MANAGING COLLABORATIVE INNOVATION: THE EVOLUTION OF INTER-ORGANIZATIONAL TECHNOLOGY COLLABORATIONS

JASON P. DAVIS
Department of Management Science and Engineering
Stanford University
423 Terman Engineering
Stanford, California 94305
jpdavis@stanford.edu

May 16th, 2006
Brief Research Summary
Dissertation Committee: Kathleen Eisenhardt (Primary Advisor), Riitta Katila, and Mark Granovetter

Research Interest and Rationale

Scholars and practitioners have long been interested in successful innovation. Research has noted internal product development and acquisition as paths for innovation. But when markets are fast-paced and technologies are intertwined, the likelihood that any one firm can possess sufficient resources to develop the best innovations is unlikely (Powell et al., 1996; Ahuja, 2000a). Therefore, collaboration across firms is an important path to innovation. In fact, considerable literature indicates that technology collaborations between firms can generate innovative new products and businesses, and increase firm performance (Powell, Koput, and Smith-Doerr, 1996; Stuart, Hoang, and Hybels, 1999; Ahuja, 2000; Baum, Calabrese, and Silverman, 2000; Dyer and Nobeoka, 2000).

A striking feature of the research on inter-organizational collaboration, however, is that it rarely examines the collaboration process. Instead, it relies primarily on archival data to study the formation of collaborations (Gulati, 1995a; Ahuja, 2000b), effects of antecedent conditions on collaborations (Dussage et al., 2000; Kale et al., 2002), and impact of collaborations on firm performance (Stuart, 2000; Baum et al., 2000). Although a few studies take a process view (Hamel, 1991; Larson, 1992; Doz, 1996), these studies typically characterize collaboration as either a competitive learning race between the partners or as a cooperative evolution into a trusting and integrated relationship. As a result, there is little insight into the competitive-cooperative tension that is fundamental within these relationships, or into issues such as firm strategy, the distribution of intellectual property (IP), power dynamics, managerial roles, and changing market conditions that are likely to be influential. In addition, this research is

not focused on technology collaborations, and is limited by some methods issues (Das and Teng, 2000). Thus, while considerable research supports the importance of inter-organizational collaboration, *how* effective technology collaborations evolve is unexplored.

The primary objective is to explore how firms engage in effective inter-organizational collaborations. Specifically, I propose to focus on technological collaborations in the context of major established firms in the computing and communications industries. I chose *technology collaborations* because they involve the creation of science- and engineering-based innovations for use in novel products, technical platforms, and businesses. As such, they are central to a broad concern with innovation and economic growth, and yet are relatively unstudied. From a research perspective, technology collaborations are attractive because they have discrete start and end times, making it possible to track the entire collaboration from inception. This enables more accurate observation of the collaboration process and measurement of performance. In addition, technological collaborations are attractive because they highlight the inherent tension within collaborations especially well. That is, they require deep cooperative interaction with significant competitive implications. The uncertain nature of technical development may also reveal unexpected contrasts with more routine collaborations.

The setting is the *computing and communications industries* (e.g., semiconductors, networking, software, and Internet security). Given the convergent and interdependent nature of these industries (Bresnahan and Greenstein, 1999), technical collaborations (e.g., collaborations that combine mobile and microprocessor

technologies) are essential. From a research standpoint, collaborations among these industries are sufficiently complicated to create theoretical interest, but of moderate duration (e.g., roughly 18 months) to enable effective observation.

Overall, the proposed study asks: how do organizations effectively collaborate? This question is of growing importance for business and government leaders operating in dynamic, global industries. By using inductive logic and in-depth case studies, this research is likely to examine technology collaborations with rich granularity and scope. Such an approach is likely to generate novel and accurate findings regarding effective technology collaboration, and contribute to the innovation, strategy, and organizational theory literatures.

Methods: Design, Setting, and Data Analysis

Given the limited understanding of how inter-organizational collaborations occur, this study relies on an inductive, grounded theory-building approach (Glaser and Strauss, 1967; Eisenhardt, 1989) in which data are used to develop theory. Inductive logic is appropriate in research such as this where there are no clear a priori hypotheses, and likely constructs (e.g., synchronization) are not well-understood. This method expands the opportunity to develop truly unexpected findings, and is particularly appropriate for uncovering complicated temporal patterns that are likely within collaborations.

The research design is a multiple-case, embedded study. Multiple cases allow a replication logic in which cases are viewed as a series of experiments. Each case serves to confirm or disconfirm the inferences drawn from the others (Yin, 1994). A replication logic typically yields more generalizeable and accurate results than do single case

studies. Cases are also particularly useful for studying longitudinal, non-linear relationships because they permit an understanding of the mechanisms that may underlie seemingly contradictory views (Hedstrom and Swedberg, 1998). The study also uses an embedded design – i.e., multiple levels of analysis including: organization, collaboration, and industry. Although complex, an embedded design improves the likelihood of inducting richer and more reliable models (Yin, 1994).

Specifically, I use an in-depth, comparative case study of 8 technology collaborations by established firms in the computing and communications industry. By technology collaborations, I mean collaborations in which the primary goal is the development significant technological innovations that are likely to lead to new products and potentially, novel platforms, and businesses. The sample includes eight technology collaborations between established firms with significant size. These firms are attractive because they typically have the resources necessary to undertake significant innovations.

I chose the computing and communications industry (e.g., semiconductor, computing, networking, internet, and telecommunications) as the research setting because of their importance to the national economy and their emphasis on technology innovation. Moreover, given the interdependence among the various industries, rapid pace, and uncertainty, technology collaborations are an important innovation path within these industries (Mowery, 1996).

As is typical in inductive, grounded theory-building, I will first write individual case histories (Eisenhardt, 1989). Each case history will describe (1) the chronological story of the collaboration project, (2) key constructs including experiences such as mistakes and experiments, (3) key activities such as the formation and progress of

alliance relationships and personnel changes, and (4) outcomes including technological milestones and breakthroughs. After the individual case histories are written, they will be used for two types of analysis: within-case and cross-case. As is typical in inductive, grounded theory-building, cross-case analysis involves looking for the emergence of similar themes and constructs across multiple cases (Eisenhardt, 1989; Miles and Huberman, 1994). The analysis will involve iterations between data, theory, and later extant research until a strong match between data and the theoretical framework emerge.

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