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Man and His Technology

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Alexis Carrel, a Nobel laureate of 1912, published a book in 1935 that he titled *Man the Unknown*.[3] This might have been an appropriate theme for this paper. As Carrel pointed out 40 years ago, although there is much that is known about man, there is need of a much more profound knowledge of ourselves. And not only a knowledge of man as an isolated fragment in the cosmos, but, perhaps even more importantly, a knowledge of man as an integral part of the universe, adapting, adjusting, controlling, struggling, failing, surviving.

The purpose of this paper is to consider the fix we find ourselves in today as we try to cope daily with the complications of modern technology and with the uncertainties of a future wherein that technology appears destined to become even more pervasive.

There are two prefatory qualifications or conditions I would like to identify. I do not propose to attempt to define a sharp dichotomy of science and technology. On the continuum scale of their characteristics, I think I will be discussing technology, but to you it may be science. Nor do I propose to emphasize the conditions in Iowa as they relate to these issues. True, the impact of technology upon daily life in rural Iowa is different from that in midtown Manhattan, but, in most instances, it's more a difference of degree than one of kind, albeit that I recognize some fallacies in this, too. Values related to land use, energy use and supply, use of nuclear power plants, abortion, population control, environmental quality, trade-offs between economics and aesthetics, individual freedoms, among others, are as familiar to Iowans as to any, at least in the United States.

Carrel in that 40-year-old book was optimistic about the future of man. He concluded it thusly:

> We must liberate ourselves from blind technology and grasp the complexity and the wealth of our own nature. The sciences of life have shown to humanity its goal and placed at its disposal the means of reaching it. But we are still immersed in the world created by the sciences of inert matter without any respect and from the ignorance of our true self. To such a world we cannot become adapted. We will, then, revolt against it. We will transform its values and organize it with reference to our true needs. Today, the science of man gives us the power to develop all the potentialities of our body. We know the secret mechanisms of our physiological and mental activities and the causes of our weakness. We know we have transgressed natural laws. We know why we are punished, why we are lost in darkness. Nevertheless, we faintly perceive through the mists of dawn a path which may lead to our salvation.
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> For the first time in the history of humanity, a crumbling civilization is capable of discerning the causes of its decay. For the first time, it has at its disposal the gigantic strength of science. Will we utilize this knowledge and this power? It is our only hope of escaping the fate common to all great civilizations of the past. Our destiny is in our hands. On the new road, we must now go forward.[4]

Four decades later, many vigorous voices that come to my attention are not as optimistic about the efficacy of the strength of science. In fact, many, such as Jacques Ellul, are crying that technology growing from that science will destroy us. Robert Heilbroner echoes such pessimism as he questions, "Is there hope for man?" To these may be added a roster of other distinguished prophets. Include among them, with variant mixes of pessimism and optimism, such diverse scholars as Lewis Mumford, Harrison Brown, Herbert Marcuse, and Leo Marx.

René Dubos, the noted microbiologist of Rockefeller University, in his *So Human an Animal* expresses what I believe to be the attitude of many of us. He states he "experience[s] a love-hate relationship with technological civilization."[5]

Loren Eiseley in his incomparable style portrays one aspect of the love-hate dilemma of Dubos as an introduction to his essay, "The Unexpected Universe."[6] His train stalls one night in a marsh just at the edge of a large city. He gets out to explore and finds himself in the perpetual nightmarish burning of the city dump. Indistinctly, through the murk of smoke and flame, he discerns the grime-covered attendants persistently feeding the flames of almost innumerable fires from mountains of rubbish. And what are some of the components of these mountains? Paper by the tons—but in that tonnage, how many love letters, how many valentines, how many messages of tender human emotions? And there are the remains, with its shattered cabinet and its awkwardly twisted wires and battered electrical components, of a once-proud console radio. An instrument that once brought music and poetry and humor and information into homes and into human consciousness. The great bulk of these mountains are the end products of a technological culture. As one of the feeders of the flames remarks, "We get it all. Just give it time to travel, we get it all."

