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SOFTWARE WORK AND WOMEN

In many workplaces, employers are using new technologies to dramatically change the way people work. In many settings, managers follow the precepts of scientific management, sometimes known as Taylorism, to divide labor into distinct tasks, de-skilling labor for a large proportion of their employees. Since, in the long run at least, de-skilled employees can be paid less, labor costs are reduced.

Sociologists Philip Kraft and Steven Dubnoff of the Center for Survey Research at the University of Massachusetts-Boston conducted a detailed survey of computer programmers and other software specialists to determine the degree to which programming work has been fragmented. In 1982 and 1983 they interviewed nearly seven hundred Boston-area software workers, asking each to note which of 32 job tasks fit into their activities.

Kraft and Dubnoff found that the separation of conception and execution, as characterized by Harry Braverman (in his influential treatise on scientific management, **Labor and Monopoly Capital**), exists in programming. Workers doing complex systems analysis are distinct from, and are positioned higher in the occupational hierarchy, than applications programmers. ("The Division of Labor, Fragmentation, and Hierarchy in Computer Programming")

Kraft and Dubnoff's work is important, not only in its findings, but because they broke away from official labor statistics. Computer workers are usually lumped somewhat arbitrarily into both professional and technical categories, and real labor statisticians have no means by which to measure job-skill levels. Historically, employers have retained job titles to mask the de-skilling of their jobs. That is, programmers who become coding technicians may still hold professional titles.

The geographic base of Kraft and Dubnoff's study, however, may have introduced a bias. The Boston area is generally considered home to the nation's minicomputer, or medium-sized-machine industry. The West Coast, however, is home to a high proportion of microcomputer software development. For programmers, the chief characteristic of a personal computer is that he or she can own his/her means of production. There is a flourishing industry of small, independent software writing outfits in Silicon Valley. Within these largely self-sufficient enterprises, programmers are much less specialized than in the software labs and offices of larger firms, such as those owned by or serving the minicomputer industry.

This independent sector might be large enough to give results unlike Kraft and Dubnoff's, should a similar study be carried out in California. Such a finding would not undermine the strength of their survey, however, since they see workplace stratification as a result of industrial organization, not computer technology.

In a companion study, "Gender Stratification in Computer Programming," Dubnoff and Kraft explored the impact of gender upon computer employment. They found that women are overrepresented in the lowest paid sectors of programming and underrepresented in the highest. Furthermore, in positions that are generally high income - systems programming and management - women are paid salaries averaging 60% of their male counterparts. Though numerous factors, such as education and experience, contribute to the difference, outright pay discrimination clearly exists.

A Stanford University study with a similar focus examined data collected by the U.S. Bureau of the Census. Researchers Myra Strober and Carolyn Arnold found that women systems analysts, programmers, and computer operators earn substantially less than their male counterparts. Even when age and education are taken into account, women still suffer pay discrimination. Top jobs, such as systems analyst, are predominantly male, where lower-paying operator jobs are preponderantly female. ("Integrated Circuits/Segregated Labor: Women in Three Computer-Related Occupations," Institute for Research on Education Finance and Governance, Stanford Education School, Report No. 84-A27, November, 1984)

PIRATES CAPTURED

MicroPro, marketer of leading word processing programs such as WordStar, MailMerge, and SpellStar has successfully defended into copyright against blatant piracy by employees of a major American corporation. Wilson Jones, an Illinois-based subsidiary of American Brands, settled out-of-court a suit brought by MicroPro, admitting fault and agreeing to halt illegal copying and pay for copies already made (or destroy the pirate versions). Of course, it is much easier to trace piracy and take legal action at a large institution or corporation than it is to prevent individuals for circulating software without authorization. (*Electronics News*, June 3, 1985)

DIRTY WORK

KRON-TV, the NBC affiliate in San Francisco, has charged that several major semiconductor manufacturers under-reported illnesses caused by gas leaks at their Silicon Valley production facilities. As **Global Electronics** reported in issue no. 44, members of the Semiconductor Industry Association had agreed to re-classify one-time exposures as injuries, not illnesses. Since the requirements for reporting injuries to the state are looser, industry's illness reports fell 70% between 1980 and 1981.

In a two-part news report, KRON charged that state investigators considered industry's new approach to state and federal reporting guidelines to be a violation of the law, but that they were pressured to cut their review short. Their final report, not released to the public until KRON obtained a copy, found no legal violations.

