

FROM HARD TO SOFT OR THE POETRY OF TECHNOLOGY

Opening Speech by Mario Costantino, former President of REHVA

Did you ever ask yourself: why this kind of events, like CLIMA 2000, exists ?
Are they - and the costs and efforts involved - justified, especially now when the transmission of the information can be made, and is going to happen more and more electronically through Internet and "virtual meetings" ?

My personal answer to this second question is **yes**.

If it is true that Man is a social animal, then visual communication is a fundamental vehicle for socialising. Visual communication means, among others, human contacts: meetings, gatherings, get-togethers, round tables, and this is the answer to the first question. A conference like this is an encyclopaedia, or - to use the words of an Italian writer Italo Calvino - "*a connecting network amongst facts, people, things of the world, a method of knowledge, a crossroad where a multiplicity meet. Multiplicity of experiences, of effects which can be provoked by our actions, of scientific and material interests which underline our activities.*"

During these few days many excellent and duly selected authors will tell us about their researches, their ideas, their design and will show their slides and their electronic elaborations. It will be a stimulating and enriching week-end if the expositions and the reports are followed by debates and discussions. I do not belong to the selected group of the bests. I have only been asked to break the ice, so to say, and -so they write - to make a stimulating introduction. I am sure they did not think to anything less than respectable, but even so it is difficult for me to understand the meaning of this expression. What is stimulating for a clima professor or for a Swedish engineer ? And what for a Napolitan lady professor ? Or for a Belgian consultant ? So I suggest you to forget about stimulating and to be ready to listen to a normally boring introduction, with perhaps some minor "provocations" and some general comments which, I promise, won't take too much of your time and patience.

Twelve years ago, at CLIMA 2000 in Copenhagen, Prof. Ole Fanger asked me to read in the "crystal ball" the future of air conditioning and, with the help of one of Socrates' "provocations" ("*it is not important to live but to live well*"), we came to the point that the quest for well being is the second most important motivation of Man, after the struggle for survival. The conclusion was that "Comfort Engineers" shall have a future, and a good one, provided they are able to answer the needs and the wants connected with that quest for physical well being (what we call: comfort). But there is a "but": only if they can do this without too many unintended and undesirable effects (noise, environment pollution, ozone layer distruction, greenhouse effect generation, just to quote a few ones) will the "Comfort Engineers" win the challenge of the next millennium.

Four years ago, at CLIMA 2000 in London, my key-note speech introduced the tetrahedron of the designer curiosity in order to emphasise the importance besides and over the *know how*, the *know what* and the *know who* - of the *know why*, that is of the need of a philosophical approach to design. For the many of you who were not present or who did not read the text, I want to summarise some of the "provocations" there in contained :

- design is a multidimensional process
- good design is harmony and harmony is obtained through order
- between designer and client there is always a third party : the community, which must be taken into consideration
- the "total quality concept" refuses the idea of "average man" and of "average comfort"

- in a design group the comfort engineer carries alone all responsibility on whatever is related to man and his physical well being
- scientists and researchers think analytically, the good designer is the one who reaches the synthesis

I was happy to find other colleagues feeling the same urge toward a better definition of our profession. Just recently, Kenneth Keniston of MIT (the Massachusetts Institute of Technology) spoke of "*the crisis of the Engineering Algorithm*", where he supported the same ideas. "*The engineering algorithm*", he says with clear reference to the American way of understanding engineering, "*represents a concept according to which the relevant world can be defined as a set of problems, each of which can be solved through the application of scientific theorems and mathematical principles.*"

Professor Keniston maintains that the declining public faith in technology, which is clearly to be seen, particularly since when even the man on the street "*became aware that the human kind possesses the technological capacity to alter and even to destroy the entire world*", is a problem that involves "*the engineers as the principal embodiments of the best in technology, but*", he continues, "*there is a second problem ... a problem that is deeper, more intractable, more conceptual - indeed a philosophical problem. It strikes*", he says, "*at the fundamental intellectual assumptions upon which modern engineering is based. This is*", he maintains, "*the erosion of faith in the adequacy of the engineering algorithm, of the paradigm, the method of solving problems, that lies at the heart of modern engineering and thus of modern technology*".

I cannot but fully agree with these concepts, which may appear, to some, "provocations". An historical excursion might explain both the title of my speech and the negative effects of the "engineering algorithm". Take this as another - if you want - "provocation".

At the beginning, the world was soft. Soft were the lands and the prairies; soft the furs of the animals and their flesh underneath, soft the trees and the bushes. Everything which was created was soft. But soft did not mean weak. Under the soft layers of fur and flesh and earth and leaves, skeletons and bones and rocks provided the resistant structure, which was occasionally exposed, due to wind erosion on the top of the mountains. The only evident hard things were functional to the survival, like horns or teeth or the shield of the tortue.

Man was put in this soft world and he did not have even horns or particularly strong teeth. Man was a poor soft thing in a wonderfully soft world.

And at the beginning he complied with it. His houses were made of branches or of skins, later of wood, that one can carve and model, that is warm to touch and that hardly harms.

But Man was intelligent. Pico della Mirandola in the thirteenth century, said : "*God gave something to all animals : hoofs, horns, a.s.o., but not to Man. He left him free to create together his own self.*" That means that Man must endlessly collaborate to the Creation. So Man found that a stone on top of a stick would be harmful to other beings and that a lot of stones could be a good defence against the aggressors. And later on he discovered the use of metals and he also discovered that what he called weapons could be used against another man and not just to kill a prey to eat.

