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TECHNOLOGY AND VALUES: THE NEED FOR ALTERNATIVE  
TECHNOLOGY

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When we look at the technology in today's society a curious paradox arises.

On the one hand, with the development of technology we are promised a society of plenty, the society of growth, the developed society. In October 1945, the Atomic Energy Act declared that "atomic energy will increase the standard of living, will consolidate free competition in private enterprise, will promote peace in the world".

On the other hand, an ever larger number of people sense or see a growing disenchantment at the results of applying technology to many fields of human activity.

Within the industrialist society there is an increasing sense of perplexity before the many instruments conceived by human brains and created by human hands that turn against humanity and give such negative results that they even endanger the human species.

Exploitative economic activities, driven by the application of technology, have led to large differences in income within and between countries. Destructive and grasping economic activities within today's society have inflicted serious damage on the Earth's natural patterns. The exploitation and contamination of the Earth threaten not only the health of the atmosphere, the climate, the water, the soil, the flora and the fauna of many countries, but also the natural cycles on which we and all living beings depend.

Technology should be understood as encompassing not only all our tools and machines, but also the very organisation of work, which decides production processes. To draw a parallel with computers, we might say that the machinery is the "hardware" and the way work is organised is the "software".

All technology, within any organised society, leads to a whole set of concepts, of models, of relationships and forces that shape the way of life of each society. Technology evolves by selecting the features that allow it to interact better with the powers that be. Thus we cannot speak of the neutrality of technology. We need only look at its financing and its relations with the governments of the nation-states and the armies. That is why we must question both the nature of the technology the industrial society generates and the uses to which this technology is put. Consequently, the roots of the problems created by technology have to be sought both in the design of the technology itself and in the use it is put to.

### **How has the present situation come about?**

In the so-called organic societies, the differences between groups of different ages, groups of different sexes, etc., and between humankind and the living and non-living natural phenomena, were looked on as a "unity of differences" or as "unity in diversity" and never as hierarchies with some dominating others.

In these societies the idea that man's destiny was to "dominate nature" didn't exist. This idea of dominance over nature arose very slowly during the course of human history as some men began to dominate over others.

The organic societies were characterized by the following features: a) complete equality between individuals and groups of different ages and sex; b) usufruct and, later, reciprocity; c) avoidance of coercion in dealing with internal affairs; d) the "irreducible minimum" --that is, the inalienable right of each individual to food, shelter and clothing, regardless of the amount of work contributed.

These societies grew up spontaneously, were not coercive and were egalitarian; they were "natural" societies arising from the need of human

beings to associate, to be interdependent and to care for one another.

The failure or crisis of the first organic societies of the Neolithic marks a decisive turn in human development. In the long millennia separating the early horticultural societies from the "great civilizations" of antiquity, we have evidence of the rise of towns, cities and finally empires in which the collective control of production was displaced in favour of elitist control, family relations by territorial and class relations, popular assemblies and councils of elders by state bureaucracies.

The supremacy of old over young, of men over women, of shamans and clergy over laymen, of one class over another and of the state over society was the culmination of a process of hierarchy and domination that has led to today's situation.

But it was quite a bit later on in the history of humankind that classes and economic exploitation arose, followed by the state and all its bureaucratic and military apparatus and its armies. The state with all its specialized armies of civil servants, bureaucrats and soldiers has, from its emergence, been in constant and acute conflict with all the forms of collective association with which humankind had endowed itself over the ages.

We mustn't forget, though, that hierarchy and domination have invaded fields of human life that are less material and less tangible, and have been profoundly interiorized, as can be seen from the supremacy of mental activity over physical work, of the intellectual experience over sensuality, etc.

The view of the reality of the first organic societies as something diverse and natural has been transformed into today's hierarchic mentality which classifies every little phenomenon in mutually antagonistic pyramids around the notions of "superior" and "inferior".

## **The two technologies**

In an address given in 1963, Lewis Mumford defended the thesis that in the Middle East two technologies had existed side by side from the end of Neolithic times until today: one was authoritarian and vertical, systems centred, powerful, inherently dominant; the other was democratic and

horizontal, centred on the human individual, weak, durable and resourceful.

