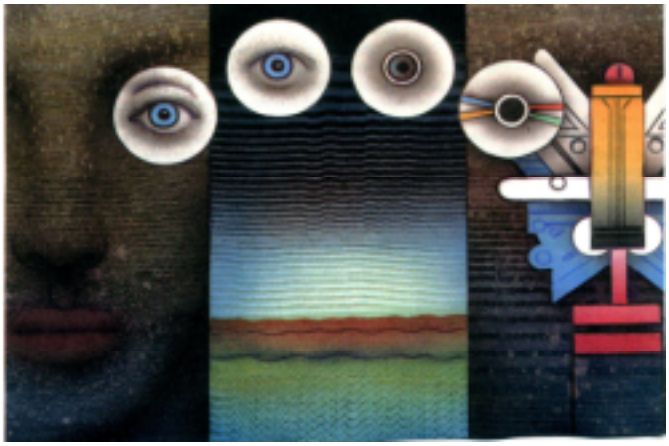
On the Presumed Neutrality of Technology



After the Industrial Revolution in England, a general feeling of optimism pervaded Western society. A common belief was that scientific knowledge, whose growth knew no limits, could always be applied to the problems of society. Since science and technology were so successful in producing marvelous inventions, it was felt that they could eventually solve any human problem. This attitude was exemplified at the Chicago *Century of Progress World's Fair* in 1933 whose motto was:

An earlier version of this article first appeared in 1980 in [27)

Science Finds - Industry Applies - Man Conforms

The Guidebook to the Fair amplified further:

> "Science discovers, genius invents, industry applies, and man adapts himself, or is molded by, new things.... Individuals, groups, entire races of men fall into step with science and technology."

Such sentiments were not expressed in sorrow, but in obvious satisfaction. The irony that human beings should bend willingly to the dictates of a technological imperative, when for ages they have struggled to be free of human tyrants, seemed to escape the "happy technologists" of that day.

A similar outlook survives among later technological optimists, typified by Simon Ramo:

> We must now plan on sharing the earth with machines.... But much more important is that we share a way of life with them.... We become partners. The machines require for their optimum performance, certain patterns of society. We too have preferred arrangements. But we want what the machines can furnish, and so we must compromise. We must alter the rules of society so that we and they can be compatible. [1, p. 12].

Did Ramo really mean "compromise"? He doesn't say that if the way we live is not optimum for the machine, then we should redesign the machine. On the contrary, we must change society and people to make them conform to the machine. There is no "compromise" here. It is not that machines be constructed to make them compatible with human processes, but that humanity accept the social patterns required by machines!

If technology is value-neutral, how can it be biased toward freedom?

But it has begun to register on the consciousness of many that the social benefits flowing from science and technology have been purchased at a very high price. The questioning is not merely a superficial probing of the merits of this or that technology, but a profound questioning of the foundations, the view-of-the-world, that can contemplate with equanimity the shaping of human beings, their society, their culture in accordance with what its champions say are the dictates of technology.

The societal problems that point up the nature of the crisis include:

a) *Environmental:* Pollution, depletion, habitat destruction;

b) *Health:* Dangers to human health posed by industrial production processes, products, and wastes;

c) *Psychological/Emotional:* A substitution of machine values for human values; transformation of the nature of work from craftsmanship to meaningless-ness, leading to worker alienation; a feeling of citizen pow-eriessness in the face of a complexity said to be understandable only by an expert elite, alienation from politics; social malaise exhibited in symptoms of increasing crime, senseless vandalism, anxiety, disharmony and tension, apathy, loss of agency, and loss of community feeling;

d) *Militaristic:* Hi-tech militarization, potential annihilation;

e) *Social:* Centralization, bureau-cratization, authoritarianism.

Contemporary Technology

Just what *is* contemporary technology? Perhaps the first image conjured by the term "technology" used to be "machine" - a physical object. This was, no doubt, an early embodiment of technology. Recent conceptions would include telecommunications, computers, and the internet. But these alone are hardly adequate conceptions for the contemporary scene. Like the term "society," technology is an abstract concept. Society is not simply a collection of people, but also the interrelationships among them. In the same way, technology is not simply a collection of machines, but the relationships among them, and the relationships between them and people. Just as a collection of words cannot adequately represent the rich texture of language, so also a collection of machines, even interconnected machines, cannot adequately represent contemporary technology.

Contemporary technology can't be understood without considering at least the following dimensions:

1) Physical Objects

a) *Hardware:* instruments, machines, weapons, appliances, tools.

b) *Structures:* bridges, buildings, plants, dams, networks (road, rail, telephone, pipeline, electric).

c) *Materials:* metals, plastics, drugs, chemicals, synthetic fibers.

2) Know-How

Not abstract, scientific knowledge but procedures, methods, processes, technique. Accumulated knowledge is as much a part of technology as a machine.

3) Personnel

Not autonomous human individuals but standardized people, largely interchangeable with one another,

having the appropriate know-how to manipulate the physical objects.

4) Organization and System

The organized structures, the mechanisms of management and control, the integrated systems within which hardware and physical structures are embedded and know-how employed by personnel; the linkages that tie together hardware, technique, and personnel with the social institutions.

5) Political/Economic Power

Implicit in 4) but should be acknowledged explicitly.

