TOWARDS HEALTHY ENVIRONMENTALLY SOUND ARCHITECTURE A (W)HOLISTIC AND PEACEFUL APPROACH THE INTEGRATION OF THE RELEVANT FACTORS IN BUILDING WITHIN ENVIRONMENT FRIENDLY CONSTRUCTION PRACTICE

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Abstract

In an (w)holistic approach towards healthy and environmental sound architecture, integrating much as possible relevant factors, we show the necessity of a fresh, independent and direct way, leading to a substantial contribution of building activities towards sustainable development in the whole of the world. More than a decade already is Sustainability as an official item - and slightly covered in other words: 'Survival of Humankind' - an objective of growing interest. The United Nations, governmental and especially non-governmental organisations make attempts to awake general the awareness for necessity, application and implementation of responsible behaviour concerning the world problems, like hunger, lack of health care, rooflessness and unemployment of millions of people. But also damage of the environment, violent conflicts and innumerous alienations in human culture are similarly important items. In spite of all good purposes and several small medium successes, we still miss a fundamental change towards a flourishing sustainable development in all parts of the world. We still face extraordinary bad circumstances in the Third and Fourth World. The contrast between the Poor and the Rich is too large for bridging understanding and for solving the world problems. Injustice has to be solved perhaps as the first as well. Since building activities are approximately for a third the reason for the ecological disaster, after sometimes nearly 40% of energy and resources are used or consumed in this field, it is worthwhile to search for efficient and sufficient ways, how (to help) to solve the problems, which (at least) are (co-)created by these building activities. Deterioration, pollution and exploitation of the vital base of our life - the environment - reached a size far beyond acceptable limits.

In spite of a growing world population there are according various studies, possibilities to build in harmony with the environment and healthy for the need of the whole of humankind. There are actually some conditions, which have to be fulfilled in order to reach the aims of a continuous sustainable development. Illustrated by ideas, examples, models and methods, the paper describes the background of the problems shortly and deals mainly with creative proposals and suggestions, how to gain a healthy and environmentally sound architecture as a substantial contribution towards sustainable development and survival. In the conclusion we include a couple of Rules of Thumb, which enable the designer, but also decision-maker in all the other target groups of the building scene and even the decision maker in finance and politics can have his or her benefit - using the Rules of Thumb, offered in this contribution.

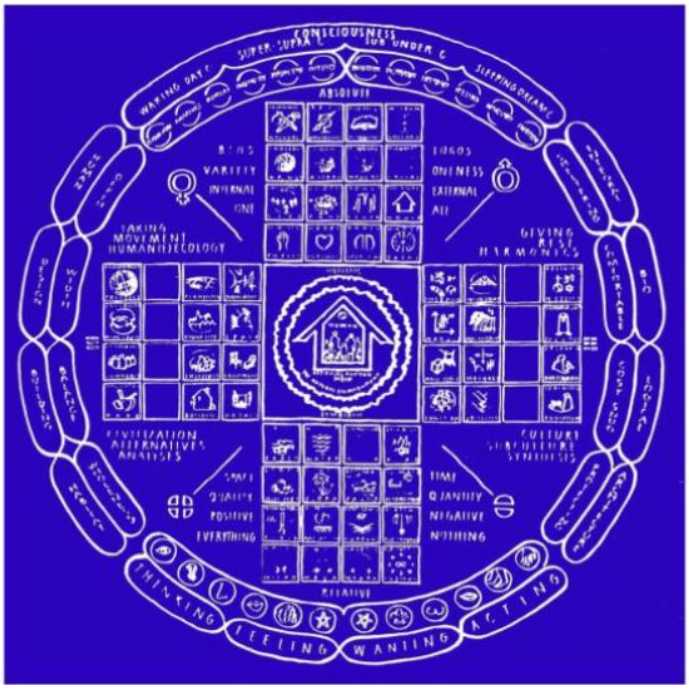

Figure 1: A (w)holistic approach is needed in order to gain a sustainable development. The necessary strategies in Science Technology Art and Wisdom as well as on political and economical levels come together in the Metamodel Integral Bio-Logical Architecture (IBA).

The Metamodel Integral Bio-Logical Architecture

1 INTRODUCTION

There is an urgent demand for healthy and environmentally sound architecture according numbers of inter/national reports and policies, codices and manifestos. From the U.N.- Brundtland Report 'Our Common Future' via 'An Atlas for Planet Management' to the World Watch Institutes annual 'State of the World'-reports we learn how extraordinary important it is to answer those demands.

In the Netherlands e.g. there are already three editions of the National Environmentally Policy Plan, sometimes accompanied by strong subtitles like 'To Choose or to Loose' (the environment) and a lot of 'packages' of governmental guidelines, rules and regulations containing measures for what nowadays is called 'DuBo' (Duurzaam Bouwen or sustainable building). Various semi-governmental institutions like research organisations join this policy as well.

It also has to be mentioned that VIBA was and is very active in this field in the Netherlands. Actually a non-governmental organisation the 'Society (Vereniging) Integral Bio-Logical Architecture' - VIBA propagates the necessary harmony between people themselves, between people and the whole environment and particularly between people and the built environment already since the begin of the seventies. Still much more consequent than the usual approaches, VIBA tries to show, how healthy and environmentally sound architecture, building and planning should be developed. A foundation VIBA EXPO was further created in order to support VIBA's pioneering long term ideas and thoughts, trying to execute them already on short term and also practically. It seems that VIBA EXPO is world's largest permanent exhibition on healthy and environmentally conscious materials, components, products and services. In the (ancient) city of 's-Hertogenbosch or shortly Den Bosch one can find - beside the office, service (working groups) and library of the VIBA - $1600\ \mathrm{m}^2$ of the mentioned exhibition. Most of the

