

STEPS TO AN ECOLOGY OF PRODUCT INNOVATION

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ABSTRACT

There are many crises in today's world and most of them are interconnected and interrelated and contribute to what Brown (2007) recently referred to as 'dark times'. The list seems endless – climate change, pollution and loss of bio-diversity, social inequality and injustice, organized crime and violence and corruption, from food systems to politics. Design makes a contribution to nearly all of these crises in some way or another through its products, processes and performances. The same motivation that contributes pathologically to these crises is unlikely to help solve them. 'New light' on 'dark times' is sorely needed.

Innovation is essential to a modern society and, though not a new phenomenon, without it the world in which we live would look very different. The 'new light' will have to come from a new kind of innovating. Not just in new products but new ways of conceiving innovation and practicing it (Bruce, 2007). These new ways need to be catalyzed from a design education where ecological and sustainable issues are as important as the economic and aesthetic.

This paper draws on research from two areas of work in the School of Design at the University of Dundee, natural design and product design in a re-think which postulates a series of five steps as guidance towards the more detailed aspects of curriculum design which will be dealt with in a subsequent paper.

Keywords: Design, Product, Ecology, Innovation, Consumerism, Entrepreneurship, Nature, Complexity, Pulsing, Lensing

1 INTRODUCTION

Economic growth and wealth creation through acts of invention, innovation and entrepreneurial activity are fundamental to the future success of nations. In 2003, the Department of Trade and Industry (DTI) released the innovation report called 'Competing in the global economy: the innovation challenge' where it stated that, innovation – the successful exploitation of new ideas, is essential for the delivery of new products and services that meet the needs and desires of consumers; the development of more environmentally-friendly production processes; and new and improved business models (e.g. processes, systems, operations and culture) [1]. So, with the capacity to offer so much to the modern organization, innovation will undoubtedly be one of the most important but difficult challenges of the twenty-first century and one in which young designers will need to be adept and adaptive.

2 FIVE STEPS TO AN ECOLOGY OF PRODUCT INNOVATION

What follows are a series of five steps which we believe are essential to the development of an overall framework for the design of new product innovation courses and practices.

2.1 Step 1 – Envision a future model for a dynamic path to sustainability

The direction which societies take in the world is bio-culturally determined. We, like all living beings are biologically motivated to survive and adapt in changing environmental circumstances. In addition, however, we are culturally motivated. The two motivations are intimately bonded together like the combination of two ‘forces’ and the direction taken at any one time is the resultant of the magnitude of the two forces. Where early hominids were almost solely biologically dictated, modern homo-sapiens are increasingly directed by culture and its primary component – technology. Whilst it is clearly not possible or even desirable to return to a primarily biologically determined state in which one planet would meet all our needs, neither is it possible to be so dominated by our techno-scientific advances that we forget or even destroy our biological ‘being’ in the world. No matter how clever we humans think we are, we cannot survive in this world without the rest of the non-human living world. To maintain a sustainable direction, albeit one which continues to fluctuate but within reasonable limits, a minimum of three practices are required: (1) Ecological Design in its focused and meta states should be applied to all our decisions relating to products and processes; (2) Ecological Ethics should be used to guide our imaginative designs in order to answer questions of not what can we do, but what should we do; and (3) Ecological Visioning should help us keep an approximate sustainable target in view. These three approaches applied collectively are fundamental to the ecologising of product innovation. For example, designing for the long view is described in our work on the ‘Island’ project [2].

2.2 Step 2 – Embrace the informal laws of ecology rather than consumption

Thirty-five years ago, Barry Commoner described what he referred to as an informal set of “laws of ecology” as follows [3]:

- Everything is connected to everything else
- Everything must go somewhere
- Nature knows best
- There is no such thing as a free meal

Designers have paid scant attention to these “laws” and have rather embraced what might be termed, the informal “laws of consumption” as follows:

- We (humans) know best
- There is always room for more
- Always sell on the never-never
- Progress is made through planning i.e. planned obsolescence or planned chaos
- Proliferate people
- Throw things away as soon as you can
- Hedonism for the masses
- Match obsolescence to desirability

If so, it is only to be expected that the world is facing an environmental crises, only currently headlined by climate change. Yet there are many other critical issues like loss of biodiversity, natural resource depletion and pollution, social inequality, violence and corruption and so on, all of which are interconnected. It is little wonder that Brown

