

Cutting Edge: Technology, Information Capitalism and Social Revolution

The following is the introduction to *Cutting Edge: Technology, Information Capitalism and Social Revolution*, edited by Jim Davis, Thomas Hirschl and Michael Stack, due from Verso this summer.

By Jim Davis, Tom Hirschl & Michael Stack

How is one to make sense of the world today? Contemporary political and economic events as well as recent technological developments defy conventional analysis. The general breakdown of the post-World War II social order is well underway, visibly evident in the dramatic dissolution of the Eastern European and Soviet socialist economies. The dramatic polarization of wealth and poverty -- not just between the technologized and under-technologized nations, or north and south, but also within the technologized center -- exposes the "capitalism has won" and "history is over" pronouncements as rather premature. The socioeconomic polarization matures as the powers of science and technology leap ahead at breakneck speed.

While the traditional Left has lost much of its appeal, and the world's labor unions are on the defensive, new forces have stepped onto the world stage. Scenes from this drama are as diverse as the Los Angeles rebellion in 1992, the Chiapas uprising beginning in 1994, the regular eruptions in the industrial heart of the U.S., the tent cities and marches of the welfare recipients and the homeless in Philadelphia, Detroit, Boston, Oakland and other U.S. cities, the labor strikes in France, Korea, Canada, Germany, Russia, and the new student movement emerging in the U.S. and elsewhere. The world has entered a period of upheaval.

This collection of essays attempts to make sense of trends and developments as the 20th century draws to a close. From the outset, we should note that the authors in this collection do not all share the same assumptions, nor do they come to the same conclusions. Rather, they are part of an important struggle to understand the processes at work in order to reach a clearer and deeper understanding. The pieces share an attempt to confront the contradictions of society today, and put them on a firm material footing. Despite the many gloomy signals as this is written, they betray a spirit of optimism about the future.

Our starting point for this collection is the observation that we are in the midst of a profound technology revolution. For lack of a better phrase, we call this the "electronics revolution." Although that phrase would seem to exclude important new developments in bio-engineering and materials science, those new developments themselves would not have been possible without breakthroughs in electronics, especially in the field of microprocessors. Even though we are about 50 years into this technology revolution (the term cybernetics first appeared in 1947, shortly after the first computers), it is becoming clear that we are still only at the beginning of the process. Research into organic-based processes, for instance, may render "electronics" a temporary way station on the way to agriculture of a profoundly new type where the properties of protein molecules and the self-replicating powers of life are exploited in radical new ways. As the explosion of new developments continue, the phrase "electronics revolution" may come to sound ridiculously limited, but it serves our purpose for now.

Although the electronics revolution is still in its infancy, there are definite indications that it follows the model of historical materialism. Marx and Engels asserted that technological developments (e.g., the steam engine) allowed new boundaries and new parameters for society. Unforeseen technological innovations would establish the conditions for the final destruction of capitalism. In general terms, "...at a certain stage of development, the material productive forces of society come into conflict with the existing relations of production..." Each chapter in this volume assesses, in some way, the dialectic between technological development and capitalist relations of production.

Many books, essays and articles have been written about recent changes in the means of production. Those writings that have addressed the social implications of the new technologies fall into distinct categories.

The non-critical approaches examine implications of technology for the organization of the workplace. These implications concern workers fortunate enough to have a place in the new economic order, and managers navigating the technological vortex.

Among those writings that are critical of capitalism, one body treats the new technologies as simply more of the same: "information capitalism" (to use Tessa Morris-Suzuki's phrase) is the same old capitalism with the same old exploitation. Other critiques are concerned with the class-partisan qualities of technology. For example, authors may examine how and why certain technologies develop, or consider how new forms of social control are made possible by technological development and deployment. Still another genre debunks the "emperor's new clothes" attitude of the apologists, pointing out the shortcomings of the technologies and their negative social consequences. Still another genre has seen the end of class struggle in the post-Fordist "information society", and retreats into personal politics and endless fragmentation of social struggles.

