The High Tech Sector: Conditions & Opportunities

By the High Tech Committee of the National Organizing Committee

Introduction

This report began as an internal discussion document of the High Tech Committee of the National Organizing Committee. Philosophically, the NOC tries to begin with an assessment of the world as it is. So this report attempts to summarize the objective situation in key areas of the high tech arena, including employment, the National Information Infrastructure (NII), intellectual property, and the high tech police state. The objective situation reveals opportunities for our work, which are also discussed below.

The High Tech Sector of the Economy

High tech is a key sector of the economy. According to the Bureau of Labor Statistics, more workers in the U.S. are employed in electronics than in automobile production. Much of the growth in electronics employment and related industries over the past three decades has been at the expense of traditional industries, as companies replaced workers with electronics and the requisite software to control electronic-based machinery. However, the same forces affecting other industries have affected the electronics industry itself, in the past four years. This is an expected development, as electronics permeates the economy, and the industries mature.

These forces can be summed up as:

- a glut in the market, with a corresponding crisis in profitability (or, the extraordinary profits of the previous period begin to come in line with overall profitability). For example, software companies are facing the saturation of the business software market, forcing companies to cut into their fat profit margins -- "$500" software packages being dumped at "introductory" prices of $50 or $100. (That is, the price of technology, especially software, is sinking to its value).

- waves of new technology making older architectures obsolete, and jeopardizing the companies that championed them. The mainframe and mini-computer companies are the primary victims here (IBM, DEC, Amdahl, Groupe Bull, etc.), where less labor is necessary to produce state-of-the-art systems (these computers are smaller, and require fewer resources to manufacture).

- in a related move, a shift from complexity in manufacture (expensive to replicate) to complexity in software (inexpensive to replicate). "Massively parallel processing" computers, where hundreds of relatively simple processors work in tandem, are replacing the old model of larger chips and larger systems. Another example is the move to "reduced instruction set computing" or RISC, away from the trend to larger and more complex chips -- the designs tend to get simpler and faster, and the software to coordinate and run them gets more complex.

- cuts in military spending. There are several reasons for this -- the end of the Cold War has undermined the rationale for a heavily subsidized military-industrial complex (or at least for particular types of weapons systems). Forces of a technology sector without ties to the Pentagon have emerged which have pushed for more research and spending in non-military areas (these forces, identified with John Sculley, then with Apple, and John Young, then with Hewlett- -Packard were instrumental in Clinton's election). Military spending cuts can be seen as a retraction of the social bribe (defense spending as a public works project) as international capitalist competition increases, and public sector spending must be cut -- a parallel move to cuts in welfare, health care, etc. While military production-related employment cuts continue, however, the Clinton administration has retreated from more cuts in the military budget; at the same time we are seeing military technology bolstering police forces.

Companies have responded in traditional ways:

- companies are cutting labor costs through "smarter technology" -- in the case of High Tech, this has been through such developments as object-oriented software, computer-aided software engineering (CASE), and faster and cheaper computers. (As the head of Radius, a company that makes computer equipment, told the San Francisco Examiner recently, "We turn out (custom computer chips) with four engineers and a giant computer. That used to get done with 100 engineers. That's 96 engineers you don't need any more.")

- companies are cutting labor costs by exploiting cheaper labor markets (made possible by high- -speed telecommunications). Emerging new low-wage high-skill labor markets include the former socialist countries of Eastern Europe, and India, Ireland and Mexico.

- particularly in the case of companies caught in the shift to new architectures, tighter profit margins, and shrinking government subsidies, companies are dumping workers as sales drop or as profitability fails to live up to investors' expectations.

- companies are consolidating through mergers and buyouts (Aldus+Adobe and Novell+ Word- Perfect most recently, as well as various other partnerships). Companies realize savings by cutting unproductive (sales & marketing) labor costs especially, but also tech support workers, engineers, and the relatively few production workers where overlap occurs.

The cuts have been substantial:

- Domestic employment in the U.S. electronics industry fell for the fourth consecutive year in 1992. December, 1992 electronics employment was 2,291M or 99,000 (4.1%) less than the 2.39M reported for December, 1991. "The only industry segment that experienced growth in 1992 was Prepackaged Software, with a modest 2,270 new jobs. On the other hand, Defense/ Commercial Guidance Systems lost 30,000 jobs last year. With one exception, U.S. electronics employment showed no month-to-month growth for 30 consecutive months. Since August 1989, our industry has lost 309,000 jobs. And, when the industry's healthy software segment is removed from the total, domestic electronics employment dropped by more than 380,000 in the same period.[1]

- That "healthy sector", prepackaged software, only employs about 150,000 workers -- about as many people who work in cement production.

