
Chapter 9

Virtual Teams: High-Tech Rhetoric and Low-Tech Experience

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Abstract

Advances in telecommunications and computer technology have nourished visions of ideal technology use. One such vision is the concept of virtual teams. The rhetoric of virtual teams, like the rhetoric of other computerization movements, makes claims to greater efficiency, a better organization, and happier people. With virtual teams, managers reach across the geographically dispersed organization to staff project teams with the best experts at least cost. Employees enjoy working at a distance seamlessly, supported by technology. We describe the experiences of a professional, geographically dispersed organization that had to work across sites and might have nurtured virtual teams. Instead, the rhetoric of collaboration, not technology, inspired top management. Project managers did not create virtual teams, believing them to incur severe coordination costs. To foster collaboration, the company changed

incentives, reorganized, and moved offices closer together. The company adopted networking technologies slowly and reluctantly. This low-tech company adapted successfully in an environment of high-tech advice and a cultural value for technology. The rhetoric of virtual teams seems to have shifted significantly in the last decade, perhaps in the face of such low-tech experiences.

Introduction

Recent advancement in computer and collaborative technologies has promoted growing interest in distributed work (Hinds & Kiesler, 2002). More and more organizations are becoming virtual and operate with businesses and employees dispersed in multiple geographic locations. As a result, project teams are increasingly composed of members who are spread across geographic and organizational boundaries. These dispersed project teams play a vital role in bringing together an optimal mix of expertise to accomplish joint objectives, to solve complicated problems, or to develop innovative solutions.

Although there are many ways of structuring distributed work (Grinter, Herbsleb, & Perry, 1999), the notion of distributed work from the 1980s to the present has been represented by concepts such as “virtual teams.” Virtual teams are temporary work groups whose members are geographically separated rather than collocated but who work together using networked technologies to communicate and to share resources. The popular literature began to emerge in 1993, although the first book with the concept in the title was *Virtual Teams* by Jessica Lipnack and Jeffrey Stamps, published in 1997. A sizeable popular literature then followed. The literature included extravagant claims, for example, that virtual teams make companies more flexible (Townsend, DeMarie, & Hendrickson, 1998) and overcome the constraints of distance (Cairncross, 1997).

The concept of virtual teams has roots in the rhetoric of the internetworking computerization movement (CM) (Iacono & Kling, 2001) in which the meaning of the Internet has been built up or “framed” in macro-level discourses of the government, media, and scientific disciplines. These frames have mobilized large-scale support suggesting specific ways to use the technology within micro-social contexts such as in organizations. Iacono and Kling (2001) characterized the internetworking CM as a general CM spawning specific CMs such as “virtual teams” or “collaborative work.”

During the early days of the virtual teams CM, organizations in practice gradually bought into the rhetoric and began adopting collaborative technologies in the hope of reducing time to market, minimizing costs, fostering innovation, and increasing organizational flexibility. As

technologies become more and more diversified and sophisticated, organizations face the challenge of simultaneously understanding the role and impact of collaborative technologies while struggling to integrate these technologies into their organizational practices. Employees working in these organizations, likewise, strive to adapt to the technologies as they learn about their social and technical usage (Knoll & Jarvenpaa, 1995).

These observations led us to consider three sets of questions. First, who was responsible for the rhetoric of virtual teams, who adopted it, and how did this rhetoric change over time? Second, what kind of role does advanced technology play in enabling and facilitating virtual team arrangements? Third, to what extent did the rhetoric of the virtual teams CM motivate action in organizations and how did managers and professionals appropriate virtual team ideas into organizational practices? To answer these questions, we first examined the virtual teams rhetoric and traced the changes in the rhetoric across time by doing a content analysis of eighty-one popular books and magazine articles on the topic of virtual teams. We then conducted a case study examining the use of virtual teams in a professional service organization, to illustrate how rhetoric actually motivates action and gets transformed into organizational practices with or without the assistance of advanced technologies, and to highlight the gaps existing between rhetoric and reality.

In this chapter we first discuss the historical trajectory of the rhetoric behind the virtual teams CM. Next, we present our case study results of how an organization engaged the use of virtual teams, and instead of following the visions of the virtual teams rhetoric, adopted low technology solutions to virtual teaming.

Virtual Teams as Rhetoric

The concept of virtual teams has roots in the rhetoric of the internetworking CM of the late twentieth century, particularly in two ideas or “frames” of the internetworking CM: groups aided by technology, and death of distance. Iacono and Kling (2001) identified four layers of public discourse in which technological action frames are circulated: government, scientific disciplines, media, and organizational and professional discourses. Technological action frames that are promoted in the discourse of government and scientific disciplines are later adopted by individual organizational settings and specific professional groups (Iacono & Kling, 2001) and this adds operational specificity to the CM rhetoric. In this section we show how the virtual teams rhetoric spread in management consulting and academic literature, later influencing the development and use of virtual teams technology by technology developers and technology companies.

Early visions of groups aided by technology are represented in terms like “groupware” and “group decision support systems,” that is, computer technology to help groups make expert decisions and share leadership (Grudin, 1994). Group decision support systems were first developed in the late 1960s and 1970s at military installations; 1980s versions were developed at Southern Methodist University, the University of Arizona, and the University of Minnesota. In 1989, IBM marketed TeamFocus as a product. It was used mainly to support collocated meetings for brainstorming.

Early visions of working across distance were represented in public discourse using terms like “information highway,” “telecommuting,” and “distant work” as technological action frames that promoted people and organizations to invest in collaborative technologies (Iacono & Kling, 2001). The virtual teams rhetoric circulating in early versions of public discourse particularly emphasized the organizational uses of e-mail and distribution lists, which would transform organizations and free employees to work at any location.

