

High-tech Communities: Better Work or Just More Work?

by Seán Ó Riain

Context: High-tech workers are creating communities that offer them flexibility, creativity and independence at work. However, it remains to be seen whether such communities can overcome the problems of insecurity, long work hours and exclusion created by the fierce individualism of high-tech careers.

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A few old friends sit in O’Dwyer’s pub in Dublin, Ireland, animatedly debating whether software development work should follow set procedures or whether individual developers’ creative instincts should be given free rein. The discussion is punctuated by sexual innuendo, teasing over the size of each other’s stock portfolios and a rash of bad jokes. Having worked together at a small, innovative software firm in the 1980s, these friends still meet regularly to swap stories about their current employers, debate technical and industry issues and compete intensely for the last word in any argument.

This scene from Dublin, Ireland, could be from any of a growing number of cities around the world which are home to emerging technical communities: Silicon Valley, California; Austin, Texas; Haifa, Israel; Hsinchu, Taiwan; Bangalore, India, and many others. These high-tech workers help each other out with technical and career advice and provide each other with a social space outside of their employers’ control. In settings like this Dublin bar, workers create a shared identity around and meaning for their work—a meaningfulness that has often been lost in an era dominated by global corporations.

Technical communities can be powerful forces. In Silicon Valley, dense social networks among workers in different firms serve as pathways for information about jobs, technologies and industry shifts. They form an industrial culture that facilitates cooperation. In my own research on a software team in Dublin, software developers discussed problems together while competing to see who could resolve the issue first. They would pick up the phone and call a friend in another company for advice almost as easily as they would ask their colleague in the neighboring cubicle. A local network of industry associations, technical groups and universities helps bring these workers together.

However, not far away from this pub in Dublin, a mild-mannered, neatly dressed software engineer in the Dublin office of a Silicon Valley firm proclaims, “We’re going back to something Dickensian. They used to have the cotton mills; now we have the software mills.” The glamorous world of high technology seems a far cry from the Lancashire cotton mills of the 19th century. Yet, as this engineer’s work hours crept steadily upward in pursuit of the product and the deadline, the glitter of high-tech work faded. Under pressure from unrealistic deadlines, long hours, and routine and often frustrating work, this software engineer claimed to find himself in a white-collar factory.

The blush has faded recently, too, from many of the high-tech boom cities around the world as the dot.com industry collapsed and the Internet economy became a much less rewarding place to make a living. Many high-tech workers learned how precarious working life is in technical communities through mass layoffs and suddenly worthless stock options. When economic crisis hit, they found themselves with few collective guarantees; they were cast to their individual fates.

High-tech work presents a startling combination of features: Successful developers rely on teamwork with friends and collaborators in other firms, other places, other continents; they work in communities that transcend their companies. At the same time, they face the lonely insecurity of the individual entrepreneur in a marketplace and culture that stresses, with macho imagery from war and sports, that they are ultimately alone. For many, this may be the shape of work in the 21st century.

These technical communities offer us a potential model for the future of work: creativity with cooperation, responsibility with flexibility, autonomy with community. Research on worker cooperatives suggests that such a model is widespread and can develop even among apparently unskilled workers when they gain some autonomy from their bosses through collective ownership. Julian Orr found similar features in a study of copier repair technicians. Technical communities could potentially be a widespread institution shaping the organization of work across the whole economy. However, if they are to provide a durable and desirable model of work, these communities must resolve some critical problems: long hours, intense pressure, insecurity, inequality and exclusion. Will technical communities ultimately promote job insecurity and the spread of the “software mills,” or will they become sustainable spaces of worker autonomy and cooperation? The outcome will depend on whether the new politics of technical communities is ultimately resolved in favor of individualist or collective solutions.

the surprising re-emergence of occupational communities

The 20th century was the heyday of the large organization as more and more workers found employment in progressively larger and more hierarchical bureaucratic organizations. Communities of craft workers, which had been central to the world of work in the 1800s, lost more and more of their independence. Through the last century, however, these craft communities and the increasingly powerful professional groups were overshadowed by the growing power of corporate and state bureaucracies; they lost power over centrally negotiated pay, work conditions and promotion ladders.

