



TRANSFORMING
TECHNOLOGY

A CRITICAL THEORY
REVISITED

ANDREW FEENBERG



TRANSFORMING TECHNOLOGY

A Critical Theory Revisited

ANDREW FEENBERG

OXFORD
UNIVERSITY PRESS

2002

OXFORD
UNIVERSITY PRESS

Oxford New York

Athens Auckland Bangkok Bogotá Buenos Aires Cape Town
Chennai Dar es Salaam Delhi Florence Hong Kong Istanbul Karachi
Kolkata Kuala Lumpur Madrid Melbourne Mexico City Mumbai Nairobi
Paris São Paulo Shanghai Singapore Taipei Tokyo Toronto Warsaw

and associated companies in

Berlin Ibadan

Copyright © 2002 by Oxford University Press

Published by Oxford University Press, Inc.

198 Madison Avenue, New York, New York 10016

Oxford is a registered trademark of Oxford University Press

All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
electronic, mechanical, photocopying, recording, or otherwise,
without the prior permission of Oxford University Press.

This volume is a revised edition of *Critical Theory of Technology*,
published 1991 by Oxford University Press.

Library of Congress Cataloging-in-Publication Data

Feenberg, Andrew

Transforming technology : a critical theory revisited / Andrew Feenberg.—2nd ed.

p. cm.

Rev. ed. of: *Critical theory of technology*, 1991.

Includes bibliographical references and index.

ISBN 0-19-514615-8 (pbk.)

1. Technology—Philosophy.

2. Technology—Social aspects.

3. Critical theory.

I. Feenberg, Andrew. *Critical theory of technology*.

II. Title.

T14 .F43 2001

601—dc21 2001021399

1 3 5 7 9 8 6 4 2

Printed in the United States of America
on acid-free paper

Contents

1. Introduction: The Varieties of Theory 3

Part I. From Marxism to Radical Critique

2. Technology and Transition 39

3. The Bias of Technology 63

Part II. The Ambivalence of the Computer

4. Postindustrial Discourses 91

5. The Factory or the City: Which Model for Online Education? 114

Part III. The Dialectics of Technology

6. Beyond the Dilemma of Development 133

7. The Critical Theory of Technology 162

Notes 191

References 201

Index 211

6

Beyond the Dilemma of Development

The Dilemma of Development

The Thesis of Convergence

According to an ancient tradition of Western political theory, societies cannot achieve both civic virtue and material prosperity. For centuries the rise and fall of the Roman Republic served as a cautionary tale illustrating pessimistic maxims. "Roman liberty," said Saint-Just, "was drowned in gold and delights" (Saint-Just, 1963: 63). There is a flaw in human nature: released by riches from a common struggle with nature, men grow soft and lose the spirit of self-sacrifice required for life in a free society. This is the dilemma Mandeville mockingly formulated in his famous doggerel (Mandeville, 1970: 76):

. . . Fools only strive
To make a Great an honest Hive . . .
Bare Vertue can't make Nations live
In Splendour; they, that would revive
A Golden Age, must be as free,
For Acorns, as for Honesty.

I shall call this "the dilemma of development," the view that two of the highest values pursued in public and private life are mutually exclusive.

Since Max Weber, modern social theory keeps reformulating something very much like this traditional view. New reasons are advanced to show that the satisfaction of material needs is fundamentally incompatible with the progress of human freedom. Today, the argument goes, prosperity requires a scale of enterprise, a management of production and markets, and an application of scientific and technical knowledge so far beyond the comprehension and control of ordinary citizens as to render them mere cogs

in an alienated mechanism. In such recent reformulations of the dilemma of development, the emphasis is less on moral flaws in human nature than on the gap between the cognitive capacities of the individual and the complex problems of technological society. This condition, it is said, is a general one today, regardless of the prevailing political system, be it capitalist democracy or communism.

Reformulated in this manner, the dilemma of development points to a central contradiction in democratic political theory. The redefinition of the state in the modern era revolves around two complementary demands: egalitarianism and a new efficacy in the performance of state functions. Divine law and inherited right no longer justify the coercive power of the state, which must now be derived from the people through public debate and elections. At the same time, a more efficient state requires expert administration by qualified individuals chosen for their abilities independent of class origin. Birth is replaced by equal participation in decisions of state, and by merit in the efficient execution of policy.

The reconciliation of equality and efficiency in the democratic state is the modern utopia par excellence, nowhere so far fully realized. The difficulty lies in the *contradiction of expertise and participation*, the two foundations of the system. They are supposed to be reconciled in the subordination of administration to democratically established policies, but in fact the unequal distribution of administrative power turns out to be increasingly subversive of equal participation. Weber's sober formulation of the dilemma reveals the dystopian implications for modern societies.

Marx's work belongs to a different tradition that seeks to transcend the dilemma, reconciling freedom and prosperity. Marx rejected the assumption that there is only one model of progress, one path to abundance. He argued that alternatives emerge with the Industrial Revolution. Thereafter, radically different industrial futures are possible, depending on whether the dominant political option is capitalist or socialist. The dilemma of development is an effect of capitalism that socialism would overcome in a new form of industrial society.

As Marx presents it, socialism is a new *civilizational project* and as such not comparable to ordinary political movements that aim at changes within the framework of the existing civilization. Such changes are inherently limited by the requirements of the existing technical system. But socialism would be a new culture in which different values, patterns of life, and organizational principles would yield a coherent, fully integrated social system of a new type with its own technical system. The study of development should therefore

address itself to the possibility of alternative paths of modernization with different consequences for human freedom.

This socialist conception breaks with the usual dualistic contrast between traditional and modern society. In place of the binary oppositions of models like Tönnies's, Weber's or Parsons's, Marx proposed a ternary system in which the third term represents a qualitatively different stage. *According to Marx, the passage from tradition to modernity can no longer be understood entirely on modern terms as the rationalization of society through the breakup of an original organic social totality into its reified fragments. The fragmentation of society invites synthesis at a higher level, an integration and concretization of the results of modernity in a new, mediated totality.* This socialist conception of progress opens the future, which is arbitrarily blocked by the assumption that there can be only one type of modern society.

Given Marx's reputation as a technological determinist, it is ironic that many of the strongest arguments advanced against the very possibility of socialism rest on a deterministic understanding of technology. The sharpest formulation of this view is to be found in theories of "convergence" of all modern societies. These theories project the dilemma of development on a planetary scale. According to modernization theory, for example, the spread of the Western model is a predictable consequence of technological development. Societies moving out of the "acorns and honesty" stage—like the People's Republic of China—will confront the dilemma of development in full force. To quote Marx himself, "De te fabula narratur": the advanced societies are a destiny for their poorer neighbors (Marx, 1906: 13).

Such views can be traced back to Weber's theory of rationalization and his image of the "iron cage" in which modern societies are trapped. As social forecasts, convergence theories attempt to identify the central causes of social change and to predict the consequences. The main arguments for convergence are sociological and economic ones, based on broadly conceived "imperatives of modernization," such as the increasing specialization and division of labor. In designating these trends as central, the intent is to subordinate other presumably secondary sources of change such as culture and politics.

Before the fall of communism appeared to verify convergence theory, its critics argued with some success that it was "ethnocentric." It is, on the face of it, implausible that differing cultural values should have no impact on patterns of development. Surely the response to modernization may influence its course. The argument seems especially applicable to societies which are self-consciously committed to the development of a new culture and a

future utterly unlike the present such as the Soviet Union and, more recently, Islamic socialism in Iran. In the early 1970s, when communism looked like a permanent feature of the landscape, Robert C. Tucker therefore proposed that we take the

culture transforming and culture building process as the *central content* of “development” in its communist forms. Instead of treating communism as a modernizing movement, we will see certain ingredients of what Westerners call “modernization” as present in the processes of directed cultural change observable in communist societies. We will, in short, take care not to assume that the communists are recapitulating our developmental history in their peculiar manner; our theoretical perspective itself will become culture conscious. (Tucker, 1973: 88, 186–187)

Arguments of this sort have returned in defense of cultural particularity against globalism. But persuasive as is the general point, the confinement of difference to culture tends to vitiate the argument. Even where social scientists reject a single-factor explanation of social change and assert the possibility of different paths of modernization, their vision of economic and technological advance is remarkably stereotyped. As a result, the range of variation permitted by these more pluralistic theories is still very narrow. After all, these theorists admit, whatever the political, legal, or cultural differences between nations, all must accommodate the selfsame technology. But the social impact of the technological subsystem of society grows constantly as the economy expands in the course of modernization. A “developed” society is one in which few major decisions can be made outside the framework of the technical and economic constraints of this subsystem.

