On the simplest level, Science is knowledge of the world/of nature. There are many regularities in nature that mankind has had to recognize for survival since the emergence of HOMO SAPIENS as a species. The sun and the moon periodically repeat their movements. Some motions, like the daily "motion" of the sun are simple to observe; others like the annual "motion" of the sun, are far more difficult. Both motions correlate with important terrestrial events. Day and night provide the basic rhythm of human existence. The seasons determine the migration of animals upon which humans depended for millennium for Survival, with the invention of agriculture, the seasons became even more crucial for failure to recognize the proper time for planting could lead to starvation. Science defined simply as knowledge of natural processes is universal among mankind, and it has existed since the dawn of human existence.

The mere recognition of regularities does not exhaust the full meaning of science. However in the first place, regularities may be simply constructs of the human mind. Humans leap to conclusions; the mind cannot tolerate chaos, so it constructs regularities even when none objectively exists. Science is an organized body of knowledge and opinion which is systematically supported by formal proofs or by observational evidence. A body of knowledge is regarded as an empirical "Science" in so far as it meets two conditions: (1) It must be the out come of a particular method of inquiry. (2) It must conform to certain principles of organization. The method of Scientific inquiry may be broadly described as follows: Every scientific hypothesis is regarded as subject in principal to being disproved by observational evidence. If any hypothesis has
consequences that can be shown to be false, then it must be rejected i.e. either abandoned outright or reformulated so that the false consequences no longer follow. Every hypotheses must be supported by actual observational evidence. A hypotheses is regarded as highly confirmed only if it has some true deductive consequences that alternative hypotheses lack. The Evidence for a hypotheses must be public this means that the relevant observational and experimental situations which exhibit the phenomena to be explained must be repeatable, at least in principle. Moreover, the evidence derived from any such experiment must be observable by a large number of persons. Thus, an introspection cannot constitute scientific evidence, but an introspective report can. One of the off shoot of science is technology. There have always been technologies i.e. even stone age man had his own tools, his own technology. The contemporary sense of Technology means something more ----- i.e. it is the application of organized knowledge to help society solve its problems.

The scientific -- technological revolution has changed man's life style radically. It has forced him into new world -- the world of mechanization, organization, automation, bureaucracy, and hard rationalism. It has interred the individual in an ocean of laws, systems, and oppressive orders. What was originally promised to be a boon to mankind by its well - intentioned original fathers, has opened the gate to total crises. As long as Science functions as a method for understanding the universe and bringing it within the ambit of a rational structure i.e., within a system of laws. It has all the epistemic virtue about it. In fact Science originated with man's motivation to employ his reason to map out the pattern and the behaviour of the universe. The impetus behind the development of Science is the knowledge --- seeking drive in man. In order to live a life as an individual as he desires it, here and in a incarnate state, It is necessary for him to know what his environment is, how it functions and how
it influences him, and what measures he must take to transform it. The
genesis of science and technology is to be found in man's thirst for
heightening his experience of worldly existence and not in the belief that
existence is only chimerical. Undoubtedly, the immense credibility that the
natural sciences have gained and the fantastic marvels that they have made
possible in various spheres of their application are largely due to their method
of rationality in approaching the universe. One has to recognize the wealth of
welfare they have generated for man by solving problems in agricultural,
medical, chemical, transport and communication fields. The ground which
sciences have prepared for space technology, for the penetration by man into
the solar system surely contain the possibility of a permanent solution to the
rapidly depleting earthly resources. By devising medicinal drugs, highly
sophisticated methods of surgery and amazing means for health protection,
medical technology has declared its commitment to the enhancement of human
well-being; by inventing fertilizers, pesticides and all types of farming
appliances agricultural science shows its involvement in the value of
accelerating abundance, the problems of transportation are met in the
construction of highways, automobiles, and jet engines; and astounding
achievements in the technologies of communication and information storage
from almost the heart of modern industrialization. The scientist who set the
beginning of all this had a definite vision about man, about his development, and
about his success against nature's antihuman forces. Actually the very birth of
technology represents the rise of an urge for full freedom in human
consciousness itself. The growth of technology enhances man's ability to
release himself from nature -- generated evil. The ability to transform one's
situation by using technical contrivances gives one self -- confidence and a
peculiar sense of moving -- forward towards an enjoyable state of being.
by saying that the analogy between brain and computer may be admitted, and it may be pointed out that the computer is helpless without the programmer.

Science has advanced so much that it has succeeded in postponing death. All living things inevitably die. Man, however is unique among living things. He knows death must come; he is resigned to it. But his hope rises above the finality: he dares to postpone it. Medical science is indeed becoming increasingly able to put off the very moment of death. A race toward successful organ replacement is under way. It follows two diverse paths, transplantation surgery and the engineering of artificial organs. Sometimes the two paths intersect; those involved in organ transplantation find themselves helped by others occupied with the development of artificial spare parts. Regardless of which path they follow, however, all engaged in this effort --- physiologists, engineers, physicians, surgeons, and hard headed industrialists --- are seeking a common goal. They wish earth other well and usually deny that a race is being run or that any competition exists. But the public senses a quickening pace in these medical adventures eagerly awaits the progress reports. In the modern surgeon's ambition to add transplant surgery to his repertoire of surgical techniques, he encounters surgical barriers (operative techniques) are no longer limiting factors -- surgical competence is greater than even before --- a number of sociological problems have recently arisen. The logistics of organ availability, how to meet growing demands against a scant supply, and the morality of removing an organ from a healthy person to aid another are some of the problems that are only beginning to be discussed. An ethical twilight zone holds other unanswered questions: the legality of donor -- recipient "Contracts" the utility of cadaver parts and the grisly prospect of black marketeering in organs, the "identity" of a made -- over "person" the salability of body parts, and a potential " pound - of - flesh" Economy.
Artificial organs are currently practical. They are being used daily in the maintenance and the extension of life. The first to be used, the artificial kidney, is a highly developed device now adopted even for home use. In contrast the artificial heart-lung system can be operated only by a highly skilled team, yet applications of the system have become routine in large hospitals, where open -- heart surgery is performed daily. Successful development of mechanical organs has been a glorious achievement for medicine, but the future of these spare parts has an even greater potential than their past would indicate. The heart -- lung machine serves as an example of this. Although it is commonly used in operating rooms throughout the country it is physiologically a crude device that cannot be used for more than a few hours. Yet new devices can be envisioned that can support a failing heart for days or weeks, can rest a diseased heart for months, or may even substitute, entirely for this organ. While the future of artificial internal organs is promising, problems stand in the way of successful application of these devices. The first is the tendency for blood to clot on artificial surfaces, and the second is the energy requirement of the implanted organ. As already mentioned there are a number of artificial devices, or prostheses, in current use that act as substitutes, struts, supports, or conduits in the body. All of these have greatly extended the fields of surgery in which they are applied. Examples are heartvalves, blood -- vessels grafts, artificial joints, and cardiac pacemakers. By broadest definition these are artificial internal organs. Future developments in pacemakers are being directed toward better coupling of power to the heart muscle, better energy sources that will work for an indefinite period of time, and better prosthetic materials for implementation. And further what of artificial senses ? Already "seeing" machines translate luminous images into electrical signals that can be transmitted to sensory nerves in skin near blind eyes. Using these devices,
patients have experienced light shadow patterns that allow them to gauge distance, size and depth. Sound has been transformed into colour patterns and use in decorative arts such use in a deaf child's environment might allow rapid accumulation of lip-reading skills. In contemplating current and future efforts in organ transplants and the development of artificial devices. One may accept Shakespeare's thought from *The Tempest* that 'what's past is prologue'. or perhaps one should recall Edmund Burke's statement, "To complain of the age we live in, to murmur at present possessors of power, to lament the past, to conceive extravagant hopes of the future, are the common dispositions of the greatest part of mankind".

By probing into the most sensitive part of the human body, For eg the human brain scientists have tried to gain better understanding of its functions. Throughout the Western countries the computer networks encode more and more information about our private lives, and the scientists increase their study of the human mind through drug and brain-wave research. Little by little, privacy is being destroyed we tacitly accept the sophisticated spying made possible by electronic circuitry microminiaturization; and drugs. It is said that if this trend continues, civil liberties will soon be replaced by formalistic rituals, and we shall have become socially tolerant of secret surveillance and spying. Just as we have learned to tolerate air pollution, foul water, ubiquitous noise, garbage in the streets, and crowded confusion in our cities, so we shall learn to tolerate sonic booms and loss of privacy. The greatest threat to human life is, paradoxically, that human beings are so immensely adaptable. Unless we take a stand very soon, we shall come to tolerate surroundings and ways of life that are incompatible with those qualities we now identify with "Humanness".

