Competing in the Knowledge Economy:
The Network-Centric Firm

Joseph Roitz and Braden Allenby

1. Introduction

Over time, it has become apparent that the context within which firms and industrial systems function differs in fundamental ways from the past. The complexity of the operating environment has increased dramatically; the role of information and knowledge as both essential inputs, and critical outputs, is evident; the pressure of competition is ever more intense; technological evolution, and concomitant surprises from disruptive technologies, is more rapid and unpredictable; and globalizing capital and labor markets, financial systems, and demand and supply structures are new, relatively unknown, but powerful forces buffeting individual firms.

Under these circumstances, it is not surprising that the internal and operating structures of firms evolve as they try to remain viable and meet new and unexpected challenges. Thus, the decentralization of power and authority in firms, and the creation of networks of information which enable localized decision-making and response, are appropriate adaptive responses to an unpredictable and rapidly changing external environment if done properly. These efforts to evolve are often tentative -- not surprising, given the new circumstances -- and, perhaps more importantly, are often challenged explicitly and implicitly by those who are either unable to manage the necessary change, or for whom the change poses an institutional or personal threat.

In some ways, this is understandable, for both current firm structures and management styles tend to reflect the more recent dominant economic paradigm, the manufacturing economy. Thus, knowledge workers work within systems that presuppose that thinking -- knowledge creation --

occurs only during certain hours of the day, and never on vacation or weekends. The globalization of firms and economic activity has made time and place obsolete as meaningful determinants of whether work is being done, yet firms still require most workers to trundle in and out of facilities each day (a.k.a. "commute"), at a significant cost of time for both individual and firm.

Still, if something isn't broken, why fix it? The answer in this case is obvious. Network-centric organizations, in which space and time are not bound by four walls and the traditional nine-to-five work schedule, are more flexible, more efficient, more productive in terms of both labor and capital, and more adept at both using knowledge, and producing knowledge and services as outputs. When work is structured around networks instead of buildings and clocks, productivity and job satisfaction simultaneously increase while the costs of real estate go down.

Networks allow diverse, dispersed teams to rapidly collaborate and the company to recruit talent that cannot or will not relocate, including those within non-traditional labor pools such as seniors and the disabled. Moving the work to the worker (instead of the worker to the work) wherever practical reduces congestion and air pollution. And if work is not tied to buildings or any particular location, then companies and communities can better prepare for and react to disasters. Our experience and data suggest strongly that an organization organized around networks, not buildings, is a more efficient, effective, flexible and resilient organization.

Data indicate that employees of such firms

are more productive on both a per-person and a per-hour basis -- and they, and their families, are happier with their work to boot. So the simple answer is that those firms that learn to manage as knowledge-based economic producers, rather than pretend that they're still automobile assembly plants in the 1950's, will prosper. Their laggard competitors will fail. Schumpeter's gale of creative destruction may be fierce, but it is not illogical.

In this paper we will focus many of our comments on a particular aspect of the network-centric firm, telework and virtual offices. But it is important to recognize that these practices are only one dimension of a much more fundamental shift in the economy, and in firm structure generally, and cannot be effectively managed as just a standalone initiative. To take an obvious example, if a firm implements virtual offices but puts none of its critical information (e.g., company practices, voucher systems, purchase and accounting functions, personnel forms) on-line, and if it fails to beef up its information and technology systems support team to manage a dispersed environment, it will fail. Adjustment to new economic conditions is seldom trivial.

2. Telework and Virtual Officing – Benefits and Barriers

AT&T has over ten years of statistically valid, longitudinal data on employee telework, beginning when telework was viewed as a tactical response to the Clean Air Act, through today's emphasis on business efficiency, business continuity and the necessity of operating in a global knowledge economy. The following information

is adapted from "Creating a Network-Centric Future: Summary of 2003 AT&T Employee Telework Research" by Allenby and Roitz.

In 2003, the percentage of AT&T managers who telework full time in a "Virtual Office" increased to 22% -- more than doubling since 2001. Virtual officing is one of the best indicators of the movement to a network-centric enterprise, since it represents an almost complete movement of work away from static, place-based

configurations. Over one-third of AT&T managers (39%) now work from home at least once a week, including those in a virtual office. Another 24% do so occasionally, as needed to meet the demands of the job.