Hence, the reservations about convergence turn out to have little content in practice: even if a society that professes original values retains its system of government and ideology as it advances, the kinds of goods it produces, the way it produces them, the forms of daily life that emerge around consumption of those goods, the educational requirements of the society, and the careers etched into its division of labor would all come to resemble Western models.¹

Some students of development, anxious to find signs of true variety, rely on the example of those exceptional nations that have mobilized the strongest resistance to incorporation into world technoculture. But such movements as the Chinese Cultural Revolution or Islamic socialism involve costly trade-offs of economic efficiency for ideological values. Insofar as it is truly significant and not merely an ethnic *point d'honneur*, cultural specificity can be preserved only at a price so high few are likely to pay it for long. The re-

turn of China under Deng to the modernizing fold signaled a general pattern to which other rebel nations will likely conform given enough time to measure the cost of difference.

Today, while some of the most extreme claims that used to be made in the name of convergence theory are controversial, a mitigated version of it is part of the common sense of the social sciences. The case for convergence seems quite strong indeed when the modest claim is made that industrial societies using the same technologies will tend to grow more similar in the increasing number of domains where technical imperatives impinge on social life. Stated in this form, what I will call the *thesis of convergence* appears obvious, but I will show that its conception of technology carries a powerful ethnocentric charge. That ethnocentricity is reflected in the view that whatever the differences between nations, the dilemma of development is an inescapable structural constraint affecting them all.

This chapter argues that democratic socialism involves a process of civilizational change more complex than anything we would normally consider under the heading of politics. Instead of pursuing the usual political argument for socialism, I have attempted to identify possible starting points for such a process. The result is not a utopian description of a perfect society, but rather an integrated series of democratic reforms affecting politics, economics, culture, and ultimately the technology of modern societies.

On these terms, socialism is a trajectory of development fraught with ambiguity. Any society attempting to move toward socialism will have to make difficult cultural and technical choices that will decide its chances of initiating a true transitional process. These choices will appear irrational or voluntaristic to observers who hold deterministic assumptions. It will not be easy to detect the first signs of fundamental civilizational change should they appear.

A better understanding of the process will require innovative approaches that do not prejudge the question of transition or convergence. This is equally true for historical studies of those brief experiments with radical policies that have occurred in communist societies. To avoid dogmatically dismissing all deviations from what has been the main line of development, our model must integrate a critical theory of technology. Only such a model can distinguish between systemic tendencies toward convergence or transition.

Technological Determinism

It is no easy task to develop concepts that would allow one to anticipate and describe radical civilizational change as opposed to reforms under the hori-

zon of the existing civilization. Such concepts necessarily transgress cultural limitations of the society in which they are formulated. These limitations appear in the everyday assumption that our own culture is "natural" and that all that differs from it is absurd or impossible. Cultural limitations are also enshrined in the social sciences in powerful methods that treat the specific dilemmas and paradoxes of life in the existing modern societies as unavoidable consequences of industrialism in general.

When "modernity" is defined theoretically, these societies enter a conceptual heaven where their particular traits acquire universality and necessity. The subsequent application of these uncritical generalizations bestows an illusory inevitability on the present and forecloses alternatives for the future. Any action that points beyond the horizon of this conception appears irrational and regressive. If in fact these concepts comprehend the limits and potentialities of modernity as such, socialism, as it has been defined here, is excluded a priori.

In this context, the argument for the existence of socialist "potentialities" becomes a major task of critical social theory. This argument must be advanced on epistemological grounds through criticism of social scientific categories, very much as Marx elaborated his economic theory in conflict with the political economy of his times. Critical social theory must work out a new approach to modernity that not only faces the facts but that also encompasses them in categories broad enough to reveal their historical contingency. In the remainder of this chapter, I will apply such an approach to the consideration of methodological problems in the understanding of socialism.

The dominant view of modernization is based on the deterministic assumption that technology has its own autonomous logic of development. According to this view, technology is an invariant element that, once introduced, bends the recipient social system to its imperatives. This has implications for the possibility of a transition to socialism, for it implies that every attempt to build a new type of modern society is a mere detour that must eventually rejoin the path of convergence. On this account, history is essentially over except for the shouting.

Determinism is based on the following two theses:²

1. The pattern of technical progress is fixed, moving along one and the same track in all societies. Although political, cultural, and other factors may influence the pace of change, they cannot alter the general line of development that reflects the autonomous logic of discovery.
2. Social organization must adapt to technical progress at each stage of development according to "imperative" requirements of

technology. This adaptation executes an underlying technical necessity.

Given these assumptions, all societies can be ordered along a single continuum, the more advanced exemplifying future stages of the less advanced. Culture plays no significant role in shaping the history of technological development but can only motivate or obstruct progress along a fixed track. Technology appears to be an application of the laws of nature to problems of production, as independent of human will as the movements of the heavenly bodies. Some of the aura of science can then be transferred back to the machines that depend on its principles. The iron necessity of natural law is read into the process of technological development and through it into society as a whole.

The conception of the mechanical subsystem of society as an independent force with a self-propelling dynamic reflects the structure of capitalist society. The capitalist division of labor accomplishes just this separation of the means of production from the producers, of machines from their human users. A definition of technology that abstracts the mechanical conditions of production from living labor and culture therefore resonates ethnocentrically with our experience under capitalism. Abstracted and hypostasized technology as an independent and determining factor reflects the categorial underpinnings of our own world. This accounts for the plausibility of the theory.

Even where no explicit convergence theory is formulated, determinism often lurks in the background, and under its influence the researcher assumes concepts of industrialization and modernity derived uncritically from advanced capitalism. The bias of modernization theory is revealed, for example, in the way it contrasts two of its chief operative terms: technology and ideology. The imperatives of technology form a "techno-logic," and the goals socialists attempt to impose upon the process of modernization can, by analogy, be described as a corresponding "ideo-logic." Techno-logic has an influence that ideo-logic lacks and is always presented as something "real," substantial, objective, almost spontaneous in character, like a natural process. Ideo-logic is a matter of human will. It is "voluntaristic" and lacks ultimate force in contact with techno-logic.

This invidious comparison of terms is supported by a characteristic methodological procedure: whenever ideo-logic contributes to economic development, it is said to coincide momentarily with the imperatives of modernization at that stage. Hence, in the long run ideo-logic can accomplish nothing original but is destined to be outmoded by the very process of development it furthers. On the other hand, any socioeconomic change that does not ac-

cord with the standard pattern of modernization is attributed to the influence of *ideo-logic*, described as irrational, and dismissed as a passing aberration imposed by misguided political leaders. The impotence of *ideo-logic* is thus a matter of definition. Its efficacy only appears independently where it is doomed to fail because it stands in the way of progress.³

William Dunn formulated this position in terms of Amitai Etzioni's concept of "dual compliance." He saw communist societies caught in the crossfire of conflicting commitments to efficiency and revolutionary values (Dunn, 1974: 5[4]). The pursuit of an "ideo-logical" end such as egalitarianism has economic costs, while the pursuit of economic efficiency has, correspondingly, "social" costs in terms of the sacrifice of egalitarianism to productivity. Communist politics are therefore characterized by fluctuating emphases as one or the other goal temporarily gains the upper hand. They exhibit essentially Western patterns of modernization during cyclical emphases on efficiency, patterns that are unaffected by the time lost to technological progress while revolutionary values are emphasized.

According to this view, societies are free to resist the implicit logic of technological development in order to preserve indigenous ideological or national values, but they do so at a definite economic price. The voluntaristic imposition of values incompatible with technological imperatives involves a trade-off of moral for material goods. Although this theory admits the possibility of small national variations, it continues to affirm the existence of a unique path of development along which societies may either limp or race, depending on the single-mindedness of their commitment to "efficiency." A socialist civilization, with its own distinctive culture and standard of wealth, is excluded in principle by the arbitrary identification of efficiency with the technical code of capitalism.

