1

Network Society and Occupational Community

> *We have entered the Age of the Internet, a globe-spanning technology that has taken hold amazingly quickly. . . . The evolution of the Internet as a pervasive phenomenon means that the traditional factors of production—capital and skilled labor—are no longer the main determinants of the power of an economy. Now, economic potential is increasingly linked to the ability to control and manipulate information.*
>
> —Michael J. Mandel, "The Internet Economy: The World's Next Growth Engine," 1999

> *This power networking is changing the way we perceive, organise, manage, produce, consume, fight and counter-fight—embracing practically all dimensions of social life. The interaction between the revolution in information technology, the process of globalisation, and the emergence of networking as the predominant social form of organisation constitutes a new social structure: the network society.*
>
> —Manuel Castells, "Local and Global: Cities in the Network Society," 2002

Once the U.S. Congress completes its deliberations and the humidity rises to barely tolerable levels, the summer months in the regional labor market surrounding Washington, DC, are generally uneventful, a good time for contemplation, vacation, and plan-making. In May 1997 two veteran software developers "rolled out" of a slowly failing firm with severance payments and stock options they would turn into cash, sufficient resources for some downtime and a chance to ponder their next steps.[1] A mutual friend characterized Vince and Adam (as I will call them in this book) as compatible personalities, one focused on the vision of a future enterprise, the other more practical and level-headed and oriented toward sober administration and financial management:

> Oh, well, they're the classic entrepreneurial duo. You know, Vince is a visionary. He's the one who gets everybody whipped into a

> frenzy, and that can be good and bad. He can get everybody, you know, pointing in the right direction, believing in a single idea. That's customers, that's employees, that's clients. Adam is definitely Mr. Solid. He's Mister Let's-sit-down-and-write-the-contract. Not that that's particularly what he *wants* to do, but he's the one who's going to do it. And so that's the classic entrepreneurial pairing that you always need: somebody who's going to kick it in the ass and get it going, and somebody who's going to keep it going. (Interview, 22 January 2002)

Vince and a small group of colleagues from a previous firm were contemplating a new venture, and he had put some preliminary thought into what characteristics might distinguish an innovative software development firm in an otherwise colorless information technology (IT) world. "We are embarking on a 'Commando Development' software project," he wrote at the beginning of one paper, capturing the aggressiveness that would become one of his hallmarks. "Success will require enormous bandwidth and discipline. We live for these types of projects."[2] He compared software development to war, demanding tight focus and precise scheduling of tasks, along with nailing down basic design issues, rapid execution, completion according to applicable criteria, and perpetual alertness to any risks that may arise in the battle to get a client's product to market. A small and nimble company that integrated these principles into their "non-standard operating procedures" could position itself to capture "mindshare"[3] in the local IT environment, he reckoned. By that summer he was devoting all of his waking hours to making that company happen.

Adam was more skeptical and otherwise occupied. He was chilling out in the suburbs, working on a long-planned project that launched on Mother's Day: a wooden deck in the back yard of the home he shared with his wife and three children. He designed the deck himself, bought the materials, poured the concrete footings, and began the construction process in earnest, spending the first half of June on it and intending to finish up by summer's end. He had a standing offer to go to work for another technology company, and "they were pitching pretty hard," he recalled, so gainful employment was not a concern. It took a few meetings at his home with Vince and others to convince him that a new venture was the way to go. Before long, he was spending less and less time on the deck.

What intervened to give Adam the final push were the overtures of a Scandinavian company and unexpected instances of what he termed "unjustified notoriety." As their previous company drifted along that spring, Adam received a telephone call from a Norwegian firm's local subsidiary expressing dissatisfaction with software developers at the parent company's headquarters. They were too lackadaisical about the development process, causing interminable delays and lost market opportunities. The American guys were frustrated and floated the idea of hiring an entire group of experienced

software developers to assume coding responsibilities—specifically, a software development team headed by Adam. Though the idea "flamed out" when it was presented to headquarters' management, Adam was impressed by the prospect and thought that this incident, and other contacts he was having with technology firms, indicated pent-up demand for a disciplined cadre of high-powered developers.