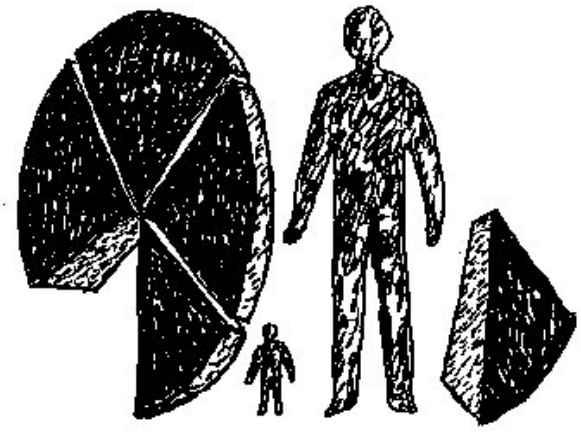

Figure 2: Only $\pm 20\%$ of humankind, the Rich, technological advanced countries of the 1^{st} and 2^{nd} World exploit, handle and consume $\pm 80\%$ of the resources of the planet, $\pm 80\%$ of the world society, the Poor in the 3^{rd} and 4^{th} World have to be satisfied with only $\pm 20\%$ of the resting resources; moreover $\pm 20\%$ of the world population can hardly survive. Sustainable Building has to be seen within this global context.

Sharing the Mondial Cake?

eco-bio-architects but also the most conscious producers and contractors in the Netherlands are already members of the VIBA. Most of the so-called DuBo model-projects are carried, designed or executed by VIBA-members.

However the development of sustainable building in different regions might be quite different. North and South, East and West - dependent of course from the climate and mainly from their economical status - have a different awareness, policy and practice concerning building construction and sustainability. While CIB, International Council for Buildings, Research, Studies and Documentation tries to bring the official statements - inspired by Agenda 21 together - in Task Groups and Working Commissions we also see how ECOHB, the Global Network of Organisations for Environmentally-Sound and Healthy Building stands for a much more than usual consequent approach towards a way to build for sustainable development and survival.

None of the results of Sustainable Building reached yet is enough to give real hope, that those results will effectively help to increase the quality of life of all with all conditions within and around.

Therefore we all have to work further to deepen and to enlarge the awareness about the world problems in their hole and their serious dimensions. Internalisation is needed in order to be able to make further practical steps towards a world society which is somehow balanced within their own parts as well as with the deteriorated, polluted and exploited environment. At the same moment we have to realise how important it is to consider the local and regional circumstances, demands and limits but also opportunities.

Assuming that the responsible and powerful blocks and persons in the world are willing to follow a radical policy - as it is absolutely necessary for a survival in a minimum of health - we can suggest the further described steps for a Best Practice. The interrelationship between our health, the environment, and the construction - our artificial habitat - one whole.

Figure 3: The national meeting point for healthy and environmentally-sound building VIBA - Society Integral Bio-logical Building for more than 25 years in The Netherlands

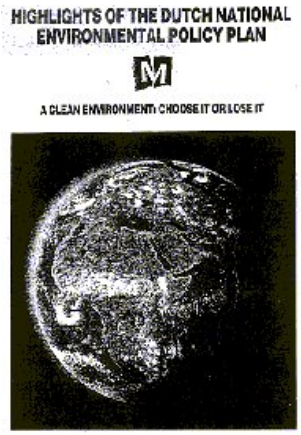

Figure 4: The Dutch National environmental Policy Plan, 1989, the first official document at the base of changes in the approach within the buildings scene in The Netherlands.

2 CONSTRUCTION PRACTICE VERSUS HEALTH AND ENVIRONMENT

On the one hand it is the most environmental friendly way to behave, not to build, because all of the building activities will more or less hurt the environment. On the other hand we need, certainly in our days in the cool and cold climate a shelter, amongst others, as a protection against the weather circumstances in order to stay healthy. The opinion, that the environmental disaster only can regenerate without any influence of human beings opposes with our existence and our need or wish to develop and to flourish culturally, what ever this might be.

Being - at the same time - a part of the nature, and being gifted by a high potency of free will and the ability to influence the surroundings significantly, we have to find a balanced way between the above given extremes.

It seems that we should strive for a dynamic equilibrium.

In this light we observe, that the construction practice opposes the environment, while it seems that its main function just is, to focus and support the maintenance of human health. But - looking deeper -

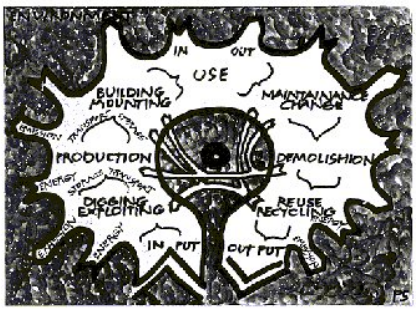

Figure 5: The entire building process - from cradle to graveor even from cradle to cradle- in its relation to the environment in terms of energy use and emission between digging (in put) out of the environment and bringingback (out put) into the environment. On the way of this life cycle we face exploitation, pollution and deterioration of the environment. Partial reuse is always good, but it is only a very low compensation for the damages, wich the whole process causes. Because of the devastating effects of the Life Cycle of building materials the figure is called:

The Porcupine Diagram

this last one is unfortunately not the case presently: Firstly - we bring the quality of the environment so far down by our building activities from digging and winning materials and energies to dumping in the environment again, that the revitalisation of the environment becomes nearly impossible. A consequence of this is an influence on our own health in a dramatical intensity, as we now already can observe. Secondly - we are confronted - more and more with the phenomenon of the Sick Building Syndrome, not only in office buildings, but also in dwellings and even in hospitals. In spite of the attempts to build for higher and higher comforts, we can refer to many studies, conference proceedings and various recommendations concerning these phenomena. There is no doubt anymore, that a radical change in the way to build has to take place. We know this already for quite a long time.