Technology is not simply *the* computer, for example, but large-scale computer networks linked through telecommunications systems; it is command-and-control systems; it is data banks, the know-how and the software to manipulate them, and the power implicit in controlling them.

Models and Their Supporting Premises

In going about their everyday lives, people carry in their heads models or paradigms of what the world and society are like. Walter Lippman noted that individuals create a *pseudo-environment,* an internal representation of the world built up over a lifetime. The images, preconceptions, and premises that underlie this pseudo-environment determine people's perceptions of events. Most people tend not to question their preconceptions, even when the consequences of acting in accordance with their images of reality lead to anomalies that the paradigm cannot reconcile.

In science, when such anomalies develop, some creative individuals question the old paradigm and its premises, and develop a whole new image of the world based on an entirely new way of looking at things. Newtonian mechanics gave way to relativistic mechanics; the economic system of mercantilism of the 15th and 16th centuries gave way to the classical capitalist economic system of the 18th and 19th centuries, which, in turn, has given way to the neoclassical and the Keynesian economic systems. The Keynesian analysis evolved because the 1930s world depression was a traumatic anomaly that the previous paradigm couldn't explain. The depression was not supposed to have happened, according to the old model.

Contemporary technological society is now facing anomalies that baffle the social and economic preconceptions most of us carry around. These are built strongly into the social structure and culture. But reality cries out for a paradigm shift. It is essential, then, to identify and critically examine the premises — both explicit and hidden — underlying the inadequate contemporary model. Here are five of the major premises.

1) **Self-Seeking:** The preferred behavior mode for human beings is self seeking, pursuing one's perceived self interest. The foundation of the capitalist ethos is that such self-seeking behavior will lead to social good through the operation of an "invisible hand" in the "market".

2) **Elastic Wants:** Human wants are infinitely elastic. So, it is necessary to have continual economic growth in order to satisfy them.

3) **Dominating Nature:** The physical world (nature) is there for "man" to subdue, dominate, conquer, subjugate, and exploit. By scientific knowledge, said Descartes, "we may be able to make ourselves masters and possessors of nature."

4) **Neutrality of Technology:** Technology is morally and politically neutral; it is a mere tool that can be used for good or evil. If it is not used properly, "man" is to blame.

5) **Freedom of Choice:** Individuals in the free market system have free choice. The root cause of such ills as wasteful consumption, urban congestion, pollution, and the specific designs of inappropriate "products" lies in the free choice exercised by autonomous individuals.

Each of these ideas fails to withstand critical examination. All must be rejected if transformation to a humane society is a goal. The first three refer to the presumed nature of human beings. Although they will be considered briefly, the bulk of the analysis will be reserved for the last two, dealing with technology.

Human Nature

Preconception 1. Self-seeking as a Preferred Value

The premise that self-seeking behavior is the preferred mode for humans tends to encourage an aggressive, contentious, non-cooperative spirit; it cultivates greed and envy - a looking out for Number One at the expense of the community. Furthermore, say its proponents, this is human nature anyway, and you can't change it. The type of social structure fostered by this outlook is a hierarchical one, with individuals engaged in a scramble for status.

The capitalist culture and social system *require* individuals to act in a self-centered, contentious manner. The proper operation of the system demands it. How convenient, then, to ascribe this attitude to basic human nature! Writing in 1930, John May-nard Keynes said, quaintly:

> "For at least another hundred years we must pretend to ourselves and to everyone that fair is foul and foul is fair; for foul is useful and fair is not. Avarice and usury and precaution must be our gods" [3, p. 372].

Why did Keynes think that self-seeking should be encouraged? Because it was useful to the operation of the capitalist system! But he recognized that, at least it was not

laudable, and that you had to work at it to make avarice and greed appear as gods!

Perhaps it is true, says Florman, "that the common man would be 'happier' if he did not have the urge to scramble upward to a higher station in life. But this is irrelevant, because the common man does have the urge ... human nature is at the root of our problems" [4, p. 77].

Technology is not a neutral, passive tool devoid of values.

But does the greedy, status-seeking pursuit of self-interest result from unalterable human nature? To demonstrate that it is not requires only finding counterexamples. We would ask: have humans ever acted selflessly? If we could find any such cases, we would have to conclude that *the* proposition that self-seeking is unalterable human nature is, at the least, not proved. With a bit of further thought, we would have to say that some humans act selflessly, others selfishly; that *any* individual *sometimes* acts one way, sometimes the other; even that individual humans - when faced with a given situation - often have conflicts within themselves as to whether they should respond to the situation in a self-seeking manner or in a cooperative, communitarian manner.

For each example of greedy, self-centered human behavior, one can find an example of altruistic, cooperative behavior. Without the cooperative and symbiotic working together of its millions of cells, the human body itself could not function.

Far from being, by nature, selfish, it can just as validly be assumed that human beings, by nature, are cooperative and fraternal. How they *actually* behave in given situations depends on their socialization. If the social order continually reinforces them for self-seeking and personal aggrandizement, the chances are they will act this way more often than not. An outside observer would then notice that most people, most of the time, behave in non-cooperative, self-seeking, status-enhancing ways. Such an observer who might conclude that such behavior is simply human nature would be a naive observer, indeed.

