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12. 'All this Useless Beauty': The Hidden Value of Research in Art and Design

Mike Press (University of Dundee)

'What shall we do, what shall we do with all this useless beauty?'
(Elvis Costello, 'All this Useless Beauty')

The annual Morgan Stanley 'Great Briton' awards celebrated the highest achievements in the arts, business, sport, public life, and science and innovation. Each year three people were shortlisted for each of the awards. The 2007 shortlist for the Great Briton in Science and Innovation included a theoretical physicist from Imperial College, an international expert in the pathology of dinosaur bones and John McGhee, an Arts & Humanities Research Council-funded research student based in an art school. McGhee's digital animation research on 3D visualization strategies to improve disease understanding among patient groups has twice featured on BBC News and secured the front page of the *Guardian's* education supplement on 30 October 2007.

When crop geneticists provided printmaker Elaine Shemilt with their DNA data, their expectation of the science-art project was that it would result in some striking decorative prints that would liven up the walls of their research institute. However, the resulting prints revealed to them the occurrence of new elements and data patterns that they had previously been unable to perceive. The prints led directly to a whole new research project examining gene progression in pathogens. Within the decorative patterns, new knowledge became visible.

With a background in craft-making and product design, Graham Whiteley brought a highly idiosyncratic approach to his doctoral research on prosthetic design. To begin with, the medical physics specialist who was part of the supervisory team saw dubious value in Graham's emphasis on life-drawing and model-making as his key research methods. Six years later, his research contributed to a new bionic arm and hand that has been hailed as one of the most significant breakthroughs in prosthetics.

We look to our art schools to produce great art and design, and the buoyant state of the UK's creative industries suggests that they are continuing to deliver. However, their recently emergent research culture is producing something else as well: unique contributions to science, technology and innovation in fields far removed from 'creative disciplines'. This chapter considers the 'hidden' value of research in art and design: its contribution

to other specialist disciplines, to industrial competitiveness and innovation, and to social policy. In exploring this value we will venture from hospital wards to the suboceanic world; we will examine the role of designers in defining advanced manufacturing processes and the role of artists in scientific research; we will see how art and design researchers can contribute to crime prevention, prosthetic technologies and urban planning.

Necessarily, this chapter is highly selective in the examples that it draws upon, and does not claim to provide anything close to a comprehensive survey of current research practices. However, it seeks to highlight notable and representative exemplars of research that demonstrate the new, vibrant and highly relevant directions that art and design research is exploring. It is argued here that these creative disciplines provide unique skills and knowledge that can be usefully applied to diverse real world problems. In some cases researchers are using their unique skills of visualization to help specialists in other disciplines to reveal and communicate new knowledge. In other cases, it is the intimate and exploratory use of materials and process which lies at the heart of 'intelligent making' that is providing a new source of innovation. The new research culture is providing novel opportunities and frameworks for collaborative working which are encouraging artists and designers to cross boundaries. Furthermore, the UK now clearly leads the world in research-led art and design education. This is a unique competitive advantage which we must seek to build on and exploit further, and which will serve the UK well in addressing the economic, technological and social challenges that confronts it.

'A perfect place and a perfect education'

The emergence of research in art and design education in the UK is relatively recent, but has accelerated apace over the last decade and is now both redefining the nature and concerns of its constituent disciplines, thereby providing a distinctive identity for UK art and design education internationally. Most significantly, it is now beginning to demonstrate and assert its value as a unique source of knowledge that can be applied to a range of problem areas. This new research culture is a product of a peculiarly British Victorian invention: the art school.

From the 1830s art schools were established throughout the UK to train artists and designers for the needs of manufacturing industry. Each art school was geared to supplying for the specific needs of local manufacturers – whether it was ceramic painters in Stoke, jewellers in Birmingham or cutlery designers in Sheffield. While the art schools aimed to improve the competitiveness of British manufacturing through better design, the associated development of public museums and exhibitions – such as the National Gallery and the Victoria and Albert Museum – aimed to raise the aesthetic awareness of the British consumer. Through production and consumption, the UK would design its way to industrial pre-eminence. The

art schools not only helped to create competitive well-designed products, but they also produced our culture – both 'high' and popular: the Apple iPod, the Beatles, Habitat, punk and the Dyson vacuum cleaner all have their creative roots in the British art school. The educational experience of UK art schools is unique. According to Kim Howells, former Minister of State at the Foreign and Commonwealth Office, and one of the leaders of the Hornsey College of Art sit-in of 1968, 'it was somewhere you just spent all your time: painting, arguing about why you liked David Hockney, learning how to weld. Looking back on it, it was a perfect time, a perfect place, and a perfect education' (Howells 2005).