Actually there are the various branches of the construction industry, and the designers, who have quite different aims on their agenda's than e.g. a long-term sustainability in the whole of the world.

But there are just interesting challenges for the human potentials behind the whole construction industry and the architectural and structural, mechanical and physical design: New creative research, design and development of on renewable resources based, autonomous possibly sometimes extreme light buildings rooted in the region can enrich the 2000's and especially a divided humankind.

The 'Porcupine Diagram' shows the whole life cycle of (building) materials (energies have a similar path) with all the side effects of using energy and producing emissions.

3 DETERIORATION OF THE PHYSICAL AND MENTAL ENVIRONMENT

Building activities effect (or attack) the natural environment by exploitation (chapter 4 and 5), by pollution (chapter 6), and by deterioration of the whole surface of the planet.

In the last years researchers explored an alarming situation: Firstly they found the manifold effects of winning, transporting, producing, using, maintaining, renovating, recycling and dumping of building materials and components. Secondly there were - the longer the more - proposals done, how to categorise, calculate and rank those effectful influences, which clearly show the environmental disasters. There are already so many models and methods available, that it is rather difficult to make a choice which of them to use. The basic principle behind all of them, actually, is always the same and even extraordinary

simple: The less a material is renewable (and for energy the same is valid) the more negative effects, like exploitation, pollution and deterioration it will cause in the environment. The more handling, treatment, adaptation is needed in order to produce a building/component the higher is the chance for deterioration, pollution and exploitation. Similar circumstances we observe concerning the risks for the healthy of all concerned and committed persons and people in building.

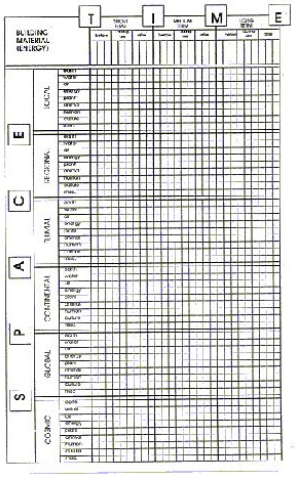

Figure 6: This table shows the empty spaces for necessary data concerning the impact or influence, a material and its life cycle has on short middle and long term for the areas of earth, water, air, energy, plant, animal, human, culture and misc. in local, regional, fluvial, continental, mondial and even cosmic dimension or scale.

The Conmplete Environmental and Health Impact Assessement

Since the socio-cultural environment is a part of the whole environment we observe also a certain influence of architecture, building and planning on this mental environment. Beside all good purposes, philosophers, historians and psychologists analysed already an oppressive power, which comes from the built environment. In figurative sense we can speak here also about deterioration and pollution. Inhumane Building. While e.g. the centralistic lay-out of the capital of an emperor or the gigantic monumentality of governmental buildings of a dictatorial regime illustrate those influencing powers, used in the past (and not only in the past) - nowadays it is the enormous diversity of different approaches combined with a farely missing harmony or a common key for addressing the deeper intersubjective consensus about the essence of architecture (and building technology) - which means bringing parts together to a new balanced structured whole. But - may be even more concrete - there is the fatal fact, that the prestige of a certain (advanced but expensive) way to build hinders us, to apply cheaper and better ways to build in order to help millions to solve finally their rooflessness - physically.

Summarising we can state that highest attention is asked to avoid further deteriorations in our natural, built and socio-cultural environment. We even have seriously to try to regenerate the surface of the planet as well as our culture. Both, by a carefully handled way to build.

The use of resources including energies transformed the surface of our planet. The Dutch National Environment Policy Plan (1989) illustrates this with a brake of the globe (Choose it or Loose it).

4 USE OF RESOURCES

In the previous chapter (3) we discussed already the limits of the resources, which we all take out of the natural physical environment, and, which finally will come back into this same environment, possibly

polluting and polluted by the handling they underwent. Often or mostly even unusable anymore.

Consequently we have to search for renewable materials and production processes, which allow reuse and which are biodegreeable finally.

This postulate leads to the choice of materials, coming from the yearly re- or further growing biomass, actually with the condition of a responsible management concerning 'harvesting' those materials.

In order to be assured of enough timber of cedar trees for continuous, 'rhythmic' building the Ise shrines, ancient Japan had a 500-years forestry policy. Nowadays we should pick up such marvellous models, which already worked practically in the past.

There has to come a research agenda for the building industry, for (building) research institutes and universities for the investigation and development of renewable products from agriculture, forestry and maritime cultivations.

Of course we have to avoid exploitation and monoculture also in case of the use of growing products. The nowadays already dramatically reduced tropical rain forests warn us. Regional and local resources have to be handled carefully and the treatments during production have to respect and include clean, wastefree and non-violent methods. Resources should be used according the concept of continuous recycling or life cyclus, as realised in nature.

Above all it is most important to share the still available and renewable resources with the peoples of the world. Although there are already commissions - also in the frame of the U.N. - working on a more balanced distribution of these resources in the world, we are still far away from a situation in which justice would be the ruling principle.

Before we deal with sharing the resources between states, it is the first duty to cultivate and to make use from the local and regional sources. This is not only beneficial for the identity and the character of a locality or region, but it makes also the transport easier and cheaper. Often there were already traditions of the use of local materials developed, which can give new impulses for nearly forgotten technologies and certainly in many cases opportunities for employment.