(2007) referred to this as *Designing in Dark Times!* [4]. Although there is general agreement that these crises exist, there is still much debate on their individual significance, their priorities and their likely amelioration by technical fixes - the conventional design contribution. A first step to ecologising product innovation is to direct our attention from the “laws of consumption” to the “laws of ecology” and to attempt now to design our way out of the crises. To do so however, design will have to see its contribution in a larger perspective and to adopt practices and techniques which go beyond the conventional. Inns (2007), for example, has recently speculated that, as significant changes take effect from this wider concept of design in the 21st Century, six new emergent roles for designers will appear as follows [5]: (1) Designer as Negotiator of Value; (2) Designer as Facilitator of Thinking; (3) Designer as Visualiser of the Intangible; (4) Designer as Navigator of Complexity; (5) Designer as Mediator of Stakeholders; and (6) Designer as Co-ordinator of Exploration. These are all key roles for the education of new product innovators.

2.3 Step 3 – Credit the universe for its creativity

We believe creativity is at the heart of all education and especially where design is a central practice. However our view of creativity is wider than most and was recently developed as a sixth generation model of the innovation process by Bruce (2007) [6]. We believe, like David Peat, that the universe is creative though perhaps not intentionally so [7]. In addition, that a significant part, but not this entire domain, is the domain of human intentional creativity. Most creative acts are not spontaneous but are catalysed from the world around us and often ‘brought forth’ by different ways of ‘seeing’ the world. The creativity of the non-human universe is the source of many of our ideas and we need to practice ‘seeing’ this. In addition, this world is chaotic and complex and many theorists have tried to explain it through the use of simple, mechanistic, linear, cause and effect models. However, these have been less than perfect but nevertheless useable in many situations and domains. In its most general sense, complexity theory is grounded in chaos theory, and is based on the notion that non-linear relationships between parts continually self-organise giving rise to the emergence of a new collective system. Reason and Goodwin (1999) have identified six key principles of complexity that organisations need to understand in order to generate success [8]: (1) Rich Interconnections; (2) Iterations; (3) Emergence; (4) Holism; (5) Fluctuations; and (6) Edge of Chaos. ‘Seeing’ this creative, chaotic and complex world around us in relation to design and human affairs is essential to the ecologising of product innovation. Seeing the planet without us is a novel way of conceiving a new approach [9].

2.4 Step 4 – Reduce materialism to ‘enough’ rather than ‘more’

Consumerism is the main driver behind product innovation and whilst there will always be a demand for new products, much of Western style consumerism at the moment is gross and harmful to the environment and human beings. As countries like China and India enter the consumer market with their huge populations and high motivations for similar levels of affluence to that of the West, then the problem becomes far worse. Western style consumerism is also central to the interconnected nature of the global crises. The more goods produced (unless from renewable sources) the more resource depletion and the associated abuse of land and landscape. The more goods there are, the greater the quantity of residuals that have to be dealt with, much of which will cause pollution of soil, air and water. Despite the successful miniaturisation of many

electronic products, high tech trash [10] is now a significant contributor to environmental pollution and a hazard to human health. In Europe, discarded electronic solid waste (e-waste) is growing 3 times faster than the rest of EU's municipal solid waste and amounts to about 6 million tonnes per annum. High tech electronics when damaged, dismantled and dumped generate sources of significant environmental toxins. Thring (1980) suggested 25 years ago that the increased consumption of goods (as part of the pursuit of higher standards of living) would soon lead to a decline in the quality of life [11]. Recent data confirms that the relationships between income and happiness are not linearly related [12]. More recently, James (2007) has suggested that an increase in materialism can also lead to increasing distress and illness [13]. Greater choice of goods too leads to similar problems in some people. Over consumption, has serious effects on consumers and the environment. Szasz (2007) has recently pointed out a further insidious effect of consumerism which he refers to as 'Inverted Quarantine' [14]. Where quarantine, as it is applied in public health, is a means of containing a potential hazard to prevent the intoxication of the general environment, 'inverted quarantine' is the attempt to contain a protective space against a contaminated general environment. Examples range from private nuclear bomb shelters to organic foods. According to Szasz, "bottled water, water filters, organic foods and organic, natural or non toxic household products and personal hygiene products" are purchases which consumers believe will protect them from harmful toxic environments. They are inverted quarantine products. However, such individualized actions dilute the potential strength of communities to force governments and corporations to stop contaminating the environment in the first place. As Donella Meadows pointed out, in a sustainable society we will need to develop technical means of reducing or ameliorating the harmful mistakes of our technical developments but many of these are secondary to the social need, not to create the problems in the first place [15]. Ecologising product innovation will mean reducing the amount of trivial products that we produce and concentrating on innovation which 'heals' rather than harms the environment.

