THE SACRED AND THE LIMITS OF THE TECHNOLOGICAL FIX

by Alan R. Drengson

Abstract. Three points are discussed: first, that limits of technological fixes are revealed by current economic, social, and environmental problems; second, that these problems cannot be solved by a technological fix but require alternative forms of activity and being; third, that realizing these limits makes possible the re-emergence of the sacred. Two attitudes toward technology, nature, and the sacred are described: Technocrats desacralize nature and strive to shape it technologically for human ends alone; pernetarians resacralize nature and develop a perennial philosophy (synthesized from elements of different spiritual disciplines) allied with an enlarged, artful science, so as to design activities compatible with nature.

It is a common, well-founded observation that modern technology, aligned with modern science, has given us a wealth of treasures and powers. It has enabled us to cure many diseases that formerly were the scourge of human life. It has enabled us to communicate with far distant humans. It has cut our travel time. Through it we have increased productivity and have set foot on the moon.

For all of its benefits, modern technology also has many negative aspects. These are often thought to be signs of the limits of current scientific knowledge, and the optimistic outlook is that current problems that result from human attempts to control nature can be solved by further extensions of scientifically applied technologies. It is a thesis of this paper that many of the problems we now face are a direct result of our attempts to control nature for human benefit alone, for example, the problems associated with modern farming methods which use enormous quantities of energy and toxic chemicals. These chemicals, mainly fertilizers, insecticides, and herbicides, contain a number of toxic contaminents that can threaten water supplies. Or consider the

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serious problems of hazardous waste storage connected with the manufacture of modern chemicals. Dioxin, PCBs, and radioactive isotopes are examples of dangerous substances that must be isolated from the water and air, for once in circulation, they invariably are deposited in the tissues of living beings and can eventually threaten health and life.

A solution to these types of problems might involve more foolproof means of storage, and the synthesis of alternative chemicals that break down rapidly into harmless substances. I call this attempt to repair the harm of a technology by modification, a technological fix. If, on the other hand, we question the very purpose and intent behind the technology (e.g., of insecticides) and thereby develop alternative approaches that might require modifying our values and goals, then we recognize the limits of a technological fix. We transcend the limits of a technological bind by entering the realm of philosophy, art, and the sacred, that is, the realms of value.

In this essay I will compare two philosophies of technology, as these relate to nature, the sacred, and the technological fix. For purposes of this discussion I will call the philosophy that considers only the technological fix the *technocratic instrumentalist* view. The contrasting philosophy I will call the *pernetarian* view.[1]

The Technocrat and the Planetary Person

In relation to science and technology the technocratic instrumentalist view values science primarily as an activity which produces knowledge with predictive power and capacity for control. It emphasizes specialism.[2] Its aims are for the most part practical in the sense of giving human beings power over nature. Basic research that has no contemporary practical value can be justified by appealing to possible future practical use. The technocrat does not question the human right to control nature.[3] When nature was desacralized by modern science, especially as allied with analytical empiricism and logical positivism, the value limits to human intrusions on nature were removed. The technocrat looks forward to the day when humans will have complete control over the earth. The ultimate realization of human destiny will involve algeny, that is, the capacity to create and design new forms of life in order to control the natural forces of evolution.[4] The technocrat inherits the optimism of the humanist technologists of the past who saw human destiny to lie in the direction of science and technology. He inherits their dreams of power as masters and controllers of nature.

In contrast to the technocratic instrumentalist, the planetary person's philosophy is pernetarian, that is, concerned with persons in networks of planetary relationships. It values the networks of wholeness and integrity of not only human persons, but of other

person-kinds, other life forms, of ecosystems, and of the whole planet.[5] The planetary person inherits elements from various sacred teachings found in the scriptures of a number of different religions.[6] We will call their core teachings on spiritual transformation the elements of a perennial philosophy.[7] The core of the perennial philosophy has as its primary concern the discovery, respect, and understanding of the *wholeness* of things, and of the symmetries between the micro- and the macrocosm. This process of understanding not only has the features of science in the large sense, but also includes features of art, ethics, and religion as they relate to spiritual development. As Gottfried Leibniz remarked, "art can give us powers which nature has denied us . . . [for] art reunifies and renders useful, powers which nature has scattered and misdirected" (Loemaker 1972, 95). Art, ethics, and religious practice all have the potential to culture us in ways that science alone cannot do. Spiritual, artistic, and ethical discipline together with scientific knowledge can perfect human persons, so that they understand their own limits.