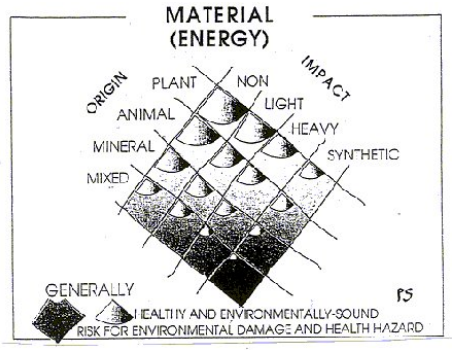

Figure 7: This matrix can help to choose healthy end environmentally-sound building materials, products and buildings.

Matrix for the Choice of Material

5 USE OF ENERGIES

Likewise the use of resources, use of energies can and did already lead to exploitation. Main sources of energy, like mineral oil, coal, and natural gas are not endless available. Although we can find quite different estimations about the availability of those energy sources and although we see that the predictions about future availability have to be adapted to new, more exact calculations or new findings, it is evident that those kinds of energy will be exhausted once.

Similarly as in case of the other resources we have to intensify the production and use of renewable energy also for the building activities and for the use and maintenance of the whole existing built environment.

It is not new at all, we need to explore much more than ever before, which kinds of renewable energy sources are available and/or applicable, in order to get enough inexhaustible power for numbers of purposes for our convenience and for our comfort. However we have to take care not to waste energy unnecessarily and to handle the process of production and application without bad effects and bad side effects, just also within all building activities and during the period of use of the elements or objects of the built environment.

An autarkic or autonomous, self-supporting building and built environment is the ideal for the use of energies in this context. Active and mainly passive application of solar power - directly or indirectly - belong to the first possibilities and opportunities to save ending energy sources. Wind, hydraulic, tidal, water wave, earth heat and e.g. also capillaric energy form challenges for local use on large scale.

Energy economy is a hot item already for a long time. Previously we had to work with human energy and the energy of animals. Sun and wind was used to help and fire as well. With the use of energy, gained from steam once it was possible to start industrialised mass production, which actually stands also at the cradle of the ecological disaster, which with we are confronted. It was and is mainly created by the effects and side effects of the overproduction - only possible by the large scale use of energy - and overconsumption. Hence beside saving energy and using renewable sources for energy, it remains as an important fundamental question, how far we should go with the use of energy. There is the assumption that new inexhaustible energies will serve humankind without any problems. It might be that nothing will get lost in the cosmos. This means that we still have to think very carefully about energy economy on a mondial level.

Earth, Water and Air belong to the life elements and life qualities, a vital be for our existence - of course - nevertheless the consequences within the scene of building activities is missing.

6 POLLUTION OF EARTH, WATER AND AIR

Human civilisation causes - especially in the last century such a pollution of earth, water and air, that uncountable numbers of kinds of living beings disappeared. Building activities belong to the main activities of human civilisation with its highly consumption- orientated character and take consequently part in the pollution process. Various estimations about this part are different, but it seems that we may speak around about a third of the whole pollution, for which building activities are responsible.

The production of e.g. metals, different mineralic products, synthetics and paints is still highly polluting. Although the waste on the site and in the production process including the dangerous waste could clearly be reduced in some countries, we still are not so much further in the whole of the world since the Club of Rome warned us for the first time - a quarter of a century back.

Further more we can see the covering of the surface of earth by all kinds of buildings - in a way also as a pollution - beside the mental pollution, which we discussed under the deterioration.

All these disbenefits are already enoughly known notated and quantified in the recent past. Now we have to act towards a pollution free and waste-less production of our buildings, for the new to build as well as for renewal. The whole process from cradle to grave, or even from cradle to cradle, the whole 'Life Cycle' has to be included into such a programme.

The aims of a proper use of resources and energies meet (fortunately) the demands to avoid deterioration, pollution and finally health hazards and Sick Building Syndrome. The principle of a non-violent building practice has to be worked out and will help to solve the manifold pollution problems on several levels. This will be discussed in the chapter 9 more detailed.

Pollution however affects Human Rights. Our way to live, to produce and to consume - in one part of the world, while in an other part millions of people hardly can survive, with all the already mentioned effects and side effects has to undergo a significant change.

We have to ask us both namely whether it is really necessary to pollute, when we try to support our life and whether it is allowed to pollute ourselves and our environment. And our environment includes also the environment of all people living on earth.

It might be that we reach clearly questions of International Right and philosophical, ethical and religious questions, on which we have to work consciously and which have to be solved internationally.

The Iceberg Theory visualises that approximately ten times more costs will be paid - for the reparation of the damaged environment and health hazards - than we pay usually for our consumption (and building!) products.

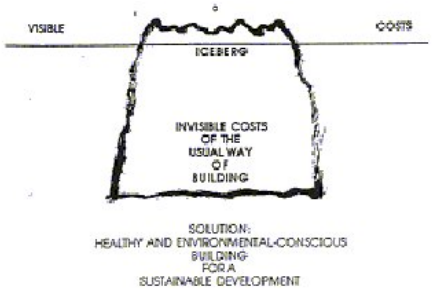

Figure 8: The Iceberg Theory visualises that approximately ten times more costs will be paid - for the reparation of the damaged environment nd health hazards - than we pay usually for our consumption (and buiilding!) products.

The Iceberg Theory

7 ECO-ECO FRIENDLY ARCHITECTURAL DESIGN

The doubling of 'ECO' in the subtitle is no mistake, but underlines the originally and basically same root of both Ecology and Economy, at least in the action orientated form of the disciplines. It seems a big task to bring those disciplines with their aims together again. However as long we do not strive for good and holistic 'house keeping' or 'house holding' - regional, continental and mondial - respecting the value of the ecotop on each scale, as long we misuse economic mechanisms for separated and short term profits, we will not succeed to reach a sustainable development.

One of the most convincing models in nature could be inspiring, namely by the principle of minimising, which leads to highest possible efficiency and economical results in the best sense of this term.