The UK art school provides an environment that nurtures creativity, and emphasizes individual development and personal direction, within a subject of study. Practically focused project work within a studio setting is the main vehicle for learning, although there is some use made of 'conventional' lecture- and seminar-based methods. Until the early 1990s 'research' played at best a marginal role in the culture of the art school. Although there is a history of formal research in design and architecture, marked by the establishment of the Design Research Society in the 1960s, this had very little impact on the concerns and practices of those who taught in the art schools. However, as a recent report for the Arts & Humanities Research Council (AHRC) argued, all changed in 1992:

Although many art schools became part of the Polytechnic system in the 1970s and developed CNAAs degrees, most other disciplines in the Polytechnics already had one foot in the university sector and for them, arguably, the shift to university status in 1992 was not a fundamental challenge to the way that academics worked or perceived their roles. For Art and Design the period following 1992 has brought some dramatic changes and in many ways Art and Design can still be seen as emergent academic disciplines despite their long history. (Rust *et al.* 2007)

Over the last decade-and-a-half, the UK's art schools – now part of the university system – have been presented with new opportunities to fund and develop research. The Research Assessment Exercise (RAE) and the establishment of the AHRC have together provided considerable funding for research in creative disciplines. In the case of the AHRC, in the eight years up to 2006 over £28 million was provided to support research in art, design and architecture. The 2,500 research active staff in art and design have also shown increasing confidence and ability in securing funding from other research councils and sources such as the National Endowment for Science, Technology and the Arts (NESTA) to pursue research. Doctoral research in art and design, which less than two decades ago was embryonic in the extreme, is now widespread in the sector and has led to the emergence of a new generation of art and design academics who are pushing their disciplines

into new territories and defining a new relevance for the unique knowledge within art and design.

New ways of making

I used to go to the faculty of science and work in a lab, with a white coat and safety specs, you know, the chemistry technicians thought I was a ceramics chemist and it took ages to communicate clearly with them that I was actually a designer, an artist. Eventually they were going, 'What are you doing here?' and I was, 'Yeah, what am I doing here?' (Katie Bunnell)¹

A decade ago, many of those seeking to undertake research in art and design found themselves working in other disciplines, simply because the visual disciplines lacked the methods, expertise or the basic infrastructure to support research. The comments above by Dr Katie Bunnell describe her experience of pursuing a research project in the field of ceramics, adding, 'It was very, very difficult because they wanted someone to do a PhD, but they didn't know what that was, a PhD in art and design. My supervisor was enthusiastic and supportive but had no experience of supervising a research degree' (Bunnell n.d.). Today Katie Bunnell leads the Autonomic research group at University College Falmouth, which is linking craft practices with advanced digital manufacturing technologies. Her personal research journey says much about how the research culture has been transformed in recent years to create a vibrant and supportive environment for creative research that has the knowledge and confidence to address serious issues in 'the real world'.

A graduate of the Royal College of Art, Katie wished to pursue her interest in developing new technical innovation in studio ceramic practice. A short unhappy period working in 'a white coat and safety specs' led her to seek out an environment that was more appropriate for an artist who wished to use her creative practice as the engine of a research inquiry. At Gray's School of Art in Aberdeen, Carole Gray and Julian Malins were pioneering an approach to doctoral research that was *practice-led*: research questions were defined through creative practice and addressed through its application using methods that applied academic rigour. Katie Bunnell joined the Gray's team to pursue research into how digital processes could be incorporated into studio ceramics, using her own creative practice as the test bed for this research.