Determinism is not the monopoly of the critics of socialism. Some Western radicals concede that a socialist production system would be less "efficient" than capitalism. Socialism, they argue, would lower labor productivity in favor of increased returns of "soft" variables, such as job satisfaction, equality, and environmental protection. They thus implicitly affirm technological determinism and its associated dual compliance model of the relation of values to the economy (Bahro, 1984).

This view is most closely associated with the Green movements today, but it has a venerable history. William Morris first contrasted "useful work" with "useless toil" and called for a revival of craft labor as the only means of restoring workers' skills and recapturing the virtues of traditional community (Morris, 1973). A much more elaborate argument along the same lines underlies Lewis Mumford's approach to the history of technology. Mumford hopes

“to persuade those who are concerned with maintaining democratic institutions to see that their constructive efforts must include technology itself” (Mumford, 1964: 7). He contrasts small-scale “democratic technics” with large-scale “authoritarian technics” going all the way back to ancient Egypt. Today, Morris and Mumford would no doubt be advocates of “alternative technology.” Amory Lovins’s distinction between “soft” and “hard” technologies corresponds to the polarities they identify while bringing their approach up to date (Lovins, 1977).

Theories of alternative technology attempt to construct a new technical code to guide the design of future technology. If one believes that technical development is socially determined, this is a plausible undertaking. However, there is an important ambiguity in many of these writings: it is often unclear whether industrial technology can be reconstructed to achieve their goals, or whether, like Morris, they reject it in favor of a return to simpler craft technology. Does the social determination of technology concern alternatives *within* industrialism or the choice *between* industry and craft?

This is a difference with enormous implications. The idea that industrial technology is irredeemable is essentially determinist. To claim that society must choose between industry and craft is to concede that the existing industrial system is the only possible one. Clearly, this is entirely different from arguing for the reconstruction of the industrial system through the incorporation of new values into industrial design.⁴

The risk of confusion is evident in Robin Clarke’s list of utopian characteristics of soft technology. The list includes dozens of pairs of hard and soft attributes, including some, like the following, that could guide either the reconstruction of industry or a return to craft.

1. ecologically unsound/ecologically sound
10. alienation from nature/integration with nature
21. centralist/decentralist
24. technological accidents frequent and serious/technological accidents few and unimportant.

But alongside these ecumenical objectives, Clarke lists such things as:

6. mass production/craft industry
9. city emphasis/village emphasis
13. world-wide trade/local bartering
19. capital intensive/labour intensive.⁵

These attributes determine a strategy of deindustrialization that is incompatible with reconstruction.

Efficiency is not the enemy even from an environmental point of view. A better society need not be inefficient and poor. That position concedes too much to the dominant ideology. Means-ends rationality is no doubt an unsurpassable dimension of modernity, but it will have quite different results in cultures that measure success differently, define the legitimate domain of optimization differently, and have different ends in view. There thus is no reason of principle why one would have to retreat economically in order to achieve ecological and democratic objectives. At least it would make sense to explore the limits of industrial reconstruction before dispersing to labor-intensive village communities!

Profit is the most important measure of efficiency under capitalism. Because profit is realized on the sale of commodities, not on public and nonmarket goods, the extension of capitalist economic rationality may diminish the availability of these other goods without the costs appearing on any socially legitimated ledger. The GNP may rise as welfare declines without anyone but the immediate victims being the wiser. In their rush to catch up with capitalism, communist societies adopted fairly crude concepts of economic growth as their main measure of success. With only such measures to guide them, and no democratic checks on official abuses, it is not surprising that their record was (and in China still is) even worse than that of capitalism in domains such as environmental protection.

A socialist society dedicated not to simple economic growth but to the actualization of human capacities could employ more direct and varied measures of material well-being than these simple quantitative ones. As I will show later in this chapter, it could evolve an economic culture that encompassed goals systematically undervalued in the existing modern societies, such as education, environmental quality, and satisfaction at work. Such a society might also find it easier to bound the economy by other logics, for example, those of human relations, protection of the disabled, children's welfare, and so on. Despite these differences, the pursuit of efficiency entails sacrifices, but—and this is the crucial point—the system differences result in different sacrifices being made.

The dominant economic culture encourages trading off such "soft" goals as occupational safety or endangered species for "hard" cash. But these goals are not incompatible with the use of technology to achieve prosperity. Nor are they objectively less vital or desirable than profits or consumer goods. Clean air appears as a political issue only because it is a post hoc expense in cities designed around highly polluting private transportation, the only kind of transportation on which a profit can be made. A different form of urban design based on mass transit and mixed use might treat air quality as just

another technical problem, no different in principle from dozens of other similar problems solved in running an efficient transportation system.

Goals that now appear as ideals or values would thus take on quite a different form in a society that embodied them in its technical code. In such a society no sacrifice of productivity would be involved in serving these ends, even if the predicted drop in the volume of consumer goods should in fact occur. This is no merely verbal point: the so-called soft variables would be pursued spontaneously by the individuals as a positive component of their own welfare and would not have to be imposed on them by artificial incentives or political coercion in opposition to their own perceived interests.

Deterministic theories share implausible assumptions about technological development that contradict the historical evidence. These are, first, the notion that technological development occurs along a single fixed track according to immanent technical criteria of progress, and, second, that social institutions must adapt to technological development. In reality, technology is not rigid but is routinely adapted to changing conditions. Sometimes it adapts to new scarcities or discoveries, and sometimes to the emergence of new cultural values. In any case, new constraints are not necessarily obstacles to efficiency but often stimulate technological change. Thus, technology does not pose an insuperable obstacle to the pursuit of "humanistic" values. There is no reason why it could not be reconstructed to conform to the values of a socialist society.

Technological development is a scene of social struggle in which various competing groups attempt to advance their interests and their corresponding civilizational projects. Many technically feasible outcomes are possible and not just the one imposed by the victors in the struggle. Critical theory of technology generalizes from such struggles to a position that contradicts determinism on each of its two theses. The nondeterministic position asserts that:

1. Technological development is overdetermined by both technical and social criteria of progress, and can therefore branch in any of several different directions depending on the prevailing hegemony.
2. While social institutions adapt to technological development, the process of adaptation is reciprocal, and technology changes in response to the conditions in which it finds itself as much as it influences them.

These propositions are based on the notion that technical objects are also social objects, as I argued in chapter 3. Only at the point of intersection of technical and social determinations is this or that concrete technology iden-

tified in its specificity and selected from among the wide range of possibilities supported by the available technical resources. On these assumptions, the technology of the existing industrial society must be described as a particular case of industrialism, relative to the dominant culture of capitalism rather than as a universal paradigm. This cultural qualification explains why it is impossible to generalize a priori from the existing modern society to conclusions valid for all such societies. The content and meaning of industrialism is not exhausted by our experience of it since technology contains potentialities that might yet be actualized in a different cultural context.

Ethics and Economics

This approach departs from traditional Marxism, with its deterministic belief in the preestablished harmony of economic growth and socialist politics. Does this new position represent a regression to a moralizing "ethical socialism" of the sort Marx rejected so scornfully? And if so, should that concern us today?

Marx's historicist critique of "abstract ethics" contrasts starkly with influential approaches such as Habermas's "quasitranscendental" grounding of democratic values. The Marxian view appears to confound "ought" with "is," but it also has the merit of providing a direction to action. Transcendental appeals do not offer much guidance once we move below the level of the most abstract principles of democratic discourse to the substantive issues that are of concern to individuals actually exercising their rights in the democratic process. Can philosophy lay down the ground rules and then withdraw from the debate? Marx was suspicious of the attempt to occupy a position above the fray. He attempted to find a way of linking the ideal with historically plausible transformations of the real. This is an attempt that can still interest us if we discard the deterministic framework in which he sometimes articulated it.

Marx was strongly influenced by Hegel's critique of Kantian ethical "formalism." Hegel rejected the idea that values subsist in an ideal sphere cut off from factual reality. He argued that all societies realize values in the everyday arrangements regarded as "facts" of social life by their members. Hegel judged values to be more or less "abstract" or "concrete" to the degree to which they achieved institutionalization. Thus, the family or state is more concrete than the as yet unmet demands of an emerging social group, and the latter are more concrete than a personal ideal that has no substantial reality whatsoever.