At local technology events, another revealing dynamic was unfolding. Vince and Adam had invented a name to signify the intensity and devotion they would dedicate to clients. (I use the pseudonym "IntenSivity Unlimited" in this book to convey the same impulse.) Vince took on the task of attending gatherings in which technology workers, venture capitalists, and marketing personnel made contacts with one another to advance new business ideas and raise money. The region's highest-profile networking opportunities were the "Coffee and DoughNets" sessions sponsored by Netpreneur, a program instigated by Mario Morino, the godfather of local technology entrepreneurs.[4] As Adam recalled:

> Vince encountered somebody at a Netpreneur gig. This was before we actually incorporated. And the fellow asks Vince: "Who do you work with?" And Vince said: "IntenSivity Unlimited." And the guy's reaction was, oh, I've heard of you. And the company didn't even exist yet, okay. So if he actually had heard of us, he had heard of us because of Vince running around dropping the name, just trying it out. And this was probably—this was the first of unexpected consequences of starting this company that Vince and I just didn't foresee happening. This kind of blew our minds forever, unjustified notoriety . . . people knew who we were. We began to get a reputation. (Interview, 23 April 2002)

Their contact with the Norwegian firm and the word of mouth promoting their nascent company indicate that Vince and Adam were enmeshed in what Michael Storper and Anthony Venables (2004) call a *buzz environment,* a geographic area in which proximity and persistent face-to-face contact foster close relationships, create and communicate new knowledge, promote trust among parties, and form in-groups that effectively socialize new members and evaluate opportunities. Both developers had been involved in a high-profile earlier firm that had briefly captured a segment of the Internet market, gained widespread publicity, attracted venture capital funding, and then disintegrated after being purchased by a larger media company. As Vince circulated at gatherings sponsored by organizations such as Netpreneur, he threw around the name of this firm—which I call "TurboPusher"—to attract attention and burnish their credibility as an entrepreneurial duo. Adam twisted the history of the firm to make a point about the power of hype:

> Keep in mind that TurboPusher was a big deal in the DC area. Came on the scene in '95 [and] sold to a public company without having a product or without having any customers, having raised three or four million dollars in venture capital. It was a big deal. I mean, everybody knew the name. So of course, hanging out at all these Netpreneur gigs, the name TurboPusher opened a lot of doors. People listened to us. I think a lot of people considered that Vince and I were the ones that started it. So that got us a lot of notoriety . . . and we started working with a lot of other entrepreneurs that were running around trying to raise money. (Interview, 23 April 2002)

The more that Vince and Adam expounded upon their prior experience and future plans, the more positive feedback they received from their peers and prospective clients, and the more those reactions motivated them to move forward. They were "in the loop," encouraged to innovate while learning about the extent of a possible market for their software development services.

The emergence of IntenSivity is emblematic of a dynamic then taking place in a number of regional economic clusters, both in the United States and abroad. Sociologist Manuel Castells (2000, 421) alludes to this sort of regional economic cluster in his presentation of a geographically based "milieux of innovation," citing prototypical and well-established examples like Silicon Valley in California (Gregory 1984; Saxenian 1990; Benner 2002; English-Lueck 2002) and Route 128 surrounding Boston (Rosegrant and Lampe 1992; Saxenian 1994). Additionally, a number of studies drawing on the Internet bubble period have documented how new media firms clustered together in networked industrial districts such as Silicon Alley in New York City, where firms engaged in strategic alliances and created routinized social events to institutionalize the interaction among entrepreneurs, venture capitalists, software developers, and digital artists (Pratt 2000). Through networking at various types of events, employees and new media firms in New York constituted themselves as a cohesive community with distinctive rituals, social networks, interpretive practices, gathering places, and gossip columnists, establishing "network economies of production" (Neff 2005, 150) that spanned organizational boundaries. Researchers have investigated other such regional clusters of multimedia firms in major metropolitan areas, notably in San Francisco's South of Market district (Pratt 2002), Central London (Nachum and Keeble 2003), the Central Business District of Sydney (Searle and De Valence 2005), and other sites worldwide (Pratt 1999; Braczyk, Fuchs, and Wolf 1999). Though more closely tied to government contracting and advanced communication infrastructure than new media production, the Greater Washington Region around the District of Columbia constitutes a regional economic cluster, the history and composition of which is detailed in Chapter 2.