After 1995, with the dissemination and technical advances of the Internet, these early vocabularies gave way to terms like “computer-supported cooperative work” (CSCW), “virtual teams,” and “online communities,” each encompassing forms of geographically distributed collaboration. The idea of distributed collaboration harked back to the early days of networking, when Roxanne Hiltz and Murray Turoff published *The Network Nation: Human Communication Via Computer* in 1978, about group collaborative work at a distance.¹ “Virtual teams” neatly captured the idea of collaboration over distance in groups using technology. The virtual teams discourse as a topic in technology development circles started cropping up in academic conferences such as the International Conference on Information Systems (ICIS) and CSCW in the 1980s. The first three CSCW conferences were attended primarily by technologists from software product development companies (almost 40 percent) and technology researchers at universities (30 percent); a minority were from the telecommunications sector, social sciences, and business (5–10 percent) (Grudin, 1994, p. 21). In several of the ensuing years, panels on the CSCW program discussed the failures of CSCW to support real or virtual teams, but invariably panelists argued that when technology improved, CSCW would be a success. From the mid-1990s to the present, technology companies and entrepreneurs marketed many new technology ideas within the framework of virtual teams, and management consultants and the media picked up the idea as well.

The public discourse on the virtual teams CM in the form of management consulting literature on virtual teams, and the media that disseminated this literature, took off seriously in the 1990s as employees got easier access to the Internet, and work organizations incorporated

networking and online facilities into routine office communications. The management consulting rhetoric surrounding virtual teams appears to have closely resembled rhetoric surrounding management fads and fashions, such as process reengineering, self-organizing teams, quality circles, management by objectives, and total quality management (e.g., Abrahamson, 1996; Hackman & Wageman, 1995; Zbaracki, 1998). That rhetoric has two important attributes: (1) statement of a serious business problem, and (2) excessive claims (including success stories) that the new approach solves this problem.

An example follows. According to the Wikipedia, the online community encyclopedia, virtual teams help organizations overcome geographic distance and allow them to hire and retain the best people regardless of location. More specifically, companies need virtual teams for the following reasons:

- Best employees may be located anywhere in the world.
- Workers demand personal flexibility.
- Workers demand increasing technological sophistication.
- A flexible organization is more competitive and responsive to the marketplace.
- Workers tend to be more productive, i.e., they spend less time on commuting and travel.
- The increasing globalization of trade and corporate activity.
- The global workday is 24 vs. 8 hours.
- The emergence of environments that require inter-organizational cooperation as well as competition.
- Changes in workers' expectations of organizational participation.
- A continued shift from production to service/knowledge work environments.
- Increasing horizontal organization structures characterized by structurally and geographically distributed human resources.

This problem statement implies that organizations need to adapt to major changes in the nature of the firm and the needs of "the best" employees. Virtual teams are a solution in three ways: The organization will be more efficient, employees will be empowered and more effective, and business processes will be transformed to create a more successful organization. Thus: "The virtual team will enable organizations to become more flexible by providing the impressive productivity of team-based

designs in environments where teamwork would have once been impossible” (Townsend, et al., 1998).

Communities Adopting Virtual Teams Rhetoric

Several communities beyond that of management consultants adopted the rhetoric of virtual teams. An important community was that of technology developers and technology companies. The rhetoric of virtual teams helped developers and companies sell themselves on investments in new virtual teams technology, and helped these same companies sell technology-based support and consulting services to businesses. Thus, by 2000, a good number of large companies were installing centralized services (and hiring consultants) for “knowledge management,” including intranets, shared task management software, shared calendars, discussion databases, intelligent document repositories offering library services, and virtual workspaces. Software products to support virtual teams included IBM’s Lotus Notes, Microsoft’s NetMeeting, Livelink, OpenText, Intraspect, Documentum, eRoom, and NetGroove, the latter created in 1997 by Ray Ozzie, a creator of Lotus Notes. “It’s all you need to get your files, projects, meetings, and data all in one place so your team can get on the same page” (from NetGroove’s Web page, www.groove.net).

In the technology community, the rhetoric of virtual teams expanded over time to embrace newer technologies, including those loosely tied to the assumptions underlying original arguments for virtual teams (see Zbaracki, 1998). For example, mobile, wireless devices would aid workers “on the go,” implicitly acknowledging the continuing role of travel in collaboration. (Virtual teams were supposed to reduce travel.) All of the books and articles we examined advocated adopting the latest computer-based technologies and applications, ranging from instant messaging to palm-top devices.

Virtual teams rhetoric also was embraced and adapted by policymakers in the science and technology arena. An idea closely related to that of virtual teams is “collaboratory.” A collaboratory is an organization and online system for supporting collaborative science. In the late 1980s, technologists and technology analysts such as Tom Malone (Olson, Malone, & Smith, 2001) (the economic value of cooperative decentralized systems) and William Wulf (Kouzes, Myers, & Wulf, 1996) (collaboratories for science) had published policy papers on collaboratories. Several federal initiatives followed, such as the Department of Energy’s Collaborative Laboratories (www.doecollaboratory.org/history.html).² Elite technology industry executives, computer scientists, and scientists such as Nobel prize winner Josh Lederberg (Lederberg & Uncapher, 1989), issued reports to the President (e.g., President’s Information Technology Advisory Committee (PITAC)) and to Congress, advocating

much higher federal investments in computing and collaborative research programs. NSF's Knowledge and Distributed Intelligence and Information Technology Research research programs are among many that followed, supporting collaborative interdisciplinary research teams. The virtual teams concept gained credibility within this milieu. Thus, the PITAC report of February 14, 1999, "Information Technology Research: Investing in Our Future," said:

Vision: Research is conducted in virtual laboratories in which scientists and engineers can routinely perform their work without regard to physical location—interacting with colleagues, accessing instrumentation, sharing data and computational resources, and accessing information in digital libraries. All scientific and technical journals are available on-line, allowing readers to download equations and databases and manipulate variables to interactively explore the published research.³

Another community that connected with virtual teams rhetoric was the academic community in the fields of organization science, information systems, and computer science. A number of scholars studied virtual teams and the innovations and behaviors surrounding distributed work (e.g., Iacono & Weisband, 1997; Jarvenpaa & Leidner, 1999). Although much of this work described the problems involved in dispersed projects and distributed work, the discourse in scientific disciplines added credence to the value of virtual teams. Thus, academic case studies and discussion of improvements in team process supported by technology probably legitimized virtual teams rhetoric.