One aspect of the shrinkage in the high tech labor force is the shift from full-time regular employment to contingent work -- temporary; contract and "consulting" work. This parallels trends in other industries (Manpower is supposedly the largest employer now), and is an integral aspect of the new "virtual corporation", where production is organized on a temporary, ad hoc basis, with workers being pulled together by capital as needed, and dispersed when projects are complete. The shock of economic contraction is shifted from the capitalist to the worker, as the worker must absorb training expenses, health insurance, and bear the cost of periods when no work is available.

The high tech workforce, especially in the weapons industry, has historically been a conservative bloc, consistent with maintaining their livelihood through inflated military spending. With the enormous job losses in that industry (an expected 1.2 million jobs in the 1992-1996 period, according to the Federal Office of Technology Assessment), there is a real danger of those workers drifting towards a fascist solution to the economic crisis. One example of this danger are the efforts of the Coalition for Visa Reform, founded last January. "Its goal is to reform the H1 visa program (and any other visa) so that technical professionals will not lose their jobs or see their pay reduced because of the cheap foreign labor being brought to this country."[2] The legitimate issue of pay equity for non-citizen workers is instead raised in the context of a nativist solution. CFVR focuses the problem on foreign workers taking jobs, instead of challenging a system that cannot provide productive the world's engineers. As more high tech work is exported to cheaper labor markets, and mobile lower-paid workers are brought in as temporary workers, "Buy American Labor" could become a popular rallying cry among unemployed engineers.

The communications sector, which overlaps with high tech work, has also been hit hard over the past three years. At the same time the "information super highway" is touted as a jobs savior, some 44,000 jobs were cut last year among the companies who have laid claim to building the "infobahn." According to the Communications Workers of America, the phone companies in particular have been eliminating union positions through automation (particularly among phone installers and operators), and transferring capital to non-union sectors of the industry, through acquisitions of related concerns (e.g., cable companies).

The privatization of information has resulted in the decimation of the public library system and the closing of library schools. The reality of trends in public librarianship belies government and corporate assertions of concern for equitable access to information.

Layoffs and other labor cutbacks especially affect workers over 40. As technical workers get older, their salaries rise, their skills age (Sun Microsystems expects 20 percent of its engineers skills to become obsolete each year [3]), and their willingness to sacrifice family and community for work ebbs. So these workers tend to bear the brunt of "restructuring", "downsizing", etc.

The job market for recent college graduates is also drying up. CFVR concluded, "[t] here are at least 50% more people entering the software programming labor market than new jobs being created. This amounts to an over supply of 22,000 workers or about 4.3% of the overall labor force."[4] These figures have been challenged, but the Institute of Electrical and Electronics Engineers (IEEE) recently found unemployment among electronic engineers to be the highest in more than a quarter century, and some 200,000 engineers were removed from U.S. employment rolls between 1991 and

1993.[5] IEEE also describes the jobs crisis as an international phenomenon. In addition, youth considering engineering or other high tech careers face the problem of getting into college in the first place, with state colleges raising tuition and closing down programs. [6]

The Digital Convergence

As electronics permeates production, the product of production assumes a digital format, a form that can be easily stored and transported electronically. "Digital format" means the symbolic representation of information as 1s and 0s, which can be converted into electrical or light pulses, and transmitted over wires and fiber optic cable; or through air and space as electromagnetic waves. Electronics-based machinery at either end of the transport system encodes and decodes the symbolic traffic, and renders it into material use values. There are numerous enormous cost savings achieved by the digitalization of products: savings in storage space required, in transmission time and cost, and in the application of computers to completely automate the processing and routing of the digital rendering. [7] Just as railroads and trucks were needed to carry the product of production in the industrial era, digital carriers are required to haul the product of electronic production in the electro

Every stage of technical development demands both transportation and a communication system that corresponds to that level of the productive forces. The Industrial Revolution was also a transportation and communications revolution, that is, one could not have happened without the other, as capital demanded better and faster means of coordinating production and circulating commodities and capital; and the manufacture of new communication and transportation systems, especially railroads, spurred industrial production to more and more sophisticated levels. [8]

The ubiquitous debate over the so-called National Information Infrastructure" (NII), also known as the "information super highway", must be examined in this context. As modern production increasingly shifts to a digital basis, as a natural consequence of electronics spreading through production, modern production demands a commensurate means of transportation and communication. Or to put it another way, to paraphrase Marx, the old means of communication and transport handed down from the industrial period have become unbearable trammels on Modern [i.e., electronics- based] Industry.