From this standpoint, Marx conceives of ethical values as, at worst, mere ideological veils for exploitation; at best, they represent utopian demands that

cannot yet appear as the interests of any significant social group. Since on this account ethical values are by definition impractical, talk of socialist "ideals" would imply that capitalism is the only system capable of dealing with the *material* issues. As we have seen, this is how socialism is viewed by modernization theory, which considers it an ideology against which wealth must be traded off. Marx's concept of social revolution is intended to respond to this kind of objection, but he never actually worked out the details.

Marx regards socialism as a potentiality of capitalism, a radical social advance made possible by the achievements of the existing society. Marx often interprets the idea of potentiality deterministically, but a nondeterministic critical theory can retain his attempt to base ideas about the future on analysis of the present rather than on abstract ethical imperatives. Interests rather than moral values continue to be seen as the basis of historical change; however, to the extent that these interests are equivocal, they do not determine a single future but open up alternative historical trajectories.

The shift from deterministic laws to civilizational change implies a logic of contingency that must be expressed in a language different from that of traditional Marxism. For example, according to this approach socialism is *desirable* and *possible* rather than the necessary next stage of history. Marx's assumption that industrial technology *imperatively requires* socialist administration is replaced by the concept of *ambivalence*, which refers to the possibility of using the capitalist inheritance to build a socialist society by realizing its repressed technical potential. Similarly, the cultural concept of *economic code* must be substituted for the objectivistic assumption that classes have univocal, determined *interests* (Guillaume, 1975: 64). In sum, the same tendencies that, in traditional Marxism, are supposed to lead to the *inevitable* collapse of capitalism, now define the horizon of its progressive *potentialities*.

With the concept of potentiality, one can walk the fine line between idealist and reductionist accounts of the relation of ethics to economics. Idealism threatens tyrannical imposition of policies that have no roots in popular consciousness. Reductionism treats ethics as mere ideology and fails to grasp the contingency of interests on culture, which, as a valuative framework, is itself subject to rational judgment. Hence, reductionism fails to appreciate the role of ethical critique in challenging the established conception of interests in terms of a different understanding of human life.

Critical theory should neither dictate policy on ethical grounds, nor dismiss transcending reflection as utopian. Its mission today is to conceptualize the processes by which potentialities that still appear in ethical form can eventually be realized in an effective consciousness of self-interest and transform technical codes. Economic progress from one stage to the next occurs

where repressed technical potential is released by fundamental cultural and social change. In economic terms, unrealized potentialities appear as vast *suboptimizations*, systematic underemployment of major resources, *as judged from the standpoint of the next stage*. These suboptimizations are due to the restrictions placed on technical and human development by the dominant economic culture. Only a new culture that shifts patterns of investment and consumption can shatter the economic premises of the existing civilization and yield a better way of life.

Because civilizational change effectively redefines what it is to be human, it has consequences for both ethical and economic advance. Thus, in the late nineteenth century, a rather narrow and socially restricted conception of humanity was replaced by a much broader one. We value human life, and especially the lives of working people, more than did our predecessors.⁶ In the early days of abolitionism and labor regulation, all the economic arguments were on the side of opponents of the new view, which appeared to be "a false principle of humanity, which in the end is certain to defeat itself" (*Hansard's Debates*, 1844: lxxiii, 1123). It was not an economist but the novelists Charles Dickens and Harriet Beecher Stowe who played a major role in the moral evolution of English-speaking people by helping middle-class readers achieve a fuller affective identification with the lowest members of their societies. The result was unexpected: the evolution of moral sentiments, by altering the definition of human *being*, opened up new ways of *having*, and our society is the richer for it.

Social potentialities are raised to consciousness in both an economic and an ethical form, neither of which can be reduced to the other because they are different aspects of a single process. That process, civilizational change, establishes a new way of life with both ethical and economic implications (Gramsci, 1959: 140). Where the struggle for new ideals succeeds in restructuring society around a new culture, it will not be perceived as trading off wealth against virtue but as realizing the economic potentialities implied by its ethical claims. In poor countries, for example, movements to lower infant mortality, protect women's rights, and eliminate illiteracy are not merely moralistic. To these demands corresponds an economic strategy based on investing in human resources. Similarly, in rich countries environmentalists resist the suggestion that environmental protection is an idealistic obstacle to prosperity and attempt to redefine social wealth in terms that are more inclusive than the dominant view. Socialism would emerge from a whole series of coordinated changes of this type. The *labiality of economic culture* explains how social movements are able to link the ideals and the interests of the underlying population in an innovative standard of welfare.

This approach to the concept of progress opens up a nondeterministic way of thinking about the connection between economic and cultural change. The generalized concept of suboptimization explains how powerful ideological motivations can anticipate a new economic order and aid in bringing it into being, even if it be through means that would be evaluated as uneconomic on the terms of the existing system.

The Transition to Socialism Revisited

Indices of the Transition

Over the last few decades socialist theory has responded to an accumulation of political disappointments by emphasizing its democratic heritage.⁷ As we will see, that emphasis is not misplaced, but it confirms the tendency to understand radical change in essentially political terms. In describing socialism as the realization of suppressed technical potentialities, I have attempted to shift the emphasis to show that it is not so much a *political* as a *civilizational* alternative. The process of bootstrapping from one civilization to another is qualitatively different from politics, however radical. Because he understood this distinction, Marx did not treat socialism as a policy but instead asserted the existence of a historical "process" leading from capitalism to socialism. In fact, at one time Marx claimed that his most important discovery was the idea of a transition to socialism.⁸

In deterministic formulations, this process is described as "lawful." But what is the law of the transition? Paul Sweezy denies its existence: "The assumption, more often implied than spelled out, is that once socialism . . . has been firmly established, *its own inner dynamic will automatically propel it forward on the next leg of the journey to communism.* . . . No one, however, has succeeded in explaining what the 'law of motion' of socialism . . . is supposed to be" (Sweezy and Bettelheim, 1971: 125). Indeed, the notion that public ownership and planning would unleash an autonomous socialist dynamic was tested and decisively refuted in the Soviet Union.

It is long since time to drop the traditional Marxist reference to laws of history. Insofar as the idea of socialism has any meaning today, it must refer to a model of the dynamics of a possible civilizational change. Reconceptualized in this nondeterministic fashion, the transition is a civilizational project realized through a *trajectory of development* that imposes a global pattern of culture based on new values (Marcuse, 1964: 219ff.). Capitalism supports just such a civilizational project, and the Marxian model of socialist

transition can be employed to define the logic of a corresponding socialist project.

Unlike a utopia, which plays the role of unattainable "ideal" in opposition to the sorry state of social "reality," a dynamic transitional model can be used to develop concrete proposals for change and to test the claims and counterclaims of the theses of convergence and transition. However, it is not easy to apply this model, as we have seen in the case of communist societies. Societies are not immediately transformed by events such as revolutions, but sometimes evolve toward new forms in the spaces opened by these events. The transition is necessarily ambiguous precisely to the extent that it comes to terms with the sort of practical problems from which one cheerfully abstracts in theory. The question is whether convergent features take their place in a larger transitional process, or whether, on the contrary, those features merely contribute to creating or perpetuating the dominant model of industrial civilization. We need to determine what constitutes an indication of a divergent path and how its importance is to be weighed relative to the convergent features of a society.

The transition to socialism can be identified by the presence of phenomena that, taken separately, appear economically irrational or administratively ineffective from the standpoint of capitalist technological rationality, but that together initiate a process of civilizational change. Any phenomenon that can be better explained in the framework of a socialist strategy of development than in the corresponding capitalist framework can be considered a significant *index of the transition*. The theory of the transition identifies these phenomena as traces of an emerging cultural pattern. Hence, Marx and Engels define the transition in terms of measures which "appear economically insufficient and untenable, but which, in the course of the movement, outstrip themselves, necessitate further inroads upon the old social order, and are unavoidable as a means of entirely revolutionizing the mode of production" (Marx and Engels, 1979: 30).