Authoritarian technology appeared around the year 4000 B.C., coinciding with the appearance of kingdoms and of organisation based on physical coercion, forced labour and slavery. It was the early economy of minority castes (religious, military, scientific, bureaucratic, etc.) which allowed the survival of urban nucleuses and massive construction and destruction.

Democratic technology, using small-scale production methods, based on human ingenuity and animal traction, was a process directed and controlled by the peasant and artisan.

According to Mumford, authoritarian technology is displacing democratic technology and destroying the autonomy of the communities that practise it.

So from the primitive Neolithic complex there arose a different type of social organisation. This society is not scattered in small units, but united under a bigger unit; it is no longer democratic --that is, based on close ties between neighbours, on egalitarian customs and general consensus--, but is authoritarian, directed from a centre and maintained under the control of a dominant minority. It is no longer confined to a territory, but intentionally steps outside its borders to seize raw materials and men from whom it demands tributes and on whom it imposes controls. This new culture does not make for an improvement in the lives of people in general, so much as for the expansion of central power.

The egalitarian technologies that began to evolve within the horticultural communities of the Neolithic have come under constant attack from all systems of domination and obeisance, be they cultural, traditional or psychological, political or economic.

All systems of dominance have throughout history developed authoritarian technologies to challenge egalitarian technologies, since the smallest spark of autonomy, of self-sufficiency --both of people and of communities-- was the chief obstacle to the desire for dominance over humankind and nature.

## **Industrialism**

The industrial society we are swallowed up in today arose from the need to "rationalize" the work process --that is, to make it more and more intense and more efficiently exploit the workers, something unthinkable in the self-regulating system of artisan production.

The ideology that supports, justifies and drives a society of this sort adopts the principle that the development of society can take place at the expense of exploiting and despoiling nature. Modern production systems are the materialization of this principle.

The original object of factories was to dominate work and destroy the worker's independence from capital. The loss of this independence involved the loss of the worker's contact with and ties to the land and the crops.

The worker's complete dependence on the factory and the industrial labour market was the basic indispensable condition for the triumph of industrial society. The need to destroy all means of independent life the worker might have, from a small plot of land on which to grow food to straightforward skill in the use of tools and the ability to provide his or her family with shoes, clothing and furniture, has no other object than to reduce the proletariat to a condition of abject poverty before capital.

To sum up, the process of industrialization has consisted in:

- bringing together artisan workers in factories,
- mechanizing manual work,
- controlling companies "scientifically",
- automating the productive process,
- computerizing society,
- robotizing the productive process.

This process of industrialization is a global one and is repeated in every country and in each new branch that arises. In this situation work tends to go from being an "artistic activity" requiring imagination and decision-making to being an "automatic" activity which rules them out.

The growing technification of life has altered activities which for thousands of years and over millions of square kilometres have taken place naturally, such as education, medicine, transport, etc. Technification over a certain level endangers global stability, because decisions are taken too late and too far

away and have excessively far-reaching effects. According to Ivan Illich it makes for a new elitism: the benefits to a few are achieved through an overall increase in the drawbacks.

Not long ago, Jerry Mander compared the characteristics of what he called "technological peoples" and "native peoples". The comparison shows, even today, the two technologies Mumford spoke of.

## **Alternative Technology**

Today's industrial society raises problems that are a result of our current technology and mode of production and for which it is difficult to find a solution based on the same principles on which these have been founded until today: hierarchy, division of labour, exploitation of nature, etc.

For E.F. Schumacher, "the choice of technology is the most critical decision facing today's societies".

But neither science nor technology can by themselves, in the words of Robin Clark, "find a way out of the present crisis, though any real way out will involve a science and a technology, even supposing that in the future these activities have little bearing, either qualitatively or quantitatively, with what we mean today by science and technology".

The technological alternative consists of the machines and tools, the political and social structures, the organisation of work, through which both human individuals and nature are freed from the domination and exploitation inherent to our present technology.

For Michel Bosquet, "without a struggle for different technologies, the struggle for a different society will be in vain".

Today's science and technology --taken as a whole-- are the cause and the effect of the development of today's industrial capitalism.

## **Characteristics of Alternative Technology**

AT has moved on from its embryonic phase to become common practice in many centres and places both in the industrialized world and in the developing world.