In the Dutch National Environmental Policy Plan already from 1989 - following the main line of the Brundtland Report - we find

- Maintenance of the recycling processes,
- Energy extensivation, and
- Improvement of the quality (of life)

as the basic conditions for sustainable development.

How to deal with the fundamental contradiction of an increasing economy and a restauration of the damaged environment, just the effect of the flourishing production and consumption of a part of humankind, remains as: still an unanswered question and unsolved problem, we state that in average approximately ten times more costs will be made, than we pay nowadays usually for our consumption

goods and buildings, when we take into account, that all the caused environmental damages have to be repaired and the health hazards have to be cured. Moreover we even expect many costly attempts to help in cases, which later will be recognised as irreversible.

The only remedy for this really terrible circumstances is to implement the rules and guidelines, the codices and manifestos, the convenants and agendas carefully and consequently in the very day practise. An Eco-Eco friendly architectural design has to include and has to embrace an extremely on health and environment orientated approach. Examples for such an approach we will give later.

The realisation of such an architecture is - of course - dependant also from a similar type of political and especially economical approaches in the responsible fields of the society.

Examples of Gaia Building Systems (GBS) - A collage of proposals for Healthy and Environmentally Sound Architecture.

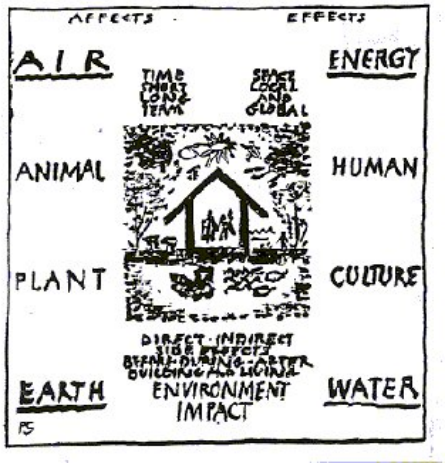

Figure 9: The Complex relationship between the building, its users and makers on the one hand and the natural environment with its vital sources for our existence on the other hand.

Environmental and health Impact Assessment

8 EXAMPLES, ILLUSTRATIONS

In the last years, more and more customers asked for healthy and/or environmentally- sound dwellings and working places. They seem to be still in the minority. Even much less experts strive towards buildings with the described qualities in spite of so many attempts by some NGOs and a growing number of governments.

Looking to conferences and various publications one could get the impression, that some progress is made: lots of conferences are dedicated to sustainability and Building and Construction, often also in relation to Health. Ten years ago it was only the name, which carried Sustainability. Nowadays we get already contributions, which contents have a serious relation to sustainability.

Still we see an enormous gap between the possibilities, the taken opportunities and especially the willingness towards sustainable building.

The models and realised model projects, currently propagated by various professional and governmental institutions reflect a kind of more or less usual sustainable building: Replacing of highly poisoned materials or materials with a lot of embedded energy, be less poisoned or clean materials or materials which less embedded energy; more efficient installation and equipment than the standard describes; some energy saving during the exploitation by the implementation of passive and active solar technolo-

gies, whereby the question remains whether active solar power with all necessary equipment is really more environment friendly than the traditional solutions; waste management during the production and on the site; and some more similar precautions are - of course - already highly welcome!

Excursions to objects, which fulfils these criteria, exhibitions of those projects and buildings and some competitions, held in order to gain ideas and plans for sustainable buildings and settlements brought the whole development clearly further.

Surprisingly enough - the results of the competitions went hardly beyond the relatively easy reachable possibilities. And the usual way of sustainable building is still far away from a substantial contribution towards significant minimised use of resources and energies.

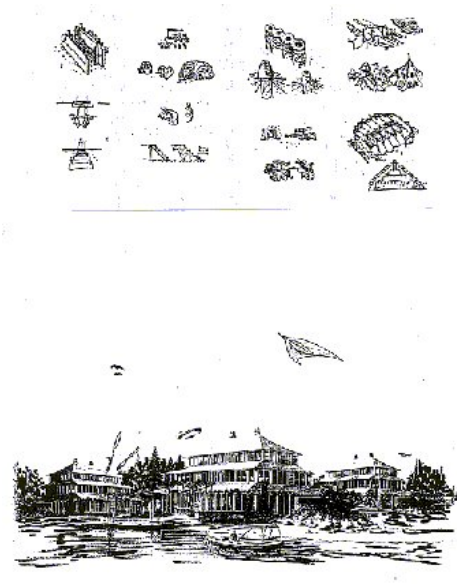

Figure 10: Examples of Gaia Building Systems (GBS) - A college of proposals for Healthy and Environmantally Sound Architecture.

Below the socalled House for Another Future
(P. Schmid in cooperation with J. Olie)

After a period (starting 1965) of designing and realising a few (early historical examples of) healthy and environmental conscious buildings - specifically under the term - Integral Bio-Logical Architecture (IBA) - the author started also to develop building principles and systems Gaia-Building-Systems (GBS) which answer the demands of higher than usual sustainability for building Redundant to mention that sustainability do not go (automatically) hand in hand with durability.

There are at least two approaches, which basically could help the poor as well as the rich in the world to reach sustainable building. This means roof- and homelessness can be solved by rather low efforts and extremely low-investments for large needs on the one hand and the rich could bring down their exaggerated energy and resource consumption on the other hand.

The one approach to reach this ideal but for the balance in the world necessary situation, is, to build mainly with easy and continuously renewable materials - much easier renewable than timber or wood, namely materials like elephant/grass, straw, reed, bamboo, Jeruzalem artichoke, maize, sunflowers ....

The other approach is to use highly advanced materials and products, but only in the smallest thinnest an lightest quantities and dimensions.