For the planetary person wholeness of being is what enables us to understand how to live carefully and wisely on the earth. Thus the science and the philosophy of the planetary person is aimed at understanding whole natural processes, in order to design human activities that harmonize with but do not control these natural forces. The planetary person believes that the multitudes of beings, with whom we share this planet, each has its own destiny and its own ways. These are to be respected.[8] Attempting to use these beings only as instruments for our own benefit is wrong. The aim of science should be to facilitate our understanding of nonbiased roles and interrelationships between beings, so that we can design appropriate technologies which fill human needs, and at the same time help us to better appreciate the intrinsic values of these beings. The planetary person aims at a unity of understanding and as a result views science as an activity contributing to this comprehensive vision. Only technologies based on such a deep ecological insight can be ecosophic, that is, ecologically wise.[9]

Being a planetary person involves primarily two things: first, a commitment to respect other beings, while striving to understand their intrinsic values; second, engaging in actions which build wholeness of community between self and others. The word *planetary* stresses these two things as working together. With respect to nature, then, the planetary person's goal is neither complete control nor knowledge only of parts and functions, but an enlarged understanding that unifies this knowledge with practical arts. The paradigm of an enlarged science includes not only a division of labor (specialism), but also an ecological synthesis of knowing which includes the experiencing self as a co-

creating participant in reality. The experimental and analytic approach is valued for its development of detailed, factual knowledge, but science must be more than this as an organized body of understanding nature in terms of interrelationships, integrity, and wholeness. For complete life wisdom this requires a synthesis of all modes of knowing. It involves a shift to perceiving the interrelatedness of world processes.[10]

The perennial philosophy emphasizes knowing human limits. It would have each of us realize our own fundamental ignorance, and the mystery of things—the unknowable. For the technocrat there is only the known and the unknown. The technocrat thinks that science and technology give us the power to know anything, for nothing is intrinsically beyond our comprehension.[11] Mystery is not part of the very nature of existence. For the technocrat nothing lies hidden, because all knowledge is ultimately reducible to quantified, sensory observations.

For the planetary person the unknowable is partially represented by chaos, freedom, random events, but ultimately by Being itself, which is intrinsically mysterious.[12] Existence itself, Being in the traditional metaphysical sense, has mystery at its center. It provokes wonder. The planetary person engages in Socratic philosophizing which leads to self-knowledge by forcing us to recognize our own ignorance and need for humility (Drengson 1981, Zimmerman 1980). The technocrat excludes recognition of mystery by refusing to accept values, aesthetic understanding, reflections on Being, and spiritual transformation as meaningful. The world is reducible to its components, and it is nothing other than these. The realm of the spirit is excluded, which lends support to the assumption of the right to human power over nature.

The technocrat's instrumentalist approach treats philosophy as an activity of techniques and methods for solving narrowly defined sorts of problems.[13] Positivist philosophy states what such an instrumentalist approach involves in terms of metaphysics and epistemology. For the instrumentalist, value becomes a hidden problem. Since value is excluded from the world of facts, it can only be a subjective feeling such as pleasure. In the perennial philosophy, embraced by the planetary person, value is a fact about the world; and the end of human life is not to be found in pursuit of narrowly defined desires, but in mastering and transcending desires in pursuit of realizing the basic order, harmony, and values that pervade all of existence. For the technocrat the world has no value in itself. It only has an external order which can be manipulated for our ends. The plaentary person inquires deeply into these ends and methods, in order to be open to the discovery of intrinsic values. The pernetarian sees the harmony of the cosmos as reflecting intelligence and consciousness, but the technocrat sees the

world only as machine. Insofar as it can be described as a machine, it is intelligible. This applies also to humankind. The technocrat "objectifies" persons and "thingafies" all other beings. The technocrat seeks to correct and run the world machine. The planetary person seeks to correct self in order to fully participate in (and commune with) the larger intersubjective community of all beings.

The Limits of the Technological Fix

In the modern consciousness, progress is identified with technological innovation and material power over nature and human life. For it nothing is sacred. All subjects are objects to be manipulated for greater efficiency. This consciousness treats nature as raw material. All beings are resources to be controlled according to the desires of modern technological man. Technology and its use is the overwhelming preoccupation of modern technological society.[14] Society is itself technologized, everything is evaluated in terms of quantities ultimately measured by economic value. There are no natural goods, only human goods. Human life is the central (almost the only) concern. Technological, economic man is the only measure or determiner of value.