IntenSivity, TurboPusher, and similar Internet-centric firms are prime examples of network enterprises. For the purposes of this book, network enterprises are small and medium-sized firms that are woven together in a web of interdependence that links the producers of software code with prospective clients, venture capital and other financial firms, economic development agencies, and institutional mechanisms that facilitate strategic alliances, commercial relationships, and the formation and dissolution of multi-firm projects. Networks have come to pervade the structure of society, enabling and constraining human action and the choice of communication (van Dijk 1999). Darin Barney (2004, 2) describes the composition of a network as a

> structural condition whereby distinct points (often called 'nodes') are related to one another by connections (often called 'ties') that are typically multiple, intersecting and often redundant. A network exists when many nodes (people, firms, computers) are linked to many other nodes, usually by many ties which cross the ties connecting other nodes. Numerous metaphors have been used to describe this type and configuration . . . all of which seek to evoke the logic of decentralized, proliferating connectivity which defines the essence of a network.

Networks thus represent a condition of life, involving relationships, in which nodes or points are tied to one another, linked together and connected, with a material (e.g., water through a pipe) or a dematerialized substance (e.g., electronic impulses) flowing among those nodes. Those flows may expand or contract, grow or deteriorate over time, and change to encompass other nodes, establish new relationships, and refresh existing connections. Importantly, networks are not dehumanized or extra-human forces that determine individual, organizational, and institutional activity because of an inherent and immutable logic; networks do not exist outside of the human activity and substances that compose them. The workings of a network are characterized by decentralization, the flow of substances from node to node without necessarily passing through a centralized point, and proliferation, the tendency to expand and mutate to adjust to changing circumstances. Networks are thus more flexible than centralized, hierarchical structures, and bear a greater capacity to adapt to rapidly changing social, economic, and technological circumstances. Jan van Dijk (2006) vividly conveys this image when he likens networks to nervous systems composed of forms and substances that relate discrete elements to one another, enabling the exchange of information and fostering interactivity among multiple levels of society.

The most widely cited and provocative exposition of the pervasive impact of networks has been Castells' formulation of the "network society" as advanced in his three-volume masterwork, *The Information Age:*

Economy, Society and Culture, first published between 1996 and 1998 (second editions appeared between 2000 and 2004). In short, Castells argues that the global capitalist system has entered a new (post-industrial) mode of development, an *informational* mode, in which the collection, processing, and communication of information has become the central element behind economic productivity levels, the generation of knowledge, changing occupational structures, and other defining features of contemporary life. The logic of network processes, which is highly influenced by advances in digital technology, he says, has become the predominant force in the workings of business enterprises, communication systems, orientations toward space and time, and cultural norms. "For the first time in history," he asserts (2000, 214), "the basic unit of economic organization is not a subject, be it individual . . . or collective . . . [rather] *the unit is the network,* made up of a variety of subjects and organizations, relentlessly modified as networks adapt to supportive environments and market structures" (italics in original). Networks represent the key feature of social morphology, he continues, eliciting a new social structure and a new historical terrain that affects production, consumption, human experience, the exercise of power, and the cultural realm.

Castells surrounds his broad generalizations with a prodigious collection of citations from empirical studies, drawing upon decades of self-described immersion in the literature and findings from scholarly research in sociology, urban studies, industrial relations, communication studies, and political science. Notably, he synthesizes material from Anglo-American sources as well as studies of socioeconomic developments in Russia, Eastern Europe, China, Japan, South America, and the European Union. Overall, despite some inconsistent and confusing use of key concepts, and gaps in his treatment of the pivotal topic of the transformation of work, *The Rise of the Network Society* and its accompanying volumes constitute a compelling work of social critique.