In this way, the world started his process towards development, but it was a development towards hardness. Swords, armours, helmets, guns, tanks, to make war but also concrete and tiles and bricks and steel doors to build houses. The progress has been fantastic, really : Man was able to build skyscrapers and flying machines. Man landed on the moon and - disguised as a robot - on Mars, Man produced very fast, metal-hard motorcars. But everything Man build since the historical times was hard. Hard and aggressive. Hard the

roads and the pavements, hard the cars and hard dismissed the armours - many other engineering products.

Suppose for a second that this trend was reversed as we became aware of too many wars and too many arms and bombs around, of increasing pollution and greenhouse effects, of too much plastic waste even on the Polynesian shores ? Not that I think of an impossible and improbable return to the Arcadian world, made of delicious and easy country girls and of handsome - if not clean - country boys texturing garlands and making love. No. What I mean is to imagine for a minute to go back - or better said - to go ahead to softness.

Man is capable of, and has the materials for building a soft world. Look at the insides : cars, so aggressive and dangerous outside, are soft and comfortable indoor; homes, made of hard bricks and concrete, show inside carpets, easy chairs, upholstered armchairs, sofas. A world of softness !

Let's dream for a minute of a world completely soft: it would be impossible to shoot from a soft gun or harm anybody with a soft sword, and it would be delicious to walk in a soft city. The walls of the houses would be soft and soft the pavements. Do two soft cars have an accident ? Nobody is severely injured, the cars only have, if any, a minor scratch. And then, think to the fantastic skyline of a soft town: no precise and aggressive edges and corners; the beautiful shapes of buildings, as conceived by the designers, are never the same under the varying conditions of pressure and wind, but they will wave friendly to the observer. It's amusing, isn't it ?

If the dialectic hard-soft is representing the ever existing dialectic aggressivity-friendship, then it would be time to shift gear and to move towards the soft vision. This move can't be made by anyone else but engineers ! It is just a matter of an engineering cultural effort. No one would be able to perform it alone, of course, but a common effort would probably succeed.

A few days ago I was listening at Smetana's Moldava while reading a paper of the Japanese Nobel Prize winner Leon Esaki and I was struck by a strange coincidence.

Those of you who happen to remember Moldava, will also remember the sudden powerful contrast between the melodic first theme and the dramatic last movement. At that same time I was reading Esaki's ideas on the contrast between two powers: the judicial mind, made to understand fundamental principles and to make descretional judgements and the creative mind: it is through the mutual interaction of these two powers - he says - that a far greater power is generated. Then Smetana mastered the "*crescendo*" thus leading to a powerful, but balanced "*finale*", while Esaki was speaking of constructive dialogue between those two cultures. And he quoted the words at the main entrance of the Bell Laboratories : "*Leave the beaten track occasionally and dive into the woods. You will be certain to find something that you've never seen before.*"

Let's take an example from another technological field which is familiar to us for its many applications in controls, building management and computer aided design and drafting : the move towards the soft, be it in a somehow metaphorical sense, is a very strong and successful one in informatics. At the beginning there was hardware. Very expensive and space consuming, with no or little software available, but with a big and rigid brain. Then came the triumph of the software and now the hardware is small, compact, cheap and with little brain, if any.

What we can do in our own field, which has such an importance, such an extraordinary meaning for human life under all the latitudes, all the cultures, is to proceed in a similar direction. Even if, according to the words of Richard Fedrizzi, the chairman of the US Green Buildings Council, "*when discussing the benefits of green buildings with any particular group*

of people, there is an uneasy stance that seems to increase in intensity in proportion with the number of times that the word green is mentioned", the "greening" of our designs should be the watch-word for the beginning of the next millennium.

Professor Klaus Daniels, a fine teacher and expert designer, in his excellent book "Technology of ecological buildings" writes : "*to build in a proper ecological manner means to use sparingly technological equipment and to put to work - properly and wisely - all the passive measures which buildings offer to us.*" This is a definition of the motto "*less is more*": less equipment and more brain, for the benefit of our clients and of the mankind in general.

This could be your contribution, as comfort engineers, researchers and teachers, to the move toward softness once we become aware of the paradoxical dilemma of the end of the millennium : well being is more and more considered a value, while in the mean time the by-products of civilisation are producing less and less comfort in the built environment.

The solutions perhaps rests on the new formula "**soft engineering**"

We are going to work hard over the next few days and we shall judge the quality of the papers submitted to us, basing your judgement on tight criteria of scientific consistency and technical applicability. But when it comes to design, that is when we go from components to systems, from differential to integral design, the judgement criteria should be different.

Somebody said, sometime ago: *To get somewhere in life (and design is a fact of life) you need the 99% of perspiration and the one percent of inspiration.* It is this one percent of sheer foolishness, this blessing spark from the Gods, that introduces into the severe rules of technology a blissful moment of poetry. And it is this magic moment that is truly meaningful and fruitful for the human kind.

It is time to close my conversation, but as Lord Mancroft once said : "*A speech is like a love affair. Any fool can start, but to end it requires considerable skill.*" This is why I ask you to let me end by paraphrasing again Leo Esaki: "*be ready, it is time now to prepare our minds and hearts for the 21st century.*"

With this exhortation, I leave you to your duties and I sincerely thank you for your kind attention.

References :

- Italo Calvino (writer) : Sei Proposte per il prossimo millennio
- Kenneth Keniston (A.W. Mellon Prof. Human Development, M.I.T.) : The crisis of the Engineering Algorithm
- Leo Esaki (Dean, Tsukuba University) : Preparing our minds and hearts for the 21st Century