Surprisingly, recent decades saw the re-emergence of occupational communities, groups of workers whose vocations are defined as much by their mutual bonds and expectations as by their position in their employing organization.

New forms of technical communities have emerged where workers swap stories and tips, build contacts leading to their next jobs and protect themselves from the global corporations that hire them. Large corporations typically try to create a technical community within the firm, but the technical communities spill out. Employees create firm-crossing networks of workers who share interests, contacts and information. Their relations conform to common technical interests rather than a common employer.

Although it is true that the work can be done anywhere on the globe as long as one has a modem, talking face to face is still important for picking up information, working together and keeping on top of the job. In fact, the demands of the global economy for increased flexibility and specialized learning actually make keeping up both local and worldwide ties even more critical. Electronic relationships are poor substitutes for shared cubicle space. When I worked as an untrained technical writer on a software team in Dublin, I contributed informally to the testing, debugging and screen design of the educational software program we were creating. Meanwhile, my counterpart in Silicon Valley was barely able to elicit any cooperation from the Dublin developers in her attempts to write the program manual. The ease of communication between the programmers and me and the trust built on daily face-to-face relationships made it possible for me, the much less trained of the two technical writers working on the program, to make a greater contribution to the final product.

When high-tech workers build global ties, they typically do it off-line through migration, contacts between companies and meetings of technical standards organizations. Regional analyst Anna Lee Saxenian has documented the rise of such connections: Hsinchu Science Park in Taiwan and Silicon Valley are closely tied through alliances between firms, emigration to the valley followed by return migration to Taiwan and perhaps most of all by a group of “astronauts,” so called because they spend as much time in the air traveling back and forth as on the ground in either place. The rise of the virtual economy has brought with it an explosion in international business travel designed to build the face-to-face relationships necessary to make the virtual world work. The local craft communities of the nineteenth century have been replaced, not by a virtual global class but by a globally connected set of local technical communities.

Technical communities challenge transnational corporations even as they remain dependent on them. Even mighty Microsoft has worried about the emergence of Linux, a new operating system designed through a decentralized network of developers and distributed freely and globally. Linux is only the most visible tip of a broad movement for open-source software, software that is designed collaboratively through widespread technical communities and that cannot be held as private intellectual property. Although these products often originate in government and university research and investment, the technical communities that sustain and push forward the development of technologies such as Linux have a power of their own. These technical communities are all the more

difficult for major companies to control since they are organized through decentralized, semiformal social ties, connecting people across multiple organizations and countries.

technical communities remaking the politics of the workplace

The bargain between worker and employer is redefined in this tense relationship between global corporations and technical communities. What are the boundaries of a firm when an engineer is just as likely to look for help from a friend as from a coworker? When a team leader's goal is to make him- or herself as mobile as possible within the industry rather than building the relationships and reputation to advance within the company? When, despite confidentiality agreements, proprietary information on new developments spreads through Silicon Valley like a computer virus?

“The young guys in the industry, they are young and stupid, they're out to prove themselves,” says an engineering manager in his Silicon Valley office. “When you're like that you feel immortal, you work hard and play hard. You are the exalted, you feel . . . like you are a God. Think of a hot young designer, he understands at the molecular level how the world works. No one else has any hope of understanding what they do. Think of the power.”

How do the almost inevitable tensions between these immortals and the corporate giants of the information economy work themselves out in the workplace? In their research on almost 200 San Francisco Bay Area high-tech start-ups, James Baron, Diane Burton and Michael Hannan found that these firms typically use an engineering model in dealing with workers. Firms choose workers based on the technical task, lure them with “cool technology,” and use peer pressure to ensure their performance. Companies are least likely to use the classic factory model, where workers exchange effort and independence for money but little else. Having long tried and failed to impose factory-style arrangements on high-tech workers, those firms that did not themselves emerge from the new culture have had to adapt to the unique demands of technical communities. Forced to compete for workers, firms had to attract developers with interesting work, relaxed supervision and, for the elite developers, a share of the bounty.