The construction of a network society, and the rising centrality of digital information and communication technologies in the conduct of everyday life and work, present a propitious opportunity for social scientists to examine the interaction of advanced communication tools with individual actions, organizational culture, social structures, and the emergence of societal institutions. This book proceeds in broad agreement with Castells' network society perspective as an insightful, empirically grounded diagnosis of an era (Heiskala 2003) and a robust analytical framework for viewing developments in the labor process among high-technology workers, the meaning technologists attach to social interaction in the workplace, and perceptions of community among members of an occupational group. In the remaining sections of this chapter, I problematize certain aspects of Castells' conception of a network society and identify gaps in his writings

that, I believe, may readily be filled by consideration of research findings in complementary fields of inquiry, notably the sociology of work and occupations. In particular, the establishment and maintenance of occupational communities, long-standing social formations evident in a number of occupations, provide a counterweight to the fragmentation and alienation endemic to capitalist society during the informational mode of development. Scholars in several academic disciplines have directed their attention to occupational communities for many years. Membership in such communities affects how individuals view their identities, interpret their connections with colleagues, and construct their work practices. In short, occupational community *matters* in the network society, and vivid expressions of community are evident in some occupational groups, including computer technologists.

Castells' Network Society

In the latter half of the twentieth century, an innovative way to explain new conditions of life in advanced capitalist economies, as contrasted with the "industrial way of life" (Bendix 1963), was presented by economists and social scientists who analyzed the attributes and impacts of information and communication technologies, examined changing labor market conditions and work processes, and studied the transformation of employment relationships (Cappelli 1999) in contemporary workplaces. As recounted by Antti Kasvio (2001) and Frank Webster (2002), these broad analyses ranged from sociologist Daniel Bell's (1976) articulation of a service-driven "post-industrial society" and Peter Drucker's (1994) notion of a "knowledge society" that has transcended industrial capitalism, to theoretical formulations of an "information society" (Webster 1995) and popular predictions of an information revolution that would decisively alter the future of humankind (Toffler 1980).

In the late 1990s, with the emergence of the Internet as a ubiquitous medium for global communication and electronic commerce, such speculations continued. Commentators on economic trends announced the appearance of a "new economy" driven by the digitization of information (Tapscott 1996; Kelly 1999). Conventional wisdom has settled upon the notion that socioeconomic conditions in advanced capitalist countries have undergone significant qualitative transformations associated with the expansion in service-sector employment (Bell 1976), the increased importance of intellectual assets to rising productivity and durable economic prosperity (Powell and Snellman 2004), and the value of information goods and network dynamics in the contemporary market (Shapiro and Varian 1999).

As Barney (2004) points out, the network society framework is part of a constellation of discourses that have attempted to name the spirit and

socioeconomic dimensions of an age in which industrial production (the conversion of resources to tangible products under a managerial regime in which hierarchical structures were the dominant organizational forms) has given way to a qualitatively different condition of life in which network dynamics, decentralization, and the production of knowledge have become the ascendant features of social organization and productive processes. The network society remains a capitalist society, albeit one organized on a global, highly integrated scale and increasingly structured by the digitization of knowledge and the workings of information and communication technologies (ICTs).

As Castells (2000) analyzes the historic changes involved in the restructuring of global capitalism, the industrial mode of development featured the innovative use of energy, and the dissemination of new energy sources, throughout systems of production, leading to greater manufacturing efficiencies, higher productivity levels, and the increasingly rapid distribution of products and services. Thus, energy was the central productive element in the industrial mode of development. In association with a surge of technological innovation, particularly the digitization of information and knowledge, Castells continues, information has become the key element in productive processes, constituting a "new, informational mode of development [in which] the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication" (Castells 2000, 17).

Part of the dynamism of this new brand of informational capitalism, he argues, emerges from the process by which information is converted to scientific knowledge, and that knowledge is fed back into systems of production to increase the flow and quality of information, along with new knowledge, creating the sort of virtuous cycles of interaction, synergistic combinations, and feedback loops that Carl Shapiro and Hal Varian (1999) have identified as the central elements of network dynamics. New knowledge is applied to improve information and communication technologies, which are applied to production processes, the management of organizations, and the design of social institutions (Goodin 1996), generating socioeconomic forces that are transforming all aspects of economic and social structures on a global scale.