In addition, theoretical developments in organization science gave implicit support to an ideal of virtual teams. The most prominent example of such theory is the knowledge-based view of the firm, which argues that the organization's most valuable resource and core competence is its ability to create, store, and apply knowledge to produce goods and services (Grant, 1996a, 1996b). Virtual teams are a natural corollary to the knowledge-based view. Utilizing expertise to deliver services to clients often requires bringing together specialized experts on a team (Demsetz, 1991). Hence the organization's competence is reflected not only in the quality and quantity of its individual experts but also in the integration of its knowledge resources through its deployment of people in project teams to create, respond to, and execute business opportunities (Grant 1996a, 1996b; Teece, 1998). Nordhaug and Gronhaug (1994) advocated a portfolio of competence—a collaborative blending of experts who, together, would perform better than competitors (see also Maister, 1993). Customers would value teams in which high expertise was

matched to project requirements (Miner, Crane, & Vandenberg, 1994). Such teams also would have a broad social network that would bring in other resources (Cummings, 2004) and buffer the firm from price competition (Podolny, 1993). In short, knowledge-based theory suggests that if managers create teams with members drawn from across the organization, with an optimal mix of expertise matched to customers' requirements, then the organization's competitive advantage will be improved. Within this framework, the virtual team, linked through technology, offers an unprecedented opportunity to combine knowledge resources effectively and for competitive advantage across time and space.

Virtual Teams Rhetoric Over Time

To investigate changes over time in the rhetoric of the virtual teams CM, we performed a content analysis of the main themes of 81 popular books and magazine articles whose topic was virtual teams. We searched Web sites, newspaper and magazine databases (e.g., ABI/INFORM, Lexis-Nexis), bibliographies, and both online and offline bookstores. Our keywords were "virtual teams," "global teams," "distant teams," "virtual collaboration," and "distributed work." We selected public discourse in the form of newspapers, trade magazines, and popular books that touted the benefits of virtual teams. We excluded book reviews and interviews with book authors, and any software application that would help virtual teams (e.g., videoconferencing) or that focused on technology as a product announcement, telecommuting, or distant education. Finally, because there were so many Web sites associated with management consultants on virtual teams and collaboration, we excluded them in order not to bias our sample.

In our analysis, we coded each book and article's main themes, then grouped these themes into four categories: efficiency, effectiveness, people, and challenge. Figure 9.1⁴ shows our results. The efficiency theme, emphasizing claims for saving money, spanning distance, reducing travel, cost savings, or time savings, was a major theme of 27 percent of the books and articles throughout the period of our sample, 1993 to 2004.

We coded claims of positive qualitative change either as "effectiveness" (transforming collaborations, doing new kinds of work) or "people" (recruiting better people, finding the best experts, empowering employees). Our data indicate that these claims peaked in the dot.com era, 1998–2001, and thereafter declined. By 2002, only 25 percent of the books and articles used effectiveness as a major theme and 10 percent used people. Also, we saw an increase in a major theme we call "challenge." In this category, we coded the books and articles that had as a major theme that virtual teams posed some difficulties, and proposed

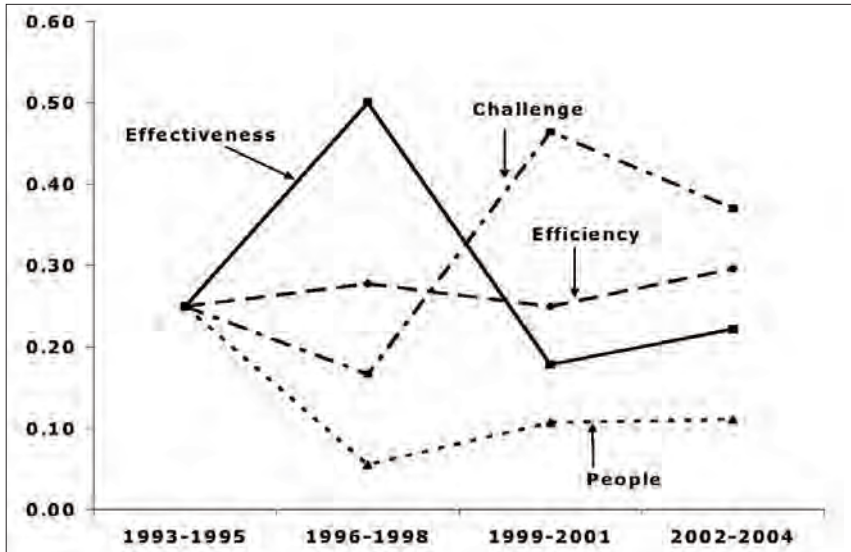


Figure 9.1 Major themes of 81 trade books and magazine articles about virtual teams

approaches for creating and managing successful teams. For instance, the Wikipedia entry cited earlier lists the “critical success factors of virtual teams” as:

- The existence of availability standards.
- Ample resources to buy and support state-of-the-art reliable communication and collaboration tools for all team members.
- The existence of corporate memory systems such as lessons learned databases.
- The existence of written goals, objectives, project specifications, and performance metrics; results orientation.
- Managers and team members with a better-than-average ability to accurately estimate.
- A lower-than-normal ratio of pushed to pulled information.
- Team communication is prioritized by the sender.
- Human resource policies, reward/recognition systems as well as career development systems address the unique needs of virtual workers.
- Good access to technical training and information on how to work across cultures.