Among other things, these data illustrate that one of the most common misconceptions about telework -- that it will somehow stop ad-hoc "water cooler" collaboration -- is more fear than reality. Most teleworkers do not disappear into cyberspace, to be intermittently spotted at Parisian Cafés or Utah canyons. They still spend a substantial amount of time in the office, working face-to-face with their coworkers, or traveling to meet with customers or business partners in person (indeed, assuming that all work must take place within the confines of a particular building is practically building in an exclusion of input from the external world). We've found that even workers who work full time from home still visit corporate offices as often as every week. The key point is that telework doesn't dictate that work be done from home; it simply allows it to be done from the optimally productive location -- or by talented employees who cannot or will not relocate.

In 2003, AT&T received over $180 million in operational benefit from telework. Most

of this -- about $150M -- is due to increased productivity, while real estate reductions -- about $30M -- are also significant and an important component of the internal driving force for change. Telework also produces harder to quantify but still important business benefits in areas such as business continuity, recruitment, retention, and employee morale/job satisfaction.

Beginning with teleworker productivity, AT&T managers over the years have consistently reported gaining about one extra productive hour each day they work at home. Much of the increase is from the time saved by not commuting, but gains also arise from removing many of the distractions in the traditional office. Working at home provides a quiet environment for concentration and an increased ability to manage one's own time by avoiding unnecessary interruptions (necessary interruptions being as close as the telephone or Instant Messenger). Telework allows activities that formerly were mutually exclusive, such as waiting on the plumber and building the budget spreadsheet, to be done simultaneously. And telework gives the knowledge worker the freedom to work at those times when they are at their most productive, creative and energetic.

We perform several tests to help validate this self-reported data on productivity. Non-teleworkers are asked the same questions on work hours and productive hours, and their results compared. Special studies show that our employees who work full time in virtual offices are more likely to be rated as promotable (by management) than their peers who work in traditional offices. Where we've been able to capture data from control groups or before-

and-after virtual officing installations, we've seen from 10% to 20% increases. Benchmarking provides a rash of similar experiences.

The Business Benefit of Telework to AT&T - 2003

2003 Work Hours
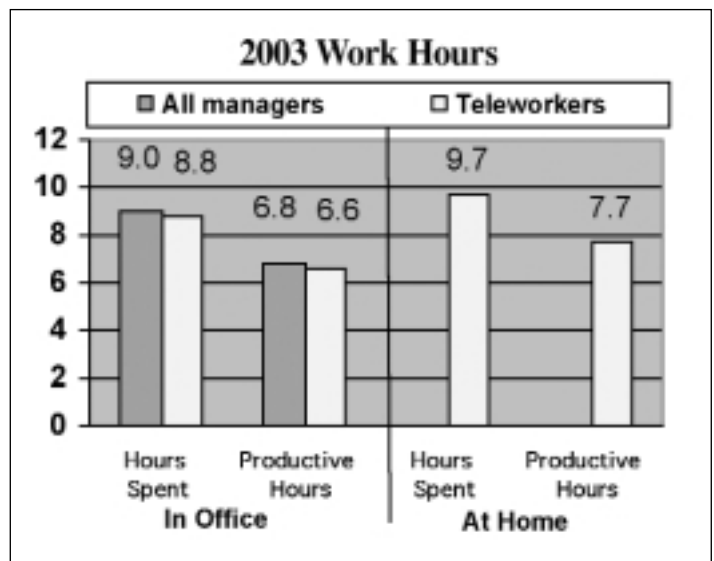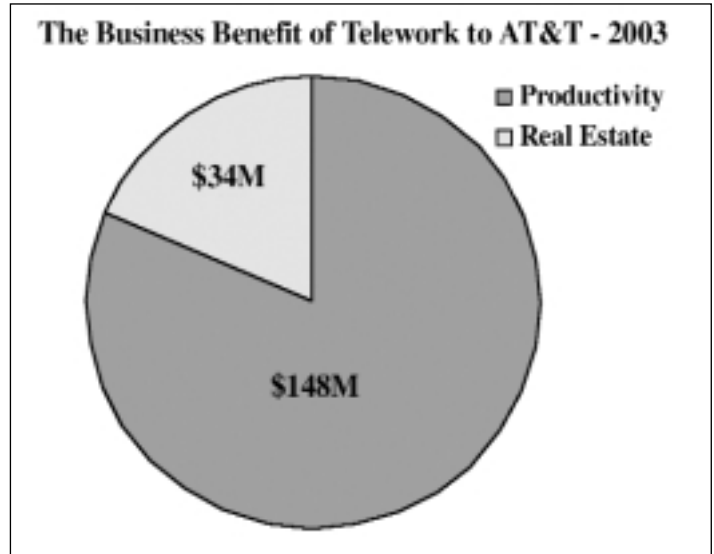
At the risk of beating a dead horse, productivity even surfaces when employees are asked about the major advantages of telework, slightly edging what conventional wisdom says is the top benefit of telework, work/family balance -- and in an industrial-age structure, these two needs tend to be thought of as mutually exclusive. An unsurprising product of a network-centric structure is a high-trust management style, focused on results rather than appearances. Financially, teleworkers say both they and the firm save money by the arrangement, even though many teleworkers use their personal broadband and home office equipment to work from home (but save on gasoline, automotive wear and tear, dry cleaning, and the like).