In its advanced stages modern technological society begins to encounter the frustration of its own ends, which are the domination of nature and the complete control over evolutionary processes, the latter through the use of information technologies, harnessed to machines and bioengineering devices in order to create (and patent) new forms of life, for the profit, amusement, and benefit of human beings. The technocrats would be the new sorcerers and magicians. These attempts to control nature with powerful technologies involve increasing risks to human life itself. Nature, after all, is not partial to humans. We are its subjects and must fit into its patterns. Thus in the success and power of high technology lies buried the risk of its own failure, since disruption of these patterns can remove our support.[15] The threat of modern technologies is so great that they could destroy the biosphere, and yet these very technologies, it is argued, are necessary for human security and happiness. Paradoxically escalation of technological power has brought less security. The level of hazard tends to expand with the level of power. It is in such a context that the limits to the idea of a technological fix become clear.

The idea of a technological fix has its basic home in the context of machine technology. Suppose that we have built a machine that lifts hay into a barn. In the early models there are some inherent design flaws. These result in the hay being dropped (intermittently) when the lift is above a certain height. A technological fix in this case might involve modification of the machine and/or modification of the proce-

dures for operating and maintaining it. In this example there are two clearly definable components: first, there are the organized pieces of hardware that make up the machine; second, there are the organized forms of behavior that we call techniques. Chipping a flint to make an arrowhead is an example of tool construction; doing this with techniques set in patterns of ritual and tradition turns this process into a technology. A technology includes techniques as standardized methods for manufacture, problem solving, repair, and modification of tools and materials. Both technicians and artisans use techniques in shaping an object or process to certain ends.

The idea of a technological fix is a natural part of modern technology. It has been observed that many technologies, although invented and developed to solve certain perceived problems, often create other problems in the process. In some cases, the same level of problem solving can provide a fix. Other cases, however, require other levels of problem solving, and some go beyond all problem solving approaches. Nuclear technology applied to electric power generation provides a fertile example. In solving problems of electric power generation it creates new problems which at first seem amenable to a technological fix, but on deeper reflection some of these problems seem beyond such a fix.[16] The security problems alone raise serious questions of policy in a democratic context.

A persistent technical problem in machine operation is something that can often be resolved with a technological fix, that is, further modification of the basic hardware, modification of techniques and procedures, or both. In the case of the haylift, it is a relatively simple matter to figure out how modifications can lead to safe operation. For example, the problem might be solved by increasing the horsepower of the lift motor and by strengthening the clutch and the brake system. Perhaps the maintenance schedules might have to be modified to assure that the various moving parts involved do not fail prematurely. In doing these things the lift failure rate might be significantly reduced. These modifications increase costs, but they are offset by savings resulting from fewer breakdowns and improved safety. In large scale technological systems these costs tend to multiply even faster than increasing power. They can run beyond acceptable limits so as to offset all possible gains. This is the case with atomic power plants, since the most serious breakdowns involve costs that cannot be tolerated. Risks of such damage must be reduced to almost zero. In such a case the technology has potential costs which exceed its possible benefits.[17]

It is often possible to repair certain faults in basic technological processes and these most certainly include the development of a whole range of complex procedures for the designers, builders, operators,

and maintainers of technological devices which carry high environmental risk. In some cases, to eliminate all serious risk requires commitments that are beyond even the best financed undertakings. For example, atomic power produces waste products, including the plants themselves, which when spent will require commitments of thousands of years, if these materials are not to damage the biosphere.[18] Because of their vast power and their attendant hazards, nuclear power plants also pose serious problems of security, as they are potential targets for terrorism. They can add to the spread of atomic weapons, and they involve other high economic, social, and environmental costs. Many developing technologies have similar implications in terms of massive social, environmental, and economic effects. These technologies are supplanting and displacing older ones as well as financial and work institutions. Their social implications are profound.[19]

Technological innovation and the development of today's most powerful technologies implies profound changes in human life. The planetary person demands a deep questioning of the fundamental motives embedded in this technological drive. Why is it necessary to develop atomic power plants? Why is it necessary to build large scale supercomputers that "think," if only to monitor extremely complicated systems of our own design? What are our final ends, the good for human life, that underlies our philosophy of design?[20]

