THE NATIONAL COLLEGE OF ART AND DESIGN

"Socially Acceptable Design"

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by

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INTRODUCTION

Quantifying Socially Acceptable Design

I consider the term 'socially acceptable design' to apply to products or designed systems created for the good of man. The ideal of this is for products or systems that:

1. Affect the environment naturally (modifying it in the same manner as cosmic, global, macro and micro environmentally initiated changes) since man must live in the environment and live with any contamination of it.
2. Do not harm life on the earth, since this is a subset of the environment as a whole; thus damage to life affects the quality of the environment. A question arises - can changes in the environment /life initiated by man be considered natural ?

I ask this because man has a capacity to reason - 'good' and 'bad'- and it is natural for man to reason. Yet the capacity to reason does not exist (to the best of my knowledge !) in the rest of nature, both globally and cosmicly. I must therefore accept that changes in the environment initiated by man are natural, even if they are detrimental and caused by man made substances. The poisoning of a river by chemicals may be bad for nature (also for man) but it is a part of nature, just as an earthquake or volcanic eruption is a part of nature.

But man can control what he destroys. Man has little or no control over nature. An earthquake will happen regardless of how destructive it is, no matter how many may be killed. Rivers need not be poisoned Man can modify his behaviour and the environment for good or bad.

What is 'for the good of man ?'

I consider, in the first case, 'for the good of man' to be:

Modifications of the environment/society that further man in harmony with the rest of the environment - continuation of the species.

Modifications to environments/societies that allow for the manifestations of mankind - thought, creation, physical activities, to be enhanced or at least unhindered. Some environments have a positive effect on man e.g. most people appreciate the beauty of nature - how many poets and artists have been so moved by natures' beauty to create works of art.

Some environments do not - architectural fiascos such as ghetto-like high rise flats and similar projects the world over.

Modifications that do not take away from attributes of man - dignity of work, free thought and expression, the physical and emotional components of man.

(It is not for me to decide in this dissertation weather the various physical and emotional components of man are good or bad, excepting those that are definitely detrimental - murder, torture, intimidation .... these are not for the good of mankind.)

But 1 and 2 above are idealised. It would be an impossible to monitor every action undertaken by man to determine weather it was for or against the good of society, especially since most actions have a ripple effect in that an action rarely has only one reaction, but a series of reactions, each capable of triggering sub-reactions. For example, the damming of a river. It may provide irrigation and a water supply to some people but how does it change the ecology of the surroundings ? For a net good or bad, and for how long ? Some reactions take a long time to become noticable, like the reaction of the ozone layer to the assault of fluorocarbons and the resulting warming in global temperatures.

Therefore, I feel that design should strive towards a socially acceptable ideal. Design should be pro people, pro environment, non discriminating.

I will now examine some systems to reinforce this idea.
In the following chapters I will examine design and related topics - its impact on the environment, on society. I will cite examples, mainly from the recent past and the present, as I feel that man is approaching a point in the development of our race that will decide weather we will continue as a species or face extinction (at our own hand). If we continue as a race, what will be the quality of life ?

Industrial Design and Technology

Design has developed in response to the needs of technology. It is doubtful that the profession of Industrial Design would ever have existed if not for the increasing rate of change in technology. Through Industrial Design, man is better able to use more of the fruits of technology. But for what use and to what end ?

We are by now very aware of some of the environments that the coupling of Industrial Design and technology has produced. But I feel that so much of what we design [illegible] our life-styles is in the service of an elaborate [illegible] the [illegible] of [illegible]. I am struck by the juxtaposition of the images of high art such as the art glasses of expensive 'furniture' or indiscriminately hand built, meticulously designed limited production cars - with that of humanity in the Third World, [illegible], development, [illegible] as 'non-World' consumers, [illegible] of the [illegible] brands of [illegible] products. Who are we serving ?

It is true that some environments are not greatly enhanced by the hand and mind of the designer. For instance, the work of the National Institute of Design in Ahmedabad in India*, but as [illegible] are usually only on a level that [illegible] positively [illegible] the majority of humanity in the [illegible] environment.

* Formed in 1961 following a decision by the Indian government to [illegible] on a report by Charles Eames. The Institute was established as a training centre and also [illegible] design projects in Ahmedabad. The Institute developed a programme which was [illegible] to evolve a [illegible], including design activities which [illegible] both [illegible] technology and existing craft methods.

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We can be very proud of some of the achievements that the coupling of Industrial Design and technology has achieved. But I fear that so much of what we design like so much of our life-styles is in the service of an existence bringing the race of mankind close to extinction. I am struck by the juxtaposition of the images of high art such as one off pieces of expensive 'furniture' or painstakingly hand built, meticulously designed limited production cars - with that of humanity in our cities without housing, employment, food. People dying in '3rd World' countries, babies at the shrivelled breast of emaciated mothers. Who are we serving ?

It is true that some environments are are greatly enhanced by the hand and mind of the designer, for instance, the work of the National Institute of Design in Ahmedabad in India*, but we (designers) are mainly used on a level that never positively involves the majority of humanity or the greater environment.

* Formed in 1961 following a decision by the Indian government to commission a report on design development. The institute was established as a training centre and also undertook design projects outside Ahmedabad. The institute developed a programme which was sensitive to India's diverse economy, tailoring design solutions which would both maximise technology and existing work methods.

