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THE ROLE OF THE DESIGNER WITHIN SUSTAINABLE ENVIRONMENT: PART OF THE SOLUTION OR PART OF THE PROBLEM

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1. Introduction

Designers are considered as an integral part of the creative industry, however, in reality, they represent the consequence business. Designing involves problem solving and improving people's lives; thereby what designers create with every decision, can be multiplied by thousands and often millions through mass production. Conversely, every produced item has an environmental price. Chochinov (2007) in his manifesto for sustainability in design wrote "we are suffocating, drowning, and poisoning ourselves with the stuff we produce, abrading, out-gassing, and seeping into the air, water, land, food … and designers are feeding this cycle, helping to turn everyone and everything into either a consumer or a consumable". Designers need to understand the role and impact manufactured products and built environments have on the world. Design is part of a set of tools for solving problems and improving life, not only in the short term, but for generations that lay ahead. The dilemma many designers are facing is seeking an internalised balance between readiness to make informative decisions to incorporate sustainable practices and constraints of being engaged in a commercial project which is focused on profit margins. Subsequently, the predicament is greater for designers working under contracts; their decision choice renders significant impact on continued employment. Thus, the majority of design decisons are determined of being influenced by the fear of unemployment and crashing professional career.

In order to develop sustainable solutions a designer has to transform concepts, considering the impact of the produced design. The impact is much greater than just interaction with the intended design's consumer; as the consequence of the design production and usage has an impact on human kind globally, with ramifications to people, the environment and the economy. Moreover, the design's consequence not only has influence in the present sense, but also has implications for generations to come. The materials used to make the design, the resources required to manufacture, package and sell it, the quantity, quality, and longevity of the product, and whether it should have been designed at all in the first place, have a major bearing on sustainable design.

Designers are often implicated in today's environmental crisis due to their active involvement in promoting a culture of oversupplying the market with unnecessary products and encouraging mass material consumption [Fletcher and Dewberry 2002]. Detailed in Papanek's (1971) book, Design for the Real World, the designer has "become one of the most harmful of professions". Yang & Giard (2001), state that the design profession is both the problem and the solution, for which design practitioners and students must understand the ecological impact of their profession. Findeli (2001) writes that without a responsible designer, you will not produce responsible design. Criticism aimed at the designer might be unjustly appointed. Managerial influence, deadlines, budget, profit motive, project partners and vendors, project leaders and lead designers all impact the final project design. It

has become essential that sustainability is fostered not only within the design profession but the occupations associated with the industry. This can be accomplished through the inclusion of the study of sustainable practices within the primary, secondary and tertiary education curriculum in order for students to become sustainable responsible persons. Therefore, inclusion of the study of sustainable practices within the primary, secondary and tertiary education curriculum cultivates tolerance and enhances understanding of significance to possess sustainable responsibility and develop capability to establish one's own position while being engaged in a design project.

2. Climate change

Climate change is one of the greatest challenges facing our generation [Rasmussen 2009]. The designers and politicians of our time will be judged by future generations on their ability to rise to this challenge. The latest researches show that climate change will damage all economic, social and environmental aspects of life [Triet 2009]. The Prime Minister of Tuvalu, Telemi (2009) stated "Never, in the history of humankind have we faced such a global challenge. We, leaders, must do this *(tackle climate change)* for our children and our children's children". Fry (2009a) wrote, "I would actually say that we're at a watershed, the future of humanity as we understand it is really before a choice which says do we change direction, or do we try to maintain what we already have? … The challenge that we have now is to deal with the world that we've created, and sustainment in that sense is both a kind of a process and a project that is about that exercise, of dealing with the world that we've got, creating a future. … it's about creating another kind of direction, other kinds of ways of living, other kinds of economies, recognising that we're in a very dangerous situation, and that to be sustainable, we have to be able to eliminate conflict as well as damage to the environment."

In order to direct public behaviour to sustainable practices, decisions that are often unpopular need to be made. To be affective, these changes need to be universally adopted and regulated. This requires a political decision to create the regulations that force industry to respect the physical environment, with guidelines to which companies and designers have to follow. Not only should the regulation be adopted in the country of manufacture, but also in the country of importation.