Sometimes the happy technologist will unknowingly concede as much. Florman says: "Man, for all his angelic qualities, is self-seeking and competitive" [4, p. 84]. There it is: a concession that humans have noble impulses (angelic qualities) as well as base ones. The real question becomes: which qualities should be cultivated and reinforced? It is not a question of *changing* human nature to something it is not, but arranging conditions so that people can more often exhibit - and behave in accordance with - their "angelic qualities" rather than their base ones.

Preconception 2. Infinitely Expanding Human Wants

Economists postulate that human wants are infinite and insatiable - that humans are incapable of saying "enough." Says Florman, "Contemporary man is not content because he *wants* more than he can ever have" [4, p. 75]. So, this being the case, it is essential to maintain economic growth and increased levels of consumption. The serious flaw in these assertions is the failure to distinguish between those wants that are basic and absolute *needs* - such as food, clothing, shelter, sex - which humans will experience, independent of the condition of other human beings around them - and those that are socially-induced and relative.

It is clearly untrue that basic human needs cannot be satisfied. The sight of food is not tempting to one who has just finished dinner; such a person would then prefer to spend time on other pursuits. It is also clear that some basic human needs are not at present satisfied for a substantial fraction of the world's population. To this extent, "growth" is on the agenda; not generalized growth, but increases in those areas of production intended to satisfy the basic needs of those now inadequately served. Perhaps "redistribution" rather than "growth" is the operative concept.

The second category of wants - those that are relative - may well be insatiable. But what is their nature? These wants are experienced only in a relative sense, only if a feeling of superiority to others is achieved, only if vanity or status is enhanced. These wants require continual comparison with others and feverish activity in pursuit of inequality. In a sane society, such pursuits would be discouraged. But in a society dominated by the capitalist ethos, they are encouraged and cultivated through high-powered persuasion and promotion. Marcuse [13, p. 5] refers to such wants as "false needs," not to deny that they exist but as a judgment of their worthiness.

The flourishing of false needs is a reflection not on human nature but on the values consciously cultivated by the social system. It makes no sense actively to promote ego trips, feelings of vanity and prestige, desires for superiority and status -and then to demand economic growth in order to satisfy these desires - at the expense of ignoring the resulting crises.

Furthermore, the effort of satisfying these wants is doomed to failure. Obviously, it is impossible for everybody to become *relatively* better off [24, p. 84]. If people's satisfactions depend almost entirely on status, ego-gratification, and feelings of superiority, thenincreasing levels of consumption cannot yield increasing satisfaction to society as a whole. The superiority and

enhanced status of some imply the inferiority and reduced status of others.

Preconception 3. Human Subjugation of Nature

The idea that human beings should have dominion over the earth and all that it contains (now extended to the entire universe) was an early tenet of Western civilization; it even carried Biblical sanction. And mankind has not been reticent in carrying out this injunction. But there are at least two fallacies in this outlook. One relates to resource depletion, the second to the mistaken notion that nature is one thing and humanity another - outside of nature. Space does not permit elaboration here.

Neutrality of Technology

Although champions of "advanced technology," or "hi-tech" may approach their subjects from different perspectives, there seems to be a common refrain to their individual verses that amounts to a litany of technology:

- That technology is just a passive tool whose consequences depend on the uses to which it is put;
- That if technology is used harmfully, "man" is to blame;
- That there are no values embodied in technology;
- That technology plays an entirely passive role with respect to issues of power and control;
- That prime reasons for introducing innovations in production processes are increased efficiency and productivity;
- That the prime reason for introducing innovations in products is to satisfy a human need, "to satisfy it more safely, reliably, and at a lower cost to the user" [5, p. 4].

Here is what some of the happy technologists say:

Simon Ramo: It isn't "really technology but rather the selector and user of it -man - who should be faulted. Surely everyone understands that science and technology are mere tools for civilized man" [1, p. vi].

MelvinKranzberg: "Technology *per se* can be regarded as either good or bad, depending on the use man makes of it.... Nuclear power provides a good example, for the power within the atom can be used for constructive or destructive purpose, as man chooses" [6, p. 705].

Peter Drucker: "The only positive alternative to destruction by technology is to make technology work as our servant. In the final analysis, this surely means mastery of man over himself, for if anyone is to blame, it is not the tool but the human maker and user" [18, p. 32].

Samuel Florman: "...a basic human impulse precedes and underlies each technological development. Very often, this impulse, or desire, is directly responsible for the new invention. But even when ... the invention is not a response to any particular consumer demand, the impulse is alive and at the ready... " [4, p. 61].

This litany of the happy technologist constitutes an ideology.[1] This *ideology of technology* has purposes quite remote from explaining reality to members of society. It fails to take political power and economic interests into account, masking their predominant role. It promotes a model that ascribes to technology objectivity - a value-neutrality -that technology does not in fact possess. A useful clue to the ideological nature of a statement purporting to be explanatory is the ascribing of action to vague collective nouns and pronouns, as:

"Man" is to blame (collectively);

"Mind" determines the shape and direction of technology [7, p. 55].

"If technology is sometimes used for bad ends, *all* bear responsibility ... " [7, p. 157].

" ... make technology work as *our* servant" [6, p. 32].

"Thus, we manufacture millions of products to enhance *our* physical comfort and convenience ... But in doing this, *we* overlook the need to plan ahead" [8, p. 1].