Scientific and Technological innovation has become an accepted noun of
western society today. The citizens adjust very quickly to heart transplants, manned orbital flights, computerized fingerprint tracing and Laser surgery. By the same token he is fascinated but not over whelmed by forecasts that, in the early 21st century, he will enjoy three -- dimensional movies and television, take advantage of weather manipulation, and perhaps be able to choose the sex of unborn babies. Another marvelous off shoot of Science is plastic surgery. What is plastic surgery? Plastic surgery means any surgery that changes the shape of the body or to remove, tissues from one part of the body to be used at another part. It developed during the first and second world wars. Hindu physician Sushruta, used skin grafts as early as 800 BC to reconstruct a damaged nose. Also known as cosmetic surgery it is used to give a better appearance to the face of a patient ie. by straightening or reducing the size of nose, sagging tissues under the chin, cheeks and eyelids. In case of server burns skin from other parts of the body is grafted immediately or at later date to improve the scars that may develop. Another off shoot of the advancement in science is genetic engineering. What is genetic engineering? Many prospective parents seek professional help in determining the chances of their offspring being born with a genetic disorder. This is particularly so with parents who have a family history of genetic disorders. Sickle -- cell anemia and Tay --- sachs disease are examples of the types of disorders, Where genetic counselling is advised. Scientists are hopefully looking forward to the day when genetic disorders can be diagnosed and treated. The branch of medicine aiming at this objective is known as genetic engineering. In near future scientists may perfect means of removing defective genes from chromosomes and substituting normal genes in their place.

The fact that scientific research generates wealth and power is undeniable. In 1783, while Benjamin Franklin was ambassador at the court of
France, he had occasion to witness in Paris some of the first balloon ascents. To skeptics who asked what use a balloon might ever have, Franklin is said to have answered with the question: "What is the use of a newborn baby". A similar story is told to Michael Faraday, the British physicist and chemist early in the 19th shortly after he had discovered the electromagnetic induction. Faraday was host to an important political personage in his London laboratory at the Royal Institution. He demonstrated the new phenomenon to his visitor, who was rather unimpressed and inquired: "What is the good of this discovery?" To which Faraday replied: "Someday, sir, you will collect taxes from it". Whether these stories are authentic is of limited historical interest. What is important is that they help us understand the social implications of scientific and technological research. Franklin's remark "what good is a newborn baby"? symbolizes the faith that any new fact holds promises for future developments. (Not all of which can be predicted, of course, because so much depends on future circumstance's). Faraday's statement that taxes would someday be collected from a new laboratory technique represents a more realistic belief that almost any discovery will eventually be converted into some process or product that society will be eager to use. Most enlightened persons now take for granted that scientific research generates wealth and power, and that its most exciting fruits are often unexpected. This, however had not yet been proven by experience. In Franklin's time or even in Faraday's theoretical science began to influence practical life barely 100 years ago.

Scientific advance has led to various dilemmas one among them is the Doctors dilemma. Whether he wants to or not, the doctor is being forced to accept a large share of the responsibility for the social judgements surrounding such basic factors as who shall survive, whose life will be spared by using an artificial organ or by doing a transplantation, current estimates indicate that
about 90,000 persons a year die of kidney disease. Each kidney transplant operation costs approximately $20,000. Assuming each person could afford it, who among the 90,000 should be selected to receive the relatively few kidney's that are available for transplant purpose?

Philosophical and ethical questions are especially pointed in heart transplant cases. Is the donor actually dead if his heart can be resuscitated in another individual? Should a heart transplant be performed on a particular patient? The donor's heart must be removed as irrecoverably as in an Aztec ritual. If the transplant should fail the graft not function the surgeons would have killed the donor no matter how altruistic their motives. It is, indeed, a very final step. And what of the definition of death itself? The use of organs from cadavers depends upon the fact that each tissue dies at a different rate. If we assume that death occurs at the moment the brain stops functioning, many organs are available in an intact state for transplantation. If however, we say that death occurs when spontaneous heart action has ceased, when reflexes are absent, and when there is no respiration, then some organs have also died or have been irreparably damaged. To avoid this, there is much pressure toward a new definition of death dependent upon brain, not heart, activity. Scientists/physicists now a days make use of mechanical spares. There are a number of artificial devices or prosthesis, in current use that act as substitutes, struts, supports, or conduits in the body. All of these have greatly extended the fields of surgery in which they are applied. Examples are heart valves, blood vessel grafts, artificial joints, and cardiac pacemakers. By broadest definition these are artificial internal organs. Their proponents recognize the liabilities and even some dangers in their use. Artificial heart valves, for example, permit replacement of valves diseased by arteriosclerosis and
example, permit replacement of valves diseased by arteriosclerosis and rheumatic fever, but formation of blood clots on prosthetic surfaces has been a problem and infection around the valve is nearly always fatal.

Today science continues to produce pesticides and new industrial processes that threaten to alter profoundly the balance of nature. Will the law eventually be forced to call a halt to such developments, on the ground that man has an inalienable right to an uncontainated environment? Already this right has been pleaded -- and lost in the courts of Newyork state, but the law can still assert it, if necessary, and science will be obliged to confirm. From the above examples, it seems clear that the future man progresses towards mastering his environment, the more important law becomes to him, because law is one of civilized humanity's tools for applying reason to its affairs. Primitives manage quite well with force and cunning. Advanced cultures can't tolerate their Technology only within the framework of those rules of reason that are law. As science produces new marvels by which man can alter his environment, his physique and his personality at will, only law can keep their use within bounds. Science may give us ultimate power; law will have to determine whether it leads us to utopia or gethsemane. At present, only about 50 of the earth's 135 nations have reached some stage of legal development. The rest have edicts imposed arbitrarily by tribal chiefs or dictators or the dead hand of tradition. These may be miscalled "Law", and our system retains remnants of them, but the law we are talking about is a less precise, more meaningful arrangement for settling conflicts between men's desires. It is an ever changing, never final, seldom even consistent body of reason created by fallible human beings to permit them to carry out their finite operations in a worldfull of fresh surprises. In the long run, legal rules to govern the changes in our lives brought about by advances in technology will be determined by the
people, not the lawyers. Either by direct demand for what they want, or by
default through apathy, ignorance, or the simple failure to demand significant
changes, the people will determine the direction of a government. The impact
of science upon law, and viceversa, is felt in the whole span of human
existence, from conception to resurrection.10 At the earlier stage it is most
manifest in problems that arise through application to humans of the ancient art
of the animal breeders, artificial insemination. The problems are expected to
multiply as science seeks to use the method to "improve" or preserve mankind.
Only a few of the 50,000 -- 60,000 "Test tube babies" estimated to have been
born in the united states have as yet come into conflict with the law, and then
usually in the course of a marital dispute. So our rules of reason are not yet
established. Is the act itself Legal? Is the child Legitimate? Can it inherit
equally with offspring who were conceived in a more orthodox manner? Does
the husband have all the privileges and obligations of a biological father? Is the
donor responsible for the child's support? These questions, which scientific
advances have posed, must now be answered by society. The field remains
what some knowledgeable lawyers regard as a no -- man's-- land, full of booby
traps for those who enter it. Consider the litigants of just two big cities,
Chicago and Newyork, in 1945 one Chicago judge ruled that donor
insemination could not possibly constitute adultery. In 1954, in an almost
identical case, another judge held that the baby was illegitimate because donor
insemination does constitute adultery. A higher court, upholding the decree,
pointed out that the infant was not bound by this judgement of bastardy
because he had not been represented at the trial. A Newyork judge in 1948
found that consent to artificial insemination constituted an adoption by the
impregnated woman's husband; therefore, the child was Legitimate. This was
contradicted in 1963 by another Newyork judge, who decided that the
husband's consent was as irrelevant to the baby's Legitimacy as if he had condoned his wife's taking a lover. Uniformity in this matter probably will have to wait until enough cases come up to arouse the public. The presumption of Legitimacy is one of the strongest presumptions in law, and it would not take much to carry it over into the no--man's--Land of artificial insemination. A present trend toward regulations preventing the stigma of bastardy from being recorded on birth certificates indicates that our states. Will one day legislate that just being born legitimizes anyone.