"*Networks are the fundamental stuff of which new organizations are and will be made,*" Castells emphasizes (2000, 180, italics in original). He provides a sketchy definition of a network as "a set of interconnected nodes," with a node consisting of "the point where a curve intersects itself" (ibid., 501). In his broad formulation, nodes are ubiquitous and highly dynamic, manifested as stock market exchanges, government councils, poppy fields, street gangs, television stations, and an apparently unlimited multitude of other structures whose "variable geometry" shifts from net-

FIGURE 1.1

Central Elements of Network Dynamics

1. Creation and circulation of information goods (including versioning)
2. Consumer expectations as a critical factor (including harnessing demand-side economies of scale)
3. Operation of lock-in and switching costs
4. Network externalities: positive and negative feedback, accompanied by virtuous and vicious cycles, respectively
5. Capturing first-mover advantage as competitive strategy

Source: Adapted from Shapiro and Varian (1999).

work to network. Networks are open and flexible, Castells continues, susceptible to unlimited expansion and readily able to incorporate new nodes and cut off other nodes that do not contribute to the overall effectiveness of the network: that is, its capacity to function in alignment with its goals and ideologies. Although the elaboration of this definition sensitizes the researcher to key aspects of networks, and helps to tease out what Castells means by his frequent use of "networking logic," this conception of a network is so broad as to defy operationalization for research purposes.

A network is fundamentally a collection of processes. Castells alludes to these processes when he writes about interaction circles and "a cumulative feedback loop" involving innovation (Castells 2000, 31), but does not elaborate. Economists and management theorists Shapiro and Varian (1999) provide assistance here, presenting a robust model of network dynamics and articulating a vocabulary useful for teasing out the workings of such dynamics at multiple (organization, industry sector, and macroeconomic) levels. My reading of the key points of their model is conveyed in Figure 1.1 and followed by a brief discussion of their interrelationships.

For Shapiro and Varian, the sharing of resources is the hallmark of involvement in a network, whether it is one of the "real" networks of the physical world (such as transportation networks consisting of highways and railroads) or one of the "virtual" networks of the Internet and electronic mailing lists. In a socioeconomic environment where maintaining competitive advantage is increasingly contingent upon the strategic use of networked resources, substantial value has been generated by the creation of *information goods* through the digitization of many products, their presentation in versions that appeal to distinct market segments, and their commercial circulation through the medium of ICTs. The value of such goods, and the success of the organizations purveying them, are closely tied to *consumer expectations,* particularly the question of whether the overall network of users will become large enough to make continued involvement

in the network advantageous; a successful and valuable network takes advantage of the *demand-side economies of scale* that accompany networks featuring a large, committed group of users. When users enter a network, sharing resources and investing time in learning how to use a particular technology, for example, there is a tendency for them to become *locked in* to that network, committed to continuing to use those resources because changing to another network would entail substantial *switching costs*. Crucial to the operation of such networks is the phenomenon of *network externalities,* in which the addition of more users to a network increases its value exponentially, contributing to the rapid expansion of nodes and ties among them through *positive feedback,* which induces a *virtuous cycle*. Satisfactory participation in a network tends to encourage others to become involved, increasing the size of the network and fostering demand for its services. On the other hand, participants' dropping out of a network generates negative feedback and tends to lead to a destructive, downward spiral of erosion and collapse. Network effects thus amplify and build upon one another, setting trajectories of growth or deterioration that can be difficult to reverse once started. Competitors who gain leadership of a network that generates positive feedback have the potential to capture *first-mover advantage* and continue to dominate the network.

This consideration of network effects is intended to make an elementary point: if contemporary society is taking on the coloration of a network society, as Castells and others argue, such network effects and network-oriented processes should be increasingly evident in the workings of organizations and institutionalized communities, demonstrating that the transformation of society in this direction is a tangible development subject to empirical investigation. Using the elements of network dynamics to help analyze the workings of organizations would be consistent with the relational or process conception of organizations, a growing perspective in the field of organizational sociology (Scott 2004). I will draw upon these elements to examine the organizational dynamics of IntenSivity in Chapters 3 through 5.