Our concerns with respect to technology are different. We enthusiastically welcome the promise of technology for ending material scarcity and for creating a foundation for higher forms of human fulfillment. Yet we suspect that the application of electronic technology within the framework of capitalism will not only fail to accomplish these ends, but exacerbate the misery and poverty under which most of the world already lives.

This collection is divided into two parts. Part I looks at theoretical considerations. Part II of the book looks at the social implications of the technology revolution around the world, and some of the responses to it. Because several essays draw extensively on concepts from Marxist political economy, a brief review of some of the major concepts may be in order.

Recognizing the central role of commodities in capitalism, Marx began his masterwork *Capital* with an examination of the commodity. A commodity is something produced by humans for exchange. It has two aspects to it: 1) a use value, that is, the quality of the thing that satisfies a need or a want; 2) and an exchange value, a quantity of human effort, or labor, which is the basis for exchanging commodities of different use values. Marx qualified exchange value as the socially necessary labor to make commodities, that is, taking into account the average skills, technology and intensity of work. For Marx, exchange value, or more generally value, roughly is human labor -- the activity of transforming the world from "things" into useful things, that is, things that satisfy someone's wants. It is on the basis of this common denominator -- as expressions of human effort irrespective of the specific work being done -- that products, or commodities, of different uses can be exchanged.

In the process of making things that satisfy wants (production), portions of technology, raw materials, buildings, etc. are used up. The value that this used up portion represents temporarily disappears, and reappears in the finished product. This process of destruction and creation is the heart of the production. Since the value of the used up portions is in a sense just transferred to the finished product, it is described as constant capital-- its magnitude has not changed during the process. Human labor, though has the peculiar ability create more value than is used up during production. Because human labor "grows" value during production, Marx described the capital advanced to purchase a worker's ability to work (i.e., wages) as variable capital. Marx argued that human labor is the sole source of value, and value -- human effort -- is the underpinning of the entire economy. Capitalists accumulate wealth by expropriating surplus value (the difference between the value of the worker's labor power, paid out as wages, and the value created by the worker in the course of production). Profit is one form of surplus value, and the drive for maximum profits is the overriding goal of the capitalist. Capitalism puts a premium on technological innovation as a competitive strategy for survival in the marketplace.

Capitalists compete with each other to maximize profits, of which one of the main ways is by getting the workers to produce more in the same amount of time, by introducing more powerful and productive technology. At any given moment some capitalists are producing using the newest technology, and some are using old technology. When a commodity goes onto the market, it exchanges not at its individual value, that is, based on the labor used to produce it, but on the modal value of all of the same type of commodities from various producers, its social value. Capitalists who made commodities with the most advanced technology and the least labor in general will sell their commodities at the same (or maybe slightly less) price than then commodities made by the backward producers. Because their costs are lower, the advanced producers will realize extra surplus value, while those using backward technology and more labor will realize less surplus value.

The ratio of constant capital to variable capital is called the organic composition of capital. As more constant capital is employed in production, or less labor is employed, the organic composition of capital rises. Marx argued that this rising organic composition will cause the rate of profit to fall over time.

As more technology is thrown at production, a crisis in profitability emerges, manifesting itself as overproduction and the lack of purchasing power. A product unsold is value unrealized. This lays the basis for the periodic crises in capitalism, punctuated by unemployment, bankruptcies, and the destruction of capital. Once sufficient capital is destroyed, the system begins to expand again, and the cycle begins anew. The capitalist use of new technologies, while raising productivity, as Guglielmo Carchedi notes, also "necessarily implies crises, exploitation, poverty, unemployment, the destruction of the natural environment and more generally all those evils which high tech is supposed to eradicate."