Yes, we have a love-hate relationship with the technology of our time. There are plenty of sources for love, particularly in the western world. Some of these are increased life ex-

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[3] Alexis Carrel, *Man the Unknown* (New York: Harper and Brothers, 1935).

[4] *Ibid.*, pp. 321-322.

[5] René Dubos, *So Human an Animal* (New York: Scribner, 1968), p. 194.

[6] Loren C. Eiseley, *The Unexpected Universe* (New York: Harcourt, Brace and World, 1969), pp. 26-28.

pectancy; cultural advantages of travel and electronic communication; unbelievable standards of living in most of the western world; regular provision of a great diversity of foods; life to be lived as long as it's lived practically free from pain and discomfort. The underdeveloped states of the world look with great jealousy toward most of these.

But there are also sources for hate. There are both real and metaphorical dumps of refuse from our technology. There is noise, ugliness, dirt, and absurdity. We talk of tradeoffs. How much refuse are we willing to tolerate in order to have access to what we consider to be benefits of technology?

And when we look to the future, our reactions tend to become even more schizophrenic, because here is great uncertainty. For one thing, since there are great inequities in the sharing of the benefits of our technological culture, particularly at the world level, but to a significant degree at the national level, is it possible for science and technology to provide the techniques and the motivation for equalization? But even before we get that answered, we ask, "Should there be equity?"

The technology for human organ transplants improves almost daily. Social regulations of donorship and of donor-recipient relationships still flounder. Although there are many concerns about the state of engineering for energy production from nuclear and solar sources, the issues involved in social control have hardly been touched. The techniques of processing information have exploded in their improved efficiencies within the past decade, but this stands to many as a threat to the humanity of man instead of as a source of his glorification. Improved techniques of population control are characterized as challenging moral and religious codes instead of being applied in attacking a serious human problem. The improvement of military gadgetry using nuclear energy and its widespread dispersal among the nations of the world causes the future itself to be questioned as a realistic prospect for humankind.

Thus we live with a technology that we simultaneously love, hate and fear. This is far from a healthy condition. Man as a biological entity has adapted for survival in a natural environment. Man as a cultural entity has adapted to a variety of social forces to produce a variety of fairly effective lifestyles. In both sets of adaptation, change was inevitable. The status quo could not be maintained. Life in any of its manifestations is never static; it is dynamic. It is my suggestion that man's technology, likewise, will force him into a pattern of flexibility and change if he is to retain his humanness and his species regality. I believe this is more likely than that man will force technology to regress or even remain static.

Of course, humankind has always had a technology. The caveman had his. There are interesting speculations as to the origin of tool-using among our ancestors. But it grew gradually and was a part of our natural evolution. There was a lot of empiricism involved and a considerable amount of haphazardness in the way in which conditions with which we lived developed. Natural evolution in a biologic sense may not be greatly different in this respect. The serendipitous contribution of the moment may become incorporated into the culture of a people without forewarning and without concern for the effects in the future. Was it "wrong" to use gunpowder when it was first used? Was it "wrong" to use DDT when it was first used? If you can build a better mousetrap, should you build it? You will remember that J. Robert Oppenheimer, after being somewhat negative about the H-bomb project, stated after he studied the Teller breakthrough in the use of lithium deuteride that this invention was "sweet and lovely and beautiful," and should be incorporated in a real bomb and tested as soon as possible.

Can we continue with such haphazardness? Science and technology of the nineteenth century have robbed us of time. Gerard Piel, publisher of the *Scientific American,* has written of the acceleration of history. Think of the changes which have taken place in a single generation in the speeds of communication, travel and data handling. Adaptation and adjustment to the acceleration of modern-day technology strain the existent biological mechanism. Social and cultural characteristics may be less firmly fixed, but the strain is still evident, particularly on the values with which the social structure operates. Crises result, and they keep coming faster and faster. Eventually they begin piling up on one another. Errors in technology have not been eliminated. It is not inconceivable that multiple crises born of errors in various parts of the complex system of worldwide technological interrelationships could trigger a planetary self-generating catastrophe before man with his human limitations could bring corrective measures into effect. Man fashioned in terms of thousands of thousands of years through biological adaptation and in terms of hundreds of hundreds of years through social and cultural adaptation lives in a world operating with events of microseconds in duration.