The Development of Western Technology

We are the tool of a technocratic society. This society has its roots some two million years ago, when man's needs for resources were rather modest. Man needed nourishment and shelter. But man's endowment with intelligence led to more complex ways at better satisfying those needs. New forms of shelter, better able to withstand nature and its variables demanded new technology and raw materials. The development of stone tools and weapons necessitated access to supplies of rock for the right kind of tool and weapons manufacture. The development of fire for cooking and warmth created the need to gather wood.

Up until approximately 10 thousand years ago man lived almost entirely in small nomadic communities, probably in tropical regions where climate favoured such a poorly protected creature.

Towards the end of the last ice age, 15 to 20 thousand years ago, some of the more geographically favoured human communities made the transition from Palaeolithic to the Neolithic period of animal husbandry. Technological innovation, social and political organisation underwent an increase in complexity.

The invention of crude forms of agriculture anticipated the clearances of large areas of land. The change from nomadic life-styles to urban life styles led to the development of increasinly elaborate technologies and increases in the production of raw materials - stone, clay, wood, fibres and leather. This also led to changes in the environment as areas of land were cleared for cultivation and settlements.

New food producing skills were devised to serve the needs of agriculture and animal husbandry. Digging implements, ploughs, querns that ground grain by friction between stones, irrigation techniques all became well established in the great subtropical river valleys of Egypt and Mesopotamia in the millennia before 3000 BC.

The technological change described so far took place very slowly over a long period of time in response to the most basic social needs. About 5000 years ago, however, a momentous cultural transition began to take place in favoured geographical regions. It generated new needs and resources, accompanied by a significant increase in technological innovation - the development of the use of metals and the beginnings of cities.

Copper and other soft metals such as gold and silver were the first metals to come into widespread use. This was because they were easy to reduce from their ores, the technology was quite simple. As the use of copper and copper alloys became widespread in ancient urban civilisations demands for the ore grew rapidly. As local sources of the ore became depleted more would be imported from other areas. The advancement of technology was matched by advancements in civilisation and its manifestations of social structuring on large scales, the development of cities and trade routes by land and sea. Between these trading routes, transport was still primarily by animal, with the wheeled vehicle developing slowly to meet the divergent needs of agriculture, transport and war.

Once the technology for the production of iron was developed (probably derived from metallurgists in Asia Minor around 1000BC) there was a switch from the use of copper to the much more abundant iron. The foundation of iron based industries sped up the transformation of other industries and farming with the crafting of new tools. With new tools to clear the land, more trees were felled to feed the furnace. There was a growth of cities to serve the new industries.

The collapse of the western Roman empire in the 5th century brought about a blending of Roman thinking and technologies and the superior iron technology of the Teutonic tribes. By about 1000AD conditions of comparative political stability enabled a re-establishment of a vigorous commercial and urban life. The next 500 years saw the recovery, preservation and modification of earlier achievements. The establishment of printing in the 15th century meant the speeding up of the dissemination and duplication of knowledge.

Throughout the 17th century metallic iron was produced from ore using charcoal as a reducing agent. Charcoal is produced by heating wood up to sufficiently high temperatures to denature it and leave a carbon residue. Britain, which was the leading society in the production of iron at that time began to experience a shortage of wood towards the end of the 17th century. A switch to coal was only successful in mid 18th century when the technology to produce coke from coal was perfected.

From the mid 15th century on to today, the pace of technology and social change has been growing at an exponential rate with newer methods in metallurgy, agriculture, construction, transport, communications and the sciences.

The development of the steam engine led to a chain of technological advances, and a huge increase in the demand for iron and coal. As the new technology spread to Europe and North America, world demands for resources expanded, and perhaps more importantly, international competitions for their control developed. The mirroring of advancements in technology and advances in domination of peoples was happening again and again, but with increasing complexity and speed. Newer technologies need greater infrastructures, spawned more complex societies with more and more abstracted and segmented employment and exploititave sectors.

Electricity was developed in the 19th century and utilised for lighting, then transport and later communication. The development of the internal combustion engine heralded a displacement of steam power as number one prime mover and led to the development of the petroleum industry. In 1859 the first oil well was drilled in Pennsylvania and inaugurated the search for and exploitation of the deep oil sources of the world.

An important development in the change of technology between 1750 and 1900 was that technology became self conscious. There was a change in attitude - from technology being craft based to science based. There was a growing awareness that technology was a socially important function. This is marked by the growing number of treatises on technical subjects and the rapid development of patient legislation to protect technological innovators. Technical education began to appear, first in France, spreading to Germany and North America. There was an increase in specialisation in technology. Whereas before science could be broken into chemical, biological and physical spheres of study there was a rapid splintering within these areas into fields of specialisation.

Two camps were developing - for and against technology - those praising it as the mainspring of social progress, those condemning it as the bane of modern man. Whatever the truth, technology had come of age, and was a forming factor in the continuing development of the civilisation of man, affecting greater and greater sections of population.