The characteristics of AT have a bearing on the whole of society (Table 1), on the principle criteria for decision-making in industry as regards products, raw materials and processes (Table 2), and on the use of energy sources.

AT is an alternative technology which allows and encourages a simultaneous social change which frees human individuals from the exploitation, dependency and alienation to which they are subjected in today's industrial society.

AT is a technology which apart from being simple and cheap (using local knowledge, means and resources) is also non-alienating, introduces a human scale to enterprise, brings mechanisms for decision-making and control closer to the people affected, and is a more democratic and decentralized form of organisation. It is also a non-violent technology as regards the Earth's natural systems, non-contaminating, based on an efficient use of energy and raw materials, and makes use of recycling. It is a technology that provides more autonomy, both to the users and to the workers.

This technology has received different names: Appropriate, Intermediary, Alternative from a political point of view (Dickson: "technology is not neutral, it always defends the interests of the dominant social group"), Soft from an ecological point of view, Radical, Convivial (Illich: "a tool is convivial to the extent that it leaves me plenty of room and greater power to modify the world according to my intentions, to the extent that everyone can use it without difficulty, as often as he or she likes, for the aims he or she sets him or herself"), Small Scale or Human Scale, Autonomous, Basic Need Technology, etc.

AT is a technological alternative based on the minimum use or non-use of non-renewable resources, which interferes less in the world's ecosystems, which tends towards self-sustainability of the bioregions (natural/cultural regions) and which eliminates the exploitation and alienation of human beings.

AT involves not only **what we produce** (which products), but also **how to produce** these products (which organisation of production), as well as **how much, where and when**.

Adopting AT involves choosing a particular way of life; it is a political choice as well as a personal one.

AT can represent a way of putting into practice what is now generally referred to as "sustainable development" (according to the World Commission for the Environment and Development, sustainable development is that form of development which covers the needs of the present generation without endangering the ability of future generations to cover their own) and which I prefer to call "sustainable societies" (those in which a) the rate at which renewable resources are used doesn't exceed the rate at which they are regenerated, b) the rate at which non-renewable resources are used doesn't exceed the rate at which renewable resources are developed and c) the rate at which pollutants are released doesn't exceed the ecosystems' capacity for assimilating them).

### **Technology: my personal experience**

After being graduated in Energy Engineering (Politechnical University of Catalonia, Barcelona, 1973) and diplomated on Biomedical Engineering, I worked at the University's Laboratory of Automatic Control, mainly on fluidics and leaving the University I worked in conventional industries (1974-1978) applying computers to industrial processes.

I was trying to use my knowledge acquired at the University to do something useful to the society. But working five years in conventional industries was enough to convince me that the industrialist way of production was not at the service of human beings:

- because the results of my work were out of my own control,
- because of the hierarchical structure that dominates industry organization,
- because the only criterion to select and develop projects was a short minded conventional economics.

I was unsatisfied with my work and this fact pushed me in the way for



searching alternatives.

At that time I combined my professional work during the day with grass roots afternoon/night activism in a Barcelona's neighbourhood. It was the last days of Franco dictatorship and Barcelona was plenty of activism.

Some facts helped me to find my way: one day I had the opportunity to read a interesting article about "Alternative Technology" in a catalonian professional engineers organization's magazine (Novatècnia, summer 1976). It was signed by Joaquim Corominas, an electrical engineer who worked many years in the USA.

What he was describing impressed me a lot: there were some people around the world trying to develop "alternative", "appropriate", "soft", .... technologies. I contacted him. He was involved with a local group trying to articulate a radical critical view of industrialism. They just started publishing -ALFALFA- a magazine about ecology and technology. This opened my mind to a vast range of new ideas.

By means of this short lived magazine (1977-1978) I contacted a very interesting group of people based at the Open University (Milton Keynes, UK): the Alternative Technology Group and the magazine UNDERCURRENTS. In these pages I discovered the experience of many wise people.

I became more and more aware that there was a split between what I was thinking and what I was doing.

In 1978, the industry where I worked was forced to close its activities. Then I had the opportunity to take a Ph.D. degree on engineering, under the direction of Dr. Joaquim Corominas, with a research on the past and future of Wind Energy in Catalonia and a proposal to reintroduce it in my country. Also I became diplomated on Environment Engineering (1979).