The impact of science and technology upon our values and value systems is great. It may be that some of the impact is more imagined than real, but in a human setting, what does it matter? There are many illustrations that can be given. Our love affair with the automobile permeates and dominates our total existence—personal, economic and social. Values are influenced. Life in the American home has certainly been modified radically since the television set invaded it and changed our associations with books, newspapers, radios and friends. Its presence demands such undivided attention. Technology seems to flower on a progressive populistic hedonism. The automobile and the television seem to have exploited this influential human trait.

In a broader sense, there are many who are concerned about the undermining of traditional humanist values. Individual freedoms are reduced. Life-styles are imposed through exploitation of our innate hedonism. Fewer of us make real decisions. Work becomes less fulfilling. Social relations are reduced. We creep gradually but inexorably toward a "Brave New World."

Victor Ferkiss, Professor of Political Science at Georgetown University, is one of many who has reacted to this impact of technology upon value systems. His proposal as outlined in *Technological Man*[7] and *The Future of Technological Civilization*[8] is an attempt to construct a new order. Technological advances cannot be undone. Their impact upon values cannot be ignored. The question, therefore, is can values be modified?

He believes much of our present plight is rooted in classic liberalism—the liberalism of John Locke and the American

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7 Victor C. Ferkiss, *Technological Man: The Myth and the Reality* (New York: Braziller, 1969).

8 Victor C. Ferkiss, *The Future of Technological Civilization* (New York: Braziller, 1974).

Constitution. The characteristics he believes to be exaggerated and advanced with the impact of technology are the dogma of growth and increase, the elevation of individualism and an aggrandizing style of life, and the rapacious vandalism of the earth and its resources. Since he sees no relief in socialism or conservatism, he argues for a new political philosophy, "ecological humanism."

This philosophy has three principles. First is naturalism. Men are not so much in an adversary position against nature, as they are a working part of it. Second is holism. In the system of mind-body-machinery-society-nature, everything connects and interacts. Third is immanentism. The shape given the total system derives from what happens within the totality and not from the action of some tinkering agency—Fate, Fortune, God—up or out there.

In order for this philosophy to become a possibility, Ferkiss suggests technological man, now a myth, must be created. In idealistic terms, he describes technological man as man in control of his own development within the context of a meaningful philosophy of the role of technology in human evolution. This new man will be at home with science and technology and will be possessed of a world view of them. Even the outlines of the blueprint for the new man are indistinct, but when one comes to the steps to take in fleshing them out, Ferkiss leaves us essentially adrift. Nevertheless, I believe the principles of ecological humanism and the basic characteristics necessary for man to live with it are worthy of more than casual attention.

Another response to the impact upon values is to suggest the need for controls. Garret Hardin, in discussing problems associated with population growth in his 1968 article entitled "Tragedy of the Commons,"[9] argued for population control through mutually-agreed-upon mutual coercion. If we are to preserve any freedom at all, some methods must be developed to exercise controls in certain selected areas of human activity. Hardin's mutual coercion may not be responsive enough. It may be too slow in responding to technological and economic innovation. Many will interpret any form of control as completely antithetical to most, if not all, individual freedoms. We have lived long with certain coercive controls. For example, we pay taxes levied by our own representatives. We are not required to enjoy these controls. We don't even need to pretend we do. We submit, in the majority, because the alternative lessens our humanness and our individual dignity and freedoms. But there are dangers inherent in such controls. Political systems may avoid mutual agreements in arriving at coercive demands. Elitism may replace the wisdom of the majority. Controls must be administered. Administration usually involves bureaucratic organization, and bureaucracies often become self-serving. Streamlined and efficient administration can be designed and operated, and this must become the expected rather than the exception.