These kinds of inducements make the lure of high-tech communities easy to understand, but there are costs to working in these communities. The other face of flexible careers is widespread insecurity of employment, and the joy of creativity at work is tempered by the long hours. Longer hours and increasing commercialization of professional work mean that technical workers are subject to much greater pressures from outside the community than were an earlier generation of professionals. Also, these technical communities may even prove to be as exclusionary as the large bureaucracies that preceded them. The individualist, macho imagery that defines the meaning of success within technical communities and the demands for total dedication to work raise barriers to entry for some people, notably women.

As high-tech workers gain some freedom from bosses in their firms, they find that they give up freedom to the market. Gideon Kunda and Steve Barley, in their study of high-

tech contractors in Silicon Valley, find that these workers often pursue independent contracting at least in part to escape the restraints placed on their work by internal company job descriptions, career paths and supervision. However, they often find “that the meaning of expertise has been transformed. To be an expert is no longer simply to possess sophisticated skills and knowledge; rather, to be an expert is to possess skills for which someone will pay.” The autonomy of expertise is compromised by the need to sell expertise to customers. As one software developer I worked with in Dublin put it: “I am the product.”

The market is double-edged. Developers reap rewards other workers could hardly dream of: obtaining stock options, starting firms of their own, controlling the intellectual property they create. Rosabeth Kanter finds in her study of Boston software developers that their security comes from their employability, creating enormous pressures to constantly update skills and to look toward prospects on the open market rather than within the firm. Thinking of themselves as products to be bought and sold on the market also takes a toll on independent workers. This is a winner-take-all system. Huge rewards for a few combine with insecurity for those who fail.

This insecurity begets long hours, according to a study of a Boston software firm by Leslie Perlow. Workers dedicate themselves intensely to one project so that they will be asked to participate in the next, in what Perlow calls a “vicious work-time cycle.” Those who fall off the fast track find it increasingly difficult to clamber back on. Individual heroics to meet unrealistic deadlines are rewarded, rather than sustained progress on long-term issues. The system encourages engineers to do whatever it takes to solve an immediate crisis while ignoring any costs imposed by interruptions or failures of coordination and long-term planning. Although high-tech workers are relatively free from supervision, peer pressure and deadlines drive them to extreme labor, to the Dickensian lengths noted by the software engineer in Dublin.

Furthermore, insecurity among employees and instability within the firm can damage the firm itself. Several studies have shown that employee turnover increases during significant internal reorganization, even without actual layoffs. According to Kathleen Eisenhardt, firms that “pace themselves” are more successful than those that create instability by reacting as quickly as possible to a series of external changes. The flexibility and adaptability of high-tech firms typically create a cycle of instability and loss of skills within the firm. Ramesh, the main architect of the system that I worked on as a technical writer in Dublin, resigned two months after I left the team, citing burnout and exhaustion—only to be replaced by three new managers working together to carry out his job. Despite the additional staff, however, it was impossible to replace Ramesh’s intimate knowledge of the product and his painstakingly constructed working relationships across three countries.

Time pressures that are both unpredictable and demanding create problems not only within firms but also beyond the company walls. Research shows that long and unpredictable work schedules put increasing stresses on family life and undercut broader patterns of civic and political engagement. Such pressures reinforce the

underrepresentation of women in science and engineering. Furthermore, much research suggests that the engineering culture obstructs women's advancement. A project team up against a deadline draws on typically male idioms such as war and sports in the drive to get the job done. Perlow and Bailyn argue that women's working styles rely more heavily on personal interaction than on individual heroics and are systematically devalued by the engineering culture. Technical communities provide more community for some workers than for others.

which model of the future of work?

If autonomy, cooperation and learning make technical communities an attractive model for the future of work, their insecurity, overwhelming work demands and social exclusion are less appealing. It is possible that these technical communities may simply be fleeting phenomena, awaiting recapture by their globalizing employers. If and when the pace of technological innovation slows, high-tech workers' leverage in the marketplace will be lost and they will be reabsorbed into the corporate world. The current crisis in high-tech investment and employment presents just such a threat, and the rash of layoffs in the high-tech world reveals how precarious "employability security" really is.

