The Future of Making

by Ashley Hall

Case Studies:
Unto this last
Agency of Design
Nature Aided Design Lab
Evolutionary
Centre for Plastic Electronics
Gordon Murray
iimaginedesign

We just don't make stuff in the UK anymore; everyone sits around staring at screens working for the knowledge economy right? Well, maybe not. A new breed of innovative design groups have quietly began what may well turn out to be the thin end of a seismic shift in making for the 21st century.

Industrial design used to be about churning out masses of plastic trophies for global corporations to facilitate the consumerist dream with little regard or understanding of the responsibilities, but we all know this story. The new approach elevates designer's ambitions and influence onto another level by producing ideas that combine ecological responsibility with enterprise models, users, experiences and artefacts. It's a sophisticated mix needing strong strategic design leadership to corral complex interrelated systems of technologies, users, markets, data and strategies.

In the past designers have mainly confined their effort to effecting change on a product level and while higher ambitions have always been articulated, a number of converging elements have recently come into play offering new opportunities. In the last decade or so design activity had increasingly bled across many diverse disciplines as a mix of curiosity, ambition, experimentation and the motivation to improve life has naturally driven designers. So what's allowed this to happen and why has it only started to emerge in the last few years when we've been designing and making for decades?

Three main factors have contributed: Ambitious designers with a powerful social agenda for change operating at a systems level. Lowering the barrier to entry in developing software and connecting sophisticated digital toolsets to generate new channels for knowledge sharing connecting new groups of customers and users by opening up creative connections and co-design scenarios unknown in the past. Finally interdisciplinary design and learning to talk the language of multiple disciplines has enabled collaboration and the production of Innovative approaches on a new level. For this new breed of creative designer, disciplinary boundaries are largely irrelevant and practitioners define themselves more via their kaleidoscopic outputs than traditional labels.

Unto This Last
Over a century ago John Ruskin had a dream for low cost, well-crafted furniture that would be enjoyable to make and valuable to purchase. Published through his book 'Unto this last' it pitched a utopian dream combining high quality craftsmanship with affordable designs. It's taken over 100 years for technology and manufacturing to catch up with Ruskin's dream of affordable and well designed locally made furniture to succeed. Unto this last has become a reality in a converted pub at the northern end of Brick Lane in East London in a company of the same name run by Olivier Geoffrey. Using one CNC machine to cut plywood and with an enormous online catalogue containing tens of thousands of designs, he has cleverly leveraged advanced

software and coding with an ultra lean business model. In fact his ultimate aim is to shrink his company and move deeper into the city, a manufacturing strategy that's been unthinkable until now. The dream of a future city of London with thousands of micro-factories generating environmentally sustainable, customisable, locally relevant designs has moved a whole lot closer.

Unto this Last, chairs cut by CNC and hand assembled in central London

Agency of Design

The main problem with designing products with optimum environmental considerations has been twofold. Knowing how much embodied energy (now considered a key environmental parameter) the product will consume to make and how this affects the material and production selection. Agency of design have developed creative tools that finally allow designers to calculate embodied energy on the fly while at the same time swapping materials to experiment with using the least energy possible. The idea has been tested on a series of lights designed and made using 1, 10 and 20 Mega joules of energy illustrating how this can be achieved alongside suggesting new material combination like concrete and cork for the 1MJ lamp. They have also designed a deck of top trump style cards called 'Energy Trumps' which designers can use to familiarise themselves with the embodied energy of a range of standard materials.

Agency of Design: top Energy Trumps, bottom embodied energy lights made using 1, 10 and 20 Mega joules

Richard Gilbert one of the founding partners describes their approach: “Our design projects always look for the big opportunities, often leading us to systems level solutions. It is these systemic solutions that inform how or why we make things; by understanding the intricacies of the end of life product system, it changes what you tackle in the design process and how you tackle it.” He goes on to suggest new relationships between users and products: “A lot of the work that we've been focusing on, is how people can reconsider ownership, how you can make sure that the resources and the material value that's going into that product can carry on being a high-quality material cycle indefinitely.”