In response, the SIA has issued a statement defending the companies' record. The SIA charged that KRON "allowed itself to be used" by litigants in pending court cases and added, "the portrayal of the semiconductor industry as one which has little regard for the health and safety of its workforce is . . . one of the tactics used to fuel the arguments of those who wish to see the industry organized by labor unions." (**Corporate Times**, July, 1985)

ENGINEER SHORTAGE

The National Science Foundation has released data on the supply and industrial demand for scientists, engineers, computer specialists, and technicians. ("Shortages Increase for Engineering Personnel in Industry," **Science Resources Studies Highlights**, NSF-85-309, March 29, 1985). The report is based upon a survey of major industrial employers in fall, 1984, before the current downturn in high-tech industry.

The NSF found that the number of firms reporting shortages of electrical, electronics, and computer engineers rose above the 1983 level to over 10%. The 1983 shortage rate, however, was substantially below the 1981 levels of over 50% in those categories. Compared to all industries, a larger percentage of military-oriented companies reported shortages in 1984, ranging from 25% among computer engineers to 45% for electrical engineers.

The severe year-to-year variation illustrates the difficulty in establishing public policy, such as immigration requirements and educational funding, to meet perceived shortages.

CAPTIVES

Though the U.S.-based merchant semiconductor industry constantly harps upon the threat of Japanese imports, the chipmakers face another important source of competition: their customers. Data on electronic and

computer system manufacturers that make their own chips, known as captive producers in the trade, is unreliable, since companies are not required to report intra-company transactions. Most statistics on the industry, such as the Semiconductor Industry Association's book-to-bill ratio, exclude captive production.

One market research firm, VLSI research, argues that captive production is growing. VLSI says the captive share of the U.S. market jumped from 23% in 1979 to 32% in 1984. The SIA, on the other hand, reportedly claims that captive production is somewhat higher, at 35%, but that is falling about 1% each year. (**San Jose Mercury News**, June 10, 1985)

AT&T TO BUY SYNERTEK

In April AT&T, which recently moved into the merchant sales of its semiconductor products, announced a tentative agreement to buy most of the assets of Synertek, presently the merchant chip branch of Honeywell. AT&T plans to take over the firm's nearly idled fabrication plant in Santa Cruz, California (a half hour's drive from Silicon Valley), a design center in Munich, West Germany, and assembly plants in Bangkok (Thailand) and Singapore. (**Peninsula Times Tribune**, April 18, 1985). For the first time, AT&T will operate offshore assembly plants. Since Synertek, like all other U.S. merchant chip firms, is not unionized, the acquisition will pose a challenge to the Communications Workers (CWA) and Electrical Workers (IBEW) who represent the phone company's manufacturing workers.

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Edited by Lenny Siegel

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CAPITAL GAINS

The conventional wisdom in high-tech industry, iterated by entrepreneurs and investors for political effect, is that reductions in the U.S. capital gains tax rate have stimulated new investment in young, innovative companies. Venture capital made the growth of Apple Computer possible at a time when large companies were hesitant to go into microcomputing, and the current pool of venture capital should enable the establishment of not only new firms, but entirely new commercial technologies.

Though, under our economic system, innovation is indeed supported by the availability of some venture capital, the large pool of venture capital now in circulation appears to have encouraged too many start-ups, stretching the technological resources of Silicon Valley too thin. The economic Darwinism of venture capital balances out for investors who diversify their portfolios, but it hurts employees who lose their jobs when their company fails.

Before the Reagan administration sent its tax plan to Congress, heavy lobbying by high-tech companies led it to re-consider the Treasury Department's recommendations on capital gains. Instead of dropping the preferential treatment for capital gains on equity investments, Reagan wants to reduce the rate further. The individuals who invest venture capital are pleased by the widening of their loophole, but careful examination of the recent history of venture capital shows that there would be a large supply of capital available for small high-tech companies without the special tax break.

Politics & Markets (January 31, 1985, Gallatin Institute, 1120 Connecticut Ave., suite 450, Washington, DC, 20036) analyzed data from the venture capital industry on the various sources of funds. It reported, "40 percent of the total committed to venture capital in 1984 - some \$1.26 billion - came from pension funds, foundations, and endowments - tax-exempt investors for whom the capital gains tax is simply irrelevant. Another 18 percent came from somewhat mysterious foreign sources not subject to American taxation. Of the remaining 42 percent, 28 percent came from insurance companies and other corporations (such as banks), most of whom are able to manipulate the timing of their income to ensure a low rate of taxation. . . . Only 15 percent came from individual investors subject to the capital gains tax."

Sources of Venture Capital

Pension Funds	34%
Foreign	18%
Individuals & Families	15%
Corporations	14%
Insurance Companies	13%
Endowments & Foundations	6%

Given the large commitment of pension funds to venture capital, it appears that 1978 revisions in Federal pension guidelines outweighed the capital gains tax changes. In that year, the Department of Labor allowed the managers of pension funds to incorporate venture capital investments into their portfolios. **Politics & Markets** says that a 2.5% commitment to venture capital does not increase the overall portfolio risk. And 2.5% of the nation's pension investment is a lot of money.