A contemporary list of measures capable of setting in motion such a process would include extensive (if not universal) public ownership, the democratization of management, the spread of lifetime learning beyond the immediate needs of the economy, and the transformation of techniques and professional training to incorporate an ever wider range of human needs into the technical code. These indices of the transition will be analyzed in more detail later. They can be used to evaluate societies in terms of the extent to which they have moved off the capitalist track.

As a civilizational change, socialism is a coherent transformation in the very foundations of the social order. It aims to achieve a significant rise in

the cultural level of the labor force and of all other subordinate social groups and a consequent change in the human type of the members of industrial society. It is not easy to reconstruct Marx's theory of the path to this result, but I will argue that it consists in three transitional processes: *socialization*, *democratization*, and *innovation*:⁹

1. The socialization of the means of production, accompanied by the early substitution of planning for markets in the allocation of industrial and cultural capital and other large-scale productive forces, and eventually, at a later stage, the disappearance of the market.
2. The radical democratization of society through an end to the vast economic, social, and political inequalities characteristic of class societies.
3. A new pattern of technological progress yielding innovations that overcome the sharp division of mental and manual labor characteristic of capitalism.

Any concept of socialism based on these premises can be called Marxian in inspiration. By the same token, the reconceptualization of socialism on the basis of the first or second component alone leads to a variety of non-Marxian positions. The Soviet model would have to be counted among these latter given its narrow emphasis on planning at the expense of democracy and technological change. Similarly, a position such as that of Habermas, which captures the democratic dimension of socialism but not its critique of technology, appears to fall outside the Marxian framework.

Marx's unified conception of socialism has by now been split into its component parts by history and analysis. His faith in planning has been mitigated by historical experience. Popular democratic movements in communist countries, like the emergence of new forms of technical politics in the West, also testify to the breakdown of the original Marxian synthesis.

Contemporary social theories that share certain Marxist premises but recognize the fragmentation of socialism are sometimes called post-Marxist. Such theories attempt to recover the democratic dimension of socialism against the exclusively economic Soviet model.¹⁰ This chapter presupposes this general critique and applies a similar approach in the technological domain. In what follows, I attempt an innovative formulation of the concept of socialism, taking into account the original Marxian notion but modifying it in accordance with historical experience and theoretical advances.

The reformulation hinges on the cultural and technological conditions for the requalification of the labor force. It is here that the Marxian concep-

tion of socialism becomes more than a political alternative and points toward fundamental civilizational change. But, where traditional Marxism assumed that workers would be guided by objectively ascertainable interests in transforming technology, I will argue that *democratic control of technically mediated institutions is a condition for generating an interest in a new direction of technological progress*. In other words, democracy itself is a "productive force" of a new type, shaping innovation in a future socialist society.¹¹

These reflections are strictly conditional. It is impossible to predict the future, but one can attempt to outline a coherent path of development that would lead to a properly socialist outcome in favorable circumstances. The discussion is thus addressed not to the probability of that outcome but to its possibility. As I argued in the beginning of this chapter, establishing that possibility is not just an act of political faith but also has a heuristic function: it is one way of breaking the illusion of necessity in which the everyday world is cloaked.

Socialization

Traditionally, the theory of socialization emphasized nationalization of privately owned productive resources. Too little attention was paid to the distinctive character of public ownership in a socialist society. This mistake in emphasis is related to the deterministic bias of Marxism, which rooted nationalization in the short-term interests of the working class and founded immense hopes for long-term social and cultural change on this relatively simple act of state. Marxists thought that public ownership and central planning would have an impact comparable to that of the French Revolution, but in reality, they remain merely political and administrative choices that fail to transform culture as promised.

Marx's hypothetical construction of the interests of workers and his predictions about the future have been criticized and defended ad nauseum. Rather than continuing that rather fruitless debate, I will reformulate the concept of "proletarian interests" as the ideal-type of a *socialist economic code*, and then show how this approach aids in conceptualizing and studying the transition to socialism.

My goal is to identify the underlying technical logic of a civilizational transformation. As a civilizational project, socialism must involve changes as fundamental as those which gave rise to citizenship through the abolition of estates, or the invention of modern childhood through the gradual limitation of the labor market. I will argue that an expanded role for knowledge, skill, and democratic participation rather than state control of industry de-

finer a comparably significant difference between socialism and all present-day modern societies, including communist ones. Marx's *Grundrisse* provides a basis for working out this idea, which, with a certain amount of imaginative interpretation, can be substituted for the usual economic account.

In this text, workers are said to have an interest in work that draws on a wide range of abilities. This interest is supposed to determine a socialist process of rationalization and innovation. Out of that process will come a whole new technology in which work will be "life's prime want" instead of a burdensome obligation (Marx, 1972: 388). This goal will be achieved when labor "is of a scientific and at the same time general character, not merely human exertion as a specifically harnessed natural force, but exertion as subject, which appears in the production process not in a merely natural, spontaneous form, but as an activity regulating all the forces of nature" (Marx, 1973: 612).

The transition to this higher type of industrial society involves a deep change in economic culture. Capitalist society, Marx argues, distributes wealth in the form of ever more varied commodities, but the commodity form is only a limited reflection of the actual enrichment of the consumers' needs and faculties. "Real" wealth is the actualization of human capacities, mediated by material goods to be sure, but not identical with them. Marx writes,

In fact, however, when the limited bourgeois form is stripped away, what is wealth other than the universality of individual needs, capacities, pleasures, productive forces, etc., created through universal exchange? The full development of human mastery over the forces of nature, those of so-called nature as well as of humanity's own nature? The absolute working-out of his creative potentialities, with no presupposition other than the previous historic development, which makes this totality of development, i.e., the development of all human powers as such the end in itself, not as measured on a *predetermined* yardstick? Where he does not reproduce himself in one specificity, but produces his totality? Strives not to remain something he has become, but is in the absolute movement of becoming? (Marx, 1973: 488)

The extension of transport and communications is a good example of Marx's new standard of wealth. Peasants confined mentally and physically to the small villages of their ancestors are "poor" by this standard, compared with modern individuals situated at the nexus of cosmopolitan interactions. Whether or not one shares Marx's disdain for rural life, the economic implications of his argument are clear. Once wealth is identified with the developed powers of the individual, there is a sense in which training and education, variety of experience and occupation, become a higher type of good. A socialist society, in the sense given that notion here, will value the enlarge-

ment of human experience and individuality as an end in itself, without subordinating these forms of wealth to the pursuit of a profit on the sale of the commodities associated with their acquisition.

Does this argument make economic sense? After all, overinvestment in human resources is as wasteful as any other misallocation despite our favorable prejudice toward education. The idea that education should be pursued for its own sake seems not much more likely to work than other similar exhortations to moral self-improvement.

But this objection depends on the culturally relative application of the distinction between *investment* and *welfare*. We signify the goals of production ethnocentrically in terms of capitalist concepts of wealth, that is to say, primarily as privately consumed commodities. In this framework, education is an investment rather than a positive component of individual welfare. The scarcity of knowledge and skill is a direct result of this economic code, which regulates the supply of knowledge by market demand and which rewards deskilling with a share of the savings realized by the replacement of skilled with unskilled labor.

Following Marx's argument in the *Grundrisse*, we could construct an ideal type of a socialist economic code in which educational activities that capitalist society considers as investments and evaluates in terms of productive efficiency would be placed in the category of consumption and evaluated as contributions to welfare. There is some precedent for this approach in the theory of the consumer value of educational services according to which education enhances the value of future consumption by refining appreciation (Becker, 1975: 69). Although this is a narrow foundation, the theory can be generalized to serve our purposes.

Why would this change in the social definition of wealth occur under socialism? Marx argues that the industrial economy not only produces a huge variety of commodities but also creates opportunities to apply the expanded powers of the individual in production (Marx, 1906: I, 533–534). This suggests economic reasons for developing human capacities. In this dynamic model the consumption of "real" wealth contributes to its production. Activities that increase workers' skill and intelligence increase the value of their labor power. Meanwhile, work itself becomes one important arena in which the individuals develop their powers.