The technological fix runs its course in satisfactorily modifying and repairing a technology that is itself basically benign in terms of intrinsic values. It sets the use of the technology in question back on a proper course which promotes defensible ends. But where a technological fix prolongs a basically ill-conceived technology (with unquestioned or confused ends), it can serve to multiply the basic problems, and magnify the fundamental conflicts that are part of the initial technological impulse toward control.[21]

The technocratic instrumentalist assumes that all things are (potentially) within our control. Ultimately, through science and technology we will know enough to eliminate most of the uncertainties, reduce risks to "acceptable" levels, and balance all "costs." And yet, the problems seem to grow ever larger with greater increases in technological power. It is not just that technological advances enable us to assess hitherto unrecognized problems, for the problems are often of a new, unexpected nature and magnitude. The initial problem that stimulated the search for large scale technological power might have been the relatively simple desire for security.

In the case of atomic power plants one aim was to anticipate and meet future demands for electricity. In the planning process the (almost mechanical) projections of past behavior were treated as "predictions"

of future demand; and on the basis of these expectations, investments were made. These projections often failed to take account of the influence of the multitude of attitudes, values, and needs involved in human activities and of how rapidly these can change.[22] In the case of the Washington Public Power Supply System (WPPSS), for example, the projections of future demand and the estimates of expenses were mistaken, but on the basis of these, a vast and costly nuclear power plant construction project was undertaken. The end result has been expensive debt, loss of capital, and increasing technical problems. In the industry as a whole there are long-term storage problems and security problems of major proportions. There are also demands on human operators for levels of perfection that training has not assured. These shortcomings stem in part from the instrumentalist assumptions that flaw the planning process (Hibbard 1981). A further assumption is that all technological developments can come under the control of planning bodies which have only to follow set procedures and use the best scientific methods in order to solve the basic problems. Any problems from the technology (it is assumed) would be technical and capable of a technological fix. But this proves sometimes not to be the case, and then what is needed is sensitivity to a wider circle of values. The paradigm must shift.

In the contemporary setting the technological fix, as the technologist's way of approaching the perceived problems caused by modern technologies, has reached certain limits. It is thus forced to consider its own ends, and this process can lead to freedom from the compelling technological drive. The mechanistic models (and metaphors) of explanation as applied to natural processes, animals, and humans, are seen through.[23] The disappearance of the sacred turned things to instruments, but considering ends leads us to reflect deeply on persons and other subjects, not as abstract objects of theoretical reason, but as agents. Moreover, innovation cannot be mechanically programed, and the creative leap here required at the limit opens doors to other dimensions of possibility.

The natural world and its beings are not machines, but only machine-like in certain respects. The values of other beings and the existence of other person-kinds (other conscious beings, such as wolves, whales and the like) seems undeniable to our moral and aesthetic sensibilities. The meeting of technology and natural world in antagonism, where one-sided control is the only aim, ignores these sensibilities, and this results in transgression of limits which show themselves in environmental degradation, increasing incidents of disease, accelerating rates of species extinction, and pervasive threats of biocide.[24] On reason we have not found any way to master the

technological impulse is not only because we have shared (i.e., "we" in technological nations) the benefits of modern technology in convenience and comfort, but also because we have not questioned the fundamental values involved in this impulse. The basic problems are not technological, for they have to do with our very sense of what is important and central to a worthy human life. The bankruptcy of modern technocratic instrumentalism is that it consigns human existence to separation from all that was once perceived as sacred, and without a sense of the sacred, basic values can become wholly subjective. When nothing is sacred, there is no spiritual center in human life, and responsible limits are removed.[25]

The Emergence of the Sacred

It is not to be denied that religion (as well as technology) is a powerful force in the contemporary world. Religion is often a form of institutional power with wide political and economic implications, which can reinforce the technocratic impetus. In its worst institutional forms religion is not spiritual development or spiritualized living; it is a body of dogma shared by a group of believers, who may not be celebrants of the sacred but only partisans of an ideology.

However, in its more positive forms religion is a celebration of the sacred (the ultimate values) and a means for spiritual transformation. The re-emergence of the sacred in contemporary technological cultures occurs as a result of realizing the limits of the technological fix with respect to our basic problems. These limits can reveal to us the limits to our whole approach. The constraints and complexities of the biosphere that limit responsible technological power can humble us with our own ignorance which in turn can alter our basic orientation. However, assume that there were no limits to our power over the earth. Suppose we could have everything we desire. What then? Suppose we build a fusion source of energy which produces an abundant supply of very cheap energy. What would we do then? How would we accomodate this economically, politically, and socially? How would we apply this power to the biosphere? What would we deem worthy of pursuit? If there was no need for work and if everything we desired was abundant, what would we do, other than service our whims and desires for thrills, pleasure, and fame? Is this all there is to human life? Would such power make us better persons or more appreciative of other beings? Would it prevent and resolve human conflicts and war? How would it (or could it) aid us to improve ourselves so as to be worthy of its power?

