 285-300.

Jones, C., Hesterly, S., & Borgatti, S. (1997). A general theory of network governance. Academy of Management Review, 22 (4), 911-945.

Kalman, M. , Fulk, J. & Monge, P. (2000). Resolving communication dilemmas: A motivational model for information contribution to discretionary databases. Manuscript submitted for publication.

Kauffman, S. (1993). The origins of order: Self-organization and selection in evolution. Oxford: Oxford University press.

Kumar, K., & van Dissel, H. G., (1996). Sustainable collaboration: Managing conflict and cooperation in interorganizational systems. MIS Quarterly, September, 279-300.

Levitt, R., Thomsen, J., Christiansen, T. R., Kunz, J., Jin, Y., & Nass, C. (1999). Simulating project work processes and organizations: Toward a micro-contingency theory of organizational design. Management Science, 45(11), 1479-1495.

Lewin, A. & Volberda, H. (1999). A framework for research on strategy and new organizational forms. Organization Science, 10 (5), 519-534.

MacKenzie, D., & Wajcman, J. (1985). The social shaping of technology: How the refrigerator got its hum (pp. 2-25). Philadelphia, PA: Open University Press.

McKelvey, W. (1997). Quasi-natural organization science. Organization Science, 8 (4) 352-380.

McKelvey, W. (1999). Self-organization, complexity catastrophe, and microstate models at the edge of chaos. In W. McKelvey (Ed.), Variations in organization science. Thousand Oaks: Sage.

Monge, P.R. & Contractor, N.S. (in press). Emergence of communication networks. In F. Jablin & L. Putnam (Eds.), New handbook of organizational communication. Newbury Park: Sage.

Monge, P. & Contractor, N. (1988). Communication networks: Measurement techniques. In. C. Tardy (Ed.), A handbook for the study of human communication: Methods and instruments for observing, measuring, and assessing communication processes. Norwood, NJ: Ablex.

Monge, P.R. & Fulk, J. (1999). Communication technology for global network organizations. In G. DeSanctis & J. Fulk (Eds.), Shaping organizational form: Communication, connection and community (pp. 71-100). Newbury Park, CA: Sage.

Monge, P., Fulk, J., Kalman, M., Flanagin, A., Parnassa, C. & Rumsey, S. Production of collective action in alliance-based interorganizational communication and information systems. Organization Science, 9, 3, 411-433.

Nohria, N., & Eccles, R.G. (1992) Networks and organizations: Structure, form, and action (pp. 471-490). Boston, MA: Harvard Business School Press.

Norman, R. & Ramirez, R. (1993, July-August). From value chain to value constellation: Designing interactive strategy. Harvard Business Review, 65-77.

Pool, I. (1983). Forecasting the telephone: A retrospective technology assessment of the telephone. Norwood, NJ: Ablex.

Powell, W.W. (1990). Neither market nor hierarchy: Network forms of organization. In B. Staw (Ed.), Research in organizational behavior (Vol. 12, pp. 295-336). Greenwich, CT: JAI Press.

Prigogine, I. & Stegners, I. (1984). Order out of chaos: Man's new dialogue with nature. New York: Bantam.

Quinn, J.B. (1992). Intelligent enterprise. New York: The Free Press.

Reich, R. (1991). The work of nations. New York: Vintage Books.

Snijders, T. & Bosker, R. (1999). Multilevel analysis: An introduction to basic and advanced multilevel modeling. Newbury Park: Sage.

Strange, S. (1996). The retreat of the state: The diffusion of power in the world economy. Cambridge: Cambridge University press.

Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. Cambridge: Cambridge University Press.

Wasserman, S. & Pattison, P. (1996).Logit models and logistic regressions for univariate and bivariate social relations, I: An introduction to Markov random graphs and p*. Psychometrika, 60, 401-425.

Weick, K. (1990). Technology as equivoque: Sensemaking in new technologies. In P. S. Goodman and L. S. Sproull (Eds.), Technology and organizations (pp. 1-44). San Francisco, CA: Jossey-Bass.

Weick, K. (1998). Improvisation as a mindset for organizational analysis. Organizational Science, 9 (5), 543-555.

Winner, L. (1986). The whale and the reactor: A search for limits in an age of high technology (pp. 3-18). Chicago: The University of Chicago Press.

Winter, S. & Taylor, S. L. (1999). The role of information technology in the transformation of work: A comparision of postindustrial, industrial, and protoindustrial organization. In G. DeSanctis, G. & J. Fulk, Shaping

organizational form: Communication, connection, and community pp. 101-127.
Newbury Park, CA: Sage.

Ybarra, J. (1989). Informationalization in the Valencian economy: A model for underdevelopment. In A. Portes, M, Castells & L. Benton (Eds.), The informal economy. Baltimore, MD: Johns Hopkins University Press.