But work remains work, however fulfilling. Thus, even under socialism workers will strive to reduce labor time while simultaneously increasing their leisure, much of which would be used for learning. And the more workers employ their leisure to learn, the more productive their labor and consequently the shorter the workday. "The saving of labour time (is) equal to an

increase of free time, i.e., time for the full development of the individual, which in turn reacts back upon the productive power of labour as itself the greatest productive power" (Marx, 1973: 711–712). Socialist "interests" and the corresponding patterns of consumption develop the "wealth" of the individual personality and the productivity of labor in a self-reinforcing cycle.

Of all Marx's utopian ideas, this one seems to me the most interesting and fruitful. Here the economic circle is squared by the creation of an industrial *perpetuum mobile* that feeds off the very resources it consumes. The socialist labor process will be based on a synergism of the demand for skilled labor and the growth of human powers in leisure. A primary leisure activity pursued for its own sake increases the value of labor and so can be freely converted into an economic input. In the domain of human resources, consumption and investment become two sides of the same coin as an economic cost, education and training, becomes a benefit for the individuals.¹²

The higher levels of knowledge and skill achieved in this labor process will enhance efficiency, motivate the transformation of technology, and reconcile broader participation with the technical requirements of an industrial society. In this new system, there is no necessary trade-off between democracy and prosperity. Both these goals are achieved by integrating technical and economic codes around a much fuller development of the individual than is possible today.

Democratization

Can we bring this utopia down to earth to inform our analysis of the present and our speculations about the future? To give content to this notion, we must turn to a different domain of problems, the democratization of technically mediated institutions. Whatever else is involved in socialization, the discussion in chapter 2 shows the importance of the devolution of a considerable portion of management power to employees. But given the disqualifying effects of the capitalist division of labor, can they organize the firm? I think we can answer this question with a qualified "yes." Employees need not all be experts to play a role in corporate governance, but they must at least have capacities equivalent to those that enable investors to handle their investments and work together in selecting managers. Absent these capacities, socialization either remains purely formal or leads to disastrous mistakes.

Clearly, education is essential to democratization. Social ownership must extend beyond machines, buildings, and land to include the monopolized knowledge required for the management of industry. The democratic redistribution of culture thus becomes a function of the socialization process. But

the *socialization of cultural capital* cannot be accomplished at the stroke of a pen; it implies a fundamental change in the institution of knowledge in view of achieving two objectives:¹³

1. To qualify the entire labor force, and not just a small elite, to participate effectively in management and politics.
2. To supply the volume of intellectual resources required to take advantage of technological options that rely on skill and intelligence more heavily than does the capitalist labor process.

Rudolph Bahro explains these goals, writing that socialist society should *produce quite intentionally a surplus of education* which is so great, both quantitatively and qualitatively, that it cannot possibly be trapped in the existing structures of work and leisure time, so that the contradictions of these structures comes to a head and their revolutionary transformation becomes indispensable. The emancipatory potential that is gathered in this way, and finds itself under too great a pressure in the confines of the existing conditions, has no other way out than by attacking the traditional division of labour in the reproduction process. (Bahro, 1978: 408)

The *Grundrisse's* implicit educational theory appears to dovetail neatly with these considerations. But Marx does not address the issues Bahro raises. Instead, he offers a deterministic account of the redefinition of welfare as self-actualization and defers basic change until a remote, technologically advanced future. But as our discussion of computers has shown, even the most advanced technology does not automatically democratize society.

To free Marx's theory of its deterministic cast, it is necessary to identify a practical context in which education would have some purpose more compelling than the sheer enjoyment of learning. The democratic dimension of socialism offers such a context and purpose. Even though low skill levels would be associated with the inherited labor process for a long time, the politics of self-management on workplaces and in communities would provide a scene for the application of broadened cultural capacities. Higher levels of education would make possible the democratization not only of work but of other spheres of activity such as medicine and urban planning. Issues such as environmental protection could be addressed far more effectively where the public could be expected to understand them. The consumer value of education would be realized at first in relation to these public functions. Education would "pay off" there, if not economically, at least in terms of increased influence and better outcomes.

The scope and importance of education would broaden accordingly, and in this context the acquisition of knowledge and skill would no longer appear

as a subtraction from individual welfare but as a component of it. Education would be *uncoupled* from society's economic needs and from individuals' investment strategies; it would become the driving force in social and technological change. Industrial society would bootstrap out of the knowledge deficit to a condition in which more and more individuals possessed the cultural qualifications needed to fulfill expanded social responsibilities.

Eventually, educational advance would make possible a leap to a higher level of labor productivity. The initial "overinvestment" in education would lead to the introduction of new technologies and work methods adapted to a highly educated labor force. Not technology but democratic social change would lead the transitional process, with technological progress an outcome rather than a cause of the establishment of new social relations. Thus *democracy appears as an economic and technological requirement of the transition to socialism.*

The socialization of culture defines a possible trajectory of development toward a new form of industrial civilization in which cultural competence and social responsibility are much more widely distributed than today. Although that project contrasts sharply with our expectations in the advanced capitalist world, it has partial precedents in Japan, the Soviet Union, and several other societies that responded to the challenge of modernization with enormous educational efforts both at the social and the individual level (Bailes, 1978).

It is true that the arc of cultural advance has nowhere been prolonged to the point where it generated major technological alternatives, but that possibility casts a critical shadow over current arrangements and refutes technocratic complacency and resignation. Those who would seek an easier path to a more participatory society must explain how that goal can be achieved on the basis of the level of culture inscribed in the existing division of labor.

Innovation

The cultural and political changes discussed earlier would create a new type of social environment for technological development. Skilled labor would be far more abundant than in a capitalist economy at a similar level of development. The supply would be limited primarily by the social cost (i.e., the cost of classrooms and teachers), once private costs had been reduced or disappeared through generalized educational consumption. Under these conditions, *highly qualified human resources would not be scarce but would be widely available as a nearly "free" good* on which the economy could draw at will.

In addition, patterns of innovation would change as democratic management increased margin of maneuver, enabling employees to alter the "rules of the game" in their favor. With the new management system would come new criteria for judging proposed innovations. The capitalist technical code, adjusted to the need to maximize profit and control the workforce, would be replaced by a different code that would take into account a wider range of variables. As Carol Gould writes, in comparison with capitalist managers, "members of a worker self-managed firm would be prone to be more sensitive to the impact that the use of given technologies would have on their conditions of work and the quality of work life. They might well also be responsive to issues of consumer need and environmental effect, since they are themselves also consumers and residents of the local area" (Gould, 1988: 277).

An economy developing under these conditions would favor new solutions to technical problems. In some cases, skill-intensive technologies might be adopted that would be discarded in a capitalist society with an economizing approach to knowledge. In other cases, work conditions and environmental protection might be enhanced by innovations that would be rejected in economies oriented toward short-term growth or profits. Different patterns of consumption and leisure pursuits would occupy a labor force that had a good education and performed interesting work, and the political process would no doubt take on a qualitatively different character. In short, this would be a socialist system of production in which technological change was governed by new principles.

There is a commonplace objection to this argument: government, it is often said, suppresses the individual freedom required for innovation. This view is popularly represented by the romantic myth of the innovator as an isolated genius at odds with ignorant bureaucrats. Is it true that any extension of social control will kill the goose that lays the golden eggs of progress? Is this perhaps what happened in the communist world?

While the myth is certainly overdrawn, the communist record in this domain lends it a kind of backhanded confirmation. Innovation in the Soviet Union was hampered by a variety of problems such as an excessive emphasis on technical professionalism, the isolation of research institutes from production, and the lack of advertising as a spur to demand for new products. As one would expect, the greatest obstacle was indeed bureaucratic lethargy and Soviet managers' aversion to risk.¹⁴

But all these problems appear to be due more to the obsession with central control than to public ownership as such. One does not hear of cases where innovations were suppressed out of concern for workplace democracy, ecology, or other social objectives. If socialism is tested by this experi-

ence, that is only because the absence of property rights made it possible to erect the obsession with control into an imposing barrier to change of any sort, an unfortunate outcome that would have been much more difficult to achieve under capitalism.