Law will not find the solution that easy in the event artificial insemination is ever applied eugenically. The possibility of freezing sperm for later use perhaps decades or more. Later--presents tricky legal, and personal, questions. Does a deposit in the sperm bank become part of a man's estate, which his heirs can later dispose of as they would his bank account? What authority will determine whether the proposed act of creation would, in fact, produce desirable results? The dangers of this were recognized by George Bernard Shaw, So the story goes, when Isadora Duncan, the dancer, suggested they have a child so the world could be blessed with a combination of her beauty and his genius. "Ah, but what if he had my looks and your brains?" Shaw demurred. One wonders how many women would experiment if the frozen sperm of a Leonardo da Vinci say, or a William Shakespeare, or more, likely, a famous athletic or movie star, were available? Fears that the state might take over the licensing of reproduction in the interest of "improving" mankind or breeding for docility seem unfounded, at least in the Western world. Law, we suggest, will go no further than to set reasonable guidelines, to restrict the use of sperm to a donor's stated wishes, to prevent fraud, and to require medical examination of those who make deposits to the sperm bank and those who would draw from it. Perhaps because we are optimists, we
believe the law will progress in this area with the welfare of children as its primary concern courts will no longer subordinate the interests of the offspring to those of their quarreling parents, which is the common practice. Today perhaps the law may even call upon science, which by then may have learned enough about human conduct to suggest where true justice lies.

Not unrelated to the problems of artificial insemination and frozen sperms are those created by the use of the body or its parts at the other end of the lifespan. An organ such as kidney, which can be spared during life raises no special legal questions, but transplants at the time of death promise complications. Heart transplants force the law to reexamine its definitions of death. In the past, death has been what the doctor said it was but in their eagerness to give a patient a "new" heart, some physicians propose grounds that law may not accept. A Boston medical group suggested that when the brain shows no electrical activity for a specified period, say 24 hrs, its owner may be considered dead, though he is still breathing and his heart continues to beat. Should that heart be available for transplant, even assuming the family consents? The law may have to answer this questions. If science could provide some clear, unequivocal facts about death, then perhaps the law could change its mind. Such facts can be established, however, only on the basis of a companion definition of life. Is it merely survival? And as more is learned about such things as the role of DNA, will we discover a need to discriminate between different kinds of human life? These questions will bring us face to face with such problems as: (1) If new medical techniques can prolong a healthy life far beyond the present span, who will be selected to remain alive? Society, through law, probably will not leave it to the workings of the market place or the caprice of physicians. At the very least, it will try to prevent a black market in hearts and lungs. But if science manages to
transplant a human brain, the law will be in serious trouble. Which individual will be considered legally "alive" -- The one into whose functioning body the new brain has been deposited, or the one whose brain with all its memories has merely moved to a new home? (2) If the right to live is expanded what of the right to die? At present the law recognizes no such right, neither for those newborn. Who will never have a functioning brain, nor for the aged who have lost it. Euthanasia and suicide are crimes now, but perhaps science will one day be able to prove that in an overcrowded world both acts are rational -- whereupon the law will concede the right to die (3) If as Robert Simsheimer of the California Institute of Technology predicts, "Man will have the power to alter, specially and consiously, his very genes" so that "intelligence can be applied to evolution", whose intelligence will be applied, and toward what evolutionary goal shall man strive? The people, through law, will have to make that god -- like decision.

Scientific activity can be said to be a combination of Eros (constructive principle) and thanatos (destructive principle) in Freudian terminology. The reductionists character of science becomes evident when it uses its method, which originated as a way of explaining the physical world exclusively, to account for the phenomena of man itself. Although social sciences, which so far as their basic assumptions are concerned are widely regarded today as only an extension of natural sciences, philosophers of science are seen to face a challenge when they encounter the mysterious and ineffable meaning; -- giving activity of human consciousness. Man's intentionality, his freedom to direct his inner being, his urge to seek the transempirical foundation of whatever is given in experience, make any attempt of converting social phenomena into phenomena amenable to natural sciences impossible.
During 1967, two editorials appeared in the Newyork press, one by James Reston in the Newyork times, another unsigned in the wall street journal. Both writers were concerned with an attitude of mind that they called "The new pessimism" : The widespread feeling that our urbanized and industrialized societies are experiencing problems for which there seems to be no solution. This disenchanted mood originates in part from the fact that health and happiness are not necessarily synonymous with comfort and prosperity. But the deeper reason for the new pessimism is that most new technologies have unexpectedly created situations that are inimical to human welfare. Power blackouts, environmental pollution, soaring noise levels, the progressive erosion of public services, social regimentation, loss of privacy, let alone the threat of nuclear warfare, are but a few among the many manifestations within the technological order that are threatening the quality of human existence. Because of the lengthening roster of environmental problems, we are approaching a crises in our own times that could destroy the planet earth as a place suitable for human life. Unless we stop and reverse present trends, the least that can happen is a progressive deterioration of the values and amenities that have given such richness and variety to western cultures.

Science enables technology to do almost anything, but there is a painful discrepancy between what man aims for and what he gets. He sprays pesticides to get rid of mosquitoes and weeds, but he thereby kills birds, fishes and flowering trees. He drives long distances to recapture the purity of nature, but he poisons the air, or is even killed along the way. He builds' machines to escape from physical work but in so doing he also becomes their slave. Each week our magazines and newspapers bear witness to the public's Somber anticipation that the Legend of this Sorcerer's apprentice may soon be converted from a literary symbol into a terrifying reality.
All living things are interdependent and from such a complex and highly integrated web of relationships that what happens to one organism is reflected in many others. DDT and other insecticides sprayed at low concentrations accumulate in plants and in the sea plankton. As a result, they become further concentrated in the fish that feed on plankton, and ultimately reach high concentrations in the birds that eat insects or that prey on fish. Certain insecticides, DDT in particular, become progressively concentrated several hundred fold in eagles and falcons, for eg, which are thus poisoned and become victims indirectly of our clumsy attempt to control insect life. Scientific interventions that appear at first sight to act only on plants and animals may eventually affect human life as well, often in desastrous ways. When nuclear weapons were exploded on isolated pacific islands, they destroyed the local plant and animal life, as was expected; but other, unexpected effects soon came to light. As the fallout spread over much of the earth, it reached the region around the Artic circle, where its radioactive material accumulated in lichens. The caribou that fed chiefly on these plants were in turn contaminated but the lappe and eskimos who ate the caribou were the ones most seriously affected by the far -- off south pacific blasts. Nuclear technologies will soon provide mankind with an almost endless source of energy. Experience has shown, however that any form of energy, improperly used, contributes to the devastation of the environment and makes it increasingly unfit for man. Ecological sciences must be developed to provide the information essential for making nuclear technologies an asset to human life, rather than a threat to environmental, health and to the quality of human life. Walter Orr Roberts, Director of the national center of Atmospheric Research wrote in a similar vein nearly every advance of science has two faces. One smiles on us and lifts the aspirations of man; the other scowls
sternly on all future hopes. For the miracle of the modern automobile there is
the raising scourge of carbon air pollution that threatens to choke our "Bosny
washes" (the giant Boston --- N.Y. Washington megalopolis). The advance of
urbanism brings us befouled rivers, vanishing privacy and lives full of strain and
tension. For all the miracles that atomic energy has wrought in medicine,
industry and power generation, there hangs over us the specter of nuclear
war..................we will likely know when the first intercontinental missile of
world war III comes, should that happen, in a routine computerized check, on a
millisecond time scale, of the inventory of space debris; and the decision to
retaliate, to enter total war, will probably be made on computer based
advice.14