20th CENTURY TECHNOLOGY

It is the numerous events of social and technical importance that mark this century as being the most important time in the history if the world. The past eight decades witnessed more advance over a wide range of activities than the whole of previously recorded history. A whole host of new devices and concepts have impacted on our society - the aeroplane rocket, electronics and digital computers, atomic power, antibiotics insecticides - the list grows by the moment. A concentration of technological change that no more than two or three generations has had a chance to attempt to assimilate into our world culture. Now I trace the rapid mutation of our society / ecosystem in the past 80 years - a change of equal magnitude to the changes of our society of the past 2 million years.

Perhaps the most noticable distinction of the first half of the 20th century are the two world wars that occurred in the space of 25 years. Never before had there been warfare on such a scale in such a relatively short period of time. The wars were a great contributing factor to the speeding up of the development in important technologies and social changes. The detonation of the first atomic bomb in Alamogordo, New Mexico in July 1945 is one of the greatest ironies of our technological drive, and the most blunt reminder of how destructive it can be. In a matter of half a century man went from a situation of barley understanding the fundamentals of matter and energy (much less understanding how to develop it on an atomic scale) to using it as a threat that transcends any natural disaster our earth is capable of unleashing.

The two world wars became the testing ground for new technologies, on the battle field and off. The first world war was made possible by changes in communications and transport developed in the 19th century, and helped to evolve these and new developments such as air transport, the tank and chemical warfare. These changes in the nature of warfare saw a transformation of scale - mass destruction, and to keep pace with it, mass production.

The wars stimulated innovation, especially through government sponsored projects which took the isolated workings of scientists and put them into large, co-ordinated research teams, working collectively on the development and application of new techniques. An example of this is the Manhattan project and the development of the atomic bomb.
At this stage in the development of technology it can be seen how technology has been raised to a level of high importance - away from the breaking of new ground by individuals working to sate their intellectual and monitarial appetites to the probing of technical possibilities by minds under contract to large organisations.

The escalation of technological development in the first half of the 20th century spawned developments to change the fundamental elements of society.
In the area of transport - fast, mass transport systems allowed for the speeding up of personal communications which changed business, work patterns and cultural content of nations - nations were opened to rapid exchange of political and cultural views.

Increasing use of the electromagnetic spectrum as a communications medium brought about a fundamental change in the nature of communication. The rate of exchange of data is still increasing at a phenomenal rate, much of this data being useless.

The power sources being utilised in the early part of the 20th century were increasingly complex developments of existing systems. The internal combustion engine was improved enough to power aeroplanes. Diesel engines - burning heavy fuel oils - were adapted to power submarines (in conjunction with relatively modern electric motors), and adapted to heavy road haulage duties. Development of the gas turbine led to jet flight.

Electricity generation capacities increased, to feed new developments in technology and to change life-styles with power for communication - telephone, radio, followed by TV, and home life - cooking, refrigeration and electric lighting.

Industry was changing, in materials used, diversification of products developed (and their increasing integration into peoples life-styles) and in work practices and methods.

New materials developed included polymers, concrete, aluminium and complex heat treated iron alloys.

Industrial organisation was benefiting productivity by improved techniques. Methods of workstudy, first systematically examined at the end of the 19th century, were widely applied in the US and European industrial organisations, rapidly evolving into scientific management. These methods successfully transformed the comparatively small workshops of the 19th century into the giant engineering establishments of the 20th century, with their mass production and assembly techniques. The rationalisation of production inherent in our present work techniques is a legacy of those techniques of the late 19th century. This has had a huge impact on the nature of work itself - divorcing the designer, in most cases, from his product by the consent of mass production, (establishing a role for the industrial designer).

The growth of chemical knowledge profited both the creation of new materials and also led to the expansion of the modern pharmacutical industry with a milestone achievement of the discovery of penicillin in 1928, leading to the development of antibiotics, which were used for the first time in World war 2. The conquering of diseases such as typhoid and other plague diseases had an impact on life expectancies, which were being increased dramatically in the industrialised parts of the world.

Chemical knowledge was applied to the study of food, vitamin groups were categorised and the reasons why some foods are healthy and others not was investigated. Eating habits and public health programs were adjusted. As well as am improvement in quality, food was being produced in greater quantities as a result of the intense application of modern technology. The scaling up of urban areas increased the discrepancy of more urbanites depending on less farmers to utilise, in some areas, diminishing land areas. All facets of technology were called upon on the modern farm - internal combustion engine powered equipment tilling land that twenty years previously was horse tilled. Synthetic fertiliser, a development of the fledgeling chemicals industry, was gaining in popularity and towards the end of the mid 20th century herbicides & pesticides were developed, the most successful being DDT.

During the Second World War there was, as in the 1st World War, an introduction of new ideas, methods, devices. By the end of the 2nd World War industry in many countries had been converted to a level of efficiency that would, within a matter of years, be producing consumer goods at the same rates. War was a good time for implementing new methods to serve mass production purposes.

As mentioned, monumental progress had been made in the field of atomics. So too had radar technology and, at the wars end, television continued where it had left off in 1939 - utilising radar parts no longer needed for military purposes. Those large companies who had huge contracts with the governments to supply military commodities soon switched to producing for a new, fresh society (particularly in the US) wishing to be reborn from the death of war.