In the first section of essays, the authors follow several lines of exploration into the terrain shaped by the new technologies. The collection starts with Morris-Suzuki's look at some of the "peculiarities" of knowledge as a factor in production. The new technologies are possible because of the accumulation of what is known about Nature. The continuing development of the technologies requires substantial training, research, etc. In this sense they can be described as "knowledge-intensive." The function of "knowledge" in the economy, though, is a problematic one. Once produced, knowledge is cheap to replicate; it's not "consumed" or exhausted after use; and, she notes, it "can only acquire a price when it is protected by a monopoly." Capitalism thrives in the new climate only by bending and subsuming knowledge formation to its needs through aggressive privatization, "harnessing freely available 'social knowledge' to the profit-making activities of the large corporation."

The consequences of the critical act of replacing human beings with machines under capitalism can only be understood by grasping the idea of the central role of the human being -- as the sole source of value -- in production. Caffentzis analyzes the history of this idea, in the context of 19th century discussions of machines, energy and work, and brings the argument up-to-date with an analysis of the "Turing Machine" -- a concept developed by the brilliant English mathematician Alan Turing in the 1930's. Turing showed the possibility of constructing a machine capable of carrying out any computational task that a human being could do (with a few notable exceptions). Caffentzis points out that the Turing machine means that any skill, whether physical or mental, can be replicated mechanically -- "computing, like tailoring and weaving, is just another aspect of human labor-power that can be exploited to create surplus value and, if its value is higher than a rival machine, it can be replaced." The reason that human beings are the sole source of value is therefore not to be found in any unique talents of the worker, as any machine can theoretically provide that; rather, it is to be found in the profound relationship of power and property, at the intersection of the worker and capital.

The concept of the Turing machine raises an immediate question: is electronics, as the basis of contemporary production, a qualitatively different technology, not just "more," but "different." In *Capitalism and Automation*, Ramin Ramtin argues that the capture of human skills in "software", capable of being repeatedly activated by microprocessors, "is a technology which brings to life the machinery of production, it is thus in itself a radically new form of objectification of labor." In her essay "Robots and Capitalism", Morris-Suzuki considers the implications of the replacement of living labor with "objectified labor" in the form of software. When robots replace living labor in production, surplus value, and hence, profits, cannot be created in the old ways. In her analysis, surplus value can only be created "in the design of new productive information and the initial bringing together of information and machinery." So companies are forced into creating the "perpetual innovation economy." Such an economy accelerates the commodification of particular kinds of information or knowledge useful to production.

Martin Kenney, following on Morris-Suzuki's work, pursues the problem of value creation in the contemporary work site. Knowledge becomes "the critical production factor" in the "innovation economy" where workers are reconceived as sources of "knowledge", and must work within a tighter discipline to ensure uninterrupted production. Kenney notes the central role of "intellectual property" in the "innovation economy", but he suggests that "protecting" copyrights and patents -- essential to maintaining the commodity status of knowledge -- in the digital age is problematic, if not ultimately impossible.

This view of a "knowledge economy" is not without its problems. Dan Schiller points out that "knowledge" is essential to all societies. The location of "social discontinuity" is not to be found in what he calls "information exceptionalism", in seeing some special qualities of information or knowledge. Such a view removes information and knowledge from a long history of "commoditization", ultimately mystifying it. The "knowledge society" is not the end of history, but rather, capitalism, adjusted (and adjusting) to a new technological climate.

Jim Davis and Michael Stack follow up on Schiller's critique of information exceptionalism by looking at one critical aspect of the application of new technologies to the economy. Digitalization -- the conversion of information and "knowledge" into the 1s and 0s that can be manipulated by digital machines -- is an important means by which "knowledge" and "information" is cheaply replicated and quickly socialized. The enormous economic advantages of digitally rendering products means that more and more commodities appear in an "information form", and the economy is undergoing a broad

restructuring to take advantage of the digital rendition. The Internet represents the re-creation of the transport and communication system to handle the digital traffic. Various industries, once separated by incompatible media, find themselves digitally converged into the same competitive arena. And not least, the digital transformation is having a profound affect on the role of human beings in production.