A clear definition of a network and a delineation of network dynamics contribute to examining the parameters of network (or networked) organizations, including network enterprises. Again, Castells' writings here are evocative yet exaggerated. Consistent with his overall argument about how the network society has materialized in organizational forms, he states that the "essential component" of the new economy is networking and asserts that "networks are indeed spreading throughout the entire economy, phasing out, through competition, previous, rigid forms of business organizations" (2000, 160–161). This kind of broad, sweeping declaration of an indomitable and ubiquitous transformation pervades his writings, as does the use of binary constructions to characterize socioeconomic trends and

dialectical logic to examine social change. Thus, networks are described as hegemonic, wiping out all previous rigid and hierarchical modes of organization. Similarly, he argues that the dominant ideology and goals of a network will vanquish all opponents, driving out all those interests that disagree with it. Such formulations are problematic because they tend to reify networks as an immutable, supra-human force with an intrinsic logic separate from human agency.[5] Moreover, this tendency apparently contributes to Castells' overidentification of the network enterprise with those organizational forms that are, admittedly, very powerful commercial entities and prime agents of the globalization of production: major transnational corporations. In this way, as Bob Jessop (2003) argues, Castells moves in the direction of a conservative (and ultimately pessimistic) celebration of globalized informational capitalism as an unstoppable force that marginalizes the role of human agency and the capacity of counterhegemonic groups to offer resistance sufficiently strong to counteract (working *internally*) the dominant ideology of a network.[6]

Although Castells acknowledges the presence of small and medium-sized enterprises in the labor market, he argues that they are controlled by major transnational companies, centers of economic power that have transformed themselves into "dynamic and strategically planned network[s] of self-programmed, self-directed units based upon decentralization, participation and coordination" (2000, 178). Because of global competition, the large, vertically integrated corporation has been dissolved into "a web of multidirectional networks" (ibid., 209), embedded in many national and institutional environments, pushing out other organizational forms and subsuming smaller enterprises. Castells argues that major transnational corporations, and the linkages between their subunits, are the "basic organizational form" (ibid., 207) of the global economy and paramount exemplification of a network enterprise, a formulation that limits a comprehensive account of the full range of organizational forms that make up the network society.

In terms of identifying the operating units of network enterprises, Castells' writings contain some contradictory formulations. In discussing the new economy, he highlights networking as its "essential component" and "critical attribute," followed by a claim that "*the actual operating unit becomes the business project, enacted by a network,* rather than individual companies or formal groupings of companies" (2000, 160, 162, 177, italics in original). Later he writes that networks, not projects, "have become the actual operating unit" (ibid., 187) of the network enterprise. In his strongest expression, he argues that the "basic unit of economic organization" (ibid., 214) is no longer a subject, either an individual person or a collectivity or an incorporated business enterprise; it is rather the network, which is composed of many subjects and organizations that relentlessly

FIGURE 1.2

Manifestations of Network Enterprise Model: Organizational Forms

1. Large firms with internal decentralized networking of project-oriented teams
2. Networked chains of producers, manufacturers, or service providers that are territorially dispersed and associated with a brand
3. Flexible networks of small and medium-sized firms linked to larger networks of production and distribution
4. Strategic alliances and joint ventures between firms at the sectoral level
5. Networks of interactivity between consumers/customers and vendors/firms to facilitate the customization and personalization of products and services

Source: Adapted from Barney (2004, 85–90).

modify the market structures and sociocultural environment around them. Moreover, after a network is created and programmed, Castells asserts, it operates autonomously, exerting a nonhuman power to include or exclude particular nodes:

> Networks work on a binary logic: inclusion/exclusion. . . . The network is an automaton. In a social structure, social actors and institutions program the networks. But once programmed, information networks, powered by information technology, impose their structural logic on their human components. (2001, 167)

These formulations both confuse the relationship between networks and projects—which may be carried out inside a single enterprise, among more than one enterprise, between a commercial firm and a supportive organization, and so on—and, again, tend to reify networks as standing apart from, outside of control by, human actors and their intentionalities. Though firms and organizations increasingly exhibit the variety of network dynamics enumerated in Figure 1.1, they continue to function in the context of national economic structures, constrained by legal institutions and by custom, and influenced by social and cultural norms that vary around the globe.

To broaden Castells' perspective, I again turn to Barney's treatment of the network society, and specifically his discussion of five types of network enterprises (Figure 1.2). He argues that the term "network enterprise" actually encompasses a number of organizational forms, with major transnational corporations constituting one manifestation (Barney 2004, 85). This scheme helps to guide research by accounting for the multitude of small and medium-sized firms that exhibit network dynamics and may be

linked to one another through a variety of alliances and projects, yet are not wholly dominated by the power of large corporations.