After the war the military were also kept occupied. There was the atomic bomb to be concerned about, especially since it did not take very long for the major political powers to start stockpiling the weapons. This side of technology received a boost to all sides by the 'liberation' of German scientific minds, particularly those involved in nuclear research and rocketry. The arms race began and with it the greatest justification for the development of new technology for weapons - for the sake of peace. Military technology provides us with many technological spin-offs, that now provide us with fast jet transport, satellites, nuclear power stations and of course, very efficient weapons and many jobs.

One of the developments which has changed the way we work, communicate and relax in modern times is computer and semi - conductor technology.

It was during the 2nd world war that the first electronic computers were used, though not to any great effect regarding the war. After the war the possibility of using them for a wide range of industrial, administrative and scientific applications was quickly realised. It was not until the development of the transistor in 1948 that real computing power could be utilised. By the late 1950's the computer was in office use, and today most people in technological societies have frequent encounters with some form of semi - conductor device, be it in work using a terminal connected to a larger computer or using a CNC lathe, or even using a multi - function quartz watch.

The data processing power of computers created whole new technologies and industries. Any function that can be rendered into a series of steps which are non deviating can be automated by computer, this giving rise to whole sections of industry under the supervision of one man and a computer. Computers have changed work methods even faster than the mechanisation of work processes that began in earnest in the 19th century.

These changes have changed the face of society. Urbanisation and centralisation increase and with it, in many areas, a change in the fabric of life. Families and traditions have been scattered. Work practices have been disrupted, trades which have been passed down through generations, are lost to increasing mechanisation of tasks and the work in other areas these changes initiated.

The rate of change has accelerated, and instead of the situation 100 or 200 years before where a fundamental change in life-style might not occur in a generation there are now changes in peoples lives - changes that are seriously affecting the quality of life - happening at increasingly fast rates. People now accept change as normal - a change of job, home, car, changes that would not have occurred 100 years previously. People now need change as part of a stimulating life, its an expectancy that 20th century technology and its manifestations in design have cultivated. We are conditioned to accept rapid change, and expect others to accept it as willingly as we ourselves do in the high - technology based cultures of the world.

So we have reached the stage where technology is THE major force in the world. It affects both those who use it and those who do not. In our 'developed' nations it is an instrument of change, the rate of which has dulled our senses. 10,000 years ago change was initiated driven by a need to survive, to adapt. At this stage in man's evolution there are available the tools to allow everyone the chance to survive. But why has this not happened, why do we appear to be destroying ourselves and our planet ?

4

Technology & Economics

Throughout the development of technology in the world there has been an economic motive. Once the struggle to survive had been overcome there was a chance to better ones material position. Throughout history, economic struggle can be divided into two - passive and aggressive.
By this I mean that passive economics profit all. Early barter systems are a good example, someone might have a surplus of something and could then swap it for something they do not possess. Those involved profited from the exchange of goods.

As history unfolded and man's pool of intellectual and cultural experiences broadened, economics became more aggressive. By this I mean that material wealth was gained to the disadvantage of some other system. There was an increasing complexity in economics corresponding to complexities in life. Economic motives prompted developments, social, administrative and technological - the need to better ones life, to live beyond the limit of mere survival.
Technology enabled a transition from passive to aggressive, since having a technology gave an advantage. Those who could use fire skilfully had an advantage over those who could not - it could be used to keep warm, to cook, as a weapon. The more complex a technology, the better one can use it as an economic weapon since it becomes more difficult for others to duplicate easily.

This is the whole basis of todays human economic world - having a technological advantage or having a design advantage. It works on all levels of society.

On the highest level, independent states do business with each other in an endeavour to fulfil the economic needs of the state. For instance, this can happen because one state has a raw material for another state's industrial base - crude oil, for example. It so happens that crude oil is the basis of a large number of technologies. Such a condition can have a large impact on a society - many depending upon a resource being used for economic gain. Affect the availability of a commodity and it affects all related technologies and people in contact with them. So it is dangerous for a society to become dependent upon a technology that has a basis on conditions uncontrollable by that society. But, in an endeavour to widen the gap between mere survival and a 'quality' life, we have become more and more prey to such aggressive economic factors.

As outlined above, the consequences of this dependency on unstable technologies, especially when they form a foundation of a society, are far reaching. It is a distinct economic advantage to control a technology upon which countless people depend.

This is a very important concept in the context of design, since design is the utilisation of technologies. The dependency of someone on technology means they will be very reluctant to allow it to change, since it will affect the qualify of their life. This means that systems designed around a technology are difficult to change if it jeopardises the economic position of those dependent on the technology.

DESIGN & TECHNOLOGY IN THE LATE 20th CENTURY

Design and technology are intimately linked. Without the raw ideas and forms that technology offers us in the shape of new concepts or materials we would not be able to apply design. This has always been so - man always dreamed of flying but was not able to until the technology of flight had been explored and developed.

Through design we take resources unuaseable by man and process these resources, via technology, into a form which we can use. Fire could not be used until the technology of harnessing it was developed. Man then designed means of controlling the technology - a fire could be started and controlled for man's purposes.

Nature 'designs' on a scale where change takes thousands of years. All of natural design is contained in a cyclic journey of creation, function, disintegration and rebirth, everything from the smallest virus to the largest mountain. All parts of the cycle serve a purpose, nothing is wasted when looked at as part of a greater whole. Nature's 'economic' systems are 'passive' - for example, certain parasites live off their hosts without causing damage to the host.