Still, the communist experience with innovation is not entirely negative. At various times, the Soviet Union and China favored worker involvement in technical change both to improve efficiency and to advance, or at least to prefigure, the eventual abolition of the division of mental and manual labor (Lee, 1977). For example, the Soviets established a system for encouraging workers to make the small technical improvements called "rationalizations." Workers were offered a means of claiming authorship and receiving bonuses for useful ideas. To promote worker participation in innovation, "complex brigades" of workers, engineers, and others were assembled to draft blueprints, test solutions, and refine original ideas. Several mass organizations mobilized large voluntary support networks to help worker-innovators overcome the bureaucratic obstacles to success.

Workers' contributions to rationalization and innovation were always overshadowed by engineering professionalism in the Soviet Union, not surprisingly in view of the Bolshevik faith in the saving power of technology. However, the Chinese case was quite different. Although they began by imitating the Soviet system, the Chinese soon became dissatisfied with it. In the Great Leap Forward and the Cultural Revolution, workers were freed from technical supervision to transform their firms under Party leadership. The Chinese version of "complex brigades" differed from the Russian one in terms of the balance of power between blue and white collars, a difference symbolized by the requirement that all members engage in manual labor. As Renssalaer Lee remarked in an article published during the Cultural Revolution: "The function of 'politics' in Communist China is largely to distribute opportunities of generating technological and cultural change. This redistribution occurs at the expense of professional elites and results in a close integration of change-producing actions with participation in labor" (Lee, 1973: 323).

We are now better able to judge these experiments than when Mao was still alive. It appears that often what was presented as a struggle for workers' control was actually a mere faction fight within the Communist Party. It is therefore difficult to know whether the policy failed because it was hopelessly voluntaristic or because of political mistakes. In any case, the overall results were disastrous, destroying valuable machinery and demoting or demoralizing skilled managers, teachers, engineers, and technicians. There is a warning here against populist anti-intellectualism. Nevertheless, there is something right about the idea of mobilizing the full resources of ordinary people

in the technical process, not in opposition to the technical intelligentsia as in China but in the context of a wide consensus embracing managers, technical specialists, and workers. Perhaps someday this idea will receive a worthier test.

Although these examples are in no sense models, they show the interest in mass technical creativity in communist countries and point up the possibility of organizational experimentation even in the framework of a planned economy. There are interesting similarities between these experiments and attempts to promote innovation in certain large, high-technology capitalist firms. These firms cannot afford bureaucratic stagnation and have made radical departures from classical organizational models to promote technical creativity. Small teams combining a variety of skills are encouraged to work in an almost parasitic relation to the corporation, drawing on its resources for an unusually autonomous activity of research and development (Kidder, 1981; Pinchot, 1985).

Such teams bear a certain resemblance to another type of entrepreneurial activity carried out with great success in the bowels of a vast government bureaucracy, namely, scientific research. Most of the funding necessary for research is provided by governments through grants to universities. Individual faculty members, usually representing teams of researchers, compete for funding on the basis of carefully prepared proposals and a record of past accomplishments. While not without flaws, the system favors innovation. Yet until quite recently, scientific entrepreneurs were rarely engaged in capitalist competition on the open market. Their achievements cannot be credited to capitalism but fall squarely within the much maligned public sector. In sum, technical innovation in any advanced economy depends on institutional innovations that circumvent bureaucracy and privilege originality and creativity.

Socialism and the Middle Strata

Discussion of these issues was surprisingly subdued as communist nations struggled in the late 1980s to build more democratic and efficient economic systems (Goldman, 1987: 240). The dismantling of bureaucratic dictatorship and its clumsy planning machinery requires greater reliance on markets, either through privatization or through the creation of self-managing firms. Self-management is not without its problems, but the lack of enthusiasm for it among communist loyalists was perhaps due less to the unhappy Yugoslavian precedent than to the fact that they felt more at home with hierarchical control, regardless of who is at the helm, than with socialist ideals.¹⁵ And they hoped to land on their feet, still in charge but now with the chance to get

rich. Not the apparatus but workers themselves would have had to initiate democratic experiments if these were to occur at all. Unfortunately, workers were disarmed as a pressure group by popular revulsion from generations of abuse of power perpetrated in their name.

There are, furthermore, unsolved problems in the theory of the self-managed firm. For example, whatever the legal structure of enterprise, the socialist workforce must rely on professional and managerial personnel with considerable operational autonomy for a prolonged period, no doubt measured in generations rather than years or decades as Lenin had hoped. How much real change can be expected with the same social groups in charge? An elected management might be more responsive merely to workers' demands for health and safety on the job and job security. Indeed self-management might turn out to have few practical consequences because a technocratic consensus united workers and managers around the reproduction of the capitalist technical code.

Thus, formal democratization of the firm is a necessary but not a sufficient condition for a transition to socialism. The democratic tasks of the transition go beyond formal measures to include *recomposing formerly divided mental and manual labor in order to reduce the operational autonomy of leadership and reincorporate the alienated functions of management back into the collective laborer*.¹⁶ Managers' actual authority must be accommodated to the gradual enlargement of workers' margin of maneuver. This *deep democratization* implies significant changes in the structure and knowledge base of the various technical and administrative specializations.¹⁷ Furthermore, in advanced societies, where so many relationships outside the sphere of production are technically mediated, self-management in the workplace is only one dimension of a general attack on technocratic hegemony. The rules and roles governing the exercise of authority must be altered to promote greater autonomy not only in industry but in agent-client relations outside production as well.¹⁸ In fact, democratization of industry might well follow rather than lead administrative changes in a variety of fields such as government services, science-based technical systems, medical practice, mass media production, teaching, and so on.

How plausible is this strategy for recomposing the unity of the collective laborer? In the introduction, I mentioned the importance of a culture of responsibility, without which those on the bottom of the system are unlikely to demand changes in the distribution of power. To be effective, this demand must meet a sympathetic response from a significant fraction of the technical elites to which it is addressed. Nothing can be done without their help, and it cannot be enlisted by violence or administrative fiat. But would tech-

nically qualified personnel participate in a process that diminished their operational autonomy?

One is tempted to answer this question a priori in the negative. After all, the Russian Revolution faced massive resistance on the part of technical and cultural elites. A few intellectuals and technical professionals supported the revolution as individuals, but such defections from the bourgeoisie remained a minor breach in the otherwise solid wall of hostility. Judging from the historical experience of radical professionalism in the new Left, conditions appear to have changed in technologically advanced societies. In the 1960s and '70s, many members of the middle strata contested their social roles in societies bent on exploitation and war. These movements went well beyond the philanthropic gesture of a few revolutionary intellectuals.

In fact the most powerful revolutionary movement to occur so far in an advanced society was characterized by intense "fraternization" between workers and sympathetic members of the bureaucracies, professions, and corporate administrations. During the French May Events of 1968 these latter proposed quite elaborate plans for reform of management and government agencies (Feenberg, 1999: chap. 2; Feenberg and Freedman, 2001). Thus, the idea of an alliance to reorganize the collective laborer is not merely idle speculation but resonates with an important historical experience.

To go beyond such anecdotal evidence would take a theory of the middle strata.¹⁹ Such theories usually assume that classes have clearly defined interests independent of their political relations.²⁰ Judging from the May Events and other similar experiences, this assumption does not hold for the middle strata: in a revolutionary situation they enter into an internal crisis and lose confidence in their technocratic identity. There is an obvious reason for this instability that is obscured by traditional class theory: the middle strata are defined by their *place in organization* rather than by an economic function. The fragility of their social identity is due to the instrumental character of the organizations that support it. In the modern world, these owe their existence to their legitimacy as determined by legal or economic criteria that can change at a moment's notice.

Members of the middle strata have been hired, usually after acquiring appropriate educational credentials, to carry out an action based on specific technical codes. Unlike the other classes of modern society, which arise from an "organic" economic process, the middle strata acquire their class identity through a process of selection, rooted in an expert relationship to a body of knowledge. This is the origin of the "professionalist" ideology according to which they are the "agents" of "clients" in whose interests they act and for whom they perform services these latter cannot perform for themselves.