Experimental

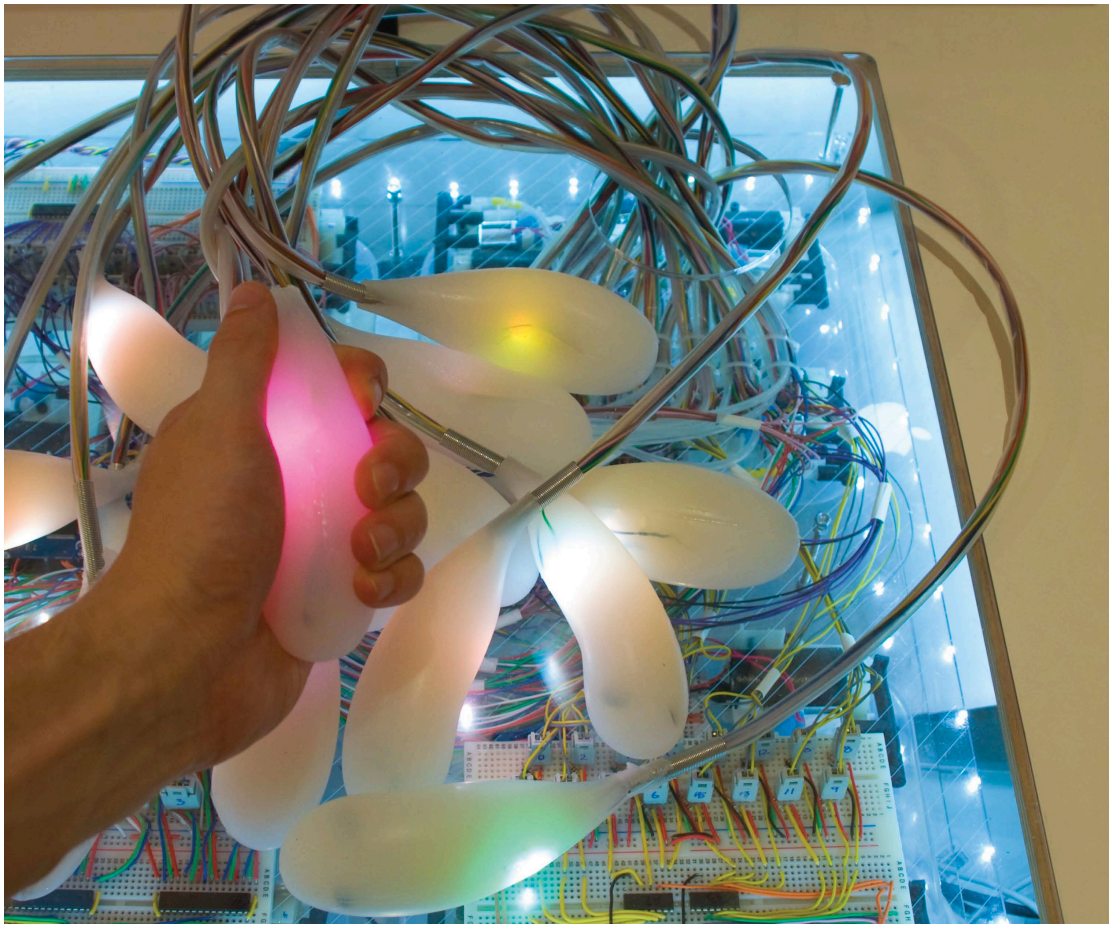
Part of my academic role includes leading thinking on the experimental design strand of the Royal College of Art/ Imperial College masters in Innovation Design Engineering where over the last three or four years we have seen a large increase in designers interested in systems innovation for production. The experimental approach is to look at the whole of design activity as experimental, focussing on early up front innovations, new materials, technologies and creative methods.

Nature aided design lab realised that we can redirect the abundant supply of natural power to manufacture unique and locally relevant products by challenging our manufacturing model. They describe their approach as: “The work of nature aided design lab represents part of a larger movement where new manufacturing processes are imagined and realised using the power or influence of natural phenomena. The use of nature as part of the production method allows environmental conditions to become embodied in the final object.”Their approach used

tidal power from the Thames to form concrete sections for park benches with different tidal patterns, currents and weather varying the results producing a range of natural forms. Keeping energy usage local and using related natural sources for products allows us to customise products in subtle and relevant ways as the bench system manufactured in the Thames near Hammersmith bridge shows. The ultimate aim would be to manufacture benches for parks and walkways along the whole length of the Thames, illustrating how variations in the river could affect the generation of forms and narrate the flowing river as a physical object.