The same sense of Alarm can be read in a statement published recently
by Harvey Brooks, dean of engineering applied physics at Harvard university:-
Scientists are becoming increasingly aware that decisions about science and
technology must be made in the light of their possible second --- order
consequences -- even when these cannot be anticipated; since the
disadvantageous consequences of introducing a new technology can at times
outweigh the primary expected benefits.15 These forceful statements, far
from being antiscientific, represents the scientific attitude at its best, namely,
the willingness to look at facts as they are the best reason for optimism is that
an objective evaluation of the effects of science in the modern world will make
it possible to define the areas of danger and to develop a scientific philosophy
compatible with human values. Evaluated in this light, the breakthroughs
predicted by the Hudson Institute are trivial because they do not suggest any
solution to our present problems. The really needed scientific developments
are the ones that will enable mankind to use technology for worthwhile ends,
instead of becoming its victim. Environmental degradation in all its forms is
everybody's doing and everybody's business; its control requires mobilization of public concern and active participation of the citizenry control will in many cases conflict with individual interests, but this should not serve as an excuse for failure to act. The uninitiated, water pollution means simply that raw sewage and industrial effluents have been discharged into water supplies. But scientifically, the problem is much more complex than that; after all, wastes always contaminated rivers and lakes. Under natural conditions the bacteria of decay, destroy organic materials and convert them into innocuous substances. This self-purification is essential for the maintenance of safe water supplies; it requires only the proper kinds of bacteria and large amounts of oxygen so that they may perform their natural functions. If the amount of organic wastes and toxic substances discharged into streams and lakes is too large, however, the oxygen content of water falls. When that happens, the needed bacteria die, the processes of self-purification collapses, and the water becomes foul. As a result of rapid accumulation of wastes from deficient sewage systems and industrial effluents, may beautiful water ways have been converted within a few decades into nauseous sewers. Lakes Eric, which was once a clear and productive inland sea, is now a rank, muddy sink. Lako Michigan faces the same fate. All over the world industrial wastes are killing off game fish, and sewers are rendering beaches unusable. When self purification breaks down water becomes almost undrinkable, even after chlorination, because it is loaded with potentially toxic chemical substances. Even the dirtiest water can be made clear by filtration. And most (but not all) of the disease -- producing germs it contains can be held in check by chlorination. But there are no practical techniques for removing from it certain minerals and synthetic chemicals. Even though it may be clear and free of bacteria, potable water is becoming increasingly contaminated with an immense variety of substances.
that are not recognized (because of their low concentrations) as dangerous. Through continuous usage, however, these same substances may nevertheless exert delayed toxic effects.

Water is only one of the vehicles that bring chemical pollutants into everyday life. The U.S. Food and Drug Administration estimates that Americans are exposed to more than 500,000 substances, usually over very long periods of time less than 10%. Of these substances have been cataloged in a way that would provide useful information concerning their effects on our environment slowly developing health hazards are not publicized because they lack the drama that would give them new value. Yet the evidence is now overwhelming that even very low concentrations of environmental pollutants can, in time, have disastrous effects through a number of indirect mechanisms.

Air pollution is another threat on everybody's mind. But while it is endlessly discussed by lectures and in newspapers, this does not mean that we have much knowledge of its effects or even of its components. Everyone can see that the air of our cities is increasingly loaded with various kinds of soot and other particulate matter, but there is much more than that to air pollution. Automobile tires grind into the pavement and are slowly pulverized into colloidal material that penetrates deep into the lung, and development of efficient breaking systems for motorcars has led to the release into air of material that contains toxic asbestos particles. City air contains an immense variety of other ill-defined matter, perhaps much more dangerous than those pollutants that have been chemically identified.

It is obvious that air pollutants soil shirts, penetrate closed windows, irritate the mucous membranes, kill plants, and damage buildings. But oddly enough, it is extremely difficult to prove scientifically that air pollution is really a serious threat to health. An eminent sanitary engineer recently stated that,
for all we know, air pollution is more an aesthetic affliction than a health hazard. Why is it so difficult to demonstrate the danger of air pollutants to health? Because their effects develop slowly and often require decades before they can be diagnosed. Persons may become so used to smog that their behaviour and health seem unaffected by contaminated air. However, the respiratory tract registers the insult of the air pollutants, even when the affected person is not aware of them. After periods of time that differ from one person to another, and that may extend to two or more decades, the cumulative effects of irritation commonly result in chronic bronchitis, perhaps even cancer. Since such diseases do not become manifest until a long time after initial exposure, it is difficult to relate the effect to its cause. But it is well established that chronic pulmonary disease now constitutes the largest single medical problem in the industrialized and highly polluted areas of northern Europe and is becoming increasingly frequent in the industrial cities of the U.S. Because the incidence of the disease increases with the time of exposure and the concentration of pollutants, we may expect, infact, that the worst effects of air pollution will not be experienced until the end of this century.

In view of the fact that the new generations are now exposed to massive doses of all pollutants from the time of birth, it is not unlikely that they will suffer the effects of pollution much more than we have. We are engaging in a kind of chemical warfare against ourselves, and especially against our children.

Noise is another much neglected example of the nefarious effects of environmental pollution, since steady, intense noise inflicts irreversible damage on the nervous system of the ear. American courts recognize its effect as an "occupational disease" an award compensation to workers whose hearing has been affected by exposure during work. In many cases however, the level of
city noise equals, and may exceed, that considered on the borderline of safety in industrial work. Recent laboratory investigations indicate that supposedly tolerable noise levels can cause ear damage in animals, and that sounds not sufficiently loud to awaken sleeping persons nevertheless affected their brain waves. Most disturbing in this regard is the recent discovery that the heart rate of the fetus can be accelerated by noises to which the mother appears to have become tolerant. One shudders at the thought of what the supersonic boom will do to the forthcoming generations if it ever becomes a part of daily life. There is as yet no way to prevent the boom at supersonic speeds, nor to decrease it significantly by high altitude flying. We may learn to tolerate the boom, if acceptance of an inevitable harm can be considered as tolerance, but the chances are very great that this acceptance will be achieved at the cost of physiological and mental damage. The sonic "boom may indeed turn out to be the senic doom. 16 Almost everyone can become adjusted to high noise levels, but such an adjustment is usually achieved through loss in the finer shades of hearing and, therefore, one's ability to enjoy music. Clearly the criteria of adjustment to noise should involve more than the ability of human beings to function as components of the economic machine: the criteria should also include the aesthetic qualities of life.

Increasingly we are developing tolerance to ways of life that appeared intolerable two generations ago. Hidden cameras and eaves dropping mechanisms for ability tests, the secret surveillance, computers for recording and disseminating personal data, personality tests, the subliminal suggestion -- all these techniques for the invasion of privacy are gradually achieving social acceptance in government operations, business practices, and private relationship's. This intrusion into one's personal life seems incompatible with
our traditional values of privacy and human dignity, and yet it is increasingly accepted because of certain social needs and apparently beneficial uses.

Western society looks at life in a radically different way from such traditional societies. Perhaps its main characteristic is a willingness to take a critical look at what exists and to make changes. It is an attitude that is applied not simply to economic organization but to everything: to the political and social structure of society and to man's own intimate being. Western man has gone so far as to refashion his environment, the organization of his society, and even his physical make up and psychological nature through the use of surgical, chemical, and psychological techniques. In the last few centuries, these attributes of western culture -- pragmatic, flexible, secular, humanistic -- have become more and more deeply in-grained. Occasionally, contrary tendencies have made themselves felt -- tendencies having to do with certain aspects of the reformation and counter- Reformation, the puritan era in England and the later victorian era, as well as 20th century Stalinist communism, Nazism and Fascism. Nevertheless, the basic thrust toward reexamination and rational change has persisted, until now this western approach to life has come to influence almost the entire world. The transition from feudal to bourgeois society meant the fading of the idea of a divinely ordained social order. Government relations came to be regarded as resting on some form of "social contract" between the people and those holding the reins of power. Human relations underwent an analogous change. Person -------- to -- person commitments were no longer considered to have been made in heaven or fixed by tradition. They became a matter of convenience, subject to reevaluation and alteration.

From this cultural pattern and the institutionalization of change, has come a systematic accumulation of scientific and Technical knowledge. The
process is most commonly referred to -- by the modern corporation, the pentagon weapons planners, the university scientists -- as research and development. It is a built -- in, continuing process for ensuring that changes come about, and at an increasing tempo.