It is important to remember that these technologies spring from somewhere. When scientists, engineers and other mental workers are set to solving problems posed by their employers, the results are stamped with the demands and needs of the ruling class. At the same time, though, technology is produced amidst conflicting social relations, and thus holds the possibility of being a tool for liberation as well as for social control. Jonathan King looks at the roots of one particular field, biotechnology. The history of biotechnology, funded in large part through public monies, is increasingly appropriated by private interests. Private appropriation radically constrains the social benefits of biotechnology, and raises the specter of "egregious violations of human dignity and body in the quest for private gain."

A recurring theme throughout the essays in this book is the impact of electronics, as well as other new technologies made possible by electronics (including digital telecommunications, computers and biotechnology), on the working class. The exchange of the ability to work (i.e., labor power) for wages, and wages for necessities, is the foundation of capitalist relations of production. The idea of the "end of work" has been raised in several recent books, including Jeremy Rifkin's *The End of Work*, and Stanley Aronowitz and William DiFazio's *The Jobless Future*. Morris-Suzuki points out that if human beings are made redundant in production by automation, then surplus value disappears, and capitalism becomes unsustainable. "Perpetual innovation" forestalls the problems faced by Capital.

Ramtin, in *Capitalism and Automation*, poses the dilemma for capitalism:

"[F]or capitalist production 'a certain number of workmen must be employed in the same field of labor'. Less than a certain number of productive workers and capitalist production becomes impossible. The application of microelectronics technology to production processes will radically reduce that 'minimum' quantity of living labor-power essential for the self-expansion of social capital. At a certain stage, the quantitative displacement of living labor generates a qualitative break in the organization and structure of capital production." (Ramin Ramtin, *Capitalism and Automation*, Pluto Press, 1991. p. 56)

New technologies mean the end of work; the end of work means the inability to make profit, the inability to realize value, and the end of value creation. These describe the conditions for the end of capitalism.

This of course raises a few problems. First, is "work", or value creation, disappearing? Caffentzis dismisses this notion. Davis and Stack suggest looking beyond the often-cited employment statistics to other indicators of the trend towards "the end of value." Davis and Stack suggest that capital, as a social relation, starts to break down as the cash nexus of the wage relationship is eroded, and that this process is most vividly revealed in the social destruction going on throughout the world.

A second question is deeper -- is change possible? Can we envision a society beyond capitalism, where value, "work" in the traditional sense, exploitation, etc. no longer exist? Is revolution possible? Mike Brand presents a unique approach to this question by drawing on recent developments in complexity theory, establishing a connection between it and dialectics, and testing the applicability to social change. Thomas Hirschl revisits Marx's theory of revolution in light of current changes. "Maturing social polarization in an era of qualitative technological progress is Marx's formula for revolution."

A third question is very practical: how will capitalism end? What strategies might be employed to forestall it? No one is suggesting that it will collapse on its own from its internal contradictions. The question of agency -- who will do the deed -- must be raised.

The second set of essays looks at social implications and responses. Beyond the consequences for labor, capitalist deployment of new technologies has deindustrialized metropolitan urban centers, created a bio-engineered, industrialized world agriculture system, and restructured the world economy around high speed transport and telecommunications. In addition, manufacturing heads to the periphery, and the international currency market dominates national monetary policies. These economic transformations have forced a fundamental struggle for survival upon large sections of the population, and especially those workers cast into the ranks of the marginally employed and permanently unemployed.

In this climate, "jobs" are a major political issue for governments, and various options for expanding employment have been advanced, from more education to government-financed jobs programs to job-sharing. The intensity of the contradiction between technological development and property relations can be gauged by the unemployment crisis. The upward trend in unemployment since 1973 in both the industrialized and less industrialized nations calls into question the capacity of capitalism to provide adequate employment over the long-term. This policy crisis is openly acknowledged by organizations such as the "G-7" group of industrial nations, and the International Labor Organization. Sally Lerner provides an overview of the (mostly failed) employment policy strategies advanced by governments of the U.S. and Canada.

