4D DESIGNING IN PRACTICE: SOME SPECULATION.

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This is a position paper. It draws form a number of publications produced by Alec Robertson as author or co-author. It collates a number of speculations as to the 4D designs with the purpose to illustrate the application of the notion in design practice. A bibliography is provided at the end, within which detailed references can be found if the reader is interested further.

Introduction

The definition of 'design activity' is hard to pin down to one with consensus, as it encompasses multifarious activities and perspectives. The definition of Herbert Simon(1969) is useful here as a basic one.

*"**Design** is the transformation of existing conditions into preferred ones" (Simon 1969: 55).*

The notions of 'transformation' along with 'metamorphosis', are at the core of the concepts presented here with the idea that there are designs designed that are not currently considered as being designs, and it is timely to consider a new way of looking for the creation of the artificial. A position taken is that these can be characterised in part if not in whole, by the definition of '4D design'. 4D Design focuses upon designing cultural expression within dynamic situations of the everyday 'designed' world in the field of Arts&Design. Although the definition is close to the sciences of complex systems and cybernetics, it has a cultural and aesthetic context and a more intuitive way of looking at the artificial involving people.

*" **A 4D design** is the dynamic form resulting from the design of the behaviour of artefacts and people in relation to each other and their environment. (Robertson 1995).*

So how can concepts of 4D design with the science of complex systems enable the creation of new kinds of 'artefacts' for the 'everyday – 4D products. Let us consider the notion of 'dynamic form' within the definition of 4D design. The idea of 'applied performance' was introduced in an attempt to encourage trans-disciplinary work between design and the performing arts. The concept encourages application of useful choreographic knowledge into everyday life situations (outside theatre stages and without trained dancers). For example, Sophia Lycouris has outlined a relevant theory that architectural space is caused by the interrelationship between body, movement and space, where the act of design becomes the shaping not of buildings, but of space conceived in relation to a moving point of reference. The advantage of creating architectural space with an

integrated understanding of its dynamic potential is that such space can increase the corporeal responses of the viewer or user, in the sense that as they move through the building this results in them perceiving space more intensely as a result of the generation of multiple physical sensations. 4D design helps to make conceivable the integrated choreographic understanding of all manifestations of movement in a given physical space beyond the typical use of interactive digital displays in the built environment. In the architecture of public spaces, the concept of 4D design brings together physical objects, media, and the activity of people in the situation within spaces and can thus engender a dynamic multi-sensory expression of culture.

Below the issue is expanded in the context of consumer products generally then illustrated with attention to the humble video recorder. This is followed by various are where some speculation as to the 4D Design perspective is illustrated further.

4D Consumer Products

The common goal of designers is to create an 'appealing', 'useful' and 'acceptable' product at the right time in the right place for the right customer to do the job required. In design practice cross-disciplinary teams are increasingly required to do this as consumer products become more complex. Designers with different perspectives increasingly contribute to product development. At one extreme there is the ethos of engineering and ergonomic functional capability, and at the other extreme - artistic aesthetics and emotional value. The former has tended to receive more attention, indicated by the value of research grants for engineering compared to industrial design. What would 4D product design research involve in this area? Three research questions to ask are:

- What characteristics will a 4D product have that a 3D product does not have?
- What specialist knowledge is required for 4D products that is not required in 3D products?
- What non-technical functional components are involved?

Technologies that enable articulation of components and their control are developing at the same time as multimedia information technology, and the quality of technical engineering design can increasingly be relied upon. Consumer rights and legal product liability legislation are ensuring the basic characteristics of any product are good - the product will do what it is said to do, and it is safe and increasingly environmentally benign. However the 'emotional' value attributed to any product is of crucial importance in the consumer market. The question of whether a product is a appealing and pleasant to use has to be answered. Richard Guyatt, once Rector of the Royal College of Art, aptly said to an audience sympathetic to 'form follows function' - " there is such a thing as the ergonomics of the heart'.