Design laws planed for legislation can be seen in the automotive industry. On May 19, 2009 the United States government unveiled a plan to impose a nationwide standard for vehicle mileage standards that would require an average of 35.5 mpg for cars and trucks to be introduced by 2016, in a move aimed at cutting greenhouse gases and reducing dependence on oil. In Canada new federal standards are set to limit vehicle availability to the consumer, dependent on its use by the family, farmer or small business. In Australia the government is looking at introducing legislation to limit the use of two-stroke engines which are a major cause of high emissions and contribute significantly to urban smog, and pollutants in waterways and oceans.

Australia is in a similar situation as many other countries. For major reforms to occur to combat and reduce the impact on climate change, the Federal Government has to force regulations through parliament by political power and ignore the threat of voter-backlash. Climate change requires greater substantial sacrifices to be made from some sections in society, and from the design and engineering industry in particular.

Organisations including the United Nations (1983 & 2004), UNESCO (1990 & 2005), International Association of Universities (2005), UK Government [H.M. Government 2005] and internationally recognised climate change theorists Clark (2005), Fry (2003), Laszlo (2008), Rebelo (2003) indicate that climate change is a design problem, and through sustainable education humans can address one of the key priorities of the 21st Century. Ecological architect Van der Ryn, an acknowledged researcher, theorist, educator and a leader in sustainable architecture, wrote:

"In many ways, the environmental crisis is a design crisis. It is a consequence of how things are made, buildings are constructed, and landscapes are used. Design manifests culture, and culture rests firmly on the foundation of what we believe to be true about the world. Our present forms of agriculture, architecture, engineering, and industry are derived from design epistemologies incompatible with nature's own." [Van der Ryn and Cowan 1996]

A statement in September 2009 from the Chairman of the Intergovernmental Panel on Climate Change (IPCC) Dr Pachauri, on the UN Summit on Climate Change, Copenhagen, quoted findings from

IPCC's Fourth Assessment Report (AR4); collective research from four thousand specialists over a 5 year period; that if no action is undertaken to stabilize the concentration of greenhouse gases in the atmosphere, then the average temperature by the end of this century would increase anywhere from 1.1 degrees to 6.4 degrees C. Figure 1 illustrates the IPCC average temperature forecast taken in 2007.
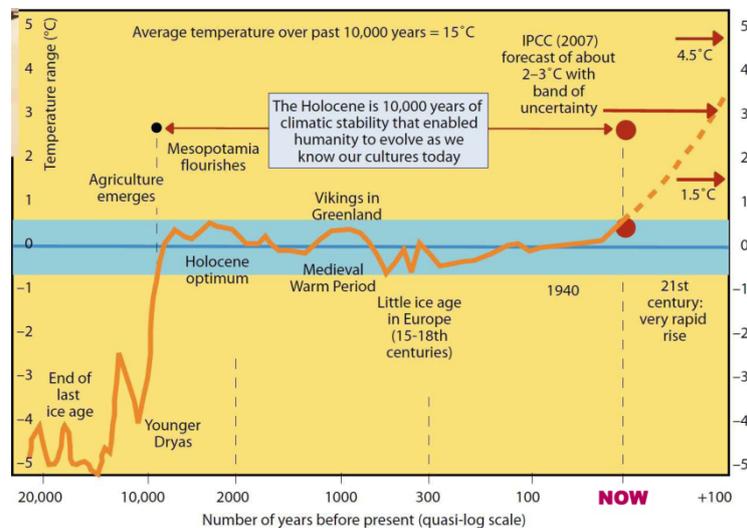

Figure 1. The average temperature by the end of this century. Source: Robert Corell, Heinz Centre. (After: Safe Climate Australia Prospectus, July 2009, Page 11)

The depletion of natural resources is faster than what nature or humans can replenish; sea levels are rising as a result from the melting ice caps and warming oceans; extremes in temperatures are causing increased precipitation, tropical storms and cyclones; pollutants are found widely in waterways, oceans, soil and the air due to non-sustainable manufacturing and agricultural processes, greenhouse gas emissions and overproduction [IPCC 2001]. In the absence of not taking sustainable action, the likely hood will lead to:

- Economies will falter. The success of many national economies are closely linked to their natural resources [Smith 1981];
- Possible disappearance of sea ice by the latter part of the 21st century;
- Experts estimate that climate change will force millions of people to abandon their homes over the next fifty years, due to increased floods, fire, drought, and deadly heat waves;
- If sea levels were to rise by 1 metre, it is believed the majority of land would be underwater in Bangladesh (population 162 million), Sri Lanka (20.2 million), Tuvalu, Nauru, Antarctic Peninsula, Maldives, Singapore, Carabian States, Papua New Guinea Islands, Micronesia, Kiribati, Indonesia, Samoa and Egypt. Many other countries will have the problem of having their fresh water supplies contaminated with salty water. According to the Environmental Protection Agency sea level will continue to rise for several centuries, even if global temperatures were to stop rising by 2020;
- Increase in frequency of hot extremes, heat waves and heavy precipitation;
- Increase in tropical cyclone intensity;
- Decrease in water resources due to climate change in many semi-arid areas, such as the Mediterranean Basin, western United States, southern Africa and north-eastern Brazil;
- Possible elimination of the Greenland ice sheet and a resulting contribution to sea level rise of about 7 metres. Without mitigation future temperatures in Greenland would compare with levels estimated for 125,000 years ago when palaeoclimate information suggests 4 to 6 m of sea level rise;
- Approximately 20 to 30% of species assessed so far are likely to be at increased risk of extinction if increases in global average warming exceed 1.5 to 2.5 degrees Celsius.

Science leaves designers no space for inaction now. Designers need to urgently act and make sustainable reforms within their own design fields.

Research conducted by the Emission Database for Global Atmospheric Research 2000 project provides a snapshot of global annual greenhouse gas emissions. Industrial processes 16.8%, residential, commercial, and other sources 10.3%, transportation fuels 14%, waste disposal and treatment 3.4%; see Figure 2. These values provide a snapshot of global annual greenhouse gas emissions in the year 2000.
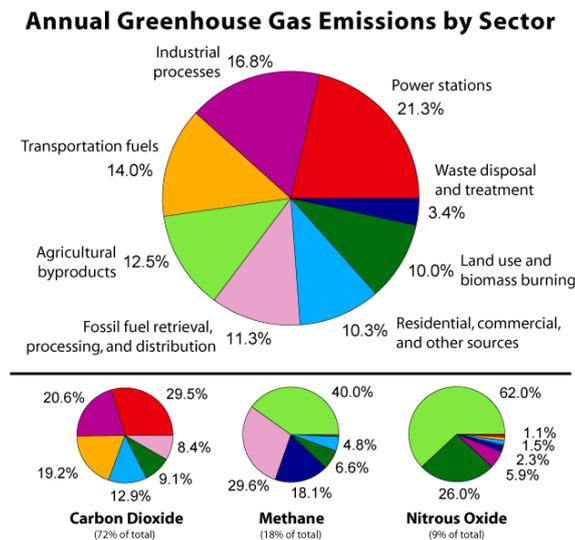

Figure 2. Greenhouse Gas by Sector.
Source: "Image created by Robert A. Rohde / Global Warming Art"

3. Design sustainability

Design sustainability is putting into place a process of transformative change to an agreed sense of direction to respond to the circumstances designers find themselves in. This direction is coming from the world. It is through design that peoples futures are being taken away from all. Through design, people are becoming unsustainable. Designers can no longer be ignorant to the ramifications of their own design decisions. Most designed products directly or indirectly are leading people to unsustainable lifestyles. It is crucial for designers to learn how to design for a sustainable future. This at times involves the designers negotiating their design resolution and the value of sustainable design with employers, contractors, and other involved parties to not be compromised by an underlying commercial profit.