Some of these questions have been addressed by spiritual disciplines, especially in the context of some monasteries. In a monastery there can

be an abundance of time for deepening awareness, because there is a minimum of diversions. Boredom and striving are handled through a spiritualization of daily life. Rituals are not supposed to be mechanical chants to numb the mind; they are part of an ongoing practice which creates community and celebrates the "mysteries," while also being a discipline in awareness and mindfulness. In Zen and Taoist traditions monks have wrestled with the basic questions that reemerge in our enlarged context of the mass technological society.[26] Zen monasteries have not been centers of technological innovation, for their central concern is living properly and simply.[27] Such monasteries have stimulated the flowering of various arts which celebrate the values of other beings. The Zen poets and the Taoist sages in their silence let other beings "speak." Their practices of meditation and mindful work increase awareness of one's basic nature. Becoming aware of this basic nature of the self enables a rectification of one's self with other persons, other beings, and with nature.

In Zen philosophy each person already has Buddha nature, but since most of us do not realize this, we are dissatisfied and feel incomplete.[28] Out of unknowing ignorance we wrongly try to complete ourselves through acquisition of other beings, of other things, of knowledge, of merits, of awards, of wealth, fame, and power. The spiritual way, in contrast, approaches life nonacquiringly. It is open and receptive to what life offers; its time is not the mechanical (short) time of the profane, but the timeless perfection of the sacred (Eliade 1959). In Buddhist philosophy there is no dualism between self and other; samsara and nirvana are different aspects of the same unified life. In a similar manner, the pernetarian strives for a balanced understanding of self and nature, and this involves these same dimensions of concern for purifying one's self of delusions.

What is the basic desire that leads humans to strive to control their environment, to accumulate further wealth, to accumulate more than they need, to subdue and control others and other beings? From a religious standpoint, for example, in Buddhist analysis and in the perennial philosophy, this basic desire is to realize the completion of self, but this self is often confused with the ego self. However, there is a sense in which this larger self is already complete. Realizing completion, then, does not result from the accumulation of material goods, but only from the letting go of separation and dualism. This analysis of the human situation is one of the elements in pernetarian philosophy, and it informs activities which enable us to be consciously in tune with the basic cycles and harmonies of human, planetary existence. Its disciplines aim to overcome the tendancy of each of us to separate ourselves from others and of our species to separate itself from the rest of nature.

Thus the realm of the spiritual, as we have been considering it, is not a transcendental, ethereal realm, but a full conscious dwelling in daily life, and this involves an intense awareness of the unity of existence and of its perfection as it is now revealing itself.[29] The planetary person's knowing would unite the mind of science with the sensibilities of art in order to create ways to harmonize all spheres of existence, such as the physical, biological, emotional, intellectual, spiritual, and so on.

The limits of the technological fix now being revealed are stimulating the development of forms of knowing that lead us back toward such a reunion of science and art. From this communion will develop a celebration of the deeper values that science (as improved perception) linked with art (as attuned sensibilities) will make clear. The uniting ground between science and art in this context could be the spiritual disciplines of a perennial philosophy that aim not at conquest of worlds (whether through technology or conceptual imperialism), but at deepening appreciation for the networks of interconnected beings who participate in the creation of a symbiotic planetary community.

Such a philosophy is not, and cannot be reduced to, a mechanical routine, a set of techniques, or a set doctrine. The illusion of the technocrat is that everything will yield to techniques. We could compare this to the mastery of a martial art such as Aikido.[30] The basic philosophy of Aikido is one of nonviolence. Aikido is a spiritual discipline (rather than only a martial technique) precisely because it leads its practitioners beyond competition to a spiritual communion of mutual assistance. In short, its practice helps to free them of the desire to fight and transforms the martial impulse of the fighting mind to the harmony of body-mind. There are techniques in Aikido, but mastering techniques alone does not make a master Aikidoist. The master Aikidoist transcends techniques in being totally in tune with his or her context. Fighting cannot arise, since the mind is free of contraction and aggression; reconciliation and patience flow out of a centered compassion for others. Such spiritual discipline cannot be technologized, either in terms of hardware or in terms of techniques. It is not something anyone or anything can do for us, nor should we put it off by trusting the future to create devices that will solve the basic problems of living a value-filled life. We must do this for ourselves.