Static visual design has been of fundamental importance, and many design schools have been instrumental in the growth of designers, who as well as capable of technical design, are visually aware about qualities of 2D and 3D product form. However, even here, the dominance of the 'visual' has left other form attributes to fend for themselves. Dynamic form, such as the sound of a product and the way it moves are just two non-technical performance attributes that have not

received the attention they deserve. Noise has been tackled but not musical composition. Animation as a linear form of narrative entertainment in 2D and 3D has developed with film and video technologies, but the issue of 4D form, where the behaviour, especially as a metamorphic non-technical performance attribute, increasingly needs to be addressed. How can this be done? Knowledge of 'personality' and 'behaviour' in people and animals is an initial requirement for any designer.

To illustrate some 4D issues and how 4D form would affect the humble video recorder some teleological design thoughts on the humble domestic video recorder/player are described below.

4D design of video recorder.

The forces on product design to reduce component cost etc. tend to dominate the design decision process. Folklore has it that someone was told what an industrial designer does. The surprising response was ' Oh they are the people who make things less enjoyable, as the person recalled the aesthetic qualities lost from of old cars and machines - the materials, smells and sounds 'experienced' in for example driving a Morris Minor car, to using a classic Singer Sewing Machine.

Evolution of the video recorder could take either of the two routes. Loading of a cassette may be eliminated with on-line download through the internet. Alternatively, pop out/up cassette loader could evolve into something more kinaesthetic, responsive, and dare we say enjoyable.

At a more complex level of 4D design, the video recorder has a notorious reputation for many years for being 'un-programmable' except by the most technologically adept. It took the development of VideoPlus - the bar code based swipe invention for programming a video recorder before progress was made, as it significantly automates the process and it adds value by subtracting hassle. Alternatively, the action of programming the video would have been made not only easier but enjoyable too - it would be designed as an 'event'. So how could this be been done?

The communication of ideas, mood and emotion through action is the bedrock of the performing arts - music, theatre, and dance. This is an untapped source of knowledge for product design and development. It is a necessary input of knowledge for 4D design, which together with multimedia and robotics technologies would be used within our 4D video recorder. What 'character' would the video recorder have? Would it be friendly? The term user-friendly has been one used by the ergonomist and human-computer interaction specialist. However inspection of 'user-friendly' designs show such specialist do not really mean 'friendly' but just non-problematic. How would a really user-friendly video recorder 'behave'? How would it 'act' when you switched it on? It will have a technical performance through speed of cassette loading but how will it 'perform' in non-technical performance?

How will a video recorder 'sound'? The sound of the cassette loading and its ejection has not been 'designed-in'. 'Worrying' clunks and winding sounds have been design-out' but what about 'audio aesthetics' that is pleasant to hear. Are the silent designs of today's electronic products appreciated more than the clunk of mechanical ones of the past? What is the alternative?

How would a video recorder move? The robotics technology required for ejecting a video tape is relatively simple, but one can only but notice however that the design of its dynamic form is only functional. Kinaesthetics has not been considered for the loading or ejection of the video tape, nor has it had a major influence on the 3D form of the video player's ' black box'.

Movement has been designed-out of many products. The 'performance' of the mechanical arm in a 1950's Juke Box was an 'event' that contributed to the experience of 'playing' a record. Imagine the possible movements using today's robotics technology.

Would the video recorder talk? The art of conversation between people can be fascinating experience to be part of. With speech synthesis and voice recognition now on the threshold of practical application a dialogue with your video recorder could be designed. Natural language conversation is not the aim here, but random verbal annunciation based on recognition of words you might say, or the conditions of the environment could provide some interesting 'infotainment'. Would the accent of a voice have - that of the chief executive in the original company head office - a Japanese owned company product speaking English with a Japanese accent? If you are Scottish would you expect the recorder to speak in your regional accent?

The design of such dynamic non-technical performance attributes through notions of 4D design would, it is contended here, add-value to a video recorder/player, and even make it more useable. It might move on product design from the 'black-box' syndrome into something completely different. Robotics and multimedia technologies could facilitate this.

Robotic devices currently in service are unlikely however to be the main thrust of evolution in 4D consumer products. Techolust and the walking - roving video recorder/player should no more be the goal for the 21st century than the robot waiter holding a glass of wine for you at a party, but the consumer product with 'dynamic personality' could well be a goal worth exploration.