The industrial boom, the accelerating modernization bring increasing affluence and, with it, increasing leisure, which can be brought with affluence. Affluence also makes possible the financing of more and more literacy, which in turn is necessary for feeling the research and development machine'. Populations expand as better hygiene, medicine, and food supplies lower infant mortality. Urbanization accelerates as the population conveys on center where the work of industrial society can be carried out. Agriculture, more and more scientific and mechanized, is left to a decreasing proportion of the citizenry. As the process becomes more advanced, towns turn into cities, and cities begin to run together in a new kind of mass : The megalopolis. The technical -- economic make up of 21st century society will have a marked effect on the cultural and aesthetic life of the community.

A number of respected men of learning have suggested that the erosion of the old values might cause massive socio -- psychological problems. The economists John Maynard Keynes predicted in 1930 that, as a result of the capacity for cumulative economic growth, the "Economic problem" would be "Solved" in perhaps another hundred years. He viewed the prospect with some "dread". The struggle for subsistence has always been man's primary occupation. If it became unnecessary man would be deprived of his traditional purpose. Keynes questioned whether the ordinary man could make the revolutionary adjustments of habits and instincts that would be called for. Still the economist discerned great opportunities : I see us free to return to some of the most sure and certain principles of religion and traditional virtue:
that avarice is a vice; the exaction of usury is a misdemeanor; the love of money is detestable; and those walk most truly in the paths of virtue and same wisdom who take least thought for the morrow. It is said that we shall once more value ends above means; prefer the good to the useful. We shall honor those who teach us how to pluck the hour and the day, the delightful people, who are capable of taking direct enjoyment in things.

Parents will not be so strongly motivated (this already is happening) to imbue their children with respect for diligence, punctuality, self--denial, or even patience or they will try in vain. Rapid technological and cultural change itself creates a strain between generations. Most families will be like those of the American immigrants whose children rejected the values of their parents and looked to their peers and to the external society for their standards. The parents found themselves turning to their adolescent children for guidance because the children we closer to the world around them. A peculiarly American style is likely to characterize the decline of traditional values in the United States. 18 For the most part, the list of 100 technical innovations is a list of physical inventions or improvements, having to do with materials, products, processes, power, and the like. The developments in service that are listed -- new educational techniques, more reliable and longer -- range weather forecasting -- will most probably evolve from material developments, such as new kinds of computers. Some of the innovations are obviously ominous -- for example, new and possible pervasive techniques for surveillance, monitoring, and control of individuals and organizations. (Even so, we can conceive of an over crowded world in which such techniques would be essential. In any event, we can expect more or less successful counter techniques to be devised). Many of the innovations may have unexpected bad effects, or at least equivocal effects for instance, worldwide use of high altitude cameras for
mapping and prospecting could turn out to be harmful in indirect ways -- contaminating the upper atmosphere or increasing spying activities. Another likely occurrence -- though not, strictly speaking, a technological innovation -- is the appearance of new languages this may involve the development of one or more multinational languages, or such rapid change within an existing language that it will, at the very least, be considered to have entered a new phase or there may be a greater differentiation, in which small groups of individuals devise coded languages for the purpose of avoiding monitoring, or to set themselves apart from the rest of society.

It is clear that the middle of the 20th century marked the beginning of a new era, in which mass destruction on an unprecedented scale became possible. It was common in the mind -- and late 1950's to talk glibly of "overkill" and of total world destruction, though in fact no one had made calculations demonstrating the likelihood of such an event with the weapons systems then available. But weapons technology continues to "progress", and it is possible that the "ultimate" in weaponry, the so-called Doomsday machine that can destroy all human life, will become not only technologically feasible but inexpensive.

One of the most important U.S. nuclear programs, atoms for peace, makes cheap power widely available. But it also makes fissile materials available to many nations that could learn to produce nuclear weapons with them rather easily. Other peaceful technologies could also bestow on their possessors the capability for making nuclear weapons, or chemical or biological agents of mass destruction. The biological and chemical sciences are progressing swiftly one result is that new weapons are invented even when they are not the objects of research. As with nuclear weapons, there is much apocalyptic and exaggerated language about biological and chemical weapons.
Even though they have been "improved" tenfold since World War I, when they were last used on a large scale, their capabilities are often overestimated, at least as far as normal military objectives are concerned.

Research in molecular biology and genetics could produce a technology that would be very dangerous in the hands of an unrestrained government. If it becomes possible to alter the genetic inheritance of human beings, some governments might attempt to reshape part or most of their populations in ways considered undesirable by the rest of mankind. They might take a leaf from Aldous Huxley's *Brave New World* and breed legions of soldiers who have great physical prowess and dull, unquestioning minds. There are many possible new techniques for insurgency, crime, or ordinary violence, some extraordinarily destructive weapons might get into the hands of relatively small groups and be used for insurgent or criminal operations or even for "pointless" destruction.

We may also expect new techniques for counter insurgency and 'counter criminality.' These in turn could cause serious problems of excessive or unjustly imposed order. Thus, new technology may shift the balance between "order" and "disorder" either way, or in both ways simultaneously. Since undemocratic, illegitimate, or unpopular regime may have the greatest difficulties with sedition or insurgency, new technology that further strengthens the hand of those in power may be, on the whole undesirable.

Developments in areas like modern technology, weapons etc. raise very serious issues. Radioactive debris from peaceful nuclear installations, waste heat, insecticides, fertilizers and food additives are nuisances today, rather than matters of life and death. But they might grow serious enough to threaten individual health or survival comfort, and happiness. There are nuclear power plants and even commercial steam plants that give off enough heat to
raise the local temperature of a river such as the Colorado by several degrees. As the number and capacity of power plants increase, the resultant heating of rivers could become an overriding problem. Similarly, in large urban areas the temperature is almost constantly five, ten or more degrees higher than in the corresponding rural areas, largely because of heat given off in man-generated activity. To cite one example the air conditioning for an apartment house gives off much more heat to the outside world than is removed from inside the house -- a phenomenon caused by inefficiencies in the system. As urban life becomes more affluent, as metropolitan areas become more densely populated and more dependent on energy-consuming devices, this effect will be intensified. There are other potentially serious problems that are not widely publicized. For instance, some experts believe that the burning of gasoline by high-altitude jets may trigger odd and possibly dangerous reactions in the upper atmosphere.

An issue that has probably received excessive publicity, on the other hand, is the use of chemicals and other artificial additives in food production. It must be kept in mind that while there may have been too much apprehension in the past, conditions could easily worsen -- and probably would, were it not for such campaigns of "exaggeration". A related problem is the sacrifice of taste and other aesthetic qualities of food to economic efficiency. This has already occurred to some degree in the United States. The contamination or degradation of the environment does not necessarily have to be gradual or local. In a nuclear war (or even nuclear testing), it could to both spectacular and multinational, or perhaps affect the entire planet. Bacteriological and chemical substances are not only dangerous as potential weapons; widespread damage might also occur as the result of accidentally produced but uncontrollable epidemics.
Several much-publicized projects, most of them government-sponsored, have been subjects of controversy in recent years because of their real or alleged degrading effects. The "artificial moon" concept of the U.S. Defense Department projectable, for instance, involved the orbiting of a giant reflector that would catch the sun's rays and bounce them back to a predetermined point on earth (in this case the jungles of Vietnam at night), thereby transforming night into day. Astronomers registered loud objections to the project, claiming that it would hamper their observations after studying the proposal, a committee of the space science Board of the National Academy of sciences reported that it saw "no scientific value in a satellite reflector system that is in any way commensurate with the costs and nuisance to science of such a system". Beyond the effects on science itself, the committee discussed the possible adverse effects that an artificially prolonged day might have on those planets and animals whose life cycles are regulated by the natural passing of day into night. On the strength of these and possibly other objectives, the government decided not to pursue the project for the moment.

Another example of possible degradation of environment is the sonic boom that would be produced by supersonic jet transports. Some proponents of the SST expect that the difficulty will be alleviated by more efficient aircraft design and or special operating procedures. But this remains an open question and most experts believe the "boom" constitutes a very serious problem. It has been suggested that supersonic transportation may have to be restricted to routes over water or other uninhabited areas and that, even in that case, shock waves might be excessively disturbing to ships at sea or to other aircraft.

There is a growing awareness that new developments in technology may raise serious internal political and social difficulties. The power failure of Nov, 9, 1965, when the incorrect setting of a relay at an Ontario power station
blacked out most of the north eastern United states, spot lighted the problems of highly centralized or integrated systems that may be more vulnerable or unreliable than had been realized. Potentially, an even more serious problem is posed by centralized "command and control" or other administrative systems that tend to filter the information that goes to the top, thereby giving decision makes a very incomplete and possibly dangerous picture of reality. In some cases this systems may completely supplant other sources of information. There are, of course, enormous advantages in modern management techniques. Yet they may also raise serious hazard by isolating decision makers from direct contact with the actual situation.