Furthermore, the Gallatin Institute argues that the general partners who control venture capital funds are motivated primarily by the promise of high rates of returns from their investments. The average pre-tax return on investment to venture capital funds jumped from 23.4% in the first half of the 1970's to 32.5% in the latter half, bringing the return of general partners to 77.7% before taxes. (Limited partners, investors who turned their funds over to general partners, earned 29.9% before taxes over 1975-1980.) Even at the pre-1978 capital gains rate of 49%, this would mean that general partners would have a return of 66.2% after taxes. While the difference between 78% and 66% might buy a lot of BMWs's, it is hardly enough to influence many investment plans.

FOOTLOOSE

In good times, there are few runaway shops. Manufacturers merely add capacity at new locations. In bad times, geographic shifts in production and other corporate operations are more visible. For example, AT&T is investing US\$32 million in Singapore to produce telephones for the U.S. market. It plans to employ about 1,000 workers there (**Electronics**, July 15, 1985). Los Angeles-based Dataproducts has announced plans to close a San Jose factory where it makes computer printers, laying-off 250 workers. The company plans to build nters in Hong Kong. (**San Jose Mercury News**, July 23, 1985). Colex, which apparently designs and assembles printed circuit boards for telecommunications and computer companies, is moving its headquarters from Dallas to Silicon Valley, where it has a major subcontract with PBX-maker DEKA. Colex employs about 75 workers worldwide, half of whom are in Hong Kong, where it does its manufacturing. (**The Business Journal, San Jose**, July 22, 1985). And National Semiconductor plans to close its chip assembly plant in Seremban, Malaysia, where it employs 1,000 workers. I expects to expand production at its other Malaysian factories, in Malacca and Penang. (**San Jose Mercury News**, June 25, 1985)

STAR WARS WILL NOT COMPUTE

Computer Professionals for Social Responsibility, a high-tech peace group expanding in many parts of the U.S., is challenging the feasibility of the Reagan Administration's Strategic Defense Initiative (SDI), commonly known as "Star Wars." Computer scientists Greg Nelson and David Redell have written a paper, "The Star Wars Computer System," (CPSR, Box 717, Palo Alto, CA, 94301, June 25, 1985), analyzing the data processing requirements of the proposed defense program.

Nelson and Redell warn that there is no way to adequately test SDI's battle management software. They conclude, "In short, credible simulation testing of any real-time closed-loop system is extremely difficult, and for a system as large as that envisions for the SDI, may be simply impossible." The SDI software is projected to contain fully 10 million lines of code.

Furthermore, they argue that the automated threat assessment envisioned for the SDI system would interact with Soviet defense planning to create an escalating feedback cycle similar to the escalation of threats that launched World War I.

Nelson and Redell summarize, "The computer system required by the Strategic Defense Initiative is the most complicated integrated computer system ever proposed. We have surveyed some of the difficulties in building such a system. The problems of software and system integration are far more serious than the problem of achieving the required radiation hardness and high computation rates. Flaws in any system of its size are inevitable."

GAME

One of the most frequent criticisms of video games and computer games is that many of them are violent. One game company boasted in its TV commercials that it offered the visual effect of the destruction of an entire

planet. It is unlikely that the games, any more than chess - an earlier generation war game - encourage anti-social violence, but it does prepare young American for fighting the high-tech wars of the future. Real military systems resemble their arcade and home counterparts, although many of the games appear more sophisticated than the real thing.

But there is nothing intrinsic in the high-tech medium which makes it violent. One leading games designer, former Atari manager Chris Crawford, has developed "Arms Race," a game played on Apple's Macintosh computer. In Arms Race, the player - as U.S. President or his Soviet counterpart - manipulates menus on a global geopolitical display with the goal of expanding influence without resorting to military action. Unlike other games, in Arms Race launching a nuclear war is a loss.

The game, still needing revision, is hard to get. InfoWorld (June 10, 1985) reports, "Perhaps Crawford's point of view - as well as the game's lack of bombs and explosions - was a factor in Random House's decision not to publish the game. Crawford now has no publisher and owes Random House his \$15,000 advance."

INDIA

India's hopes to produce ultra-pure polysilicon for semiconductor production are being held up by disputes between the government and the scientific community there. The government's Department of Electronics negotiated an agreement with U.S.-based Hemlock Semiconductor to establish a silicon production plant at Baroda. Indian scientists, however, charge that the plant would utilize old technology and would single-handedly saturate the Indian market. They argue that the project will undermine efforts to establish an indigenous silicon production capability. (Far Eastern Economic Review, March 7, 1985)

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Center
222B View Street
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