R. W. Sperry,[10] a neurobiologist at the California Institute of Technology, argues for the development of a science of values, as he sees the impact of rapid technological change upon western values. He points out that social values built around inherent traits in human nature are written into the species by evolution. Change in the stone age may have been so slow that adjustments could be effected as changes occurred. Not now! Social consequences of changes today must be subject to regulation and control through higher cognitive value systems. As he says, "No final absolute final proof can be advanced to support the values of one person or one culture over those of another." These values rest on basic axioms that are accepted without proof, such as axioms of mathematics, geometry, and physics. Since these basic axioms are crucial, the ultimate axioms of values and value systems must be subjected to scientific inquiry and public examination and checked within the real world of human experiences. Science becomes a source and an arbiter of values and belief systems, and a science of values can arise to provide a positive response to the impact of technology upon them.

Among the range of reactions possible, I must at least refer to the mystical belief of Teilhard de Chardin.[11] In this context, he expresses a faith in the inevitable progress of cultural evolution of man which embraces technological impact. Such a faith emanates from a firm belief in the metaphysical union of matter and spirit. Although different in manifestations of human behavior, such a response is somewhat related to those in which the mystical and spiritual elements of human experience are exaggerated and the physical and material elements are diminished. The increase in such exaggerations is one index of the degree of impact of technological change upon traditional values.

Thus four types of possible responses to the impact of technology upon our value systems have been examined briefly. One is the development of a new political philosophy. Another is the exercise of effective and efficient controls. A third is the utilization of the benefits of a science of values. And the last is the dependence upon the inherent progress of cultural evolution in man arising from the metaphysical union of matter and spirit.

My own personal response, as of this time, is one of preparing to live rather consistently with crises. It is my conviction that the mood of our time is toward a growing pessimism, and much of this is associated with the concomitants of a galloping technology. Yet we are not willing at this point to give up our human condition to the natural evolution that would result from basic environmental mechanisms. We will still try to condition that destiny.

But, as the cliché would have it, we will live with crises. It may be argued that man has always done so. However, in the past, as we lived with war, famine, disease, and other destructive forces, we struggled with the faith that we would overcome and that our children's children would be spared our crises. Today we live, and will continue to live, with crises that we suspect we may not overcome, and we know with surety that the lot of our children's children will be reduced. Such a mental state must be taken into account as we look toward the future. How do we prepare a people for famine? How do we educate a people to donate individual freedoms for the sake of survival? How do we maintain the dignity of the individual as those freedoms are donated or conscripted? Will it be necessary to reappraise our values related to the sacredness of human life as we consider possible advantages of infanticide, euthanasia, gerontocide, and cannibalism? Living with crises may mean living intimately with

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9 Garret Hardin, "The Tragedy of the Commons," *Science*, 162: 1243-1248, December 13, 1968.

10 R. W. Sperry, "Science and the Problem of Values," *Zygon*, 9:7-21, March, 1974.

11 Norman Denny (trans.), *The Future of Man*, by Pierre Teilhard de Chardin (New York: Harper and Row, 1964).

such questions, and what does this do to the psychology, the sociology, and the spirit of man?

John Platt, a research biophysicist and associate director of the Mental Health Research Institute at the University of Michigan, approached this situation a number of years ago with a positive suggestion in spite of his recognition of the tremendous potentialities of this crisis of crises. I think it is still worthy of some attention. He described it in a most provocative article in *Science*, November 28, 1969, "What We Must Do."[12]

Basically, what Platt proposed is that we must search for and test social inventions in the same way in which we have searched for and tested technological inventions. Furthermore, we must be willing to accept these inventions as we have been willing to accept the results of science and technology. This will require the formation of interdisciplinary teams of scientists, philosophers, and scholars of a wide variety of types. There must be developed techniques for efficient team operation. New social structures and social ideas must be invented, studied, criticized, and rejected or advanced. More effective procedures for sharing the results of such study must be developed.

In his article Platt proposed a number of areas where interdisciplinary task forces might start. These included peacekeeping mechanisms and feedback stabilization, biotechnology, game theory, psychological and social theories, and social indicators.