Highly centralized facilities are vulnerable to exploitation by persons who want to cause trouble. Furthermore, an overly centralized and automated information network creates a great psychological distance between leaders and followers. This kind of alienation could become widespread in a society dominated by large scale, impersonal, automated procedures. It seems to be one of the sources of the student rebellion of the 1960's. At large universities, where students feel -- justifiably are not that they are mere IBM cards in the eyes of the administration. Another issue raised by a number of observers is that, with an increasingly complex world changing so rapidly and dangerously, and with the need for anticipating problems so enormous, we may be tempted to sacrifice (or may no longer be able to afford) democratic processes. It is important to keep in mind that tyrants have frequently come to power as the result of an overwhelming desire on the part of the people for firm leadership -- leadership that could not be supplied under an existing democratic system. Even if caesarism is avoided, more and more decisions may be made by relatively narrow -- minded technocrats, who -- intelligent, responsible and well trained though they may be --- still may have what Thorstein Vebhen called a
"trained incapacity" to consider problems outside their special spheres of interest. A critically important future development will be the capacity of worldwide communications to show less developed populations what life is like in a modernized society. On the one hand, this will drive home the point that poverty and disease are not inevitable, and should stimulate the desire for modernization. On the other hand, the example of the hippies and dropouts, or a general relaxation of the puritan ethic in developed nations, deni the allure of modernization in disadvantaged regions. This ambivalence may complicate the job of lifting these Economy, since what will be needed are responsible, intelligent local entrepreneurs and dedicated administrators. Propsects seem to be increasing that the traditional path to economic progress, the exploitation of cheap labor, may become much less usable. The reason: Modern technology will tend to make even the cheapest unskilled labor too expensive. As a result of science and technology the availability of cheap and rapid transportation is increasing. So the "brain drain" --- The movement of more skilled and mobile persons to the developed nations -- will be accelerated.

The development of synthetic food could have an upsetting effect in several ways. Removal of the danger of major famine may almost rule out serious birth -- control programs in some nations. At the same time, the problems of education and economic development may remain insoluble until population growth can be stabilized. Furthermore, a greatly increased supply of manpower could be politically, socially, and economically disastrous if there is no constructive way to use it. The same dilemma arises in a slightly different form when education becomes cheap and an "overeducated" group develops (as in India today) that cannot be absorbed into the economy because there are not enough jobs requiring a high degree of education and skill. Another example of the potential of new technologies is that it is increasingly likely that...
the oceans -- possibly even the moon, planets, and outer space --- may become areas of competing or even incompatible economic and military exploitation. They could then become the focus of new international tensions or crises. The problems of choosing the sex of children and of genetic engineering generally are discussed in the year 2000. Another problem along this line is that of supercosmetology. People may be able to change their physical appearance even more drastically than they can today. If this is done to excess, perhaps stimulated faddism, it could lead to loss of identity, depersonalization of the individual, and a sense of impermanence in even the closest human relationships.

Ever since the emergence of science in Europe and the Industrial Revolution, a hope had been nurtured, that the development of science and technology would solve the problem of poverty and remove inequalities. Yet with each stage of development, despite the vast resources, created through the development of science and technological capacities, the goal appears to recede. The inequalities have, in fact, grown, between different sections of society and between different societies. Why has this been so? Various explanations have been suggested such as the factor of inequality being inherent in contemporary science and technology, the misuse of science by the existing society or the delinking of science and technology from religion and morality, which is responsible for the existing situation.

The above mentioned expressions of worry about the present trends of Technological civilization are assumed by the uninformed to represent an anti-scientific attitude. This assumption is absolutely wrong and even dangerous. It corresponds to the euphoric, pollyannalike view of scientific technology that prevailed during the 19th C, the same view that is handicapping us now in our efforts to adopt the scientific enterprise to the problems of 20th C civilization.
Fortunately, many prestigious scientists and technologists -- men and women who can hardly be accused of being anti scientific -- have recently issued explicit warnings that man-made environmental threats are spoiling the quality of human life and might in the end bring about its destruction. One example which illustrates the farsighted and responsible attitude of some leaders of the scientific community in this regard is as follows: In 1967, Elmer Engstrom, the president of the Radio Corporation of America, published in American Scientist his speech of acceptance of the Proctor Prize awarded by the Scientific Research Society of America.

The following paragraph expresses the mood of his message:

The introduction of new technology without regard to all the possible effects can amount to setting a time bomb that will explode in the face of society anywhere from a month to a generation in the future.

Many of the issues we have been discussing may seem bizarre, uncomfortably divorced from what we can accept as potential reality. Yet the possibilities for unaccustomed developments have by no means been exhausted. There has been considerable speculation that the traditional nation-state, unable to cope with rapid changes will find it necessary to limit innovation, even at the risk of becoming authoritarian. The world may not tolerate unchecked population growth in less developed areas that depend on international charity for support. Other "justifications" may be found for interference in the internal affairs of nations -- by other nations or by an international system. For example if a nation started to build a "Doomsday Machine," there would surely be interference from outside. Worldwide changes in environment, caused by man's activities, are already under way. It is impossible to say whether or not we are on the road to disaster, or at what rate. The accumulation of carbon dioxide in the atmosphere as a result of the
burning of fossil fuels, the production of smog, and other similar processes should already be causing a "greenhouse effect". Raising the temperature throughout the world. This should result in melting of the popular icecaps, flooding of coastal areas and port cities, and the closing of vast agricultural areas to further farming. Yet the system that maintains the earth's temperature is so little understood that no satisfactory explanation can be given for the fact that these effects do not yet seem to have started. Conceivably we could poison or otherwise alter the earth to the point where it could no longer support life as we know it. It is hoped that such potential disaster would be discernible in time to effect change. But it is often difficult for people to act effectively on large scale, long-term problems. All too often, these are "everyone's problems" and therefore, for lack of jurisdiction, no one's. Interplanetary contamination is one possible hazard of current space programs, but it seems to have received appropriate recognition, at least at this early stage. In fact, there seems to be far more tender concern for the hygiene of other planets than for that of our own. One wonders whether the unspoken assumption is that, for this planet, it is already too late.

It is clear that western man now has Faustian powers,\textsuperscript{20} which seem impossible to renounce (in the medieval legend, Faust tried to repent but in vain) what is not certain is which of these poetic insights will prove valid. With these powers bring about the damnation of Western man, or will angels intercede for him? Realistically, the possibility must be faced that man's unremitting faustian striving may ultimately remake both his inner and outer environment to the point where he will be dehumanized or where his life on earth will be altered in some disastrous and irrecovable way. Already awesome choices are before him. We have some power now to alter the weather. Suppose that in the future we can divert a hurricane with this ability will come
the responsibility of deciding where to send it. The choice will have to be made, for we will have foreclosed the option of leaving the decision to nature. There is a widespread irrational response to such problems in which the artifacts of technology themselves become the targets of hostility. Also prevalent is the simplistic view that technology now presents man with an either or choice between immolation and utopia. But evils may not be stark and obvious; they may be subtle, slow acting; uncertain --- and well distributed among all the available options. A series of decisions can be taken separately, for good reasons, and yet produce an ultimate condition that, had it been foreseen, no one would have wanted. Practically all the major changes since the beginning of industrialization have brought unexpected and unwanted consequences. Most obvious has been the "fouling of the nest," the Ecological damage from the accumulation of the waste products of industrial society. In the future, medical developments may ultimately blur the distinction between human and non human entities. Research that began as an expression of the value of the individual human life could easily become a step towards the treatment of men as disposable objects.