This process is most intensely affecting the information industries -- especially communications, entertainment (music, film, television and the hybrid "multimedia"), publishing, education, scientific research, financial services, and advertising. But the shift to "information-based" or "knowledge- intensive" production affects traditional manufacturing as well. Just-in-time production requires sophisticated information networks to work. Modern robotics-based production requires not so much assembly workers as computer operators to monitor the workflow. Designs and orders enter into the machinery through digital ports: "'retooling' with the new "flexible manufacturing systems", simply means changing the software that guides the machines. The assembly line (hardware) remains unchanged. The robots, hardly pausing, begin exercising different actions in obeyance of the newly-loaded programs."[9] The production and circulation of goods is increasingly an information processing function.

The terminal phase in capitalism is being driven by the expulsion of labor from commodity production. Objectively, this manifests itself as rising global unemployment, and for those able to find a market for their labor power, falling wages. The increasing use of information technology in the context of intense global economic competition is rapidly eroding wages. In 1979, 12 percent of the full time workforce earned less than the "poverty wage", so-called because it is the amount necessary to support a family of four above the official poverty level ($13,000 in 1992 dollars). By 1992, 18 percent of the full time workforce was earning less than the poverty wage, an increase of 50 percent. Thus, of those workers able to find full time employment, one in five is not earning enough to support a family. [10]

The expulsion of labor from commodity production results in a crisis in the realization of profits. To maximize profit, the capitalist is driven to a handful of strategies: expand markets, cut costs, and speed up the circulation of capital. The digital transport and communication system, the NII, helps capital in each of these areas. At the same time, the cure only worsens the deteriorating condition of the afflicted.

Transportation and communication is key to the realization of profit by ensuring the circulation of capital. The faster and more cheaply capital circulates (that is, goods leave the contemporary point of production and reach the purchaser as quickly and with as little human intervention/labor as possible, and money returns to the producer just as quickly), the higher the rate of profit. Seeking out faster, cheaper circuits is an expression of the quest to maintain profits as the technical level of production advances.

But this means at the same time that less labor is needed in the overall process of global production and distribution. For example, it is technically possible for music to be delivered directly from the source (e.g. musicians or record company) to consumers, in CD-quality format. This eliminates the manufacturing, packaging, trucking, and retail workers involved in this particular industry. More value is driven out of the product, laying the basis for overall profit rates to fall further.

Another historic strategy for dealing with the falling rate of profit has been to expand the market (by bringing more of the world's population into the commodity exchange system, by commodifying new areas of human wants, and by putting cheapened commodities within the price reach of larger numbers of workers). Transportation and communication systems have been a fundamental component of capitalism reaching out over "the whole surface of the globe," as Marx described in the Manifesto. But with the entire planet pulled into commodity production and exchange, the contemporary transport and communications systems can only facilitate more intensive competition among various capital groupings for market share. Unable to extensify the market (geographically, there is no other known populated world to conquer) or intensify the market (consumers have exhausted their credit and savings), the capitalists can only raid each other's market.

The digitalization of production and distribution smashes the technical barriers that once separated various industries and markets (e.g., the motion picture market was distinct from newspaper publishing market was distinct from the recording industry market; and cable was distinct from telephones was distinct from video stores). This represents both an opportunity for companies (other industries' markets become available) and a profound danger: Companies with once-secure monopolies in their respective sectors are now being forced to deal with new competitors now that the walls are falling. That is, the markets of these various sectors are converging, as their products converge to a vast sea of 1s and 0s.

The digital convergence is laying the basis for a new, extremely intense round of competition among very large concentrations of capital. The merger, takeover and partnership frenzy among computer, communications and media companies that has dominated the business news over the past two years is a life-and-death struggle for these enterprises, and when the smoke clears, we will see fewer companies competing in a greatly consolidated market.