Humans, through the creation of closed synthetic systems, have broken out of this circle of life. We apply technology with a limited view of its function; usually for the creation of wealth or power first, for the use of others second, and without regard to the environment in most cases. Judging by the number of designed systems utilising a profusion of technologies with a termination of usefulness when the system is outdated,

used up or just discarded, it is true to say we do not consider how a technology will indirectly change any other part of a system it contacts once it ceases to have economic credence.
We have not tried to consider how the waste created by a technology can be reabsorbed into the world positively.

This does not always apply. The generation of nuclear waste (the by product of a synthetic system) and its inability to be easily re-absorbed into the ecosystem is a problem that is well discussed, probably since it is such a high profile technology with easily definable weaknesses. Design solutions for the problems of nuclear waste all concern containment, none particularly appealing given the length of time it takes high level waste to become safe. Because it makes economic sense to use fission reactors, and because enough people are convinced that this is so they will continue to be used. So in this case we are willing, for as long as we can get away with it, to use a system that has many faults and only two positive aspects (the creation of electricity and jobs). These aspects only have any value for the short time that reserves of fission fuels are available, so in the long run, are there any advantages ?

This question can be applied to many artificial systems we design. They create a visible positive effect but when examined on a larger scale and from further away have no real positive effect, and in some cases have a great negative effect on other systems.

An example of this is in modern farming. Before it was transformed by modern technology, the farm was a place where natural biological activities were localised to produce food. Plants were grown in the soil and animals fed from crops. Plants and animals were nourished, grew, and reproduced by means long established by nature. There interrelationships were natural - the crops withdrew nutrients, such as inorganic nitrogen from the soil. These nutrients were derived by bacterial action from the organic matter in the soil. The organic store was maintained by the return of plant debris and animal wastes to the soil and by the fixation of nitrogen from the air into useful organic form.

In this form of farming, man is keeping the ecological balance nearly stable. With a little care the natural fertility of the soil can be maintained as it has been, for example, in many parts of the world, particularly in the Orient - for centuries.
It is particularly important for animal manure to be maintained in the soil and for dead vegetable matter to be returned to the soil.

Post World War 2 technology has changed this.
In the great depression of the 1930's, American farmers of the mid west were constantly struggling to survive, as the soil of their land was first degraded by poor husbandry and then lost to the winds and washed away in rivers. After the war new technology came to the rescue. This new type of technology, when deployed as a farming system, became very successful when measured by the hard currency of the farmers economic return. Agriculture had become agribusiness.

Agribusiness is founded on several technological developments - new farm machinery, genetically controlled plant varieties, feedlots, inorganic fertilisers and synthetic fertilisers. Much of this new technology has been an ecological disaster, contributing greatly to environmental crisis, but since it is now part of the economic system of many nations and has restructured many related job areas it has become a grim necessity, immensely difficult to change.

An example of this is the feedlot. Cattle, removed from pasture, spend most of their time in one area being fattened before slaughter. Their wastes are confined to one area. Organic wastes take time to break down to humus, so in the feedlot, where large quantities of wastes are localised , most of the nitrogenous waste is converted into soluble forms (ammonia and nitrate), which is leached or evaporated and can find its way down to the water table or directly into rivers and lakes, contaminating the water for both humans and other organisms.

Confining the animals to feedlots has another ecological disadvantage. Animal waste helps form humus, a component of soil, and when animal waste is removed, humus is less readily formed. Intensifying agriculture depletes the humus content of the soil, making it less fertile. farmers had a choice - spread the animal wastes from the feedlots or use inorganic fertiliser. Since manure must be managed carefully in order to derive the most benefit from it and some farmers are unwilling to expend the necessary time and effort needed, it must be stored carefully in order to minimise loss of nutrients, and applied to the proper crop at the proper time.

Why was there a need to switch from natural methods to artificial ones? In the areas of the US. where the soil was made barren by poor husbandry the only alterative to abandoning the land was to revitalise it artificially, and where a person had the possibility of quitting their home, job and community, artificial methods were the logical answer.

Farmers allowed themselves to become dependent upon a technology over which they had no direct control. It meant they had to depend on it to continue farming, no matter what effects it had elsewhere, provided it did not affect the farmer's ability to maintain or better his material comfort.

There are many other examples of how our designed systems are utilising technology and causing damage to the environment. Most of these systems, as described above, will remain unchanged until an irresistible pressure which overides economic precedence is forced upon us. Such pressures may be manifesting themselves now, such as the growing debate concerning the ozone problem and the greenhouse effect. Knowing that our technological culture has caused this has not, it would appear, prompted any real rethink into how certain technologies and their corresponding design spin-offs could be altered to stop damaging the environment (and human-kind).

The reality is that those involved in decisions regarding the implementation of designs on all levels of society, from power stations to foodstuffs, are fully aware of the pros and cons of such systems but economics over-ride ecology. Our main economic and technological systems have been designed with ecological variables left out of the design equation. These designs, having been built upon from base designs of the early 20th century have the same ecological flaws. These flaws, economically speaking, are acceptable for the time being since the net economic effect at the present still yeilds profits or keeps people employed. They are for 'the good of our country' or 'the good of our coal industry'. Since they have become woven into the fabric of society it is difficult to change them in times of relative prosperity.