Will 'form follow fun' in the 21st century? Which do you prefer - the silent internet delivery of a music-video, or, the evolution of the 50's Jukebox to a personable product joining in the event? Which do you think would be the most socially and ecologically responsible design? What do you think will happen and importantly have we any choice?

Architecture

In the early 1990s there were notions of the 'intelligent building', cyber-control systems (in contrast to automatic), 'archionics engineering' (analogous to avionics for aircraft) and 'kinematic buildings' (in contrast to static). Here it was advocated that a building could be as beautifully responsive as a plant is physically to its environment, and as graceful as a ballet dancer with gentle articulation of its components on an urban stage. Later questions were posed – 'Is the 'automatic door' opening as one approaches the beginnings of buildings dancing with people? 'Can we look forward to buildings and a built environment that responds kinaesthetically with each other as well as efficiently, with subtle performances of buildings in our cities?' Examples of the 'kinematic building', where a building incorporates motion through use of dynamic technologies are beginning to appear and likewise with consumer products. With the 4D design perspective on dynamics, can we encourage dynamic architectural expression within the whole public experience; designs

involving choreographic expression within articulated artefacts, media displays, traffic and people? With notions of complexity science and specifically the interrelationships of 'autonomous agents' as human movements and dynamic elements within cityscapes what can be possible? One impact may be on the 4D design of 'traffic'.

Traffic Systems

Movement of commuters on pathways could create a kinaesthetic spectacle, as could traffic flow through urban roads with automobiles embodying choreographic ideas encouraged by use of intelligent traffic signals interacting with the acceleration and braking of vehicles thus creating the experience of delightful movement in participants and for observers alike, as well as efficient traffic flow. On the roads, there may be 'herds' of vehicles where cars communicate with each other and adjust their drive to increase safety of themselves as the raison d'être, yet with courtesy. With 'smart materials, imagine if a particular make of car, like an Audi communicated with other Audi cars by a colour or lighting changes, like the driver ritual of flashing indicators to respect good reciprocal driving behaviour. Likewise articulated traffic lights could sense your car's approach and wave you though a junction if no car is waiting with a delightful comment through the radio.

Driving

The 'smart car' will have a character as well as style. This will make a reality of Kit the talking car of the Knightrider TV series. It will be your chauffeur, your concierge for driving. Petrol stations will be 'self service' but with a 'host' in the pump massaging your ego with conversation. The subject will be derived from your smart card as it provides your consumer profile. Your host will greet you and attempt small talk 'just how you like it'.

Fashion

In the high street fashion boutiques, smart fabrics for fashionable 'designer' clothes could flirt with each other though sensing their environment aware of the wearers physiological responses too. Dynamic elements embedded in the fabrics could act as a display like the peacock courting with his feathers displays.

Manufacturing

It may well be effective to have 'colonies' of machines operating working in the fields and factories that move with 'performative' qualities in a ritual dance of their own design while working. However, what is socially and ecologically desirable or realistic beyond an experiment, and what is fundable are other issues to incorporate within 4D design innovation if it is to transform existing conditions into preferred ones.

Shopping

We can envisage an increasing development of the shopping experience as a more leisure based one. Customer care will become customer entertainment. The reason for this lies in the need for added value in contrast to internet e-commerce shopping. As such the attraction to go shopping is significantly the 'window shopping' experience extended. The cathedrals of commerce will become theatres of commerce. This does not mean public art squeezed in between the mall shops. The stage will be the mall, the actors will be the sales assistants, and the acts in everyday situations will be the performances. Who better to help put on the show than playwrights and performers in the design team?

Vending machines are becoming more prevalent such as 'cash-in-the-wall' machines. These will take on personalities and respond just how you like them. They will do this by reading data on you from your card or even sensors as your stand nearby. Your mood, health and cultural habits will be used to provide an appropriate response just for you. These machines will become articulated artefacts moving kinaesthetically. Who better than choreographers and dancers to help design these? The friendly local corner shop is a valuable asset to a community in English villages as it offers a personal service rich in local cultural content where the act of shopping takes on the qualities of theatre high in 4D value within the dialogue, gesture, anecdote, gossip and multi-sensual experiences. E-commerce interfaces therefore should be designed to retain as much rich content in the trip to a local shop as the technology allows and simulate for the e-customer the experience if at all possible, as well as providing the benefits of low cost purchases.