Nature aided design lab, bench-forming process in the Thames at Hammersmith

Remember the 1990's cult film 'Screamers" based on Philip K Dick's novel Second variety? It's about an army of self-replicating robots who communicate with each other allowing autonomous evolution. Alex Bone's 2011 graduation project mixed evolutionary algorithms with a group of products that could adapt and reform according to users habits. This allows products to evolve in real time rather than the 1,000's of year it normally takes in the natural world based on biological principles. The advantage with Alex's system is that we can deviate from natural selection and modify the preferences for change by adjusting the underlying code. We've seen adaptive and evolving interfaces in software for some time now but the physical world is about to catch up.



Hidden Industries

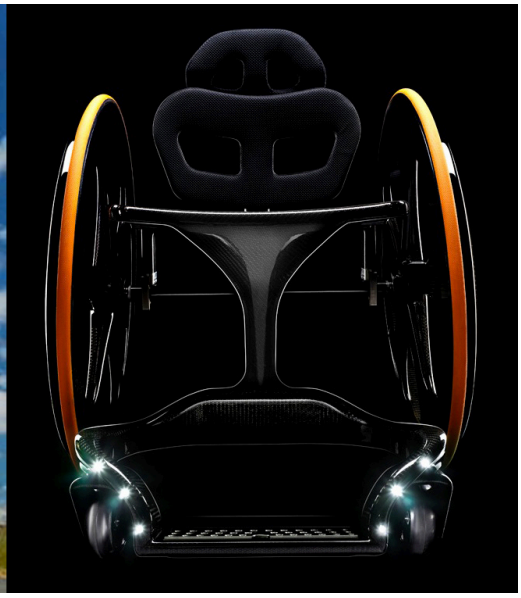
Most people assume our industrial output can be seen on the shelves of supermarkets, out of town megastores and shopping malls. There is however a parallel market in military, aerospace and medical products, many of which are never seen by the public yet contribute enormously to the UK's industrial output and GDP. The extreme demands of harsh environments, high accuracy and improved performance produce a continual cascade of high-end spin-offs which often feed into the top end of our everyday product ranges. The centre for plastic electronics at Imperial college is working on a new printable technology which will offer faster, cheaper and more efficient electronics which can be recycled more easily and avoids the toxic metals and recycling processes that we use at the moment. Designers are already creating dispruptive market innovations that imagine how plastic electronics could provide custom on-the-spot manufactured products like the example below which can also be upgraded and even have its product type changed at a later date.

IDE Masters students Hannes Harms, Alex Du Preez and Peter Krige collaborate with Imperial College Centre for plastic electronics to design new reconfigurable products.

Smart thinking & Smart Materials

Another factor contributing to the future of making is the UK's traditional strengths in design and technology driven innovation delivering products right at the top-end of advanced industrial output. Combining cutting edge composites, advanced computer driven manufacturing processes and structural engineering optimisation to bring us products like Gordon Murray's T25 electric car or iimagedesign's lightweight composite wheelchairs. Murray takes his top-end F1 skills and successfully applies them to an electric single occupant car. The visionary Sinclair C5 electronic vehicle was launched on the UK market 27 years ago in 1985 and its taken well into the 21st century to see large number of similar products on London's streets. Again it's fast-moving small and medium scale companies that are successfully filling the gaps left by large

global conglomerates or quickly growing their own emerging markets largely unnoticed by the bigger players.



Future

Looking further ahead commentators have described the convergence of making via bio and nanotechnologies that could result in bringing together developed and developing economies to share skills, cultural influences and equitable economic benefits. Digital skills are rapidly liberating difference from global geographies allowing us to influence each other with ideas and cultural elements on an unpredented scale. Unique local skill-sets can now be translocated allowing combination and recombination into whole new product types and making approaches. Rapid prototyping and desktop object printing are technologies that will democratise the making of sophisticated parts. It's likely that initially we will download customisable product templates in a plug and play format to make relatively simple objects. This is a fast moving area and already we can see early multi-material machines on the market offering much more sophisticated composite components. The long-term challenges come from closed loop recycling to supply material for RP machines and how we build systems to locally gather and reform materials on such a large scale for the emerging digital cottage industries of the future.