In Barney's scheme, IntenSivity Unlimited is an example of organizational form number 3, a small firm whose existence was linked to the workings of a network of other companies, especially entrepreneurs who had received venture capital investment for innovative ideas to use Internet technology.

As regards the elements making up the network society, I concur with what van Dijk (2006, 28) characterizes as a moderate perspective that takes the "basic units of contemporary society . . . to be individuals, households, groups and organizations increasingly linked by social and media networks." The study of social interaction and other relationships at any of these levels provides a lens through which to view the workings of the network society.

The Transformation of Work

Individuals and organizations in the network society, despite the social fragmentation and precariousness that accompany work during the informational mode of development, continue to derive meaning and identity from *what they do* in the workplace environment, not just *who they are* in terms of the cultural groups with which they identify. My ethnographic research among members of an occupational group who originally gathered together in a single network enterprise sheds light on the nature of work practices in a segment of the network society.

Although the precise dimensions of the transformation of work in the network society are active topics of debate, there is wide agreement that employment structures and labor market relations have changed in significant ways compared with the industrial mode of development. These changes are associated with the growth of network enterprises and project-based work, the demand that employees accept greater flexibility in skill acquisition and work practices, and the increased amount of risk that has been transferred from businesses and social institutions to individual workers.

Based upon an analysis of employment patterns worldwide since 1920, and his reading of empirical research on work and labor market relations in many countries, Castells concludes that changing employment structures have been dominated by the increased productivity of human labor, closely related to advances in technology and innovative organizational methods, with the result that "work and workers have shifted from direct production to indirect production, from cultivation, extraction, and fabrication to consumption services and management work, and from a narrow range of economic activities to an increasingly diverse occupational universe"

(2000, 243). A number of common features are evident in the employment structures of advanced capitalist countries, he finds, notably a decline in traditional manufacturing jobs, the rise of work in service activities in multiple industries, a bifurcation of workforces between the upper and lower levels of occupational structures, and the upgrading of many occupations in terms of the levels of skills, education, and training required. The widespread introduction of ICTs into workplaces, particularly the computerization of manufacturing and the application of automated computer networks to office work, has dramatically increased "the importance of human brain input into the work process" (ibid., 257) and enabled a fundamental change in the contemporary labor process in which production tasks are rationalized, routinized jobs are subject to elimination, and workers come under increasing pressure to continuously upgrade their skills and be flexible in the performance of multiple work tasks. Here Castells does an admirable job of synthesizing a wide range of empirical research, reaffirming the insights of other social scientists about the situated and contingent impact of telecommunications on the organization of work (O'Mahony and Barley 1999); the collapse of the postwar "social contract" based on traditional full-time jobs in relatively stable firms with robust internal labor markets and a measure of job security (Rubin 1996; Cappelli 1999; Osterman 1999) and the decline of the centralized mass production model of work organization in favor of more collaborative high-performance work systems (Sabel 1984; Hirschhorn 1986; Appelbaum and Batt 1994).

Castells argues that these socioeconomic forces have had a decisive impact on labor processes across the entire society—namely, that "the work process is increasingly individualized, labor is disaggregated in its performance, and reintegrated in its outcome through a multiplicity of interconnected tasks in different sites, ushering in a new division of labor based on the attributes/capacities of each worker rather than on the organization of the task" (2000, 502). His discussion resonates with the examination of contemporary labor force trends undertaken by other scholars. Employment relations in enterprises are increasingly influenced by external labor market dynamics (such as the outsourcing of corporate functions and the offshoring of jobs), contributing to a "more individualized workplace" (Cappelli 1999, 243) in which employees and managers are required to assume more responsibility for their own education and training, manage their career progress and occupational skill levels, accept a greater amount of risk, calibrate their current work performance according to future job prospects, and maintain a network of personal contacts. In turn, career development is moving toward a "boundaryless" orientation in which individuals, moving from employer to employer, gain knowledge, competencies, and social networks from their work experiences and thereby construct their careers as repositories of knowledge (Bird 1996). A key feature