Are we *all* equal in responsibility, or aren't there some more equal than others? Who are the "we" who do the manufacturing? Is that the same "we" who forgot to plan? Doesn't *somebody's* profit enter the picture at all? Surely it is some specific minds that shape technology, not an abstract "mind"! The preceding manner of speaking conceals the existence of very specific, powerful groups and individuals whose activities in pursuit of their interests are major factors in the problems of contemporary technological society.

Some insight into the role played by technological ideology can be obtained by analogy, through an examination of the role of economics in our society. Like any other science, says John Kenneth Galbraith, economics has the purpose of *understanding* - in that case, the economic system - how it works, what is the nature of money, labor, capital, taxation, the market, etc. But economics also has an *instrumental* function: to serve the goals of those who have power. It creates images in the minds of people - and thus contributes to their model of society. These images are

[1] The dictionary definition of an ideology is: 1) A collection of errors, illusions, and mystification which present an inverted, truncated, distorted reflection of reality; 2) A manner of thinking or a set of values which is characteristic of a group; it is the integrated assertions, theories, and aims that constitute a sociopolitical program.

not at all consonant with the reality of the economic system, at least with over 50 percent of the economy represented by what Galbraith calls the "planning system," the large corporations and their activities. The instrumental function is to induce people to behave *as if* the image were the reality. It is to *conceal* from people the true nature of most of the economy as a *planned* system - not free enterprise - with the planning being done by a handful of large corporations in their own interest [9].

Like economics - which has both a scientific purpose and an instrumental function as an ideology - technology also has two goals. Quite apart from its purpose "to enhance our physical comfort and convenience," technology and technical expertise serve an ideological, instrumental function. This function is again *image making* and *concealment,* the covering of political and economic power in a cloak of technical objectivity. The image is created that decisions and actions serving the interests of those in power are simply the consequences of objective facts, carried out for such objective reasons as efficiency.

Innovations in Production Processes

Let us first examine the issue of technological innovations and their introduction into the production process. The ideological assertion is that these serve the objective goals of efficiency, increase in production, and human needs satisfaction. Those holding the images that make up the dominant paradigm see this as reasonable; but the picture cannot withstand closer scrutiny.

In studying the development of the textile industry during the Industrial Revolution in Britain, for example, David Dickson [10, pp. 71-83] shows that the rise of the factory system of production, the organization of work in factories, was largely a managerial necessity, rather than a technological one. It was done for the purpose of "curbing the insolence and dishonesty of men." The rising capitalist class made no bones about it that the specific machines introduced had as major purposes the subduing and disciplining of workers. This is widely reported by biographers of industrialists of the period or of early champions of the factory system.

Technological innovation was not so much determined by a concern for production efficiency, as it was a management tactic to maintain fragmentation of workers, authoritarian forms of discipline, hierarchical structure, and regimentation.

Similar lessons can be learned from other events in the history of industrial development. Cyrus McCormick was a manufacturer of agricultural equipment in Chicago. In 1880, unhappy with working conditions in the McCormick plant, the skilled workers attempted to organize into a union, something McCormick violently opposed. He installed a $500 000 machine - a truly tremendous amount of money for the time. The machine required only unskilled workers to operate it. It was very inefficient and produced goods that were greatly inferior to those previously produced. It was abandoned after three years, once it had served its purpose of getting rid of the "troublemakers," destroying the union, and cowing the workers [26].

The same story is evident down to the present. In *Contested Terrain: The Transformation of the Workplace in the 20th Century,* Richard Edward concludes that the complex hierarchy of the modem corporation grew, not from the demands of technology, but the desire of greater control over workers [12].

Innovations in Products

Next consider the introduction of technological innovations in "consumer products." To a significant extent, such innovations arise as a consequence of R&D activities of corporations. And what are corporate goals? Simply, they are: a) Survival, b) Increase in market share, c) Growth in profits [9].

All the activities of corporations - production, sales, marketing, *and* R&D - are carried out to reach their goals. Product innovation, no less than marketing or production, serves corporate purposes and so would be carried out, independent of social need.

If a market does not exist, it must be "developed." That is, it must be created, cultivated and nourished. Once the decision has been made to introduce an innovation in furtherance of corporate objectives, "developing the market" is then thrown into high gear. The entire arsenal of persuasion is unleashed to convince potential consumers that this innovation will not only perform the specific function for which the product is ostensibly designed (such as comfort, cleanliness, transportation), but it will also enhance status, satisfy vanity, increase personal appeal, etc. The result is to intensify these impulses, and then to prey upon people's expectations that this product can satisfy such impulses. People are thus sold the idea that their self-worth is measured by the goods they possess and consume, in general, and by this specific product, in particular.

Thousands of "new products" are introduced to the market every year, the vast majority of which are not bought by enough people and soon disappear from the market. Was there a societal need for these products? Was "lower cost to the user" a criterion for developing, producing, and marketing them? In fact, pricing of all the corporation's products must reflect losses from those that "failed." Hence, prices on other products of the corporation generally must *rise* as a result of these "innovations," quite contrary to the ideologically stated reason for product innovation.