The mastery of modern technological forces, and their control by humans for benign ends, cannot come about through a technological fix. There is no fix that will put misuse and abuse beyond our reach. The creation and use of inappropriate technologies is the product of minds and imaginations that are not reconciled with the basic values and facts of interdependent human life. The virtue in the limit of the technological fix is that it reveals to us the limits of the specialized

technician as overseer of human destiny.[31] It reveals the arrogance of assuming control over human and natural evolution. The limits of the technological fix point toward a full human life that is not dependent upon devices for its realization of value. Ultimately, our fulfillment cannot depend upon technique alone, and cultivation of compassionate understanding must form part of an enlarged and spiritualized science.[32] This spiritualized science involves philosophy as an activity of love in pursuit of wisdom. Thus perceiving the limits of the technological fix can make us humbly aware of our ignorance, and this humility makes the love of wisdom possible. Such love takes us beyond the limits of rules and techniques and puts us in the undetermined ground of creative possibilities.

The emergence of the sacred involves the appearance of a new horizon which throws the technological ground into new relief. From this vantage point we see that the technological fix which attempts to repair our social and technological disorders eventually encounters limits which escalate problems at a rate beyond which technology can reach. The technological fix of the haylift machine was well within the limits of repair. On the other hand, the technological fixes required for atomic power plants reveal the limits of the technology itself, especially as it is applied to economics and to the social processes connected with environmental integrity and human safety. Repairing the haylift machine raised no fundamental questions of policy and value. However, the limits of the technological fix in the context of powerful new technologies certainly does raise such questions. Technological development itself ultimately forces us to face basic philosophical and spiritual questions that we can now ignore only at great peril. We could, in an earlier era, ignore the long-term consequences of haylift technology. Today the faith in human ingenuity for technological fixes can be itself an addiction which is symptomatic of a basic spiritual disorder. The emerging new paradigms for an enlarged understanding are ecological. Ecological models will serve as connecting links, so that our more specialized reflections can become part of an enlarged, integrated understanding.

Technologies include our values and activities as part of their employment. To attempt a technological fix of modern, powerful technologies, without considering the basic values and conflicts involved, will intensify the risks and dislocations that these technologies can cause. Above all, knowers have to rectify themselves, not only with the known and the unknown, but also with the unknowable. In facing the unknowable we are led to the humility that engenders spiritual discipline. An enlarged science of compassion and delight would consist not merely of techniques and manipulations, but would unite with

spiritualized activities that help to make us more aware and appreciative of the values and ways of other beings.

Our humble lack of knowledge carries risks when we proceed as if we can control everything, as if we can know and reduce all things to set patterns. In its deepest impulses science is a search for understanding; at its shallowest level it is only a struggle for control. The limits of the technological fix reveal fundamental limits in our approach. Recognizing these limits should humble us to deepen our understanding of nature by including new dimensions of value and spiritual discipline. These are some of the implications of the limits of technology revealed by current economic, social, and environmental problems.

Summary and Conclusions

The instrumentalist's idea of a technological fix is part of an approach that applies the techniques of mechanistic technology to solve problems using a methodical approach to machine design and repair. The philosophy of this idea, in its modern form, holds that all problems have a technical (read this as technological) solution, and the imposition of that solution means applying set methods in a manipulative, calculative, ordering way. In this way, it is thought, we will realize the dreams of such thinkers as Francis Bacon and René Descartes, since we will be able to bend nature entirely to our will. The final stage of the technological fix involves applying technology to technology to cure the problems of the lower levels of technology. If any change in human desire and action is necessary, that too will be engineered by technological manipulation.[33] Such changes in human desire manifest themselves only as external impositions of modified behavior, rather than a change in spirit, in heart, or through reasoned inquiry. Thus, technology applied not only to the world but turned on itself and its users becomes modern industrial culture's medium of exchange, its be-all and end-all, its raison d'etre. We have tried to show that such levels of technological application usually fail to examine the basic impulse that underlies the fundamental difficulties. Examining this impulse at the limit undermines the guiding philosophy of the technologist's approach. The technologist's cities cannot exclude the "hand of nature." The earth is not an artifact.