However, occupational communities have always been crucial to the economy and are likely to remain so. From the medieval guilds through contemporary craft workers, artists, professionals and blue-collar communities, workers' groups have existed in a tense but symbiotic relationship with large firms. In addition, recent decades have seen a seismic shift in how all sorts of workplaces are organized—with projects, contingent employment, networks and capital markets shouldering aside jobs, internal labor markets, corporate hierarchies and banks as the most prominent institutions shaping the workplace. In her recent book, *Crossing the Great Divide*, Vicki Smith documents that these trade-offs between flexibility and insecurity, between inequality and opportunity, increasingly define the character of work in a wide range of industries. Technical communities, born of the old economy, have come of age in the institutions of the new economy. Going back is improbable.

However, the road forward is open; technical communities may be reshaped in a variety of ways in the future. In her book *Regional Advantage*, Anna Lee Saxenian characterizes the Silicon Valley social world as a combination of competition and community; indeed these technical communities combine individualism and collectivism in a variety of ironic ways. Workers who rely on one another to solve technical problems also nevertheless explain their success or failure as a result of individual skill, and they pursue their careers through individual job-hopping rather than collective bargaining or moving up the firm ladder. Self-interest and group interest are in profound tension with each other within these communities, and members have few common solutions to shared problems such as insecurity and the work-time cycle.

Some commentators argue that the individualist ethic of technical communities must be sustained and even strengthened. Laws, corporate practices and worker attitudes must be transformed to make it easier for workers to take their experiences, skills, cash and

benefits with them as they hop from job to job. Increasing the portability of workers' assets and treating workers as investors in their own portfolio of benefits does nothing, however, to tackle the fundamental employment insecurity within technical communities or to facilitate the collective learning and cooperation that is the strength of the communities. Celebrations of the arrival of "boundaryless careers" within "portfolio capitalism" ring hollow in the wake of the dot.com collapse and the recent economic malaise.

Cooperative relations within technical communities must ultimately be supported by collective institutions if they are to persist. Collective institutions such as governments, universities and large firms were critical to the formation of these communities. Workers could still change firms and learn from one another, even if there were guarantees of job security and collective bargaining. The Scandinavian economies, for example, provide universal health care and child care, secure employment and unemployment benefits while still fostering their own highly successful technical communities.

If such collective institutions assuring security of income and long-term learning can be strengthened, technical communities could emerge as an important alternative model of economic organization to increasing corporate dominance of the workplace. The software developers joking in the Dublin pub would be better able during an industry crisis to resist the pressures to become software factory workers, and the technical communities themselves might prove more open to outsiders. Such technical communities would prove more sustainable in the long term. They would certainly be members of a better society.

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Recommended resources:

Barley, Steven L., and Julian E. Orr. *Between Craft and Science: Technical Work in U.S. Settings*. Ithaca, N.Y.: ILR Press, 1997. This book presents an interesting series of studies of the actual work practices of technical workers in a variety of industries in the United States, revealing how skills are defined and developed within communities of practice.

Benner, Chris. *Work in the New Economy: Flexible Labor Markets in Silicon Valley*. Oxford, U.K.: Blackwell, 2002. This most comprehensive analysis of flexible work and labor markets in Silicon Valley and the new institutions that have emerged around these new work practices.

Ullman, Ellen. *Close to the Machine: Technophilia and Its Discontents*. San Francisco: City Lights Books, 1997. A gripping autobiographical account by a software programmer of the appeal of programming and the discontents of the work process and the lifestyle associated with it.

von Burg, Urs. *The Triumph of Ethernet: Technological Communities and the Battle for the LAN Standard*. Palo Alto, Calif.: Stanford University Press, 2001. A case study of how a technical community decided computing standards.

Washington Alliance of Technology Workers, Communications Workers of America, Local 37083, AFL-CIO. . <http://www.washtech.org/wt/>

<http://www.andreas.com/faq-networks.html> This is an annotated list of professional associations in Silicon Valley.

Working Partnerships USA. <http://www.atwork.org/wp/> A non-profit organization with links to organized labor. Policy experiments and reports on workplace change, job security and the new economy.