Intellectual Property

One other important process in the digital economy is the emergence of intellectual property as a key source of profit. As information and knowledge in its various forms assumes a dominant role in production, the monopoly control of that knowledge can be a source of tremendous profits in concentrated sections of the economy. The replication cost of digitized knowledge is near zero, and monopoly control allows the seller to demand whatever price the market will bear. That is, the law of value is temporarily defeated until the knowledge reaches widespread use. Substantial profits lie in the gap between social value and the individual value of products. This social value is propped up by patents or copyright (granting a temporary monopoly to the patent or copyright holder). "Knowledge can only acquire a price when it is protected by some form of monopoly."[11] This makes possible the extraction of superprofits from that sector of the economy. "Intellectual property rights" linchpin of profit for high tech companies. This explains why companies are so quick to drag their competitors to court over various "property" infringements, alleging in some cases billions of dollars in losses (e.g., Intel vs. AMD, Apple vs. Microsoft, Lotus vs. Borland). The Software Publishers Association has pursued an aggressive campaign against unauthorized duplication of computer programs, including encouraging workers to turn in co-workers and employers via an 800 number, and pushing the FBI and other police forces to arrest violators.

These "property rights" issues have taken on an international scope. Shared "property rights" conventions are required to internationalize the market and open up new profit-making potential. So the U.S., under pressure from Genentech, the bioengineering company, refused to sign the biodiversity agreement at the 1992 environmental summit in Rio de Janeiro, because they argued that the treaty did not provide enough "protection" for U.S. gene splicers. Aspects of GATT (the General Agreement of Trade and Tariffs), the WIPA (World Intellectual Property Agreement) currently under debate at the Hague, and the Berne copyright convention are attempts to harmonize international "intellectual property" conventions. Countries may be ostracized from world trade until they change their property laws to conform to contemporary world capitalism standards.

"Intellectual property" reaches its most absurd heights in biotechnology (and explains why biotechnology is such a popular speculative arena for capital). Patents on genes in biotechnology enable monopoly control over the production of food, rather than just the distribution of food, as is the current case. This very complex process is just beginning -- that of converting economically important plants and animals into private property through the mode of modifying their genomes, and then patenting them. The application and enforcement of intellectual property rights will be accomplished in biotechnology through increased impoverishment, starvation and death of those who cannot afford patented foods and pharmaceuticals.

Technology and the Control of the Social Revolution

The economic revolution that is proceeding from the technology revolution is creating a social crisis, from which the beginnings of a social revolution is emerging, as is well-documented in the pages of the People's Tribune. The response by the ruling class "is turning from neglect to attack," with greater levels of repression.

Beyond the welfare agencies and social engineering institutions, lay the armed state agencies. Police forces have turned to more sophisticated technology to control the emerging social revolution. This technology takes many forms -- satellite surveillance of communities, INS databases of undocumented workers and proposals for a national ID card or national employment registry, automated prisons, electronic fingerprinting of welfare recipients, DNA "fingerprints", etc. Historically, new forms of control of the working class are first advanced against the most vulnerable and least organized, and afterwards spreads to the general population.

At the same time, the various police forces are moving to control the new areas of human interaction made possible by new technology. New technologies provide powerful tools for protecting privacy and sharing information. To maintain control over the new technology, information and the people who use it, the U.S. government is clamping down on several fronts.

Here are a few recent developments:

The FBI wants to require all computer bulletin boards and communications carriers and makers of electronic communications equipment to give it a way to spy on everyone who communicates.

The federal government is pushing ahead with its so-called "Clipper Proposal," a plan to subvert private communications by requiring users to give cryptography keys to the government.

The Commerce Department has recommended changes in the copyright law that will outlaw the use of technologies that can break "copy protection" schemes.

This summer, a Tennessee jury convicted a couple who ran an adult computer bulletin board in California of 11 counts of transmitting obscenity through interstate telephone lines. A U.S. district attorney used conservative Tennessee "community standards" against the couple because he was able to copy pictures from the couple's computer, 2,000 miles and several states away. With computer networks, what is legal in one state or country can still be prosecuted in another place where that same activity is illegal.

Various proposals have emerged from the Clinton administration over the summer for proposals that will facilitate tracking people: electronic delivery of government benefits via an ATM-like benefits card, a national health card, and a national "work- eligibility" card and/or employment registry.

The government claims that it needs these proposals to protect the citizenry from drug dealers, child pornographers, welfare frauders and terrorists -- these are the Trojan horses by which the police state will be introduced in this country.

Another level of control is emerging through the debate on human genetics. The proposals of biological determinism, trying to assert a genetic basis for joblessness and criminality, will be intensified, with more sophisticated and even more fraudulent pseudo-scientific models.