Until it becomes economically viable to include ecology into the design equation nothing real or lasting will change in our systems. Token gestures are made to give some semblance of ecological sensitivity - such as the change-over from the use of leaded to unleaded petrol in cars.

Changes are also made when humans involved in the economy of a region become endangered - the smoke regulations after the great London smog of 1956 could only have been implemented because of the high death toll resulting from the smog.

Our designed systems, by affecting our ecology, affect ourselves. Ecological diversity (which is being undermined by mass extinctions caused by the destruction of habitats, over fishing and hunting), has a great stabilising effect on the ecosystem. A number of studies and extensive field research demonstrate that fluctuations in populations ranging from mild to pest-like proportions depend on the number of species in an ecosystem and the degree of diversity in the environment. The greater the variety of predators and prey in an environment, the more stable the population. Also, the more diverse the environment in terms of fauna and flora the less likely there is to be ecological instability. If the environment is simplified and the variety of plant and animal species is reduced, fluctuations in population go out of control, tending towards pest proportions. By reducing diversity, systems break down.

The need of farmers in some countries to rely on cash crops means they have nothing to fall back upon if the crop is lost to weather or pests - the farmer suffers and so does the land. This situation would not occur as easily if there were diversity - different crops have different characteristics, so while one may be attacked by one form of insect, another will not. Decentralisation is important, with a sensitivity to region, climate, plant and animal life. Otherwise, the land becomes barren and is lost to the elements.

The same sensitivity can be applied to many systems on a macro scale - is a system suited to the population or local ecology ? Does it utilise or complement the skills of the people and the local biodiveristy ? If the answer is 'yes' then the locality should profit from a level of stability, both social and ecological.

6

SOCIAL ASPECTS OF DESIGN & TECHNOLOGY

In the last chapter I examined how economics, modern technology and design have combined to force man's life-style against the ecology of the earth. These systems have also, in many cases, become blatantly anti-man as well as anti-ecology. In an endeavour to utilise technology for economic gain many humans have been and are increasingly being left out of the design equation. People in technological countries have become conditioned to believe design is a right, it is lauded in the media and provides diversions in our bland lives. It is a part of modern life to possess designed items by virtue of the fact that we have money to purchase them and they are rewards and necessities of life. We purchase because "it's the newest", "it's got special functions", "it's better than last years", "I liked it", "I needed it".

Companies are happy to supply objects to be purchased and possessed. They utilise production methods to enable them to produce as fast as possible as cheaply as possible. In many cases, production is first to create profit, possibly to satisfy a need, rarely to satisfy a genuine need. How many times have we grimaced at some particularly useless object being hawked on TV, responding to some fad or another, knowing that it will sell successfully for a time and end its days in a drawer or cupboard. But possession of technical products creates a feeling of sophistication, an embodiment of the scientific achievements of man - how we have escaped the barbaric life of the animal kingdom. People have substituted the satisfaction of owing things and spending money for any meaningful reward in life. In the words of Karl Marx:

> "They want production to be limited to 'useful things', but forget that the production of too many 'useful things' results

in too many useless people".

We are allowing technological progress to steamroll over ourselves. Technology has so many uses, both good and bad, that we tend not to look too deeply at how far it modifies our life-styles and environments since life has become so complex. It is impossible for most people to comprehend the total change caused by our technologies, they can only grasp small insights, such as when they purchase a video recorder, use a computer, read about an air crash or see another oil spill from a damaged ship. Technology is such a mystery that people do not realise how it changes them unless it does so in a direct, catastrophic manner. It is especially difficult to differenciate socially acceptable design from non socially acceptable design, due to the integration of all forms of design into life. Some things may just feel 'righter' than others.

It is true to say that technology has displaced and replaced many social events and activities of former times. We in technological societies have lost skills and abilities to technology - abilities that, in the past, lent a sense of purpose and fulfilment to people's lives.

This is reflected in modern work practices. An example is that of draughting. In Britain and Europe upto the 1940's the draughtsman was central to the design activity, and was familiar with all aspects of the design of a component or components. Today, these aspects are broken down into isolated functions with specialists governing disparate aspects of a design. The draughtsman then digitises the design which can then be used to compile instructions for a computer controlled machine such as a milling machine.

Therefore, the interaction of people at all levels of the design process is being disrupted - the interplay of interpretation and feedback between the designer and skilled manual workers on the shopfloor is being broken. Skilful and highly satisfying jobs on shopfloor level up have been destroyed, the jobs technologically eliminated.

Work is a very important part of our lives, giving vent to our myriad abilities, allowing self expression. Not, of course, the type of work associated with mass production techniques of the present, which seek to reduce the human form to no more than an organic machine - but instead work which unites hand and brain in a creative process. In the words of Mike Cooley:

> "Work should provide a balance of a range of activities - manual and intellectual, creative and non creative".

This balance of work is still found in many non technical parts of the world, and also with those privileged with some of the more holistic work forms in the technical world.

The Indians of the Amazon Rain Forests have managed to continue their way of life in harmony with an environment completely unsuited to the technocrats who currently pursue the exploitation and destruction of this land. They have the knowledge of poisons and healing which is of great scientific interest.

Their culture has remained unchanged until the recent (past 500 years) of intrusion by colonists into the forests. There way of life was as complementary to the forest as was any other plant or animal.