Practice-led research within an art and design context provided the ideal environment for Bunnell. The Autonomic research group at Falmouth specializes in applying their craft-based knowledge and creative expertise to emerging digital manufacturing technologies that have developed through science and engineering research. They are seeking to demonstrate how such technologies can be applied by individual designers working in a 'craft'

context and are exploring a new digital aesthetic. This has considerable application for micro manufacturers to exploit the opportunities of a digital manufacturing revolution. As the group explains, this revolution 'has the potential to enable mass customisation and highly responsive localised production, perhaps even in the home. Through our research we want to challenge perceptions of the boundaries between craft and industrial production and raise the profile of *making* in 21st century design culture' (Autonomic 2010).

The Falmouth research team is representative of the new generation of design researchers – individuals who use their design expertise and creative practice, often rooted in traditional methods and materials, within a clearly defined research context to address the opportunities presented by new technologies and fast changing consumer culture. While Katie Bunnell and her team are developing a new vision and aesthetic for micro-manufacturing, others from this generation have used the knowledge arising from their creative research to connect with the needs of mainstream manufacturing industry.

Ann Marie Shillito provides a powerful demonstration of how craft knowledge, applied within art and design's new research culture, can contribute to addressing the needs of innovation in manufacturing and digital industries. Ann Marie is a jeweller whose work has been exhibited throughout Europe, including a solo show at the Scottish Gallery. However, as Research Fellow at Edinburgh College of Art, she has initiated and driven forward the Tacitus Project which has gained major external funding and has led to the establishment of a spin-out company that has attracted the interest of major manufacturing companies.

Tacitus was established to investigate how advanced virtual reality technologies could be applied as design tools for craft makers. AHRC funding was secured in 2001 to explore the potential of 3D haptic and multisensory computer tools for designers, in a project that also involved specialists from Edinburgh University's Virtual Environment Centre. This project succeeded in demonstrating the value of such research, and after three years further funding was secured from Scottish Enterprise to develop virtual design tools that had commercial application. This has led to the spin-out company being established – Anarkik3D Ltd – to provide bespoke haptic software solutions for industries that include automotive design, oil and gas, and computer animation. As the company explains:

As easy and as versatile as using pencil and paper, this digital equivalent of sketching and rough modelling, gives full movement and rotation (six degrees of freedom) and co-location within a true three dimensional environment. This application is a radical alternative to traditional CAD methods for visualisation and exploration of initial design concepts. Designers, artists, architects and animators can now construct and modify

their ideas more intuitively as if it were a real solid object, entirely in the digital domain, with all the advantages this offers. (Edinburgh College of Art 2010)

The Edinburgh project has demonstrated the value of creative research within an interdisciplinary context where art and design specialists are working alongside researchers from other disciplines to develop and apply innovative new technologies. Anarkik3D is already developing an enviable client roster of world-class companies that recognize and seek to exploit the benefits that these new design tools offer.

Elsewhere in the UK, Hewlett Packard is working with a research team whose specialisms are rooted in fine art practice. The Centre for Fine Print Research is based in Bristol's School of Art, Media and Design – a part of the University of the West of England. The centre was established in 1994 as a focus for research in fine art printmaking at a time when the culture of research in art and design was only just emerging. Fourteen years later, the centre has a highly successful track record of research funding – including twenty AHRC research grants together with a number of industry-funded projects – and a strong record of dissemination through journals and research conferences. A staff of eighteen, plus doctoral students, is evidence of the centre's success in establishing robust, relevant and well-resourced programmes of research.

The centre combines historical research in printmaking with explorations into the development of new printing technologies and systems. The research approach spans both practice-based fine art and industry-focused research, which is internationally unique within its field.

As well as looking forward, our research also looks back to reappraise forgotten processes, techniques and standards that may add to, and enrich modern technological development. This strand of research has resulted in a number of fusions of old and new, which have included practical and theoretical studies of high quality 19th Century printing processes such as Woodburytype, Collotype, Photo ceramic relief casting and photogravure. We also undertake research into artist quality digital output, with a particular emphasis on wide format printing. (Centre for Fine Print Research 2010)

The Bristol team has used their expertise as artists and historians in the use of colour and print technologies in art to critique current ink-jet technologies and to explore refinement in them. As a consequence, Hewlett Packard has funded the centre to develop new methodologies for colour printing that focus on the exacting demands of fine art printmaking. As Carinna Parraman, Senior Research Fellow at the centre, explains:

Methods are being developed at the Centre for Fine Print Research that explores alternative colour sets for inkjet, modifications to the hardware and methods of programming that bypasses printer driver software or the need for profiling, that explores colour mixing on a pixel by pixel level. The objective is to enable a more creative approach to colour mixing and printing that returns to traditional notions of how pigment colours are mixed. (Parraman 2008)

The centre is therefore succeeding in using the unique knowledge of fine art printmaking as a means of understanding historical approaches to the use of colour in print to inform and develop future printing technologies.