- Training methods accommodate continual and just-in-time learning.
- There are standard and agreed-on technical and “soft” team processes.
- A “high trust” culture; teamwork and collaboration are the norm.
- Leaders set high performance expectations; model behaviors such as working across boundaries and using technology effectively.
- Team leaders and members exhibit competence in working in virtual environments.

Exhortations like these acknowledge numerous boundary conditions for virtual team success. Nonetheless, rhetorical excess is still evident in the use of buzz phrases such as “high trust” and “model behaviors,” and in the implication that problems are caused by factors extrinsic to the virtual teams approach itself. For example, in the list just given, managers are required to provide adequate training, adequate technology investment, and proper organizational incentives. Employees must have good motivation. Companies must have the right culture. The rhetoric of virtual teams continues while acknowledging difficulties of implementation.

Virtual Teams Case Study

While the rhetoric of virtual teams has moderated over time to acknowledge difficulties in ensuring virtual team success, the evidence from case studies suggests that some companies, particularly those involved in the invention or manufacturing of advanced technology, took arguments about virtual teams seriously (e.g., Boeing: Majchrzak, Malhotra, Stamps, & Lipnack, 2004). Nonetheless, our knowledge about how the arguments led or did not lead organizations to organize around virtual teams is still limited. Institutional theory suggests that symbolism can replace action in organizations (Meyer & Rowan, 1977). Previous studies of management-related rhetoric have shown how using rhetoric to gain legitimacy can support managerial practices that stay essentially the same (Zbaracki, 1998). If so, the rhetoric of virtual teams would have left behavior in organizations fundamentally untouched. We do not know whether few, some, or most organizations that adopted the rhetoric of virtual teams actually organized around virtual teams. We particularly do not know much about “low-tech” organizations, such as professional organizations not in the business of selling technology. To fill this gap, we traced and examined the impact of the virtual teams concept in a low-tech professional organization.

Research Setting

The organization we studied was American Institutes for Research (AIR). Founded in 1946, AIR is a successful, nonprofit organization that carries out applied research, consulting, and technical services. Business in AIR typically is conducted through team projects or engagements. Before AIR can do project work, it must sell its expertise to its customers within a highly competitive business environment. Its competitors include RAND, Educational Testing Service, SAS Inc., Research Triangle Institute, and Westat, among many others. Its customers include U.S. federal agencies such as the Department of Education and the Census Bureau, state governments, private and public companies, and foreign governments. From 1996 to 2002, AIR employed more than 1,000 employees at seven major locations and a number of minor locations. Its ability to win projects depends on pulling together project teams whose members have the expertise customers want for their projects.

Most of the data about AIR are drawn from a study of how managers decided to create dispersed projects from 1996 through 2000 (Boh, Ren, Kiesler, & Bussjaeger, 2005). We also conducted a follow-up analysis of dispersed projects in the organization in the first 10 months of 2002. Finally, from 1996 through 2002, we monitored and documented top management decisions that were meant to effect collaboration across sites. These decisions included changes in the incentive structure for collaboration, a major reorganization of the firm, geographic relocation of offices, and various modest investments in technology. We also interviewed managers and professionals about their experience of managing and working in dispersed project teams. In total, we interviewed five site directors and nine project managers for the period 1996–2000, and we conducted follow-up interviews with the CIO and four other project managers in 2002.

Rhetorical Influence

Around 1996, the Chief Operating Officer (COO) of AIR, at the behest of an AIR Board member, read a book on professional organizations by the management consultant David Maister (1993). The book articulated many ideas that surround the idea of virtual teams—company-wide utilization of expertise, collaboration, and teamwork. AIR had recently expanded through mergers and acquisitions from its original three major sites to six. Maister's book, and the support of some Board members, led the COO to recognize a problem the organization now faced: how to utilize expertise across the growing firm. The COO liked Maister's book so much he ordered copies for all senior managers in the firm and all Board members. With Board encouragement, AIR's top management set a goal of increasing collaboration and joint projects

across the organization's sites. A few years later, the COO became the CEO of the company and the driving force for collaboration across geographic locations.

Obstacles to Collaboration

At AIR, because projects were managed locally at each site, collaboration would require managers at different sites to draw on employees from other sites for their projects, or to give employees' time to a different site to work on a distant project. Professionals at AIR typically would not relocate to serve on a project team run by another site; they would work on the project at a distance. Thus, to improve collaboration, AIR managers would have to form dispersed projects in the mold of virtual teams.

Figure 9.2⁵ provides a snapshot of dispersed project work across sites in the six main AIR sites in 1996. Arrows pointing to one site from another site represent the number of dispersed projects at a focal site that drew on at least one professional employed by a source site. As the figure shows, dispersed projects were not part of normal business at AIR; in fact, they were rare—only 3 percent of all projects included anyone from another site and only 9 percent of employees worked on a project managed at another site.