The preceding analysis seriously weakens the claims of technological objectivity and value-neutrality. The

nature of a society's technology is intimately related to issues of power and control; it reflects the dominant paradigm in terms of which reality is interpreted. A society in which economic growth is a high value necessitates a particular kind of technology; namely, one with a high level of "innovation," quite independent of social need. Policies required for economic expansion *must* be reflected in the particular form of technology through which this expansion is achieved. Hierarchical forms of social control become reflected in the technology. The presumed neutrality of technology then lends legitimacy to social policies, however repressive.

Like other happy technologists, Simon Ramo over and over explicitly claims the value-neutrality of technology. Without realizing it, however, he makes an amazing concession contradicting this position and acknowledging an instrumental function for technology. In reviewing the space program and justifying having spent large resources on this program, he concludes:

> "The pattern we are developing - to be far-sighted, to be bold, to want to pioneer, to be willing to take some risks, to carry with us as a part of our way of life the exploration of the unknown - it is these habits that we cultivated when we carried out our space program" [1, p. 51].

This is a remarkable concession that a specific technological development had an agenda quite unrelated to the primary goal; *that the program served the ideological purpose of cultivating certain habits.* Can it be denied that less glorious-sounding attitudes than the ones admitted by Ramo: greed, status-seeking, ego-enhancement, con-tentiousness are also on the agenda? The general truth cannot be escaped: technology serves an instrumental function.

Individual Autonomy

Not only is technology passive and neutral, according to the happy technologists, but also whatever evil consequences are associated with the deployment of technology result from autonomous individuals exercising their free choice.

Contemporary technology limits individual autonomy and imposes a style of living over which individuals have little choice.

Not only that, but people perversely choose to use technology even though this fact leads to environmental degradation, depletion of resources, and other unpleasant things they themselves experience. Furthermore, technology itself is liberating and enhances individual freedom. Here' is a sampling of their assertions:

John Gardner: "Everyone lampoons modem technology but no one is prepared to give up his refrigerator" [19].

Samuel Florman: "However much we deplore our automobile culture, clearly it has been created by people making choices, not by a runaway technology" [4, p. 60]. Experts underestimate "the inclination of ordinary people to make choices contrary to what appears to be their best interest" [4, p. 24].

Melvin Kranzberg: "Similarly, the American small town of the beginning of this (20th) century on which many of our contemporaries look back longingly, may not have been as idyllic; how are we to account for the fact that so many Americans fled from the small towns? ... That kind of spatial freedom vanished from the onrush of urbanism; but people apparently want to live together in large agglomerations...." [6, p. 700].

Alvin Weinberg: "A social problem exists because many people behave, individually, in a socially unacceptable way" ... "Too many people drive cars in Los Angeles with its curious meteorology, and so Los Angeles suffocates from smog." ... "What right does the water resources expert have to insist that people use water less wastefully? Green lawns, clean cars and swimming pools are part of the good life, American style ... and what right do we have to deny this luxury?" ([15], reprinted in [20, pp. 22-30].

Emmanuel Mesthene: "The freedom of individual decision-making is a value we have cherished that is built into the institutional fabric of our society. The negative effects of technology ... are traceable less to some mystical autonomy presumed to lie in technology and much more to the autonomy that our political and economic institutions grant to individual decision-making" [16, p. 40].

Simon Ramo: "National control is really the only answer, and that can come only if a majority of Americans are willing to accept interference in their freedom to choose automobiles" [1, p. 117].

Daniel P. Moynihan: "Freedom is choice and technology greatly enhances choice. (Therefore), technology has vastly enhanced human freedom" [21].

These assertions constitute a second litany. To be generous, one could ascribe the origins of this litany not to a deliberate agenda, ideologically promoted, but to a

fundamental confusion about what technology is. As noted earlier, the *systems* within which *the* separate components of technology are incorporated are its essential features. Failure to understand this implies a profound misunderstanding of the nature of contemporary technology.

The concept of technology as liberator grew from the same origins as the 19th century social philosophy of *progress.* Industrialization was seen as releasing humanity from bondage to economic necessity. In this, industrial technology has been successful; at least the order of magnitude of the problem of want has been reduced. (The price that has been paid for this is another issue.) But the contemporary technology-enhances-freedom claims have generalized the concept far beyond its limits of potential validity. The claim now is framed in terms of freedom and autonomous choice; this is the concept at issue. Similarly, the concept of technology as neutral tool had its origin in the view of technology as hardware. Clearly, a hammer can be used to pound the head of a nail or the head of a person - with differentiable moral consequences. But we must assume that the conception of technology held by the sophisticated and learned people represented by Ramo, Drucker, and Moynihan has evolved far beyond the simplistic view of technology as mere hardware. It is the claim of neutrality of *contemporary* technology, in all its complexity, that is being addressed.

The two major propositions -that technology is passive and neutral, on the one hand, and that it enhances human freedom and autonomy, on the other - are incompatible and mutually exclusive. If technology is value-neutral, how can it be biased toward freedom? And if it plays a non-passive role with respect to this one moral issue, then is it possible to claim that technology is passive and neutral toward other ends? Notwithstanding this fundamental contradiction, the same individuals who make the one claim, more often than not, also make the second one. It might be argued, though, that this logical fallacy does not rule out the possibility that, even if both claims cannot be simultaneously true, one or the other might be true. I have already argued that the technology-is-passive-and-neutral proposition is not true. I will attempt to do the same for the technology-enhances-freedom-and-choice claim.