As they contact the outside world, their great skills are lost. What use can they serve to the frontiersman ? None. He is trying to adapt the land to his life-style, an adaptation which destroys the 'factories', tools and raw materials of the Indian. The frontiersman clears the forest to grow coffee or coca, or for mining tin or gold. The stable environment of the forest disintegrates, destroying the life of the Indian and impeding the prosperity of the frontiersman. Everyone loses out.

This will continue, for good or bad. After all, many of those intruding onto this virgin land are there out of desperation, trying to escape a former life which offered no hope.

Technology changes work practices. The Indians will lose their old skills, their culture will be absorbed into the seething mass of techno-culture. Work practices are changing at an ever increasing rate because systems are becoming obsolete so quickly. High capital equipment is an example of this. Computer systems of the 1950's were obsolete in ten years. Now computer systems become obsolete in 3 to 5 years.

Horse and oxen have been used for thousands of years. Now, our cars look "dated" after 3 or 4 years.

Norman Macrae, deputy editor of the Economist in 1972 said:

> "The speed of technological advance has been so tremendous during the past decade that the useful life of the knowledge of many of those trained to use computers has been about 3 years".

This rate of change places great stress on people in these rapidly changing areas in their attempt to keep abreast with the latest technology. I quote Mike Cooley:

> "What is happening is that the organic composition of capital is being changed. Processes are becoming capital-intensive rather than labour intensive".

This has led to the changes in the structure of employment seen in technological countries. There is a concentration of labour in the services area. Industrial employment is declining with increasing automation, and agriculture is being concentrated with smaller numbers of

people feeding the remainder of the population.
On the topic of agriculture, on of the ironies of the modern farming system is the fact that farmers use various synthetic methods to vastly increase their productivity while at the same time there are vast surpluses of meat, milk, butter and wine, being kept in intervention at great cost. Yet there are places in the world where people die of starvation for lack of food.
The change in the employment structure is leading to chronic unemployment. If someone is made redundant by an automated process it can mean that the skills they have for their job cannot be applied elsewhere. There is the view that if people lose their jobs in traditional industries that it will liberate them to engage in more creative activities. But instead of a new found freedom to enjoy leisure there is enforced idleness. It is argued that people displaced from one job sector can find employment in another. But other work areas are becoming automated, computerised, so if this is happening in all ares of employment it cannot be expected that people can find new jobs, especially in areas that bear on relationship to their skills. In this instance, technology is not serving the people.
The systems are being designed with an insensitivity to people who, in many cases, have no choice but to indirectly support the industry by purchasing necessities manufactured using these systems.

Even for those left with employment (especially in the industrial sector) designed systems can still lower the quality of life. As automation speeds up work processes, a glaring discrepancy becomes apparent regarding the work tempo of machine and human. Humans cause a bottle neck in the flow of manufacturing. This leads to the pressure to replace this inefficient part with something to complement the pace of the machine. We are adapting industry to serve the machine.

The pressure of employees to make workers to conform to machine like conditions has led to much industrial unrest and loss of productivity. a report from Rome in early 1985 indicated that in a major car manufacturing company with over 180,000 employees, 147,000 of whom were factory workers, 21,000 were missing on a Monday and there was a daily absentee rate averaging 14,000, this was attributed to the increasing disgust of the younger workers with the assembly like discipline and the recent influx of untrained southern Italians into the northern factories.

The pressure of machines on workers, which began so many years ago with the introduction of steam engines, is spreading to all forms of work. In the push by manufacturers to utilise their high capital equipment to its full potential (before it becomes obsolete) there is the push to have workers to on all levels of to fit into a machine centred routine. This involves the likes of shiftwork and the adoption of scientific management - Talorism. It has started with manual systems and as machine systems become more complex, is filtering into tasks which are intellectually based.

This is leading to an objectification of systems. Machines cannot make subjective, intuitive judgements, judgements which are the life-force of diversity. We are in danger of closing off creative options and solutions to problems through over reliance in machine centred systems.

The pressures of the work place have an effect on home life. Technology produces effects which spread right through the fabric of society to affect the way we live and the way we relate to others. For instance, continuous night shift work has an adverse affect on the physiology and psychology of men. Biologically, we are not nocturnal creatures.

Our systems have started to diminish the quality of life of intellectual workers (i.e., those not directly involved with skilled manual labour) just as it has already done to shop floor workers, particularly in the areas of computer aided design and diagnostics.

With the increase in the tempo of change it is becoming increasingly difficult for those in industry and government to grasp the sum total of the changes happening to the way we work and to how our social systems interact. Systems are becoming too complex too quickly, frequently not addressing the needs and wants of people world-wide. Design is on such a huge scale that systems are conditioning people, who have so lost touch with human scale that they place themselves at the mercy and care of these systems (which appear to take over the role of religion in some lives). We trust that systems will continue to function in the way they have always done, changes being initiated by little known or unknown people across the globe.

7

WHERE ARE WE GOING ? - DESIGN DECISIONS

The end of the 20th century will see an intersection of events which will direct human life in the future. Environmentally, the damage we have been causing to land, sea and air since the inception of the Industrial Revolution will probably have reached a point where any changes initiated to redress the damage caused will not stop some, possibly irreversible changes to the world ecology.