The Internet of things (IoT) describes a convergence of digital technology and products including ambient intelligence, ubiquitous computing and intelligent interfaces. 1960's visions of the future often showed the large physical impact of technology, yet our homes today are very similar at first glance to those of the 1960's. Instead our advances have produced technology that is increasingly invisible and inter-connected. The IoT will increasingly disperse computing power into the surrounding world. Essentially all things could be digitally connected in a network of objects allowing their location, usage and environment to be tracked and coordinated offering huge benefits of organisation and connection. At the same time this challenges designers, governments and agencies on an unprecedented level regarding the ethical configuration of the background systems, who owns and controls access to the data and how the information may be used or abused. This technology is already here in our Oyster cards, company security cards and the next generation of smart phones like the upcoming iPhone 5 with near field technology.

Rob Van Kranenberg, a member of the council for the Internet of things describes two possible future scenarios: "*The Matrix of Control*: smart cities as gated communities for the happy few plus the very upper middle class, a 'Mad Max' Detroit bound scenario for the rest of us with the current homeless and poor emerging as the new leaders in self organization. *The Matrix of Trust:* an open layer of data, generic infrastructure and basic income (sewage, roads,

connectivity) on which through a single flat tax, paid by starting up applications on a passport/ID/phone, everyone is free to offer apps and services. The *Matrix* is the constant. Undoubtedly designers will soon be faced with making large-scale decisions at the systems level affecting the use of emerging technologies with immense powers for social benefit and social control alongside offering new ways to make, evolve and engage users. Products won't just be finished when they leave the factory floor or makers bench, they will all have the potential to change, evolve, learn to be part of our computing and communicating world.

The future of making isn't necessarily digital either. Richard Sennett in his recent book 'The Craftsman' attempts to reposition making as an equal thoughtful activity on the same level as writing, drawing and debating. In fact, the analogue revival is already here with 'thinking through making' being increasingly reintroduced and promoted on design courses. Many felt that the digital pendulum has swung too far in generating synthetic objects that lacked human connection and thoughtful evolution in the physical world.

The future of making is global. Gone are the days when competing countries tried to outdo each other and jealousy guarded industrial secrets. Developed and developing economies will be increasingly interconnected sharing skills, cultural influences and economic opportunities. Designers will increasingly shift to systems level innovations in making and inevitably this influence will shift the heart of making away from large-scale global producers. Some markets and categories will survive where the production and efficiency models are lean and the global digital tools offered have a ubiquitous purpose. More than ever, designing and making is about collaboration and sharing where the cross-cultural influences, technologies, authorship, company boundaries and trans-disciplinarity continue to collapse into a converged activity. Hidden industries and Universities will continue to feed new innovations into the consumer pipeline and support the UK's world leading technology development communities.

Author:
Ashley studied design at Nottingham Trent University and the Royal College of Art where he received his master's degree. He is currently deputy head of the Innovation Design Engineering dual masters programme at the RCA where he is first-year programme director, head of experimental design, the GoGlobal project and IDE research. He is also a partner and director of Diplomat design consultancy. His research interests are pursued in a number of areas including non-linear systems in design, experimental design, trans-located manufacturing, geographically liberated difference and industrial design pedagogy. He has also been a visiting lecturer and worked on educational initiatives at universities in the UK, Australia, China, Ghana, Japan, India, Korea, Mali, Thailand and Norway. He is currently co-investigator on an AHRC research network grant 'we are all designers' which explores inter-disciplinary boundaries, collaboration and design activity.

Links:

Unto This Last
http://www.untothislast.co.uk

The Agency of Design
http://www.agencyofdesign.co.uk

Factory for Infinity
http://factoryforinfinity.tumblr.com

Nature Aided Design Lab
http://www.nadlab.co.uk

Gordon Murray
http://gordonmurraydesign.com

iimagedesign
http://www.iimaginedesign.com

Centre for Plastic Electronics
http://www3.imperial.ac.uk/plasticelectronics