The middle strata serve the needs of the community within the limits imposed by the established hegemony. Like the technical code on which it is based, their action exhibits the double aspects of power/knowledge discussed in chapter 3. Where social struggle is weak or ideologically inarticulate, a technocratic self-understanding arises from the misperception of this tensionful limitation. But, when the "clients" rise in struggle, as in the May Events, the bureaucracy's legitimacy is challenged on a global scale. Its selection, its conception of service, its claim to represent the public interest are all shaken, and its self-image shattered. The repressive aspect of its work, as that work is organized and shaped from above, becomes clear in the light of resistance from below. Splits and conflicts paralyze it and block its functioning.

When the people appear "in person," they become the source of an alternative legitimacy different from the one granted hitherto by capitalist or communist elites in their name. The bureaucracy is no longer an interest in its own right engaged in maximizing its operational autonomy at the expense of the population, but becomes instead a scene of struggle on which popular interests are represented. The "people" are a recourse and an ally through which at least a major portion of the middle strata can be reconstituted and their "selection" reconfirmed under a different hegemony for different social purposes. The culmination of such a reconstitution would be the elaboration of new practices and technical codes representing a wider range of interests and aimed at reducing the operational autonomy of professional leadership. The concluding chapter of this book explores the philosophical implications of this new conception of socialism.

6. The point seems obvious today, but it was a quite eccentric view of the computer world until the recent fascination with the Internet. For an early defense of the communicative potential of computer networks, see Hiltz and Turoff (1976).

7. For the early discussions on self-organization, see Yovits and Cameron (1960) and Von Foerster (1962).

8. See also one of the starting points in the debate, Dreyfus and Dreyfus (1986).

9. This aspect of Heidegger's theory is curiously anticipated by Marx's critique of economic fetishism and its role in obscuring the activity of the producer. Marx writes, "It is generally by their imperfections as products, that the means of production in any process assert themselves in their character as products. A blunt knife or weak thread forcibly remind us of Mr. A., the cutler, or Mr. B., the spinner. In the finished product the labour by means of which it has acquired its useful qualities is not palpable, has apparently vanished" (Marx, 1906: I, 203).

10. For another formulation of this approach, see Suchman (1987).

11. The history of communications media is particularly rich in illustrations of this thesis. See de Sola Pool, (1977: chaps. 1, 2, and 4); and Fischer (1988). The French videotext network underwent an evolution in some ways similar to that of the early telephone. See Marchand (1987) and Feenberg (1995: chap. 7).

12. For a feminist critique of Cartesianism with certain similarities to this approach, see Bordo (1987).

5. THE FACTORY OR THE CITY

This chapter draws on recent work I have done in the field of online education. It was not included in the original edition of *Critical Theory of Technology*. It stands here as an application of the interpretation of the computer in the previous chapter.

1. For accounts of the centrality of the city to modern life, see Sennet (1978) and Berman (1988).

2. For discussions of the technical code of the Internet, see Flanigan et al. (2000) and Bakardjieva and Feenberg (2001).

3. For an up-to-date review of the issues by a select faculty group at the University of Illinois, see *Teaching at an Internet Distance* (2000).

6. BEYOND THE DILEMMA OF DEVELOPMENT

1. For a review of these theories, see Meyer (1970). Daniel Bell writes, "While the phrase 'technological imperatives' is too rigid and deterministic, in all industrial societies there are certain common constraints which tend to shape similar actions and force the use of common techniques. For all theorists of industrial society (and to this extent Marx as well) the locus (or primary institution) of the society is the industrial enterprise and the axis of the society is the social hierarchy which derives from the organization of labor around machine production. From this point of view there are some common characteristics for all industrial societies: the tech-

nology is everywhere the same; the kind of technical and engineering knowledge (and the schooling to provide these) is the same; classification of jobs and skills is roughly the same. More broadly, one finds that the proportion of technical occupations increases in each society relative to other categories; that the spread of wages is roughly the same (so are the prestige hierarchies); and that management is primarily a technical skill” (Bell, 1973: 75).

2. “To be a technological determinist is obviously to believe that in some sense technical change *causes* social change, indeed that it is the most important cause of social change. But to give full weight to the first term in expressions such as ‘*prime mover*’ and ‘*independent variable*,’ it would also have to be believed that technical change is itself uncaused, at least by social factors” (MacKenzie, 1984: 25(3), 474).

3. This procedure is widespread. I first noticed it in an otherwise interesting article by Richard Baum (1975) from which I borrow the terms “techno-” and “ideo-logic.”

4. In sharpening the issue in this way, I am no doubt overlooking the many intermediary positions that suggest, for example, dual economies in which industrial and craft labor exist side by side. And it is important to note that environmentalism is by no means generally antitechnological. However, these positions are often confused with each other. A clarification of their differences is best achieved by confronting pure formulations.

5. For the full list and much relevant comment, see Dickson (1975: 103–104). For a further discussion of the ambiguities of environmental politics, see Feenberg (1999: chap. 3). For the argument against Murray Bookchin’s version of the position criticized here, see Light (1998).

6. See Sen (1976–1977: 6: 337). Sen’s principle of “metaranking” of preference orders could be applied to the problem of civilizational comparisons.

7. For wide-ranging surveys of the contemporary discussion of socialism and democracy, see Cunningham (1987) and Gould (1988).

8. “What I did that was new was to prove: 1) that the existence of classes is only bound up with particular, historical phases in the development of production, 2) that the class struggle necessarily leads to the dictatorship of the proletariat, 3) that this dictatorship itself only constitutes the transition to the abolition of all classes and to a classless society” (From a letter of Marx to Weydemeyer dated March 5, 1852, in Lenin, 1967a: II, 291). “Communism is for us not a *state of affairs* still to be established, not an *ideal* to which reality [will] have to adjust. We call communism the *real* movement which abolishes the present state of affairs. The conditions of this movement result from premises now in existence” (Easton and Guddat, 1967: 426).

9. The two most important texts for understanding the Marxian theory of the transition are “The Critique of the Gotha Program” and “The Civil War in France.” See Marx (1972: 383–398, 526–576). For a review of the theory, see Stephens (1979: chap. 1).

10. For examples, see Laclau and Mouffe (1985); Boggs (1986).

11. This is the argument with respect to capitalism of Dokes and Rosier (1988: 291–294).

12. Educational programs that required full-time attendance would still have significant costs to the individuals; but part-time adult education, pursued as a leisure activity, would fall in a different category and might make a large (free) contribution to the economy. For the distinction between these different costs, see Becker (1975: 194–195).

13. On the political implications of the concept of cultural capital, see Gouldner (1979) and Bahro (1978: 278).

14. For discussions of the problems of innovation in communist societies, see Burks (1970) and Berliner (1988). For a classic discussion of the wide variety of contexts of innovation see Jewkes, Sawers, and Stillerman (1959).

15. Since Yugoslavian workers did not own shares in their firms, they took advantage of easy credit rather than improving efficiency, badly indebting the economy. While this is undoubtedly a serious problem, it is difficult to believe that technical solutions cannot be found through appropriate credit regulation and incentive systems such as tying pensions to the income of firms. Dangerously loose credit policies are not specific to socialism, as the American Savings and Loan crisis amply demonstrated.

16. There is a large literature on the concept of democratic management. See, for examples, Blumberg (1976); Lindenfeld and Rothschild-Whitt (1982); and Rosanvallon (1976). For recent philosophical defenses of self-managing socialism, see Gould (1988: chaps. 4 and 9) and Schweikert (1993).

17. A recent book by Judith Green (1999) takes up this term independent of my approach.

18. Arguments for this conclusion are offered in articles by Gorz, Maccio, and *Il Manifesto* in Gorz (1978).

19. For a collection surveying the debate on the class status of the middle strata, see Walker (1979).

20. For an interesting exception, see E. O. Wright (1978).

7. THE CRITICAL THEORY OF TECHNOLOGY

1. I am grateful to John Ely for pointing out this connection. For accounts of the tension in Marxism between naturalistic holism and theory of the social construction of nature, see Ely (1988), Ely (1989), and Vogel (1995).

2. See Schluchter (1979: 57, 117–118).

3. The contribution of the Frankfurt School to the age-old debate on the problem of universals deserves a study. I would guess that such a study would find considerable agreement, if not a doctrine. For example, Marcuse's position and Adorno's have more in common than is usually recognized. Michael Ryan points out that in contrast to Marcuse, who claims that universals like "freedom" contain more con-