Autonomous Individual Choice?

If individuals exercise free, autonomous choice in the development, deployment, and "use" of technology, in what arenas is this choice exercised? Three possible arenas might be conceived as the locus of choice: the individual as consumer, as producer, and as citizen.

The term "lifestyle" designates the manner in which individuals in a society go about their daily activities. In American society, the general perception exists that lifestyle is a matter for individual choice, at least for a vast majority. Disregarding economic means for a moment, it is thought that one can choose to lead a bohemian lifestyle or a straight one, to wear flashy clothing or sober ones, etc. But is one free to choose to have a refrigerator or not? Is it a simple matter of lifestyle choice? Is it the kind of choice referred to by Justice Oliver Wendell Holmes when he said:

"In its evenhanded majesty, the law forbids rich and poor alike to sleep under a bridge."?

The purpose of a refrigerator is to store perishable food for a period of up to a week or more. Consider a society in which it is possible to purchase perishable foods on a daily basis in markets, small shops and bakeries, easily accessible and within walking distance of their homes, even in the largest cities. *This option is not available to almost all Americans.*

The supermarket as a social institution, not within walking distance of most people, has its own imperatives. One buys for a week of eating, not for a day, so storage in a refrigerator becomes essential to living. It is a necessity induced by an institutionalized life-style over which individuals have little control. To chide individuals for recalcitrance or perversity for unwilling-ness to "give up" a refrigerator is to profoundly misjudge the nature of contemporary technology and its induced social change.

No value judgment about the merits of different lifestyles is implied in the preceding scenario. It is irrelevant to the argument whether or not a supermarket/refrigerator society has advantages. The only question is: do individuals have the autonomy to freely choose?

Automobile Culture

An even stronger case can be made about the automobile. "The love affair of Americans with their cars" is an image commonly used to explain our automobile culture. The question, again, is one of choice. During the period of gasoline shortages in the early 1970s it was customary for American leaders to exhort people to conserve gasoline by driving less, though such exhortations have been missing in the high-priced gasoline era of 2004-2005. The implication is clear: driving by Americans is mainly discretionary and it is only the perverse exercise of individual free choice that causes our ills. The arguers for the existence of free choice gaze out at existing society, with the existing social structure and state of technology. Within this framework, they claim, individuals can choose. They can choose to buy this model car or that, this or that color, with this or that upholstery material, this option or that. The one fact that belies this apparent freedom is that the majority of individuals cannot choose *not to* buy a car - if they

also want to participate in the normal life of the society: going to work, buying food or clothing, attending a concert or a ball game, etc. The design of cities, the location of services, places of employment, shopping centers ... are all predicated on the motorcar as the dominant mode of transportation. They could not choose to buy a car with high fuel efficiency because such cars were discouraged after 1981 by the removal of prior increased fuel-efficiency standards. Discussion of such standards appeared again in 2005-2006, following increased gasoline prices.

Many communities in the U.S. had electric railway systems that served admirably in the first third of the 20th century. It was not the autonomous choice of individuals that killed these existing urban and interurban mass public transportation systems and prevented their improvement and expansion. In many cases, they were purchased by automotive corporations (the major culprit being General Motors abetted by Gulf Oil) and converted to buses, and then allowed to die in order to promote the use of the private automobile [22].

A case in point is Los Angeles [22]. The city had an extensive electric streetcar and interurban rail system in the early part of the twentieth century. During the 1920s the Pacific Electric Railway operated 1200 miles of interurban rail service. When the population of the area was only 1 million in 1924, the system carried a volume of 109 million passengers. (By comparison, 45 years later when the population was 8-9 times greater, public transit using buses carried not 8-9 times but only 3/4 times more passengers annually.) The reason we have smog in Los Angeles, says Alvin Weinberg, is because too many people drive cars! A much more accurate reason is that General Motors bought the Pacific Electric Railway system and destroyed it [22]. Not individual autonomy, but the power of large corporations, is the major cause, not only for smog but for the fact that something like *half the land area of Los Angeles* - including freeways, streets, driveways, parking lots, gas stations, automobile show rooms, etc. - is dedicated to the automobile!

It should be observed, parenthetically, that the same results to be achieved by driving fewer miles can also be achieved by driving fewer gas-guzzlers. But U.S. auto producers have long resisted designing and producing automobiles having better fuel efficiency. The conventional argument that manufacturers "give the public what they want" doesn't wash. From 1976 on, for example, even after Chrysler management was informed by its own market analysts that there was increasing public resistance to large cars, Chrysler made no plans for introducing more fuel-efficient models because its profits on large cars were admittedly greater. Then, in 1979, when it had to seek federal assistance to avert bankruptcy, Chrysler had to entice people to buy its backlog of fuel-inefficient cars by offering large price reductions, but it had few fuel-efficient cars to sell in order to obviate the need for public welfare.

People were not asked to debate the merits of different transportation systems and then choose what they favored. Specific corporate interests, in order to promote their own welfare, brought about the current state of the U.S. transportation system. It is not descriptive of reality to say now that people have free choice in their mode of transportation. To set up the social system so that individuals are compelled to buy a car just to be participating members of society, and then to sneer at them because they are unwilling to give them up, is to add insult to injury. It is like blaming the victim for the crime. For most contemporary people in the U.S., driving a car is mandatory, not discretionary.