3.1 Design domain

Design responds to the world where humans live. The design domain addresses three particular kinds of ecologies (biophysical, social and ecology of mind) that have all been damaged through climate change and all have a relation to design both in terms of how these ecologies became distorted and what needs to be addressed to achieve a viable future. There are two important points to this: first of all, climate change is just one of the problems, and it is a problem which generates other problems, so the problem that humans face is more serious than just the implications of climate change. To put this into context, the United Nations November 2009 monitoring on emissions reduction indicated that the earths warming is progressing and greater than anticipated. Using the 1990 levels as a benchmark, the temperature has increased by 41 percent. The global warming spectrum is arranged from 1.8 to 7 degree. At the moment the earth is looking at a 7 degrees temperature increase. Therefore, the way governments have been talking about working towards an emissions reduction to 5% is too low to what is required. To add to this, the speed of government action to reduce climate change has been incredibly slow in terms of the pace of the problem. The speed and acceleration of the problem on one

hand and the very slow response on the other is another way of characterising the problem. Thereby there are two problems, the inherent or intrinsic problem created and the problem of responding to that situation very poorly.

3.2 Biophysical ecology

The first ecology is a familiar one, what people understand to be biophysical ecology, but what has happened to a significant part by design is that humans have actually made the distinction between the natural and artificial impossible to distinguish. For example, not even the water we consume is natural; with additives such as fluoride, chlorine and antibacterial chemicals. People are dependant on the artificial as it has become indivisible from the natural. This has become one of the reasons why design has to be on an increasingly significant steep trajectory of importance in relation to the situation that people are in. But it is more than just physical understanding of the complexity of the one or the other, it is also a perceptual indivisibility between the natural and artificial; in other words people do not see the world naturally. People only see the world from what people have learnt artificially. The relation between what it assists empirically and what it assists perceptually has become a significant part of the problem.

3.3 Social ecology

The second ecology that people live in and exist by is the social ecology. The fact that people only exist by virtue of each other and have no ability to exist as simply independent identities, so that the social and the notion of community, has a direct correlation to ones ability to flourish and survive. There is a relation between one and the other, so that as the biophysical ecology becomes critical there is a very strong chance that the social ecology also becomes critical. Again, going back to climate change to illustrate the fact that by the end of the century it is quite possible that about 10% of the world's population will be displaced under the term climate refugees. To put this in perspective, tens of millions of people will become refugees. These people will not be completing forms to migrate to different countries. People are going to move, and travel where they can in the circumstances they find themselves in. The notion of border protection and immigration procedures will be completely gone, but replaced by an enormous amount of social disruption and dysfunction. The Australian Defence White Paper published May 5, 2009 indicated that there is an expectation that this problem will arrive in this country from the North. The government's short term solution is to increase the size of the Australian Navy and to start to deploy more troops in the North of the country as prevention. With the large number of water craft expected to arrive, the government's solution does not seem probable. From this example, one can see the way the problem has unfolding and is at odds with the ability of people to consider the problem and address it.

3.4 Ecology of mind

The last ecology, ecology of mind relates to design education. People exist in a particular kind of way of thinking and that particular way of thinking has a direct relation to their way of seeing. "… people see with their eyes (physically) as well as with their minds (interpretively) the existing reality (perceptively), and some see requirements and (with foresight) possible solutions for the future …" (author unknown). Eyes are simply instruments that facilitate the capability of sight, but people see the result of what it is they know. If what people know is to how to act in the world in a destructive way, then that way of thinking determines what it is they do. So a great deal of the problems designers have is that people wrongly continue to think the world as a place of infinite resources; when in fact the resources are limited. People think in terms of being, enduring and continuing as a species when in fact they are a finite species, and the more that they mistreat the conditions that they depend upon, the shorter the amount of time that they have. Thereby, the biophysical, the social and the ecology of mind are all inseparable. If you pull them apart they are an explanation of the design domain, and it is not the way you would normally understand design.