The policy debates around unemployment are often framed in terms of globalized production and globalized labor markets. Some argue that further globalization is a solution to unemployment, while others assert that globalization is a primary cause of unemployment. Our reading of the evidence suggests that this debate is miscast. The higher levels of global integration of the economy are not independent of the new technologies -- rather, the pace and quality of globalization today is only possible because of new transportation and communication technologies. Global market dynamics (e.g., trade, investment and labor migration) are able to allocate unemployment across a much wider geography.

The struggle for jobs is just one dimension of the social response. Nick Witheford, drawing on the work of the autonomous Marxists, describes how, as capital maneuvers to contain the working class, the working class repeatedly recreates the class struggle in new ways. In "high technology capitalism", these struggles are being recreated in ways that exploit what new technologies make possible. Witheford catalogs this new class struggle emerging in the "social factory" at the various moments of the "circuit of capital": production, circulation, reproduction of labor, and the "(non) reproduction of nature." The struggle takes new forms as labor is pushed out of the factories and offices and into the streets. Ramtin proposes that our understanding of "alienation" must correspondingly change. Confrontation will occur less on factory floors populated by robots, and increasingly within the political domain, in direct confrontations with the State.

Since the technology revolution, and the restructuring around it, is a global phenomenon, the collection would not be complete without a discussion of the less industrialized areas of the globe. For A. Sivanandan, we are "caught in the trough between two civilizations: the industrial and post-industrial." Through "communities of resistance", a new kind of class struggle is emerging in the new technological climate. Gerard Otero, Stephanie Scott and Chris Balletto analyze recent developments in Mexico in light of agricultural and biotechnology trends. Abdul Alkalimat looks at the concept of

class struggle in Africa. Although rich in natural and human resources, Africa is a continent of the poorest of the poor, bound to the centers of capitalism as a source of mineral resources and exotic agricultural products. Within Africa, the deepest contradictions of technology and social destruction can be observed. As people are driven out of a meager existence in small-scale agricultural production, they completely leap-frog the "working class" (for there is, for all practical purposes, none) and, Alkalimat argues, land into a "new class being formed in the forbidden zones, areas within cities, rural provinces, refugee settlement camps, and even entire countries that have become economically unstable, consumed with violence and crime..."

So another possible avenue of exploration is in the relationship of broad technical stages of history, and class formation. The formation of a capitalist class and a working class was inextricably linked to the development of key technologies in manufacturing, transport and communication over a period of a few hundred years. With today's qualitatively new technological environment, can we make projections about the development or formation of new classes in some kind of relationship to the new technologies? For example, could the broad margins of the working class, dismissed as an "underclass" or maligned anachronistically as a "lumpen proletariat," be in fact a new class-in-formation? Could this new class be, not a working class, per se, but a new proletariat, in the Roman sense of the term, being forged in relationship to technologies that destroy the use-value of their labor power? Historically, new classes have had to struggle to recreate productive relations that would accommodate them. How does this shape our understanding of "class struggle" today? That is, the "end of work" may suggest the "end of the working class" as we have known it, but not the end of class struggle. Nelson Peery looks at these questions in a talk reprinted here.

Unfortunately, this volume can only hint at the possibility of a world free of want, where the promise of science is fulfilled, and where knowledge is unleashed as a social force. We believe that such a future is visible on the horizon of history. For this vision to seize hold, it must be taken up, struggled over, articulated, popularized, and made into a material force.

The questions we are posing here we think are the proper questions. They will take us forward, not just towards understanding the world that we live in, but towards changing it. For too long, the debate about social change has been bound up with old concepts of a world fast disappearing. A sharp edge of new ideas is needed to cut through the accumulation of exhausted ideas. These essays are a contribution to that effort.