Opportunities: High Tech Workers

As the old system of lifelong stable employment breaks down, opportunities arise to influence how high tech workers comprehend what is happening to them. Without ideas being introduced into the debate that point the way towards a reorganization of society along the basis of distribution of social wealth according to need -- a communist resolution -- those workers will succumb to fascist agitation (the problem is Indian programmers, or undocumented workers, or people on welfare; the solution is more police and prisons, less welfare, gated communities and walls around the border).

High tech workers being displaced through the technological changes discussed above need a program that points the way forward. What would such a practical program be? Developing self-defense organizations (e.g., a union) for high tech workers? Pushing for a guaranteed income, to remove the economic terror faced by contingent workers? A redistribution of work, based on a shortened work week? A government jobs program? Effective training programs? Such a program overlaps with the demands rising out of other sections of the trade union and unemployed workers movement. Events like the MIT Technology and Employment Conference last January, and the planned Chicago Technology and Employment Conference next March provide opportunities to raise these issues, and advance the development of a practical program. As workers in high tech, we need to raise these issues in the various forums that we have available.

Opportunities: Youth

The burden of dead end, low wage jobs, or no jobs at all, especially hits youth. For full time workers age 16 to 24, the increase in poverty earnings went form 23 percent in 1979 to 47 percent in 1992.[12] Growing numbers of college educated youth are finding their opportunities defined by dead end, low wage jobs. When the bleak prospects of fully employed youth is combined with the fact that, in many areas of the country, youth unemployment approaches 50 percent, the revolutionary position of youth becomes clear. For a vast section of America's youth, the capitalist system offers no future.

The phenomenon of "hackers" should be examined in this context. Expressing an explicit disdain of capitalist property laws, these youth represent in many cases the hint of a new society in formation, expressing the values of sharing, exploration, and creativity. They have succeeded in drawing a great deal of fire from the Secret Service, the FBI, and local law enforcement agencies who recognize the vulnerability of the digital infrastructure. As with other sections of society, this loose youth movement will likely polarize. Generally missing from their discussions is an overall understanding of the historical significance of their activity. Although implicitly communist in their outlook, unless this impulse is nurtured and cultivated through discussion and education, it will wither, be bought out, or pervert into a fascist impulse. Important opportunities exist for linking up the hackers movement with other currents of the youth movement -- the truce movement, the new student move "Break the Blackout" movement, the anti-censorship movement.

Opportunities: Popular Convergence and the NII

At the same time that once-distinct capitalist markets are merged, the various popular organizations that addressed individual arenas around media access, education, artists' rights, and labor issues in the various computer, communications and artistic spheres are also thrown into working together.

Organizations that fought for a vital public library system or that fought for public access to local cable television systems or that represented culture workers in film, music, writing etc. have a new, practical basis for working together with each other and with new groupings like the community networking movement. This has taken a concrete expression in coalitions like the Telecommunications Policy Roundtable, probably the largest of these efforts on a national level. Organizations as diverse as the American Library Association, the Consumer Federation of America, the Communications Workers of America and Computer Professionals for Social Responsibility, along with an other 100 or so organizations they are on the some battlefield in the struggle for equitable access to work, information and audience. Coalitions like this are replicated on the local level, for example, in Chicago in the recent formation of the Chicago Coalition for Information Access.

The breadth of organizations that have stepped forward to advance a progressive position on the NII affirms the broad nature of the struggle for democracy in culture -- culture in its grandest sense -- that the battle around the NII represents. Missing from most of the debate around the NII, though, is a broader context for understanding the relationship of the technology revolution to the global economic and social crisis.

The general tendency in the current discussion is to begin from the point of view of those already able to afford access to information, the upper strata of the working class that is afraid of being shut out of the developing process. Largely ignored in the debate is the growing section of the population that has no financial means, often no educational means, and no social means (housing, food, health care, etc.) to use the NII as it is envisioned. It is important that this survival movement (the movement for shelter, welfare rights, health care, etc.) take up the call for access to culture and knowledge, and that those with the skills and access encourage and defend their participation. The general struggle around the NII will be to define "universal access" in the broadest, most democratic way possible -- access to knowledge, access to culture, access to technology, access to skills, access to audience, access to democracy, access to a future worth living in. What this means in terms needs to be worked out.