Effects of External Costs

Even within the context of the regulation of technological developments by the market, is it possible accurately to describe the current status of specific technologies (e.g., the transportation system) as the collective consequence of untrammeled individual choice guiding the invisible hand? Market prices can be kept artificially low by transferring some of the costs associated with production or use from the manufacturer and/or user to third parties - that is, to the rest of us.

This can be - and has been -done in at least three ways:

a) Direct subsidies from the government,

b) Failure to account for "external costs" in the setting of prices,

c) By accounting procedures that treat nonrenewable resources as flow rather than capital.

All of these processes have operated widely to distort price structures but space prevents further exploration. Purchasing decisions are obviously influenced by prices that are artificially depressed in such ways. If this permits the occurrence of a large-scale technological development, which then induces major changes in the way people live, would it be meaningful to assert that the detailed forms of the resulting society are consequences of individual "free choice"?

It might be argued that, in a democracy, citizens are the ultimate determiners of government actions. So, if government subsidies result in the development of certain technologies, it must be the result of individuals exercising choice among candidates. James Carroll [23, p. 647] gives a cogent and compelling analysis arguing that there are no appropriate political processes for identifying and debating the value choices implicit in what appear to be technical alternatives; that technological decisions occur in administrative

organizations (either government agencies or corporations) to which citizens have no access. There is no public debate and issues are posed and resolved in technical terms. Individuals have no autonomous choice in the matter.

For purposes of argument, suppose that in some historical period, the development of some specific technology *had been* a political issue, had been fully debated in political forums, and had subsequently become the subject of a referendum or legislation; would that settle the issue? Not for later generations, it wouldn't. The resulting configuration of technology would become a given for subsequent generations and, to the extent that other options have been foreclosed by the adoption of the technology in question, individuals in those generations would have no choice. And we, now, are the "later generation" of earlier times. One might respond in rejoinder that that's life; people in one era must accept what those in another era left behind - not only in technology, but also in laws, mores, etc. Fair enough; but the rebuttal can be countered by at least two arguments:

a) Precisely! The rejoinder grants the contention that individuals have no choice; and
b) Laws handed down can be repealed and mores can be violated by future generations, but the dependence on technology cannot be easily transcended.

Is Kranzberg serious when he offers pure individual choice as the explanation for the specific way that Americans are distributed around the country? Did people leave the dust bowl in the 1930s because of free choice? Were individuals consulted on farm mechanization that drove farm workers away from rural areas? The locations of industries will greatly influence where people live; are individuals consulted as to where specific industries should be located? Didn't the interests of huckstering land developers have anything to do with luring people to southern California? Was it individual choice or the manipulation of specific corporate interests that led to the specific layout of Los Angeles where it is *mandatory* to drive long distances just to carry on daily activities?

The answers to all these questions are obvious. The design of cities, the location of services, places of employment, shopping centers, etc, are all based on the private car as the dominant mode of transportation. Individuals in most places have little choice. They cannot decide to buy either at the supermarket or at the comer grocery - they must buy at the supermarket. They cannot choose either to take mass transportation or to drive a car - in most places they are compelled to drive a car, since there is no mass transit. They cannot choose to buy unpackaged, unwrapped, unboxed products because such products don't exist in most places. Until very recently in most communities, they could not choose to recycle much of the "waste" materials (paper, glass, plastics, metals) that they are compelled to bring into their homes.

Employees as Autonomous Choosers of Technology

What about individual choice in the context of employment? In contemporary technological society, vast numbers of human beings are employed as personnel and embedded in an organized employment structure in which they perform specific well-defined functions. For its proper functioning, the technological order requires that the totality of these functions be carefully articulated. In this context, how can we reconcile the concept of technology as a neutral tool for autonomous individuals to use as they choose? It is ludicrous to imagine employees - from the user of the most sophisticated equipment on the assembly line, to the airline pilot, to the supermarket checkout person, to the hamburger slinger at the fast-food outlet - to be autonomous wielders of neutral tools to achieve their individually chosen goals. As Langdon Winner points out, since the "job" of employees is usually their sole livelihood, there is strong pressure for strict discipline and obedience. "One appears at a pre-established time, for precisely-determined work, for an exactly-designated reward" [25, p. 201]. As employees, individuals have no discretion, no autonomy, in how they utilize the technology they command in performing their function. Seen in this light it is nonsensical to argue that people - as personnel - "use" and "control" technology and that, if any undesirable consequences result, "it is not the tool but the human maker or user" which is to blame, a la Peter Drucker.

Harmonious Technology

That's my case. I have presented a critique of what appears to me to be ideologically based views about technology. Now: a summary and final thought.

- Technology is not a neutral, passive tool devoid of values; it takes the shape of and, in turn, helps to shape, the embedding social system.
- The ideologically promoted, neutral-tool, use-abuse model of technology conceals issues of economic and political power relationships among different groups in society. In this way, it serves the instrumental function of legitimating the dominant ideology.
- Far from increasing freedom, contemporary technology limits individual autonomy and imposes a style of living concerning which individuals have little choice.