I believe education could make many contributions to such a series of task forces. Higher education should be particularly influential. Elementary and secondary pupils, and especially college and university students of today, must be prepared for experiences as team members at all different levels of dealing with Platt's social inventions. This preparation is not only for the young. The age span of the university student must be and will be extended. Operative teams might very well be formed to work with mini-tasks or subtasks. We must respect the importance of keeping education accelerating with history, and we must follow that respect with action. College and university students must have experiences that make them willing to accept new and untested ideas. Attitudes must be flexed in order that the unasked questions of the past may be asked and seriously considered. So much must be done with learning theory, particularly as it relates to opening up attitudinal stances and to processes involved in attitude formation.

I have some reservations about Platt's proposal for the mobilization of scientists to work on social inventions and on their trials. I think we must avoid transplanting in toto the methodology of science to social situations and to social problems. Similarly, the great constructs of the sciences can be stretched to the breaking point when they are applied to too broad a spectrum of conditions. At least, we must be sensitive to such a possibility. For example, the laws of thermodynamics grew out of the study of the relationships of energy and matter in carefully controlled experiments. In a great wave of mechanistic reductionism I wonder if we have not in some instances applied them beyond their limits of credibility. Also, Heisenberg's principle of uncertainty may very well have applications outside of atomic physics, but one must question how far into sociology and economics and other social sciences it has relevance. The misuse of Darwin's natural selection in the guise of social Darwinism also illustrates the basis for my reservations.

Therefore, I feel it becomes important that task force teams, such as Platt recommends, be made up of heterogeneous scholars and that the check and balance system of their operation be vigorous and demanding. Generalizations, very likely, will need to be formed anew for each fundamental set of variables. Results must be quickly and efficiently distributed throughout the human population and must be turned into action.

There will be many dangers. Some of these dangers will be in loss of individual freedoms. There will be dangers in indoctrination. But the greater danger, I believe, is responding too slowly to the otherwise inexorable acceleration of history as man hurtles toward his extinction.

Thus I struggle with the contrasts of love and hate, revolution and stability, optimism and pessimism. And through it all I come out with uncertainty and no well-defined blueprint for action. The conviction I have is that we cannot continue to build our social structure as we have in the past, appropriating the products of our technological ingenuity with only myopic concerns for their impact upon humankind. We do not need less technology. We need better technology, monitored by a system in which broad humanistic values are the basis for the program of monitoring. I place my most respected trust in education. Our present education has worked best in developing specialization. Now we must use it to develop capabilities for using that specialization, working together in teams, remaining flexible in testing and accepting or rejecting the results of such team endeavors.

I yearn for optimism. Victor Ferkiss apparently does also. For in his *Future of Technological Civilization*, after surveying the energy crisis, environmental degradation, Watergate, and other disappointments in our time, he ends with this paragraph:

> Yet the universe still abides, and its life processes still go on. Somewhere in deepest space stars transmute energy in patterns beyond our understanding. The earth's crust remains restless and its movements mock human pretensions to dominance over nature. Somewhere hawks still wheel in the sky, lovers' pulses quicken at the sight of the beloved, men and women still feel awe at the sacred, children still marvel at the sea and the sky. The straggling army of the human cause lifts its ragged banners yet again, regroups its broken legions, and prepares for its final battles to preserve its patrimony and keep the stargate open, serene in the knowledge that whatever the future holds, to be human means to keep faith with the cosmic processes which made man. The partisans of humanity know in their bones that in a world where doom portends, resistance and life are identical, and the odds against the survival of human existence can hardly be greater than those against its creation. They sing to themselves as they go about their tasks—merging their silent song with that of every buried seed struggling toward the sun and of the earth as it spins around its star.[13]

[12] John Platt, "What We Must Do," *Science*, 166:1115-1121, November 28, 1969.

[13] Victor C. Ferkiss, *The Future of Technological Civilization* (New York: Braziller, 1974), pp. 292-293.

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