Coordination Costs

Managers said they objected to dispersed projects because they carried high coordination costs, which included significant search and team assignment costs because managers did not have an intimate knowledge

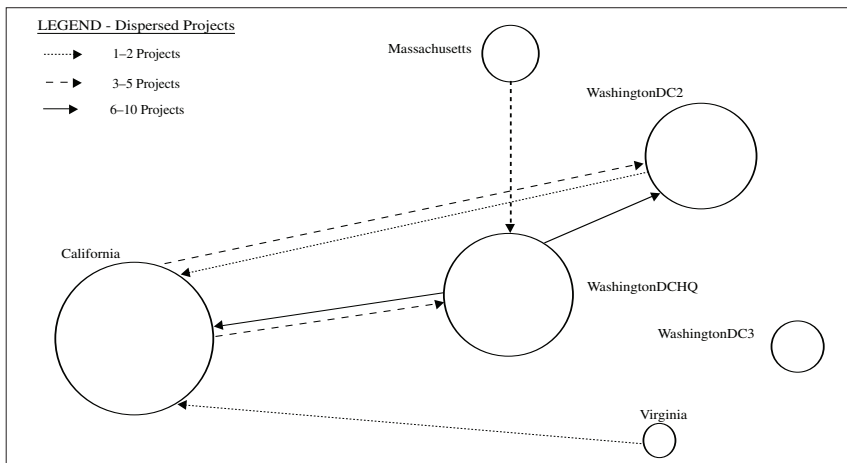


Figure 9.2 Collaboration across sites, 1996 ($N = 241$ projects, 6 sites)

of employees at distant sites (Finholt, 1993). Coordination costs also were involved in the management of interdependent but dispersed project work. Contrary to what is claimed in the virtual teams rhetoric, members of dispersed project teams spent more rather than less time traveling.

One [factor] is cost and collaborating across sites increases your costs significantly. ... [O]ne of the major people on this project lives in [city 2,800 miles away] so she has to fly in so we can all meet. That's really expensive. Phone calls, video-conferences, I mean they all add up, the amount of time you have to spend I think really talking through things where you could walk down the hall and have these communications. [Project Manager B]

The assumption, implied here, that talking is essential to project coordination, permeated all of our study interviews. Any financial or physical factor that delayed conversation or inhibited people from talking and sharing information was considered to be a significant cost, given that projects had to be completed within the constraints of the contracted work, on time, and within budget.

There are few hours in a day overlapping between our normal hours. ... It is not a big deal as long as you are not under immediate pressure to get information ... as long as you are not under crunch, say you need information within the next twelve hours, then that time can be too problematic. [Project Manager C]

Another source of coordination cost in dispersed projects was a perceived lack of direct awareness and control. Awareness and control were possible in local projects because project members and the project manager could observe project activity directly. In dispersed projects, managers could not directly oversee what was happening at other sites.

[Dispersed project work] can be difficult because when things start to go wrong, you catch it a lot later than you would if it was going wrong in your own office. It's harder to see things going on and when you do, it's harder to figure out exactly where the problem is and where to fix it. ... So for me one of the biggest disadvantages is the cost that [dispersed project work] adds to the project. [Project Manager D]

We thought some employees might be attracted to work at a distance because of the autonomy and flexibility it would permit. But interviewees said that few employees were eager to work on distant projects and nobody especially liked working with distant co-workers. The only advantage of distant work articulated in interviews was that it could offer an opportunity to enter a hot area or improve one's skills, reflected in this comment: "People get exposed to projects they wouldn't in the local office. It helps people's expertise and professional development" [Project Manager A].

Incentive Structure

Perhaps an even more serious obstacle to collaboration was the incentive structure at AIR. Although project and site managers rarely discussed these incentives openly, they were evident in annual reports of each site, which before 1997 never mentioned collaboration or AIR as a whole, and always discussed work at the site. The company, like many professional and technical organizations, was organized as distributed businesses, whereby each office (a site in a different geographic location) grew its own customer base and managed its own costs. The compensation and bonuses for site and project managers were tied to their site's revenue growth, the size of its net earnings (profit), and limiting its indirect costs. Because of the way staff time was counted in calculating growth, revenues, profit, and costs, collaborating with other sites had negative implications for managers. Labor costs, the main portion of revenues and profits, were assigned to the site managing each project. If a site created a virtual team project, bringing in employees from another site, the focal site would have the credit for the hours spent on the project by these team members whereas the source site, the home office of these team members, would lose these hours. Likewise, if a site was asked to send an employee to work on a distant project, that employee would be unavailable locally and the source site would not get credit for that employee's contributions to project revenues.

Managers' bias to staff projects at their own sites, because of the incentive structure of the company, also had ripple effects on the structure of work and expertise in the organization. Each site hired and developed the expertise needed most frequently to staff projects locally. As local work increased, local forms of expertise became each site's most frequently used type of expertise, well suited to existing customers. For example, sites with most of their customers from the education domain developed an expertise in this domain and hired experts with this domain in mind. By 1996 when we started the study, AIR's distribution of expertise across sites was tuned to local expertise and nonrandomly distributed. Each site specialized in one or two types of expertise (mainly

a domain expertise) and formed local projects that employed this frequently used expertise (see Boh et al., 2005).

Changing Incentives for Collaboration

When it became clear to management that the site-level reward structure undermined managers' motivation to collaborate across sites and failed to offset perceived coordination costs of dispersed projects, top management tried to change site directors' incentives. If a staff member worked on a project at a distant site, the earnings of that employee would accrue to the site that "owned" this employee. This change in the incentive structure lowered the barriers to collaboration and led to a noticeable increase in the number of dispersed projects and some encouraging project outcomes.

Figure 9.3 shows how the number of dispersed projects had increased by the year 2000. The company had created more collaborative dispersed projects, although these remained a minority of the overall work. The CEO's and other top managers' attitudes about collaboration had become increasingly positive as well. One reason for this attitude change was their experience with atypically high revenues and profits of dispersed projects. In other words, some collaborations were paying off (Boh et al., 2005). This fortuitous outcome occurred for two reasons. First, site and project managers self-selected to create and bid dispersed projects when the value and visibility of the projects were expected to be unusually high; otherwise they would not be willing to incur and bear the higher coordination costs associated with these projects. The opportunity to win