- The needs to which technology is said to respond are social-system-induced. In a social order with different values and goals, the needs would be different and so the nature of technology would be correspondingly different. High fuel-efficiency, resource conservation, and electrically efficient appliances are antithetical to the values of the present social system: *growth, consumption, profit.* Hence, they are ignored.
- The crisis of contemporary society cannot be resolved if the present form of technology remains dominant; it must be replaced by a technology of a different nature. But since technology is intimately tied to matters of political power and social control, changing the technology implies a profound change in the social order.

Ivan Dlich contends that the crisis is not *within* technological society that can be overcome by patching up the system, but a crisis of the technological system *itself.* The major question is not who is to control the means of production, but what the means of production shall be and what shall be produced. It is not where to locate the nuclear power plants, but *whether* to have nuclear power at all. It is not merely a question of possibly limiting growth but of radically altering the very nature of technology [17].

Contemporary technology is based on a narrowly conceived economic efficiency, on social control, and on profit. I would like to characterize the alternate technology needed as *harmonious.* It would be based on different criteria:

Harmonious technology would respect ecological values and be in symbiosis with nature. This does not mean there would be no human intervention in nature, just that such intervention would not be destructive and exploitative, but in harmony with ecological values; consequently, *harmonious technology* would rely mainly on renewable energy and would be minimally consumptive of nonrenewable resources.

- Harmonious technology would be responsive to direct social needs and would not require a hierarchical, exploitative, and alienating relationship among human beings. It would not oppress people nor treat them as mere appendages to machines, but would be emotionally and intellectually satisfying to work with.
- Harmonious technology would value:
  - Durability and quality of products,
  - Decentralization of production,
  - Agricultural diversity over monoculture,
  - Pluralism in lifestyle and culture.[2]

What is needed to bring about the transformation is a new consciousness that sees the interrelationships among the physical, biological, and social spheres; collectively they constitute a system of which humanity is a part. What is needed also is a new style of living that is in harmony with the natural world - A harmonious technology in a harmonious society. An appropriate motto might be:

Science Discovers - Humanity Decides - Technology Conforms

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References

[I] S. Ramo, *Century of Mismatch.* McKay,
1970.

[2] H. Brooks, "The technology of zero growth," *Daedalus,* Fall 1973.
[3] J.M. Keynes, *Essays in Persuasion.* London, U.K.: Rupert Hart-Davis 1952. [4] S.C. Florman, *The Existential Pleasures of Engineering,* 2nd ed. New York, NY: St. Martin's, 1994.

[5] R.M Glorioso and F.S. Hill, Jr., *Introduction to Engineering.* Englewood Cliffs, NJ:
Prentice Hall, 1975.
[6] M. Kranzberg and C. Pursell, *Technology in*
Western Civilization, vol. II. New York, NY:
Oxford Univ. Press, 1967.
[7] B.O. Watkins and R. Meador, *Technology*
and Human Values. Ann Arbor, MI: Ann Arbor
Science, 1978.
[8] S. Ramo, *Cure for Chaos.* New York, NY:
D. McKay, 1969.
[9] J.K. Galbraith, *Economics and the Public*
Purpose. Boston, MA: Houghton Mifflin,
1976.
[10] D. Dickson, *The Politics of Alternative Technology,* Glasgow, U.K.: Universe, 1974.

[II] A. Ure, *The Philosophy of Manufactures,* London,1935.

[12] R.C. Edwards, *Contested Terrain: The Transformation of the Workplace in the 20th Century.* New York, NY: Basic, 1979. [13] H. Marcuse, *One Dimensional Man.* Boston, MA: Beacon, 1964. [14] *The Great Consumer Rip-Off,* HBO Network, TV program, Feb. 28, 1979. [15] A. Weinberg, "Can technology replace social engineering?" *University of Chicago Mag.,* vol. 59, Oct. 1966.

[16] E.G. Mesthene, *Technological Change: Its Impact on Man and Society.* Cambridge, MA:

Harvard Univ. Press, 1970. [17] I. Illich, *Tools for Conviviality.* New York:
Harper and Row, 1973.

[18] P.F. Drucker, "Technological trends in the Twentieth Century," in *Technology in Western Civilization,* vol. II., M. Kranzberg and C. Pursell, Eds. New York, NY: Oxford
Univ. Press, 1967, pp. 32-33.

[19] J. Gardner, "Godkin Lecture at Harvard University," *New York Times,* p. 9E, Mar. 30, 1969. [20] A.H. Teich, *Technology and Man's Future.* New York, NY: St. Martin's, 1977. [21] D. P. Moynihan, Honors Convocation Lecture, Syracuse University, Syracuse University Record, Feb. 1, 1979,p.3. [22] B.C. Snell, *American Ground Transport,* Part 4A of hearings in S1167, The Industrial Reorganization Act before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, U.S. Senate, 93rd Congress, 2nd Session. Washington, DC, 1974. [23] J.D. Carroll, "Participatory technology," *Science,* vol. 171, pp. 647-653, Feb. 19, 1971. [24] E.J. Mishan, "The wages of growth," *Daedalus,* Fall 1973.

[25] L. Winner, *Autonomous Technology.* Cambridge, MA: M.I.T. Press, 1977. [26] L. Winner, *The Whale and the Reactor.* Chicago, IL: Univ. of Chicago Press, 1986. [27] N. Balabanian, "On the presumed neutrality of technology," Society, vol. 17, no. 3, Mar./Apr. 1980.