The planetary person realizes that the hand of nature does not disappear in the city; it merely works in other ways, distorted and fragmented by the technical structures that help to shape a person's experience. Technological power cannot be a substitute for self-discipline and effort. When we become totally dependent on our devices, we have relinquished our lives to power, separation, and materialism. At this point the devices and their processes become more

important than living subjects; the self is mechanized as well as the world. The metaphor of the machine has been applied at last to everything. The living, free subject becomes limited by its own desire to seek the unlimited power of technology, and the very survival of humankind becomes problematic, since ecocidal technology (nuclear missiles, biological and chemical warfare) now resides in the hands of humans who are often not mature or wise. They themselves not only depend on their machines, but tend to become technologized in their thinking and actions and insensitive to their own feelings. Only a spiritual discipline can reverse this, and only cultivated, artistic sensibility can reunite the fragmented images of reality into a coherent vision of the whole. The technocrat is technician and mechanic; the planetary person is artisan and sensitive. The technocrat *reacts* mechanically and predictably; the planetary person *responds* creatively and sometimes unpredictably. The technocrat neither examines the self nor inquires deeply into ends and values, but the planetary person does.

In summary, there are three main points to be emphasized. First, the limits of the technological fix are revealed by serious environmental, economic, and social problems. Second, encountering these limits is not cause for despair, but gives us reasons for inquirying into our ends and the basic values of nature, so that we can create activities and design technologies that meet our needs, while respectful of all values. Third, the encounter with our own limits helps us to realize our radical ignorance. Together these can lead to a spiritualization of human life, which will ultimately enable us to live wisely and appreciatively with all beings as companions, in recognition and celebration of our differences and unities. The limits of the technological fix can help us to see that power to control is not understanding, nor is knowledge of control wisdom. Dissatisfaction arises in part from a failure to realize that self-completion cannot depend upon ignoring the intrinsic values of other beings, nor upon an accumulation of things. Humans can lead rewarding and meaningful lives without being the lords and masters of all other sentient beings. To temper a willful nature involves spiritual discipline. This in turn requires a practice that leads us back to wholeness, a perennial philosophy which is neither doctrine nor dogma, but is an ongoing inquiry activity from which grows wonder and compassion. It delights in understanding other beings by letting them reveal themselves.[34]

NOTES

1. The word *pernetarian* is derived from *per*sons in *net*works of planet*arian* relationships. For a more detailed discussion of these two approaches see Drengson (1980, 1983a). Roszak (1978) covers much of the same ground, although in a different way.
2. For an excellent discussion of specialism see Maxwell (1980).

3. In my view recent discussions of whether to confer rights on nonhumans operate from the erroneous assumption that other beings are at our disposal. On this sort of anthropocentrism see Ludel (1982).

4. On algeny see Rifkin (1983). As Rifkin makes clear some elements of New Age philosophy, especially as aligned with Teilhard de Chardin, are compatible with algeny. For a brief discussion of these issues in relation to deep ecology see Sessions (1981).

5. The planetary person accepts Aldo Leopold's statement that "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." As quoted in Nash (1977).

6. These religions are primarily Christian monasticism, Zen Buddhism, Taoism, and some native American Indian religions. See Hughes (1983) and Highwater (1981) on the latter.

7. The term *perennial philosophy* has been used by Huxley (1970). It was current during Leibniz's day and he used it to refer to a synthesis of the true. The concept of a perennial philosophy has its ancient roots in Neoplatonism and in Plato.

8. For a statement of a native American Indian's view of this respect, see Boyd (1974, 51-52).

9. For a description of deep and shallow ecology and ecosophy see Naess (1973). On appropriate technologies see the *Humbolt Journal*, spring/summer 1982 issue, which is devoted to this topic.

10. In this vision there are elements of Platonic and Pythagorean conceptions of science as part of a whole process of knowing and understanding which is practical not only for economic reasons, but more importantly because of what it does to us enabling us to live wisely on the earth.

11. There are no Jobian mysteries.

12. As Whitehead once remarked, the fundamental metaphysical mystery is why there is something rather than nothing, i.e., that things are.

13. On philosophy as technique, see Barrett (1978).

14. For a detailed discussion of technological society, see Ellul (1964).

15. A thoughtful discussion of the possible failure in technological success occupies Meredith (1983). Also see Stewart's (1983) reply.