All of these advantages directly contribute to job satisfaction. Almost 2 out of 3 teleworkers (63%) report substantially increased job satisfaction after beginning to work from home, and even more (72%) report substantially increased satisfaction with their lives outside of work (only 3% say that their satisfaction has decreased, a side effect of our self-selection process for teleworkers). Again emphasizing the link between telework and productivity, almost 1 out of 3 teleworkers (31%) say that the arrangement has had a positive effect on their careers, while 60% of teleworkers say that telework has had no effect. Only 8% have experienced a negative impact.

With benefits like these, why isn't everyone teleworking? For one thing, not every employee has a suitable work environment at home, the classic example being the spouse who gives piano lessons. One of the most fundamental telework principles is that the arrangement should be transparent to customers and coworkers. Beyond this, our data show that "people" factors such as reduced visibility, the need for human interaction and management style are the chief reasons telework participation is not higher. This is not unexpected -- our participation data over time shows that employees usually start out teleworking only occasionally, increasing their frequency as they learn how to interact and manage virtually. Technological factors -- high barriers in the past -- have now become second-tier issues as broadband has become more ubiquitous, many if not most of the systems required to do work have migrated to the intranet, and remote access to the network (via Virtual Private Networks) has become easy and inexpensive. New technologies such as Voice over IP hold the promise of significantly reducing the barriers to telework due to lower cost, faster deployment and true location transparency (as in telephone numbers that seem to be located in Manhattan but ring in Arkansas).

3. Conclusion

Telework and the more general workplace transformations that occur as firms evolve from a manufacturing, place and time-based model towards a network-centric model are, on the one hand, relatively trivial extensions of what already happens today, as global firms with significant operations around the world learn to operate 24/7 with spatially and temporally separated employees and contractors. On the other hand, the shift is a complex one involving many different organizations in a firm, and requires an intelligent and coordinated strategy if it is to succeed. Those firms that learn how to operate in the knowledge economy first will gain significant competitive advantage over their peers, a dynamic that will also operate at the level of national economies. Some will no doubt continue to fight the evolution of the network-centric firm, or of implementation strategies such as telework and virtual offices. But the efficiency of the network-centric model, appropriately adapted to particular sectors and firms, is inexorable, and over time will become the new operating model of the knowledge economy. ∎

Major Reasons More Employees Don't Telework:

% Saying Major Reason

Reduced visibility	44%
Need to interact with others	41
Management style	40
Don't have equipment	37
Loss of camaraderie	35
Lack of broadband access	32
Lack of trust	29
Separation of work/personal life	26
Isolation or loneliness	23
Produces overwork	19
Employees don't ask	16
Help desk	14
Reduced productivity	13
Cost	12

About the Authors:

Joseph Roitz (jroitz@att.com) is AT&T's Telework Director. Under his leadership, the program has grown to generate over $180M in annual business benefit. The program has won multiple awards, and Network World magazine called AT&T the "ultimate telework poster child." Prior to this assignment, Joe held a broad range of positions in Technology Management, Operations, Engineering, R&D, Finance, Quality and Communications.

Dr. Braden Allenby (braden.allenby@asu.edu) was a key player in the AT&T initiative to implement the "virtual office" scenario in his position as Vice President for Environment, Health and Safety. Brad and his team were responsible for assessing, resolving and implementing this concept on all fronts: technology, process, policy and the soft side of career, environment and psychological impacts. He left AT&T in 2004 to become Professor of Civil and Environmental Engineering, and of Law, at Arizona State University.

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