4. Consequences

It is necessary for designers to be able to confront and address design issues with an awareness of time. To assist in the understanding and implications of timeframes, the life of CO_2 in the atmosphere by general estimates lasts for 200 years, so no matter what humans do they will have this predicament for the next 200 years. CO_2 has always been in the atmosphere, it is the only way that plant life on land can obtain its carbon to allow it to grow. The industrial revolution had really not yet ended. But since the start of the industrial revolution, the proportion of CO_2 in Earth's atmosphere has increased dramatically, and continues to increase whilst the absorbing plant-life is depleted, and that is the important part of this real problem.

The way in which the temperature of the world is regulated is through a sub thermostatic process. The thermostat being the earth's deep oceans, and terms of temperature adjustment, the deep ocean takes approximately 200 - 250 years to change a degree or two. Scientists have acknowledged that the sea levels rises are projected to keep occurring from between 300 to 400 years. Therefore, the problems will not be solved in the near future. The situation people are in at the moment is that between 1.8 degrees and 2 degrees of warming is going to occur no matter what people do. This has already been determined by the damage that has already been done. If people carry on doing what they are doing now, then there is a possibility of having a rise of 7 degrees. If the earth's temperature was to rise by 3 degrees, Australia would loose its Great Barrier Reef, species of flora and fauna including some eucalyptus species and have many coastal properties flood. The world would change dramatically. By the end of this century, much of this planet as people know it would be unrecognisable. Some areas on the earth will actually be more liveable than what they are at the moment, but many more places will be dramatically worse.

Designers have a very simple choice, they can keep on designing as it contributes to the problems, many of which have arrived by design or they can try to design by another way. In simplified terms designers can either be part of the solution or part of the problem; the decision comes down to choice. One can be paralysed by the choice, or be stimulated and motivated; and even to a degree become excited by the challenge. Designers need to change direction. Included also are the people who have an impact on the design outcome, these are clients, managers, project partners, vendors, project leaders and lead designers, who can influence the final outcome of the project design.

5. Design solution

Designers need to deal with the world they have already created. The design solution needs to balance with its problem and its effects on the environment and ultimately everyone. For example, people do not need a battery powered scooper to pick up dog droppings, and they do not need cars that achieve 17 miles or less per gallon (17 mpg is the average gas mileage of the average car in the United States, EPA 2009). Sustainable architecture is positive for the environment, but many companies do not deal with buildings and/or cities that already exist. It is imperative to be able to deal with what already exists, which does not mean you never design anything new, but it means that quantitatively you design in relation to what is the greater problem. The world's biggest retailer Wal Mart changed to sustainable packaging of its products through re-design. In 2007 the company identified $10 billion in savings from packaging efficiencies through making sustainability changes within the first two years of making the change [Scott 2007]. The sustainability changes involved reducing the packaging waste by 5%. There were many factors associated with making the packaging more sustainable, including greenhouse gas reductions during manufacture of the package, substrate material choices and chemical composition, eliminating PVC from their private-brand packaging, and integrating recycled materials into new products. The packaging reduction on the entire packaging supply chain was designed through a "cradle-to-gate" approach.

In Figure 3 designer Lotersztain illustrates his belief that sustainable design has no boundaries. Refurbished second hand yacht fenders, primarily used to protect boats during mooring have been transformed into a sofa. Its design is functional but informed by a sense of environmental responsibility. It recycles the energy and resources already expended in the production of large nautical boats, into a new form. These marine fenders, intended for the most radical of weather conditions, become the seat and back support of the sofa. They are supported by a recyclable stainless

steel frame to support the fenders which becomes the seat and back supports of the Crusoe Sofa. The fenders and frame can be deflated and packed for transport.

Figure 4 illustrates designer Gration's Hinkler Bench. Gration uses Moso bamboo in his designs to achieve the environmental benefits due to its versatility, biodegradability and rapidly renewable growth cycle. This species of bamboo has been used for centuries in buildings, as a food source and as an ornamental plant. Due to growing global demand for environmentally preferred materials, it now features in textiles, cross-laminated boards, veneers, plant-based polymers and a diverse range of carpentry products. The design solutions, elimination design and platforming are two different kinds of re-directive practices to design for sustainment [Fry 2009b].