2.5 Step 5 – Apply dynamic techniques to relate context and content

We believe that amongst many conventional techniques and skills which we would embrace in our new course, like sketching, drawing and modelling, we believe that 'pulsing' and 'lensing' are essential. We claim no originality for these techniques. We have found no documentation on them but we feel sure that they are used in one way or another by designers. However, we would have them developed into systematic methods and the detail is discussed in another paper. In essence however, they are as follows:

2.5.1 Pulsing

Much of conventional design exhibits signs of pathogenic inward spiralling tendencies and we suggest that the future will require designers to adopt a salutogenic approach which may be described as 'holistic, metropic centrifugalism'. We are aware however that neither on their own is adequate nor that both can be practiced at the same time. Our suggestion is then – pulsing, a dynamic system, like breathing. A systematic technique of in and out. In, to focus on the detailed practice of designing and out, to keep the focus in the context. In, to design the product and out to consider its consequences in context. In, to see the parts, out to see the whole. We believe from our preliminary use of the technique [2] that, like breathing, there is a limited time in which any one state is held. Focusing, for example, on the detail for too long a period inhibits

the action to step back and see the whole picture. Perhaps this is because we have committed too many resources to the detail and we are fearful of the outcome of looking at our work from a 'distance'! Wherever we place our course on the continuum (see later) it will not suit its purposes best if it is static. Our course would be designed to 'pulse' around its central core – towards science and back again towards art.

2.5.2 Lensing

Lensing is associated with pulsing and is reinforced by it. Lensing, is about looking at a design, from a different perspective or through 'different eyes'. These 'eyes' may be the eyes of different people or animals or even plants and inanimate objects. It is a highly imaginative technique which gets more difficult as we move away from the designer as centrepiece (designocentric) through zoocentrism to eventually eco or cosmocentrism [16]. Practicing pulsing draws the designer into a wider view of the world from where the different lenses are acquired. For example, seeing the design of a children's playground through the eyes of a paedophile makes us more sensitive to the activities and emotions of the paedophile and more aware of the relationships between the child, the intruder and the designed place, Techniques like Goethe's way of seeing [17] are valuable practices for developing the 'lensing' skill and the imaginative application of the 'alien' view, using for example, the idea of imaginary menagerie is provocative and stimulating (Bruce, F., Kingsley, S. and Baxter, S. In preparation).

3 CONCLUSION

The existing Innovative Product Design (IPD) course at the University of Dundee (UoD) spans the gap between art and engineering by providing students with an integrated knowledge of user desirability, technological feasibility, and business viability in the context of new products and services. The course is jointly delivered by both the School of Design and the School of Engineering and Physical Sciences. The School of Design delivers a suite of modules focusing primarily on visual expression, understanding and contextualizing stakeholders, and tools and techniques which foster problem solving, creativity and decision making in small-interdisciplinary teams. The School of Engineering and Physical Sciences delivers design technology modules which encompass engineering design, mechanics and thermodynamics, structural design and manufacturing. The skills gained from both schools are drawn together in Integrated Product Design modules. Designers in product innovation are usually 'professional designers'. Professional design lies on a design continuum somewhere between Art and Science where the whole continuum embraces the ubiquitous activity of designing. So, a whole range of disciplines use design. For example, Art only has a low requirement for 'design' in relation to its other activities and so too does Science. The disciplines with the highest requirement for design in relation to their other activities are the designated design disciplines. Product Design is a central contender. However, a review of course curricula for product design degree courses shows no single location on the continuum but rather a range in the centre with some courses tending towards the art end of the spectrum and others towards the eng/science end. This is of course true of other disciplines. We also suggest that in handling information, the continuum ranges from a high tolerance for ambiguity at the Art end to a low tolerance (or high requirement for precision) at the Science end. Again however this is a generalisation. Scientists for example will, for a small part of their efforts, deal creatively with ambiguity whilst there are times when artists will seek precise knowledge. This in our view suggests that in dealing with the 'world', scientists seek to understand its workings in detail whilst

artists seek to display a variety of awareness. Design hovers in between. Acting on the world however is what causes most of the crises. Acting from understanding is generally most appropriate when the consequences of the action are likely to have a significant effect on the world. Acting from awareness only, in similar situations is dangerous but making people aware of different ways of seeing the world is important. We would locate our new course on the median of the continuum but with the following proviso: that students are not only made aware of the continuum but are taught systematic techniques (i.e. pulsing and lensing) in which they traverse backward and forwards across the subjects of the continuum.

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