Both these approaches can be worthwhile in all parts of the world. A start, even based on some marginal traditions with similar developments is already made. Building with e.g. strawbales and reed

roofing, bamboo and various other plantmaterials is wellknown as well as the use of fabrics, foils and wires for building purposes.

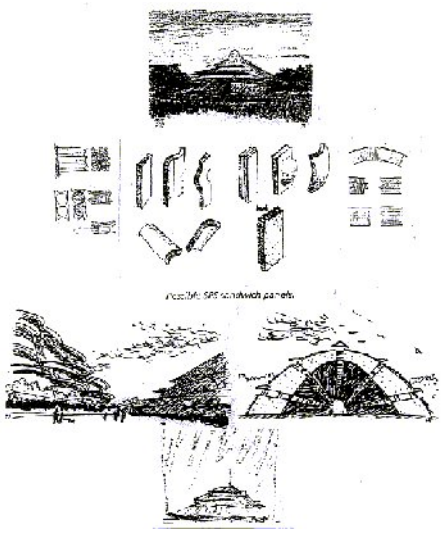

Figure 11:

SPS
The Straw Panel System
A proposal for innovation
Consequently renewable healthy and environmentally sound

The Straw Panel System (SPS)

The biggest volume of available matter - certainly including the most renewable material - is the biomass on the surface of the planet in all continents, reproduced each year. From the above mentioned kinds of plants we are able to produce manually or industrialised - sandwich panels. Those panels are filled with honey-comb-like fillings of straws and straw-like pipes or materials. With some pressure literally, the material provides us with a natural adhesive or glue, gets locally also higher strength, can become transparent, nearly like glass, reaches a high thermic insulation value (when thick enough), can be shaped in the most fantastic forms, but remains light of weight and easy to handle.

The briefly described elements or components, possible to be manufactured or produced, can be composed to a building system. The Straw Panel System can be applied for low, but also for huge and high (multi-storey) buildings together with e.g. a skeleton.

The SPS is finally fully biodegradable - after perhaps some other use in a kind of 'cascade'.

Metals belong to the ecologically most costly materials, because of their high embedded energy and the influence its production has on the natural surroundings. Metals actually are suitable to be transformed into the thinnest dimensions in wires and foils, which still can be strongly pulled.

Mainly with air, but sometimes also with sand or water filled, pipes, tubes or hoses can be produced, cushion - or mattress - like bags can be made, which all (or some of them) can be combined to a whole building system as well.

Foils of course can also be applied, like fabrics in tent constructions and tent structures, but in these cases a thermic insulation has to be added - at least in the most zones of the earth, either against cold or against heat or even both.

It might be evident that because of corrosion less iron, than non-ironmetals and noble or semi-precious metals will fulfil the functions in such a system properly.

Metal foils an already in use for thermic as well as insulation against humidity and wetness and also to cover rooms or spaces like with a seal or e.g. with gold-leaf.

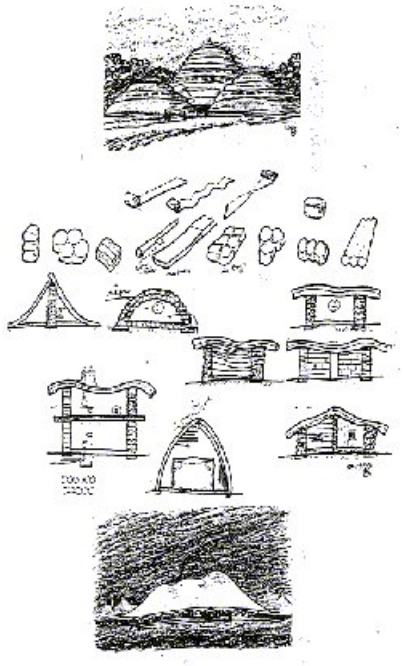

Figure 12:

LMS

The Light Metal System

Although high advanced production processes and materials are used - because of the small dimensions in which they are used, it is reasonable to apply them environmentally friendly.

Buildings made from metal foils in the form of tubes and bags with their typical shape are useful for a few storeys. In case of multi-storey buildings a skeleton is needed.

A Conclusion in Between

In this chapter we illustrated by some examples how sustainable, healthy, environmentally sound architecture could be and look like. In continuation of the first attempts, beginning in the sixties, and the Gaia Building System, particularly two practical innovations in the field of significantly sustainable building are shown, the Straw Panel System and the Light Metal System, both in a way minimised constructions. Beside the final technical implementation it is most important to sensibilise the public - the rich as well as the poor - for the necessary appreciation of those inventions in order to realise them for the benefit of all.

Non-violent Building Technology stands not alone. These are basic principles, valid for our behaviour within a discipline or a field and generally as well. (Manifesto 2000 For a culture of peace and non-violence).

9 NON-VIOLENT BUILDING TECHNOLOGY

In order to reach sustainable circumstances in our culture by, or - better to say - in spite of the building activities we could and should develop an attitude and practical methods towards non-violent building technologies. Non-violent behaviour is a demand not only for Peace in a more limited meaning, but also for a healthy, environmentally sound, integral bio-logical architecture and a harmonious, dynamic equilibrium within human society and together with nature within and around us.

Survival of Humankind - as we already have read or heard so often, and very plausible argued, will only be possible in one world. 'One world or none world' became a convincing slogan or mission.

This mission 'One world or none world' covers actually all necessary steps, needed to support the many paths, which we have to walk in different fields towards the strongly desired sustainable development. Non-violence is one of the most important qualities. To operate non-violently is not only a need in politics, military and economy, but also in science, technology and art. Thus we have to develop to learn and to use a non-violent building technology already starting from the very first conditional steps, when it goes to build, during the whole processes of designing, planning, producing and building itself.