5.1 Elimination design

Elimination design is learning how to design things away as well as designing things into existence. It is an interesting and often difficult exercise. Identify something that is a problem, something that is actually doing harm, and then find out a way of actually getting rid of it. In terms of creative challenge this exercise is the most complicated and time and effort consuming area within a design process; however, despite the complexity, namely the developed capability to undertake elimination design is a much demanded sphere.

5.2 Platforming design

Platforming is recognising that as designers, companies are in a situation where people cannot simply stop designing the way they previously had, and suddenly change direction. A company cannot have things crash around them in the transition of where they are now and where they want to be. By building a whole range of different kinds of platforms, a company produces items which it needs not to produce, but it also needs to survive. So a platform is a way that a corporation starts to build its future within itself, and then puts its platform as it were, into competition with itself. Hence, the company should not stop serving the design market that someone constituted but should recognise things have to change.

Honda was one of the first engine manufacturers who used Platform Design as a basis of sustainable responsibility in their design development process to become the industry leader in the Power Equipment range. Honda realised in the early 1960's that traditional carburetted two-stroke engines were responsible for an alarming rate of emissions and contributed significantly to pollution; therefore, the company adopted the policy to only manufacture four-stroke engines. Honda started to design and manufacture 4-stroke engines while continuing production of 2-stroke engine range. Today, their product assortment of lawn mowers, line trimmers, brushcutters, generators, outboard motors, snowblowers and other power equipment use ultra-low emission 4-stroke engines. Nowadays, Honda's management strongly supports government's legislation to ban 2-stroke engines. In addition, despite being known as the world's largest manufacturer of internal combustion engines, Honda has never built a V8 for passenger vehicles, considering petrol consumption and efficiency.

Figure 3. The Crusoe Sofa (refurbished second hand yacht fenders) designed by Alexander Lotersztain, Studio Derlot

Figure 4. The Hinkler Bench (Moso bamboo) designed by Kent Gration, Wambamboo

6. Historical condition

In the 1930's design was introduced into the United States to speed up consumption to try to increase spending to cover the economic crisis that existed at that time. This became the foundation of modern consumerism and is inseparable from the trajectory of globalisation. People can link a great deal of consumer society back to that moment. It represents separated destruction rather than simply a proliferation of consumption. Individuals have managed to find incredibly seductive and efficient ways of taking the future away by design. What is required to do is to learn to do the reverse. People need to bring the future into existence as something that has viability, recognising that the future is not an empty void in front of them, which people are travelling towards, but rather is this thing that have thrown so much from the past into. The way that people travel into the future is by negotiating their way through all that already exists within it. One can only do that by design; people cannot get to the future by accident. As far as putting into a platform of educating sustainable design, one has to see today's events as an opportunity. This is why leadership and opportunity is there to be sought, for if you really embrace design, practicing designers, and design educators have the position and responsibility to cause directional change that will make a significant difference. Seizing that opportunity is difficult, but has become a necessity.

7. The challenge

It is far more difficult to change a designer's thoughts, than to educate a designer in there earlier years of education. Good design contributes to the possibility of a viable future; bad design is what takes it away. A lot of things in the past have been classified as good design did not have a good outcome in terms of what they delivered, either environmentally, socially or economically.

8. Conclusion

To become an ethical designer one must be accountable for the objects one creates, whether engineering, industrial, architectural, product, digital or visual communication. In addition, to be a designer is not about being trendy; nor is it about being seen as creative or being a problem solver; it is about being accountable to what one brings into existence. Conversely, even though in most instances the client designates what is to be designed, the designer has the significant share in accountability for the overall effect of the designed product or project on the environment, its consumers and the world at large. In simplistic terms, designing ethically means taking responsibility for giving form and

function that minimise the use of natural resources and prevents or minimises pollution and environmental damage. An ethical design can be evaluated according to its degree of sustainability; which also involves the elimination of products which are unsustainable. Rather than create more 'green' things that simply add to the consumer choice, products can be eliminated by design [Fry 2005]. Designers have the skills, resources and reasons to deal with sustainability; therefore, they need the will to act.

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