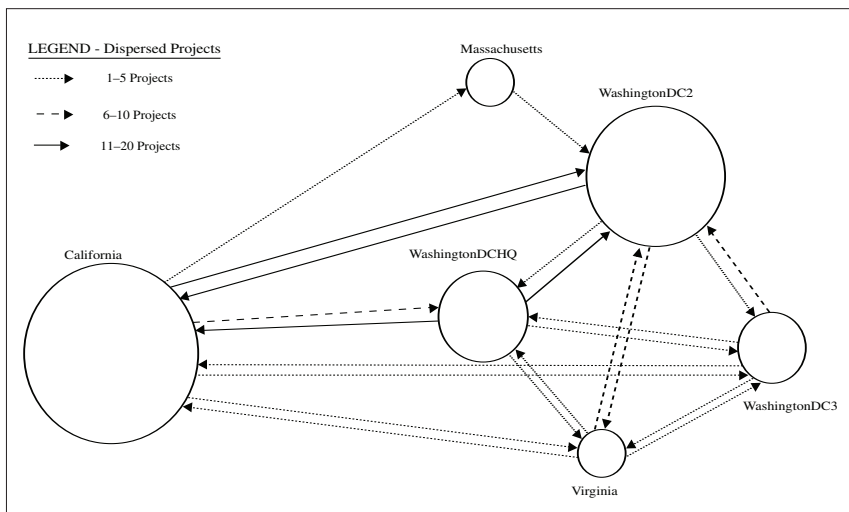


Figure 9.3 Collaboration across sites, 2000 ($N = 289$ projects, 6 sites)

a bid for a large, profitable, and visible project increased the likelihood that managers would overcome their reluctance to collaborate with other sites, either by enlisting other sites' staff members on the project to obtain desirable expertise, or by releasing a valued staff member to work on a project employed at another site. Second, managers were motivated to create dispersed projects when they could not satisfy customers using local frequently used expertise. In such cases, where a potential customer required scarce expertise unavailable locally, site and project managers, often with pressure from upper management, solicited these scarce experts from other sites. Such projects tended to attract high revenues and fees because, in customizing to the needs of the customer, the company was more competitive and price insensitive, and because the experts involved were highly paid professionals, which would have increased revenues as well.

I think the most useful thing [about dispersed project work] is the availability of expertise that you don't necessarily have in our office. [Project Manager C]

Interviewees said that management's view of the value of the bid could be a determining factor in whether the project obtained the most valuable staff, even considering additional costs that might be incurred.

A manager may see a business opportunity, and decide the organization should put a bid in on it, and the site manager agrees, and they put the bid in ... and that manager can pick from anybody in the whole [organization]—the best people to staff that piece of work. [Project Manager H]

[It's] largely dependent on the sort of profile and attention the project is getting. I think [with] a higher profile, more important project, I have better access to some people [at other sites] ... [compared with a] small, low profile project. [Project Manager G]

Changing Structure

In 2001, the CEO reorganized the company to create a structure that would better support cross-site collaboration. The new organization did away completely with geographic site-level directors and with financial record keeping by geographic categories, except as required by government contracting requirements. (The CEO reported to one of the authors: "As long as we were keeping track of site-level revenues, nothing fundamental was changing. We had to do away with [these

records].”) The new organization consisted of two major divisions that crossed geographic locations, headed up by two division chiefs, and programs (comprised of domain-related projects) within each division. The reorganization acknowledged management’s goal of fostering collaboration regardless of geography. The CEO announced that all measurements of geographically based financial performance at the site level would cease.

The CEO decided to move three sites in Washington, DC into one building to create closer physical ties in the organization. In doing so, he recognized the value of collocation. Indeed, he would have moved the Maryland office as well if an existing lease had not precluded such a move. The CEO also gave notice that collaboration would be the new way of doing normal business. These pronouncements were meant to ensure more collaboration across locations, although managers reported that California and Massachusetts still had “different cultures.” The CEO encouraged the new division directors to make many trips to California. These directors and managers of programs that spanned Washington and California held monthly and sometimes weekly planning meetings across sites.

By 2002, collaboration across sites had increased to almost 30 percent of all projects run by the six original sites in our study. Figure 9.4, covering just 10 months of 2002, shows how these collaborations were patterned. Collaboration increased in Washington across the three (former) offices. California continued to collaborate with Washington but was more likely to send people out than bring them in. This trend may reflect the fact that business in Washington grew (in two sites, especially) more than it did in California, putting more pressure on staff in the former to fill positions. Figure 9.5 shows collaboration across the original sites plus new domestic sites. These sites reflect acquisitions, business in new areas, and the hiring of experts who could not relocate. Overall collaboration across sites (including former sites now collocated in the same building) was more dense, almost 40 percent of all projects, even as the organization was adding sites in different states and branching out into more domain areas. These data suggest that collaboration had become better accepted and integrated into the normal business of the company. The original idea of virtual teams had evolved into workable arrangements for distributed work.

Role of Technology

AIR achieved a goal of collaboration without much assistance from technology, contradictory to what is suggested in the virtual teams rhetoric. AIR, as compared with companies such as Microsoft, Sun, IBM, and other technology firms, was a latecomer to networking technology and slow to invest in the technology resources needed to support virtual

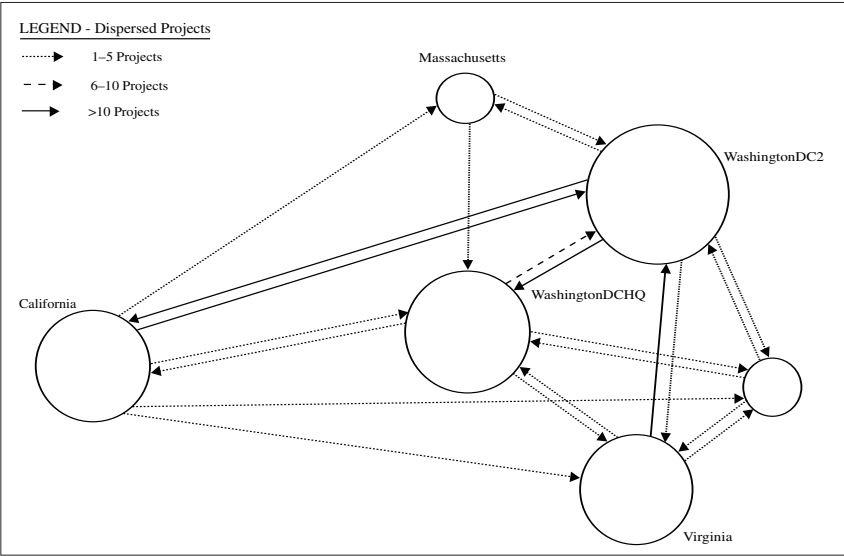


Figure 9.4 Collaboration across sites, 2002 ($N = 222$ projects [10 months], 6 sites)