One of the great tasks faced by society is to facilitate intellectual preparation for the kinds of social decisions that will be required in the affluent, technologically accelerating, rapidly changing society of the future. Clearly, academic training must provide better understanding of the kinds of faustain power over nature (including human nature) that may come into human possession, and a better understanding of the issues involved in deciding what should be done with such capabilities. This means developing a capacity to make judgements or to appreciate the judgements of "experts" on such matters as the evaluation of costs and benefits of alternative policies and of various institutional arrangements for the protection of apparently opposed interests. It
means preserving a willingness to exploit new technological opportunities while at the same time providing a new social option: to refrain from the exercise of dangerous options. It means developing a new capacity to regulate choices that may be socially dangerous, while preserving freedom of individual choice. It means learning to deal publicly and explicitly with issues that once were left to the discretion of private individuals or groups while deferring or delegating explicit decisions where this is advantageous. But after all this is said, we must be aware that, in the final analysis, these efforts can never be entirely successful. Almost the only safeguard that then remains is to try to exercise judiciously and selectively our Faustian impulses to over power the environment, to try to control our readiness to use our accumulating power. But if this power must be used let us learn to respect its disastrous potential.

Without any evidence to support his scientific faith, Franklin was bold enough to write:—

It is impossible to imagine the height to which may be carried, in a thousand years, the power of man over matter. We may perhaps learn to deprive large masses of their gravity, and give them absolute levity; for the sake of easy transport. Agriculture may diminish its labor and double its produce; all disease may by sure means be prevented or cured, not expecting even that of old age, and our lives lengthened at pleasure even beyond the antediluvian standard were they to come back to life, Franklin and his contemporaries would be startled to find that it took less than 200 years to make such hopes become reality, at least in the countries of Western civilization. Although we have become somewhat blase about the marvels of our age, their magnitude can be recaptured by imagining what our existence would be like without them. Medicine has come close to solving many problems of disease that made human life precarious as late as the 19th c,
Nutritional science has determined all the essential food requirements of man, and technology has made it possible to provide them at all seasons in any climate. Almost everyone in the western world can afford to stay warm during the winter and soon will be able to keep cool during the summer. Distances become less a problem with each passing day, and neither lack of time nor of strength need limit any longer our ability to move from one part of the globe to another. The revolutionary advances of the past two centuries warrant the conviction that almost any problem can be solved if it is properly formulated and its solutions diligently pursued. Some students of experimental medicine take it for granted that progress can be made in the control of any disease to which we address ourselves with enough energy. They also are of the opinion that physicists, chemists, and engineers can provide us with almost any kind of earthly good. From penicillin to the control of personality, from supersonic flight to space exploration, the 20th c has been marked by achievements so startling that they dwarf the miracles of the legendary ages past.

Faith in the power of science is now so great, indeed, that several scholarly groups have made it a profession to engage in scientific forecasting of the future for example, scientists at the Hudson institute, a nonprofit research center at Croton -- Hudson, New York, that makes predictive studies for the government, industrial firms and other private organizations, have published a book describing the, scientific, technological, and medical advances that can be expected to shape life by the year 2000 predicts a number of spectacular break throughs in the production of nuclear energy, the development of new electronic gadgets and the synthesis of strange chemical products of its 100 specific predictions. Let me list here a few that have a direct bearing on human life :-
Permanent manned satellite and lunar installations; inter -- planetary travel; permanent unhabited under sea installations or colonies; Artificial moons and other methods of lighting large areas at night; Robot and machines "slaves" for human use; New, more varied, and more reliable drugs for control of fatigue, relaxation, alertness, mood, personality, perceptions and fantasies; Increase in life expectancy, postponement of aging, and limited rejuvenation; Extensive and "Permanent" cosmetological changes (features, perhaps complexion, skin color, even physique); Human hibernation for relatively extensive periods; Programmed dreams; More reliable educational and propaganda techniques for affecting human behavior; public and private. New and possibly pervasive techniques for surveillance, monitoring, and control of individuals and organizations. In addition to these the Hudson institute scientists have also listed a set of developments described as "far out" but still within the realm of possibility by the year 2000 : some of them are :- Establishment of bases on the moon or planets; Increase of human mental capacity by connecting the brain directly to a computer; Lifetime immunization against practically all diseases; life expectancy will be beyond 100 years.

The scientists at the Hudson institute are careful to emphasize that such statements do not represent actual predictions of the future, but are rather statements of what they regard as "falling within the range of scientific probability". Other scientists would doubtless have different views as to what scientific possibilities will be converted into actuality by the year 2000. But all would agree that barring natural catastrophes or Social upheavals, science will soon provide new and powerful techniques for manipulating the external world and man's nature. It is believed that if even a small percentage of the Hudson Institute predictions come true, life in the 21st century should be safe, comfortable, and exhilarating, at least in the prosperous countries of the world.
Yet despite all the modern miracles and the promises of many more to come, there is a growing tendency to place the golden age in the past rather than in the future.

It is acknowledged that any approach to pollution control must naturally take into account a multiplicity of social and economic factors. All forms of pollution whether in the form of smog or noise contamination of food stuffs or waterways, garbage in the street or atomic wastes, constitute the hidden price we may pay for our modern affluent society. No one knows, the total price because it is distributed throughout the whole social structure and has not been itemized. The damage to health, to physical and mental vitality, to plant and animal life, to the aesthetic qualities of the environment, to the artistic value of buildings and objects cannot be readily evaluated. But this does not decrease its social importance we shall soon have to face up to the monumental economic cost of finding a place for the wastes created by the mismanagement of our technological society, because these wastes are now on the point of overwhelming us.

The ultimate long-term objective in environmental control should be to manage society in such a manner that the products of its activities can be recycled so as to become useful again instead of being wasted and added to environmental pollution. An effective and economic policy of recycling will demand much scientific study. It has been demonstrated that some environmental control is being achieved even now by attaching waste and pollution at the source. City garbage is being collected to make fertilizers through a biological process of composting not unlike that which has long been used by farmers and gardeners. Dust from grain elevators is being made into pellets for cattle feed. Fly ash from smoke stacks is being collected for making bricks and cement, sulfure from oil refineries and sulfur dioxide from
factory chimneys are being used as raw materials for the manufacture of sulphuric acid. In most cases, admittedly, the cost of the salvaging operation exceeds the value of the recovered material. But in the long run, and in terms, of total social accounting, it will certainly be more economical to recover a large proportion of wastes at the source than to clean the air, land, lakes and waterways after the pollutants has been dispersed and have left their damage behind. To be fully developed, the social concept, of recycling must take into consideration the manufactured goods after they reach the consumer. There cannot be any real environmental control until we develop Technologies to recycle the materials from discarded household equipment, such as automobiles, refrigerators, freezers, washing machines, and vacuum cleaners. Recycling of wastes is not the only aspect of environmental control that can be approached through a new kind of scientific Technology. Buses, trucks, construction equipment, planes, helicopters, street traffic, subways, elevated trains, air conditioners, office machines -- all these and many other sources of high -- level noise can be made quieter through proper engineering techniques. Acoustical science and technology have provided the U.S. Army with an inaudible motor for frontline, use, the Navy with silently operating submarines, and the air force with an almost silent plane. Surely some of the same techniques could be applied to civilian use to alleviate the health hazards of excessive noise.

In his book, the Most probable world, stuart chase describes a hypothetical suburban utopia in which all the environmental problems of the modern world have been solved through enlightened scientific management. But description of this utopia occupies only four pages of his book, as against 226 pages devoted to a factual and depressing statement of our present problems! This proportion symbolizes how much has to be done before
scientific technology can fulfill its potential for human health and happiness. Our situation today is in many ways similar to that which prevailed during the first phases of the industrial Revolution. The development of industry at that time created new sources of wealth, but it also generated appalling living conditions wherever the satanic mills destroyed the natural order of things, particularly in the mushrooming industrial cities. As we now realize, the creation of economic wealth during the industrial revolution was achieved at the cost of physical and mental degradation of human beings.

Half a century ago, pasteurization of milk was violently opposed by the dairy industry on the ground that it was impractical and would price milk out of the market. Scientific study of the problem soon provided an efficient and inexpensive technology of pasteurization; similarly, we can trust that technological solutions can be found for other problems once we decide to face up to them. Environmental improvement presents problems that can be solved only by a new kind of science. The scientific community must recognize these problems and provide the proper conditions for their study. It was public pressure organized by enlightened laymen that placed environmental problems at the forefront of the scientific endeavor during the second half of the 19th century. I believe that we shall soon experience disasters unless the scientific establishment gives high priority to the study of the forces that are rapidly making the earth a place unfit for human life.