Non-violence is not only a question in the frame human relationships in all over the world, but also in the relation with nature on all scales from the micro- to the macro cosmos. Although we spoke already very often about a shift of paradigm's in the last half century, this new shift will be extraordinary important on the path, which humankind will go towards a convenient future, a future free of violence; the violence which created injustice, the gap between poor and rich, the billions, sacrificed in wars and the whole ecological disaster or environmental catastrophe.

Building activities with their complex and manifold impact on the whole of our culture and civilisation have therefore their own responsibility for the quality of the whole. The place and meaning of architecture and building technology within the entire culture could become a prominent one: As an expressive carrier of messages about a healthy and environmental sound approach and moreover as solution for the problem to be protected by a built environment in harmony with the social and natural surrounding.

When it comes to measure the quality integrally - there is a Values Tool to do so.

10 CONCLUSION

We can conclude that healthy and environmentally sound architecture was, is and will be possible. It needs the integration of the relevant factors in order to reach a balanced result and a (w)holistic and peaceful or non-violent approach is a demand for the success.

1. The uncoming year 2000 starts with a period in which the international community dedicates towards non-violence. The time is ripe, to join this intention also with the way in which we will build.

2. The future architecture with its construction practise will combine the demands for health with a friendly consciousness about our natural environment, as the base of our life and finally health as well.

3. Of course we have to take care to avoid further deteriorations of the physical but also of the mental environment, and we have to regenerate the damages.

4. The use of resources has to be done selective and saving, avoiding to consume non- renewable resources and cultivating the careful use of renewable resources. We have to (re)learn to apply them creatively in architecture.

5. The same which is valid for the problem of resources is also valid for the use of energies. Renewable energies have to get a high priority, especially to develop their production and application.

6. Pollution of earth, water and air is already forbidden. It is against the Human Rights. Now the time has come to clean our natural but also our mental environment.

7. Eco-friendly architectural design is not only a question of a certain architectural language or idiom, but is based on an economical correct behaviour. Ecology and Economy have to come (back) to their roots, in order to grow fruitfully into a sustainable future.

8. The various statements and postulates, hopes and wishes towards a healthy and environmentally sound architecture can - luckily - be illustrated by promising examples from the pas and the present, from built objects and by developments of sustainable building systems.

9. In order to bring the sustainable architecture on a world scale into (best) practise, we have to exercise a non-violent approach and a non-violent technology. Of course this principle of non-violence has not to be limited to building technology, but has to be the guiding mission in all field.

10. This optimistic conclusions can only earn success, when all responsible and target groups work together. We have to find an international consensus, if we would like to realise a significant(ly more than nowadays usual) healthy and environmentally sound architecture.

11. This matrix can help to choose healthy and environmentally-sound building materials, products and buildings. In addition you will find some recommendations and rules of thumb for the practical realisation of a healthy and environmentally sound architecture.

References about relevant and used literature are given in the 12^{th} chapter. 8 Main Components divide the complex task to build. They are presented in pictograms and rules of thumb or postulates are formulated in order to design balanced proposals, concepts and buildings.

11 RECOMMANDATIONS BY RULES OF THUMB

In order to come to know how the things have to be done exactly - 100% correct - we need much more research. Actually the moment that a precise result will be found, it has the chance that it will become immediately unvalid again because of changings in the circumstances which led to the result. Changes of sources or resources of production processes or applications and new found possibilities of reuse of the various components in building and planning can easily change the just found results.

It seems also that the political hidden agendas of target groups want to wait for the socalled better research results only to get more time to continue with the usual unsustainable way to build.

Therefore it might be much better than to wait for such results (and not only to work for them), but to follow rules of thumb towards sustainability. In this way we can already avoid to make the most strange and worst mistakes.

The brief recommendations in form of rules of thumb are the following:

Rules - The 8 CO (8 Components)

The just for you developed matrix now will be accompanied by eight general rules:

I

Location, Orientation, Use

Choose a healthy site, consider the orientation, optimize the function.

II

Space and Mass

Shape useful (closed or open) protecting space.

Include identity and expression into the building mass.

III

Canon, Modular Coordination

Apply harmonious and ergonomical measures, in numbers, dimensions, weights - modular coordinated - eventually in a meaningful way.

IV

Indoor Climate, Installation, Furnishing

Create of cosy and comfortable indoor climate with minimal installations and a flexible equipment and furnishing in order to earn a suitable atmosphere.

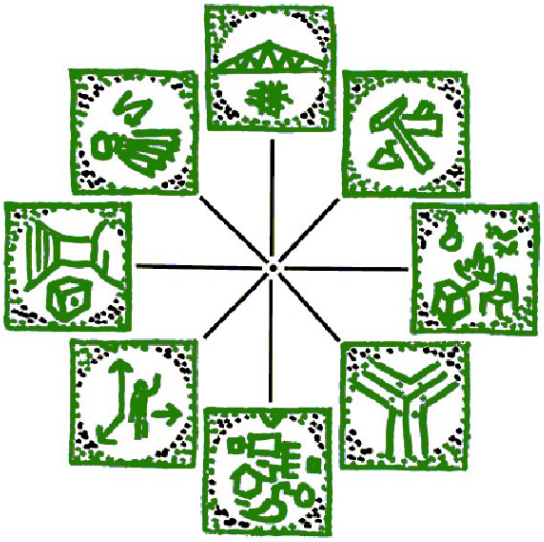

Figure 13:

V
Structure and Construction
Design sheltering (load carrying) structures and simple, understandable, durable constructions, which do not demand various kinds of means (e.g. elevators) because of their gigantic character.
Some more pictograms showing
human(e) ecological principles for architecture and building.
VI
Energy and Material
Use mainly durable, sustainable, endless (available/growing), easy reusable or recyclable, soft, clean, ”natura”, energies and materials.
VII
Production & Building Process
Produce in a humanly healthy way with a wise choice concerning handicraft or industry, selfhelp or automatization and in cooperation and participation on all possible levels.
VIII
The Art of Joining
Joint/connect/compose all building parts or elements in a harmonious way, rather solid, but demountable, simply efficient. Joints as nuclei determine (already) the whole.
Moreover
There are more simple rules developed in order to help the design and decision process towards sustainable building without complicated calculations. The additional pictograms may show the most important.