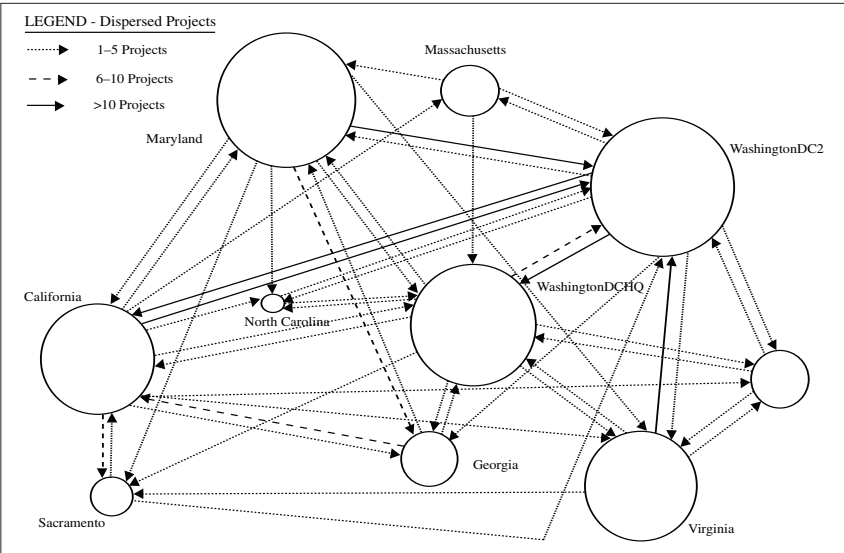


Figure 9.5 New domestic sites and collaboration across all sites, 2002 ($N = 273$ projects [10 months], 10 sites)

teams. AIR staff did not resist technology, but were not enthusiastic about it either. The company's California office implemented a local area network (LAN) in the 1980s, and the New England office was an industry leader in usability engineering. Upper management did not consider technology and technology integration to be a solution to organizational issues or to contribute significantly to business. The company did not appoint a CIO until 2000 and rather than conducting a national search, management moved a former site director with an interest in technology into the position. Despite reporting directly to the CEO, this person lacked power and influence.

Even by 2003, resources for sharing files and collaborative work spaces were "primitive" (from interview with CIO, July 2003). While the use of videoconferencing increased after the restructuring in 2002, most of the other technologies were still in an early stage of development. For instance, a shared calendar of events was put on the intranet only in 2003, and in the same year a shared database for obtaining information about professional staff experience and expertise was still incomplete. Virtual teams continued to depend predominantly on e-mails, telephone calls, and audioconferencing for distributed work. There were no sophisticated technologies such as team rooms or application sharing for cross-site collaboration. In 2003, each site was still on a different LAN; hence shared folders existed for employees only within the same site.

Organization structure for technology development and support also grew piecemeal. By the 1980s, AIR had an information technology (IT) department for computer support and programming, especially support for statistical work. In the mid 1990s, a separate telecommunications department was established. Finally, AIR appointed a small group to work on the intranet. Development and control of the intranet, staffed by Web site developers, were separate from the IT department, staffed by support personnel, and both were separate from telecommunications. Thus, AIR did not treat shared information, voice, and data communication as interrelated resources.

Throughout the period of our observations, managers did not see a strong connection between investments in technology and collaboration. Thus, as compared with the rhetoric of virtual teams, at AIR, technology and technology support were given a far lower priority. The CEO authorized investments in technology only as they could be demonstrated to support business operations. Because dispersed project collaborations were comparatively rare, the firm's major work did not require advanced technology, and the link to business success was not evident, the company avoided major investments in collaborative technology.

Discussion of the Case Study

Our study of AIR revealed a low-tech organization that embraced some key arguments of virtual teams rhetoric but without the technology dimension. Namely, management and employees, over time, adopted the belief that their geographically dispersed company would need to collaborate across sites and that dispersed team projects would utilize expertise effectively. Collaboration over distance did increase, as shown in Table 9.1.

Table 9.1 Distributed Collaboration Over Time

	Number of dispersed projects	Percentage of dispersed projects	Number of distant members	Percentage of distant members
1996	8	3%	80	9%
2000	38	13%	158	11%
2002 (10 months)	67	30%	571	22%

However, AIR never bought into the technology-laden elements of virtual teams rhetoric. From 1996 through the first 10 months of 2002, when we stopped collecting data, AIR had not created any truly virtual teams, that is, teams where many members were dispersed through the organization and communicated mainly using technology. The number of dispersed team projects involving at least one member from another site did increase significantly over time, but collaboration involved considerable face-to-face interaction and comparatively modest technology, “primitive” as the belatedly appointed CIO reported.