As I have already stated earlier scientific and technological innovation has become an accepted norm of western society today. The citizens adjust very quickly to heart transplants, manned orbital flight, computerized fingerprint tracing, and lasser surgery. By the same token, he is fascinated but not overwhelmed by forecasts that, in the early 21st century, he will enjoy three-dimensional movies and television, take advantage of weather manipulation,
and perhaps be able to choose the sex of unborn babies. A heavy proportion of the forecasting of tomorrow's society, concentrates on such specific technological advances. But it is at least equally important, if man is to cope with change, to try to project what are likely to be the social effects of rampant innovation the effects on man's income level, his work routine, leisure habits and standards of values.

What are some of the social prospects for the 21st century? To begin with, some intellectuals projections show that at the start of the century, per capita income in advanced societies such as the United States, Canada, and Northwestern Europe should range from $5000 to $10,000, about three times as high as current levels. The economy will be dominated by a different range of occupations. Today, the biggest concentration is in so-called "Secondary" occupation (manufacturing and processing), which in recent decades increasingly have supplanted the "primary" pursuits: hunting, fishing, forestry, agriculture, and mining. Tomorrow, because of production efficiencies, manufactured goods will become progressively cheaper in terms of a family's income. Services provided by those in third -- tier or "tertiary" occupations, will probably consume a large proportion of the total. This will be particularly true of services provided by highly trained persons whose productivity can be stretched just so fat: doctors, teachers, lawyers, accountants, and the like. Persons satisfying society's leisure and entertainment requirements fall in the same category. A fourth -- tier ("quaternary") category also will become increasingly significant. It embraces occupations in which services are provided to those in third -- tier occupations: for instance, the teaching of teachers.

What will be some of the other characteristics of 21st century society?
Noneconomic incentives, as distinguished from salary and prospects of advancement, will become of increasing importance in the choice of a job. By these are meant: the geographical location (Note the rush of scientists and engineers to California and to the semicircle west of Boston) availability of good schools; fringe benefits; and the pleasantness or satisfaction of the work. Computers and other devices will make possible data centers where voluminous information on individuals as well as public and private organizations will be instantly retrievable. The implications are for increased efficiency of many governmental functions, and for increased threats to the privacy and freedom of individuals, if adequate safeguards are not built in. A variety of new polling mechanisms will exist that will take rapid readings of the public pulse. This may have the effect of lessening the concentration of decision making at the top and promoting decision making by consensus. The supply and demand market will be less important as the mechanism for pricing and distributing goods. The reason will be that cheap energy and cheap manufacturing methods requiring little labor will make possible a plentiful supply of consumer products.

As has already been mentioned earlier due to the advancement in the science of medicine we have gained knowledge of organ transplantation. As the general population becomes more knowledgeable about the utility of cadaver organs, they become easier for scientists to obtain. If definitions of death become revised legally and if laws governing the giving of organs are clarified, more persons will be able to have spare parts substituted for failing tissues. A superficial glance shows, however that the demand far exceeds the supply. It is possible that one day even this problem will be solved by use of animal donors. Such xenografts have been attempted in the past but have generally failed because of the gross genetic disparity between donor and
receiver solution to this disparity may be accomplished by altering the genetic makeup of the graft. This might permit tailoring of the antigens in the grafts to match those of the recipient. If this could be done, many of the ethical problems surrounding transplantation would largely disappear because present-day morality finds it acceptable to sacrifice animals to preserve human life.

Advancement in science and technology has led to dangerous personal choices. The problems of choosing the sex of children and of genetic engineering generally are discussed in these days/in the year 2000. Another problem along this line is that of super cosmetology. People may be able to change their physical appearances even more drastically than they can today. If this is done to excess, perhaps stimulated by faddism, it could lead to loss of identity, depersonalization of the individual and a sense of impermanence in even the closest human relationships. In the more immediate future, there is ample reason to be concerned about the rapidly increasing use of the so-called mind expanding drugs. Even if it could be proved that these drugs have no adverse physiological effects (many experts claim that marijuana does less physical damage than either alcohol or tobacco), the short-range gratifications such drugs offer may tend to decrease the user's motivation to perform tasks that are difficult but individually or socially beneficial. Affluence brings with it a more permissive society but some -- one will still have to maintain that society. The mind-expanding drugs, such as LSD, are only the most dramatic manifestation of the overall drug problem, evident in the increasing use of caffeine, nicotine, aspirin, tranquilizers, sedatives, stimulants, antidepressants, and other mood changers. As psychopharmacology progresses, it may become possible to alleviate not only incapacitating mental illness, but also such states as everyday anxiety, which often serve useful psychological or social purposes. The mass of men may no longer have to
lead what thoreau called "lives of quiet desperation", but their liberation may be quite different from his hopes.

Aldous Huxley described the possibilities of introducing the "Soma" pill in his Brave New World. When troubles pressed down in anyone, he had only to take a "Soma" to produce a feeling that everything was all right, whether it was or not. Today we are already close to such a pill, with all its potential for producing passivity. The opiate of the people may again be an opiate, in new and improved form. It is not at all clear, whether we can develop institutions or even theories for dealing with this kind of development effectively. The contravensy over legalizing marijuana is a case in point. On the one hand, it is said that prohibition did not prevent the use of alcohol; if anything it encouraged such use, and led to an increase in crime. Analogously, keeping the trade in marijuana illegal may have worse consequences than legalization, assuming that marijuana is no worse than alcohol in inflicting physical or mental harm on the user, or in precipitating irresponsible behaviour. On the other hand, this argument becomes valid only after use of marijuana becomes widespread. Until then, it is foolish to argue that marijuana is no worse than alcohol. Why add its potential evils to those of alcohol? Surely, there is something wrong when we have no way of dealing with this problem until widespread usage has become a social norm.

The issue of lengthy hibernation or even the preservation of corpses for possible revival later, has come up in these years. One such experiment already has been undertaken by the cryonics society of California. The "freezing process" is still in the experimental stage; it is not yet known to what extent the human body may be damaged by freezing or how completely any such damage could be repaired. But proponents expect that the appeal of their idea will spread rapidly. At the very simplest level, one can imagine very sick
individuals being put into some state in which their body processes would be
slowed perhaps stopped in the hope that cures for their illness would soon be
discovered. Meanwhile, however, difficult issues would arise in connection
with the care and the preservation of individual and the management of his
personal property. The wide-spread application of cryonics might result in a
sudden loss of population in an unpleasant year, to be followed by over
population when times improved. There is the question of how the thawed
persons would adjust to a strange society. One can also imagine staggering
legal headaches. Would marriages survive freezing? Would life insurance pay
death benefits? Would annuities continue? Even more difficult to deal with,
from the viewpoint of social policy, would be the voluntary decision of a
healthy individual to hibernate for personal reasons.

Science today is making tall claims. This is evident from the discussion
but it has its own limitations. While the application of science and technology
are speedily transforming man’s life style and confirming his mastery over his
environment, basic existential questions are still asked as pignorently as they
were being asked centuries ago. For eg what is human destiny? How could
man attain perfection? How could a catastrophe, feared to arise out of the
struggle for supremacy among the developed countries in the world, be avoided?
What would be the shape of human relations twenty years hence? The
burdens the technological age has imposed on man have forced into oblivion his
metaphysical sensibility. But the sensibility has something compulsive and
inconsumable about it. The most basic search of man, viz; the search for the
meaning of his life, is embedded in it. The sensibility constitutes the
'ontological man' the inside man, ' the inner space' in us, as it is variously
called. Its peculiar mode of manifestation, in existential personalities enmeshed
in the web of modern civilization is most significantly described by Heidegger
as the metaphysical 'homesickness'. The ontological man cannot be contained within the scientific -- technological life style. He emerges as an alien, a stranger, a misfit, a rebel. The twentieth century technological culture has compelled a change in our view of the individual: he is looked upon as a function, as a mere 'one of them' as one not necessarily with an atman or a human face. Today an individual is defined as a producer, a consumer, an employer or an employee, an executive, a clerk, a manufacturer, an entrepreneur, a statesman, a banker and perhaps last of all, a human being or a person. Science till today inspite of advancement in sophisticated technological devices, has not yet been in a position to unfold/unravel the mysteries of human consciousness mind/ psyche/Ego. And therefore disciplines like existentialism, phenomenology, have made attempts to provide a solution to the problems that are neglected by science.

References


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