Finally

Collaboration belongs to one of the main methods on the way towards sustainability. In research, education and design, in theory and in practice of and together with the many different branches and the target groups around planning and building we have to cooperate.

The Method Holistic Participation (MHP) is an efficient tool to bring even opposing opinions and result of factors integrated and holistically by consensus together to a new harmonious whole: the healthy environmental sound building, an integral bio-logical architecture.

Collaboration is needed on all levels.

It is everybody's job! The MHP Method Holistic Participation can assist to bring opposing opinions together in consensus (the logo of the interactive, rotating and weaving process of study, consultation, creation and decision).

Figure 14:

Collaboration is needed on all levels.
It is everybody's job!
The MHP can assist to bring opposing together in consensus
Method holistic Participation MHP

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BIODATA

Peter Schmid (1935) was born in Rome/Italy but became later on an Austrian as well as Dutchman and followed most of his education in Vienna (Prof. Clemens Holzmeister) and Salzburg (Prof. Konrad Wachsmann), later also in Germany and finally in India (with Paramahansa Yogeshwarananda). He received a professional degree as a Building Engineer in 1954 from the ”Höhere Technische Bundeslehr- und Versuchsanstalt” and a Master of Architecture degree from the ”Akademie der bildenden Künste” both in Vienna/Austria. Besides that, he was the disciple of an extraordinary Yogi, at the same time the author of many books, the late Paramahansa Yogeshwarananda Saraswati (formerly Vyasa Dev). Later on in 1989 he received a honorary doctor’s degree in Yoga from the Unnayan Samsad in India. Prof. Schmid’s professional career as an architect was in Switzerland, Germany as well as in Austria from 1957-1972. He realized many buildings including large industrial complexes in European countries as well as overseas. In the sixties he started to design and to realise several healthy and environmentally-sound (mostly residential) buildings. They belong to the first historic examples of Sustainable Building. Simultaneously, he taught as a professor at the ”Höhere Technische Bundeslehranstalt” in Krems/Danube in Austria. Since 1972 he has been professor - several times being the chairman of the department - for Building Technology at Eindhoven University of Technology in the Netherlands, where his specialisation is architecture with a focus on detail on the one hand and on Health and the Natural Environment including Building for and on Peace on the other hand. In 1965 he started with IBA (Integrale Bio-logische Architektur) activities in Vienna. In the early seventies he was the chairman of the first Belgian Association/Genootschap Gezond Bouwen en Wonen and in 1975 he founded the VIBA (Vereniging Integrale Bio-Logische Architectuur), which has always been a very active association in the Netherlands. It boasts the largest permanent exhibition on Sustainable Building. Schmid has written many publications and several books on this subject amongst including: Bio-logische Architektur with 3 editions, and Bio-logische Baukonstruktion, (both R. Müller Verlag, Köln) and Bio-logisch Bouwen en Wonen, gezond voor mens en milieu, together with Michiel Haas (Ankh Hermes Deventer 1990). An Introduction to Ecological Design together with Howard Liddell is in preparation. He also contributed to Die Chance Holz, der andere Weg, L&L Verlag Graz, Austria, Wetenschap en Spiritualiteit, NL, and often as a key note speaker to many proceedings in national and international conferences and congresses all over the world. He is the chief editor of the magazines ’Gezond Bouwen & Wonen’ (bimonthly) and ’Nieuwsbrief Vredescentrum TUE’ (Peace Centre) (four-monthly). Currently, Peter Schmid holds various positions in Peace Movements: the chairman of the Executive Committee Peace Centre of his university, founding member of the Association of Environmental Awareness (STIM) and a member of the Spiritual World Peace Congress in India. He co-initiated ECOHB, the Global Network of Organisations for Environmentally-Conscious and Healthy Buildings and is the current president of the Global as well as European Co-operation. He gives many lectures and workshops about ”Healthy Building” ”Environmentally-Sound Building” and ”Building on Peace” as well as the ”Method Holistic Participation” (MHP) all over the world, mostly in combination with research journey’s to many parts of the world. Peter Schmid promotes Sthapatya Veda and Feng Shui approaches. He was patron of the Global Co-operation for a Better World-action in Austria and Germany. He received a gold medal at the World Biennale of Architecture Interarch, Sofia in 1987 for the Living Labyrinth, a case study of a Timber Production Forest and a model for a Peace

Park on the campus of the Eindhoven University of Technology - planted by himself. Prof. Schmid is decorated with the Austrian ”Ehrenkreuz für Wissenschaft und Kunst, 1. Klasse” because of his efforts for Healthy and Ecological Building. Recently, he received an award for the project ”A Global Network of Peace Gardens” in the Netherlands. Schmid was nominated on the list independent of a party for the European Parliament in 1994. His biographical dates appeared many times in various European’s and World’s Who is Who’s and he has been proclaimed, and recognized as an internationally leading intellectual by the International Biographical Centre of Cambridge, England and the American Biographical Institute. The Institute of Global Education at Portland, Oregon, USA designated prof. Schmid as a Distinguished World Citizen for his , achievement and commitment to the shared values of a peaceful and better world as well as for his international vision and concerned involvement in 1998.