Eating

Cooking appliances will be capable of having a conversation with you. Your microwave oven will help you during preparation of a meal, suggesting recipes and showing you how to do it on visual displays as well as by voice - tips and help offered with jovial banter all included. So who are the script writers of the wired chef in the microwave, the choreographers of the coffee maker and composers for the washing machine? Consumer appliances will not merely 'do', they will 'act', they will sing and they may dance!

At home

The example of Aibo, the robotic pet dog from Sony, the Tamagotchi from Banzai, or the cuddly Furby toys suggests further, that the personalisation of technology is upon us. Home systems such as lighting will not only adjust to your needs and moods but also greet you when you open the door. Your house will report on visitors or phone messages awaiting your attention. It will become your servant, companion, security guard and friend.

In the community

The internet and new social networking technologies in general, enable communities to develop through communication rather than physical location. There is the possibility of large

groups of consumers forming 'communities of interest' around preferred Websites, with 'customized interactivity' routines that surround them. The internet site 'LetsBuyIt.Com' encourages consumers to join together in the purchasing of goods and enable low cost bulk buying.

Consumer Cults.

The experience economy involves a phase beyond 'staging experiences', such as in the example above of drinking a coffee in a new café. It will involve 'guiding transformations' of people within processes that will be designed to maximize personal development and the value of this.

It is forecast here that this will lead eventually to the design of branded consumer-cults, where design is the binding issue of the community. Here word-of-mouth or electronic communications bind people into a series of shared but also variegated patterns of consumer behaviour, which can be specialized enough to deserve the term 'cult', in the sense that rituals of consumption that are acted out are not fully comprehensible to the uninitiated. These consumer cults will provide a 'packaged life' designed with coherent philosophy, and offering value for money well above chaotic individual purchases. Consumer-cults will have economic power, like trade unions for labour, which will help ensure high standards of design from producers of goods, services and experiences.

This is nothing new, as in the past many kinds of people have grouped together in communities with shared beliefs where their artefacts they have produced embody some of the beliefs, along with their use. Examples of such communities range from the Shakers, who produced some elegant and simple furniture designs for home and church as a result of their religious perspective, and the Amish community in the USA which still uses much 19th century technology, such as the horse-pulled carriage and period dress, to retain the kind of life linked to these artefacts – their manufacture and use. 4D consumer-cult designs are not religion based. They will offer experiences and personal transformations in the 'experience economy', which will be just as valid as the material based 3D designs for 'goods' were and are for the manufacturing economy. Community designs often manifest themselves as Utopias, and they have mixed success. Some branded consumer-cults will establish themselves and other will not. They will mean a new horizon for the design business, still largely based upon manufacturing industry, 'goods' and 'services'.

Conclusion

Professional design practitioners at the cutting edge of new ideas in the context of the real world are significant contributors to new knowledge in design, and therefore design research (. Indeed it is questionable as to how much 'academic' design research has contributed to making the world a different place in terms of the designing of the artificial, beyond stocking University libraries. However, there is a role for 'conceptual designing' for design research purposes outside 'professional designing'. For example, several notable thinkers in architectural design, who for one reason or another actually build very little, if anything, model innovative building schemes that provide new knowledge and insights for the discipline. Their visualisations of new architecture become famously influential with these un-built buildings for changes within 'professional design' of the built environment.

Although many human-artefact systems are 'too complex for words', a few well chosen words creatively put together, or after some systematic work, indicating new design concepts can act as 'a catalyst' for visualisations of new artefacts and can be viewed as design research outcomes. This is especially so if those who read the words act on them in professional design practice and subsequently change the artificial world.

This perspective of 4D designing is a radical departure from the norm of 2D and 3D designing in the field of Art&Design, and a way of designing some sorts of activity that are not included within categories of contemporary design education or 'professional design'

The speculative scenarios above for practical applications of 4D design are just a small step towards designing a different future; a future where our 'designed' dynamics relationships with the 'artificial' and the 'environment' are increasingly useful, and importantly, 'good' and delightful' ones. 4D designing will give rise to *new* 'creative industries'.

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