1979 was a year plenty of activities: I become involved with many local and regional ecological groups, fighting against a project to mine Uranium in rural areas of Catalonia and opposing the construction of nuclear reactors. I discovered that my professional training as energy engineer was very useful to the grass roots movements.

All that pushed me in a new road, being more and more involved disseminating the "soft" energy path (based on local and renewable energy sources) in opposition to "hard" energy path (based on centralised, foreign and non-renewable energy sources).

On summer 1979 I participated with other people on the organization of Sun Day in Barcelona, where we wrote a document about the bases to elaborate an Alternative Energy Plan for Catalonia. Also I travelled to Britain to participate at the COMTEK (Community Technology Festival) festival at Milton Keynes, organized by people from the Alternative Technology Group (Open University, UK).

I became member of a grass-roots and local governments technical commission to elaborate a report on Uranium Mining. The results of combining critical science/technology activism with grass-roots activism demonstrated a big success: a multinational energy corporation finally decided not to operate in Catalonia and the Uranium remained underground.

Together with other people we started a Scientist and Technician Group for a Non Nuclear Future. The first activity of the group was to promote a Declaration opposing official nuclear plans in Catalonia. It was coordinated with a grass-roots anti-nuclear campaign. We received hundreds of signatures from researchers and professors of the three catalonian Universities. The Declaration (Freeing Catalonian countries from nuclear power) and the signatures were delivered to the Government and to the Parliament of Catalonia.

All that was enough to become convinced that it was necessary to start a group of technicians involved in the development of alternative technology to make possible the use of renewable sources of energy, because of the lack of interest by corporations and government.

In the early eighties I returned to the University where I'm teaching, since 1982, together with Dr. Corominas, a course on Renewable Energy. I decided to work part time at the University and part time in new ventures.

It was in 1981 when with other people we decided to start a technical Cooperative -ECOTECNIA- mainly devoted to the development of renewable

energy technology. After trying to design and develop different technologies we concentrated our efforts on wind technology. With some financial help from the R&D Program we designed a 12 meter diameter, 30 kW wind machine to operate connected to the grid. It was a very successful experience and it had been chosen to build the first 300 kW wind farms in Spain. This success made possible the participation of this group in the European Community R&D Program to design and develop a 20 m diameter 150 kW wind machine. Now this technologically advanced machine is being used in Tarifa Wind Farms (10 MW).

In the second half of the decade I was involved in other activities and projects:

- from 1984 until 1988: as an expert with the Catalanian Greens because they were delivering a battle against a big electric utility who owned a coal thermal power plant with great SO<sub>2</sub> emissions. Using the legal figure of "ecological offence" they made a complaint to the utility. It was the first time that a Spanish court convicted a utility staff for ecological damage.

- from 1986 to present: as a member of the Scientists & Technicians Group for a Non Nuclear Future. After the Chernobyl accident and its consequences in Europe, the group decided to organize every year a Catalanian Conference for a Future Without Nuclear Power. Until now the group has organized seven editions ranging from nuclear (technical, economic and social problems) to energy efficiency and renewables (solar, wind) and have denounced the starting process of radioactive poisoning of Catalonia's natural systems.

At present I continue working part time at the University (teaching energy at the Geography's Department, but I will begin a new course on Energy, Society and Nature in the Environmental Studies degree) and working part time in newest ventures: with ECOSERVEIS, an NGO devoted to ecological services, mainly in education and with TREN - Transforming Rationally Energy from Nature, a private corporation, to promote the use of renewable energy sources through investments in installations for the transformation of natural resources such as the wind and sun.

As a conclusion I only want to say that I have learned a lot through my

involvement as a technician in the grass-roots organizations, trying to put in practice what I was thinking (or my consciousness was saying). Finally I summarize some of what I have learned:

- \* things take time but when time is right you will be surprised
- \* it is important to work with a synergistic and fun group of people so that the process is constantly evolving and getting more exciting
- \* few people can make a big difference
- \* the need to develop a sustainable economy and to create a sustainable society could become the key issue which expresses our common interests

I agree with a traditional catalan saying what says: "Si no fas el que penses acabes pensant el què fas" (If you don't do what you think, finally you will finish thinking what you are doing).

Thank you for sharing with me what I have learned.