Socially, we are going to have to relieve the inexcusable burden of those in the 2nd and 3rd worlds, for all our sakes. Without help, 2nd and 3rd world populations will continue to grow, increasing the difficult task of feeding these populations. Vast areas of land and sea will be lost due to defoliation. The effects of this will not be localised - it will change life world-wide, just as the continuing destruction of the Amazonian rain forests is not only affecting those in Brazil but also the rest of the world by changing climactic conditions.
In the technically advanced areas of the world, the unchecked policy of technical advancement for the sake of industry without proper and detailed reflection could lead to greater environmental damage, chronic unemployment and serious deskilling of workforces.

Technology is on the brink of another epochal period in its complex development. We are nearing the end of our easy access to crude oil, having nearly exhausted primary supplies. Mush of industry is based on petroleum derivatives. A change in the availability of petroleum will trigger a change in energy, transport, materials, pharmacuticals and politics, to mention a few areas that owe much to the petroleum industry.

Changes in these major industries will in turn trigger economic and sociological changes. The foundation of industrialised nations of the world will crumble.

It is foolish to think that industry will allow itself to grind to a halt for lack of raw materials. Alternatives will be utilised to take the place of diminishing resources, but only when it becomes economically viable to do so.

SOCIALLY ACCEPTABLE DESIGN

At this transition period, there will be scope for a radical restructuring of our economic and social systems, an age of socially acceptable design. That is, design changes on all levels of economics, technology, industry, society and environment. To avoid a collapse of human civilisation, change must permeate into the very sub conscious of humanity. Regard for both society and environment must become as familiar to us as eating and sleeping. This will be on two scales simultaneously - micro and macro. Knowledge of and regard for existing positive systems in harmony with the environment, on all scales.

It all sounds too idealistic, too far removed form the reality of life. That is, the reality of human life. But during times of great danger man is capable of extraordinary sacrifice and change. during the two world wars we saw the radical restructuring of labour and industry for the cause of the continuation of freedom of man. In the near future man will be faced with tangible results of his continued war with the environment and exploitation of non renewable resources . Survival will call for a new global policy of sensitive design, holistic design processes with priority towards the needs of environment and man. Victor Papanek wrote:

> "Design is the most powerful tool in the hands of mankind with which man can shape his environment and, by extension eventually himself.
> In the final analysis, man shapes society and his future by what is taught to the young, how it is taught and why."

There should be some understanding imparted to children at all levels of education and on, throughout life, regarding the power of design to transform environments. It should be taught to all, since every human action is a design action of some description. Discarding an empty plastic bag alters the environment, so to does planting a tree or building a house.

Traditional design education is an obvious starting point for a change. Modern design education has been aimed at educating to produce for human consumption, pandering to human needs and ideals of an aesthetic from. Design should seek to place the environment on at least an equal level with humanity because, without an environment, there is no humanity.

In the case of industrial design, an effort made to both communicate design in the interests of man and nature could be made almost immediately, since industrially designed products are such a large part of our material world.

In college, the industrial design student is made aware of the possibilities of industrial design and the systems utilised to realise products. A course outline for the industrial design course at the N.C.A.D., Dublin states that the course is

> "based on the need to provide the design profession with graduates whose education will enable them to initiate, sustain and support new developments and radical thinking in the exercise of and wide range of industrial responsibilities.... Graduates will attain levels of professional and personal competence as industrial designers commensurate with the future anticipated demands of industry, commerce and society.
> The graduate will.... perceive the significance of social, economic and environmental influences as they relate to the design of manufactured artefacts."

Despite the fact that an awareness of the environment is communicated (relating more to design sensitivity attributes rather than a holistic sensitivity), the majority of design students are not motivated to utilise their skills for the good of humanity and environment as a whole. As newly graduated designers they face the task of securing employment and are committed to the hands of potential employers. The majority of graduate students cannot afford (monitarily or otherwise) to be selective in their endeavours to find employment, let alone employment as socially useful designers.

So, once the design graduate finds employment, the forces of industry and commerce take precedence over long term social and environmental design goals. The designer works for the paymaster first, and is obliged to create, within parameters dictated by brief and budget, products suitable for human use. Judging by the amount of material lost to expended, broken and discarded products which litter the world, the brief and budget do not extend to dealing with post user problems and solutions. It is imperative that industry be sensitised to the requirements of the micro and macro environment. This will have to carried out outside the limits of economics and before our world becomes so sick with global mismanagement that it is too late.

We must educate all, not just our children, our designers, but everyone, that our every action changes the quality of life for humanity and our precious ecology.

CONCLUSION

Design activities are the most human of human attributes. We are the only force on earth that consciously alters our environment, and match the greatest of natural phenomenona in our abilities to alter landscape, seascape atmosphere and ecological diversity.

The recent history of human design achievements have been overshowed by the toll exacted upon the earth, manifestations of poverty, war, drought, climactic and ecological imbalance.

Our actions in the recent future must be radically altered if we are to avoid losing our worldly assets, assets we share with all creatures and organisms. The design activities of the industrialised world must move from being an economic, people based systems to a non-economic, ecology based systems which are sensitive to the interdependence of all natural systems which support biological diversity.

Our synthetic systems must also be sensitive to natural systems, interacting with and altering the earth for the good of humanity and ecology.

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