We speculate, with some justification in the literature, that AIR’s experience was not unique. First, we guess that many, if not most, companies experienced coordination costs in the pursuit of virtual teams (Iacono & Kling, 2001). Studies have shown that many virtual teams fail or get bogged down with delays (Herbsleb & Mockus, 2003), misunderstandings among project members (Cramton, 2001), site rivalries (Armstrong & Cole, 2002), free riding (Weisband, 2002), distraction from the work due to local site priorities (Mark, Chapter 10, this volume; Mark, Grudin, & Poltrock, 1999), inconsistent procedures across sites (Curtis, Krasner, & Iscoe, 1988), and inability to share information and address conflict (Hinds & Mortensen, 2005; Hinds & Zolin, 2004). This gap between the vision of a CM and actual consequences of organizational use of the CM technology can result in contending discourse in which altered use of the technology is reported (Iacono & Kling, 2001). Thus, AIR managers would not have been alone in believing that virtual

teams relying mainly on technology are a difficult and risky business. AIR is also not unique in its low dependence on technology for supporting virtual teamwork. A recent survey of 344 organizations in the United States, Australia, and Hong Kong examining the adoption and use of collaboration information technologies (CITs) found that only two CITs, e-mail and audio teleconferencing, have been widely adopted in these organizations (Bajwa, Lewis, Pervan, & Lai, 2005). Similar results have been found in Jarman's (2005) study of dot-com companies where virtual teams made use of only e-mail, telephone, and audioconferencing to support virtual teamwork, and in Im, Yates, and Orlikowski's study (Im, Yates, & Orlikowski, 2005) of a start-up organization where members relied on phone meetings to coordinate their distributed software development.

We also speculate that AIR's low tech approach—that is, its restructuring of its incentive system, reorganization, and physical relocations to foster collaboration—is not unique either. Some companies are now considering collocation as the best way to support collaboration in teams (Olson, Teasley, Covi, & Olson, 2002). If these speculations are correct, perhaps the rhetoric of the virtual teams CM will result in contending discourse with moderated or changed visions.

Concluding Remarks

Our analysis indicates that there are at least two worlds of virtual teams, one in high-tech rhetoric and one in the low-tech organization we studied. In the high tech rhetoric, virtual teams instantiate the virtues of collaboration across distance, enabled by technology. The idealized vision has changed over time, presumably adjusting to organizations' experience, but remains fundamentally a CM. That is, virtual teams could not operate without the "state of the art technology" mentioned in the Wikipedia list. By contrast, the world view of virtual teams in the low tech world we studied also instantiates the virtues of collaboration over distance, but without the dependence on technology. Indeed, there are no teams connected only by networked communications. There are no state-of-the-art collaboration and communication tools (though there are old, reliable ones). In this low-tech world, what matters are managers who know they must collaborate to compete.

Where might this end? We think rhetoric of the virtual teams CM will continue to evolve and to motivate technology development. As a matter of fact, technology companies and developers have never wavered in their confidence over advanced collaborative technologies as an ultimate solution to challenges faced by virtual teams (Hildreth, 2005). The academic community, nonetheless, has adopted a more realistic view of virtual teams. Acknowledging the complexity and challenges inherent in

distributed collaboration, organizational scholars, for instance, have shifted their focus to understanding organizational conditions or processes that might have resulted in these challenges, and to exploring possible ways of addressing the challenges. Recent studies on subgroup dynamics (Mortensen & O'Leary, 2005), leadership at a distance (Weisband, forthcoming), and cultural diversity in internationally distributed teams (Cramton & Hinds, 2005) have provided new theoretical insights and managerial implications in creating and managing successful virtual teams.

We have also observed changes in the rhetoric to "global online communities" rather than "virtual teams" per se. As organizations acknowledge the difficulties of using technology to bring about tight coordination across virtual teams, rhetoric is beginning to shift toward advocating the use of technology to support knowledge sharing across communities. Such communities may have little work interdependency and may span organizational or national boundaries, but can leverage on technology to serve as intra- or inter-organizational memories and to create channels of communication across individuals who are in the same practice so as to support the sharing of knowledge.

As arrangements for collaborating across distance continue to evolve, distributed work arrangements will look somewhat different from what we see today. Experiments in new work arrangements seem to be teaching companies about the costs and benefits of collaboration at a distance, and as technology becomes more ubiquitous, former experiments will probably adapt and become routine work. For instance, rarely do teams communicate with all members at once, as was once envisioned in early writings about virtual teams. Employees are working in dispersed and local teams with multiple people (see Mark, Chapter 10, this volume, for a case study of large-scale collaboration across distances in the aerospace industry). If rhetoric in public discourse on the virtual teams CM has motivated investments in technology, these investments ultimately have made it possible for employees to use a variety of both synchronous and asynchronous technologies to conduct group work. In this way, the rhetoric of CMs indirectly influences distributed work arrangements even in companies, like the one we studied, that do not think technology is very important. Nevertheless, we will still detect the influence of utopian visions from the early virtual teams CM discourse, as reflected by the continuous push toward technological improvements to facilitate collaboration across distances.

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Endnotes

1. The Wikipedia (as of 2/23/05) says: "A virtual team does not always mean teleworker. Teleworkers are defined as individuals who work from home. Many virtual teams in today's organizations consist of employees both working at home and small groups in the office but in different geographic locations."
2. A Ph.D. dissertation on collaboratory rhetoric may be found at www.intertwining.org/dissertation
3. www.itrd.gov/pitac/report
4. Notes for Figure 9.1: Efficiency = claims that virtual teams bring higher productivity, spanning distance, lower costs, less time wasted, and less travel. Effectiveness = claims that virtual teams bring higher quality work, more innovativeness, projects that could not have been done, and new alliances and collaborations. People = claims that virtual teams help recruit the best employees, bring the best experts onto a team, and improve employees' skills and capabilities. Challenge = recognition of problems and difficulties in virtual work, how to make virtual teams successful, how to manage virtual teams, and how to get better technology to support virtual teams.
5. Note for Figures 9.2–9.5: The size of each circle reflects the comparative total number of employees at each site that year. Each arrow to a focal site from a source site represents the number of dispersed projects owned by the focal site that drew on at least one professional employed by the source site.

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