16. *Fix* is ambiguous, for if we emphasize the positive we suggest repair, but if we emphasize the negative we suggest the fix of the technology addict.

17. For a discussion of these issues with reference to nuclear power plants, see Gofman and Tamplin (1971).

18. For example, plutonium, one of the most hazardous substances known to us, must be stored for thousands of years. We do not have the capacity for such a commitment.

19. Here one only has to think about the implications and potential effects of bioengineering and computer technologies.

20. It is a most instructive exercise to take hold of a technological device in order to try to divine the philosophy of design that produced it.

21. Competitive world markets are often said to force us to increase the pace of technological innovation. It is true that there is a kind of international technological anarchy. Nonetheless, the question remains: What is the nature of the technological impulse that leads us to think that the problems magnified and in many cases produced by modern technologies can be adequately dealt with by an increase in technological power? For a discussion of different attitudes toward technology see Drengson (1982). For a discussion of art and the limits of technology see Drengson (1983b).

22. Two reports which detail problems connected with nuclear power plants have been published by the Washington State Senate Energy Committee (1981) and Hinman (1982). For a more general discussion of energy systems, problems, and alternatives, see Lovins (1977).

23. For a penetrating analysis of the prevalence of the machine metaphor (of which the computer is the latest instance), see Mumford (1967-70).

24. There is a moving description of ecocidal threats in Schell (1982).

25. To say that something is sacred is to imply that it has intrinsic worth and will not be sacrificed under any circumstances. The biosphere was once held (by some) to be sacred. There is more to the sacred, but this is enough for here. Spiritual need not be esoteric, for

the spirit with which we act determines the quality of our experience of the action and the object. One of the fundamental features of spiritual disciplines is that they help us to transcend greed, ambition, impatience, hate, etc., so that we can act with patience, compassion, humility, generosity, and love.

26. This is not to deny that many other thinkers in our own traditions have asked these same questions. Christian monasteries excepted, the difference is that most of our philosophers were not part of a traditional practice in codified disciplines of spiritual transformation. For a good discussion of spiritual transformation, see Streng (1978) and also Taber (1983).

27. For reflections on Zen attitudes toward work and technological innovation, see Snyder (1977).

28. On the Zen approach, see Chang (1959) and on Buddhism, see Rahula (1974).

29. Consider this remark made in a talk by a contemporary Zen teacher, Joshu Saski Roshi: "Those who see the moment as perfect are truly religious and have no need for religion" (1977, 17).

30. *Aikido* means the way (*do*) to harmonize (*ai*) oneself with the spiritual energy (*ki*) of the universe. It is a nonfighting martial art which emphasizes friendship and community.

31. This is also one of the virtues of the limits to growth. On these limits, see D. H. and R. L. Meadows (1972).

32. See Maxwell (1967) for one possible approach to this.

33. Skinner (1975) suggests this conditioning approach.

34. Self-revealment is an important concept for the pernetarian, since one of his or her aims is nonmanipulative appreciation of other beings. To experience a unity of Being with other beings does not depend upon having or doing, but upon receptive silence. This is a state of being, not a possession. The importance of silence in realizing this is recognized in sacred teachings. Realizing this state of being, as opposed to thinking about it, is not a function of intellect alone. The separating ego-self lives in profane time. When we experience exclusively through it, we feel we are not a part of anything meaningful and that time is running out. This is the historical time of the technocratic-self. Experiencing in this way, one feels incomplete and then has the need to become somebody, to protect and extend oneself, to immortalize oneself in the dramas of history. But this is futile striving, for the very nature of profane time is its transitoriness and incompleteness. To realize nonstriving sacred time involves letting go and letting be. In this time the self is complete. The nonstriving self (consciousness) unites with the other, even the rest of existence, according to spiritual teachings. This consciousness is not an act, i.e., not a doing. To be in contemplative relationship in the empty silence (i.e., free of attachment to the objects of consciousness) of all beings is to be in mutual self-revealment. This sacred time (the Kingdom of Heaven) is always complete. It lies not in the future but in the eternal presence of Being. All beings participate in this Being. Christians for the most part refer to this Being as personal. Zen Buddhists refer to it as nonpersonal. However, both agree that it is beyond description. For an excellent discussion of a Western philosopher's conception of letting beings be, see Zimmerman (1983). Provocative discussions of silence can be found in the summer, 1983 issue of *Philosophy Today*. Finally, for a good description of the nonacquiring approach of Zen emptiness (silence) see Suzuki (1960).

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