Opportunities: "Intellectual Property"

Companies attempting to claim "intellectual property" rights are in a position analogous to the landlords attempting to enclose common pasturage in the 17th and 18th centuries. The property less class generally sees no problem with copying videos, computer software, music, magazine articles, etc. for friends. As in the period of the land enclosures, capitalists must force a new understanding of "property" and "property rights" onto people, through propaganda campaigns like the SPA's "Don't Copy That Floppy"; the force of the police; and international trading sanctions.

Within the science and high tech sectors, the private, capitalist appropriation of technology for the purpose of amassing profit stands in stark contradiction with its possible benefits. Battles have emerged, and will intensify over patents and copyrights. In the international arena, the fight over patenting of plant life has important consequences for developing countries, by forcing a new kind of dependency on the U.S. This struggle will be especially sharp over the patenting and private ownership of human genes, which is particularly significant because of its impact on the larger question of private ownership of life forms.

In this battle, we have a class culture of sharing on our side, which the information capitalists must attempt to dismantle. In this battle, the capitalists present a weak flank -- the conflict between property relations and productive forces stand in stark contrast. On the other hand, the battle is certainly not won, and the information capitalists have organization, money and the state on their side. Organizations like the League for Programming Freedom and organizations of geneticists and other scientists are raising the issues, but the fight needs to be broadened and deepened.

Articulating a Vision

The Industrial Revolution represented a process in which commodity production was uncoupled from the limitations of individual human muscle power and manipulative skill. Machinery was developed which harnessed and integrated the manipulative and muscle power of individuals to much greater power sources: water power and steam engines, and later, internal combustion engines and the electric dynamo.

The current electronic revolution represents a process in which the intelligence and knowledge of the individual is appropriated and incorporated directly into the production machinery. Under capitalism it displaces the worker and the worker's skill. However, the electronics revolution also represents the collection, summation and integration of the intelligence of individuals and groups into a higher form of knowledge. This knowledge potentially then becomes available to all members of society.

To our colleagues and fellow workers, we must articulate the simple truth that capitalism stands in the way of social progress. We must be clear in communicating that whatever moral or humanitarian impulse led a scientist or engineer or technician into this particular field is being blocked and stifled by the private appropriation of social wealth.

We also need to articulate a vision of what this society could be, to provide a rallying point for the forces of change. In a reorganized society, for example, the enormous potential of biotechnology to identify the causes of disease -- rather than to provide therapeutics to alleviate symptoms, or to condemn individuals before they are even born -- could be unleashed. The sharply increased production capacity is sufficient to provide sophisticated goods to all members of society. The new information networks have the potential to make the total of human knowledge accessible to all of society. High tech workers -- scientists, engineers, researchers, technicians, etc. -- those of us who design, use and understand the potential of the new technologies must help give shape to the vision.

We welcome your comments, and invite you to join with us in carrying out the work before us.

The High Tech Committee of the National Organizing Committee may be reached by writing PO Box 477113, Chicago, IL 60647, or sending email to jdav@igc.apc.org. We welcome questions, suggestions, and critiques.

FOOTNOTES

1. CPU: Working in the Computer Industry #005. CPSR Working in the Computer Industry Working Group. Figures are from the American Electronics Association, in the 1993 Computer Industry Almanac

2. "Standard greeting and charter." Coalition for Visa Reform.

3. CPU: Working in the Computer Industry #004.

4. CPU: Working in the Computer Industry #011.

5. "Jobs at Risk" IEEE Spectrum. August 1993.

6. The biotechnology industry represents another face of the technological revolution. Its direct impact on employment and the economy is much smaller than electronics, with less than 200,000 (mostly scientific) workers nationwide. More work needs to be done on employment trends in this sector of high-tech.

7. This "digital advantage" may be the material basis for the radically different features of the so-called "information economy", rather than some essential character of "information" or "knowledge" as has been advanced elsewhere. For a deeper critique of "information exceptionalism", see Dan Schiller's "From Culture to Information and Back Again: Commoditization as a Route to Knowledge." Critical Studies in Mass Communication. March, 1994.

8. "The revolution in the modes of production of industry and agriculture made necessary a revolution in the general conditions of the social process of production, i.e., in the means of communication and transport." (Marx, Capital)

9. Davis and Stack, "Knowledge in Production", Proletariat. 1992.

10. Census Bureau, Current Population Report, 1994.

11. Tessa Morris-Suzuki, quoted in Beyond the Casino Economy. Verso, 1989.

12. Census Bureau.

9/26/94