Manufacturing industry will remain vital to the UK's competitive future. The examples above demonstrate how research rooted in art and design practice can define new applications and aesthetics for emergent manufacturing technologies, develop design tools that are relevant to the needs of advanced manufacturing, and refine new technologies in fields such as digital printing.

Crafting healthcare solutions

Iraq war veteran Sgt. Juan Arredondo can grasp tennis balls and door knobs with his left hand again, now that he's been outfitted with a bionic hand that has flexible fingers. The 27-year-old former soldier, who lost his left hand in 2005 during a patrol, is one of the first recipients of the i-LIMB. 'To have this movement, it's – it's amazing,' Arredondo said Monday as he showed off the limb made by Scotland-based Touch Bionics. 'It just gets me more excited about now, about the future.'

So reported CNN on 24 July 2007 regarding the launch of the world's first commercially available bionic hand with articulating fingers. Prosthetic devices for amputees have been notoriously problematic in terms of their aesthetics and functionality, but the Scottish Touch Bionics company – a spin-out from NHS Scotland – has launched a solution that has been hailed as a major step forward in the design of bionic technologies. The UK is currently a world leader in the development of robotic systems and technologies, and the i-LIMB is one of the latest examples of this expertise.

Playing a key role in the development of i-LIMB is a company set up by a former AHRC-funded research student, Graham Whiteley. His was the first PhD to be successfully completed in design at Sheffield Hallam University and was entitled 'An Articulated Skeletal Analogy of the Human Upper-Limb', supervised by Chris Rust. Essentially, he was tackling prosthetic design research through a methodology that made considerable use of craft techniques such as physical prototyping and drawing. The research output comprises a thesis that was structured as an annotated sketchbook and a series of models and components. However, Graham is not an engineer by background, but

a graduate in product design specializing in furniture and automata. His interest in the subject arose from him being commissioned to make a model of a jolly fisherman that would wave at pub customers. His ability to research in the disciplines of medical physics and aerospace engineering demonstrate not only his own personal versatility and talent, but also the value of the 'lost arts' of craft to the practice of research in these disciplines. As he and his supervisors explain:

The making techniques used are familiar in industrial design practice, where the production of high quality prototypes is a normal method of advancing the product development process. However this approach is relatively unusual in the context of medical physics research where emphasis is placed on the analysis of data, often through mathematical models. The use of practical craft skills to represent a hypothesis and allow a rich set of evaluations could be regarded as a lost art in many fields of the physical sciences today. (Rust *et al.* 2000)

The first outcome of his research was a working model of a prosthetic arm and hand that pioneered new mechanical principles and attracted the interest of NASA scientists at their Jet Propulsion Laboratory. This success helped to launch Graham's career in establishing a robotics development company – Elumotion. Working for companies throughout Europe, Elumotion rapidly gained a reputation for innovation in the field. According to Touch Bionics, the Scottish prosthetics company 'struck a deal with Elumotion, a Bath-based business, to manufacture the prototype hand that will be used for trials and to find buyers' (Murden 2004).

The use of craft knowledge and skills to address complex issues of mechanical engineering and design within a medical context was perhaps unique, and Graham's continued success in the field of robotics demonstrates the enduring value of such an approach. An additional value was that his research gave confidence to the Sheffield Hallam design research team that their 'craft centred' approach to design research was an appropriate path for them to take from the mid-1990s as research methodologies in design were still in a state of flux and definition. In parallel to Graham's research were other projects which explored and demonstrated how 'research through making' could address complex applied research issues and result in commercial outcomes. A system for delivering vibro-sound therapy was designed at Sheffield, and manufactured successfully under licence. Another research team worked with a small local hospital communications manufacturer to develop a Nurse Call system that has led to significant commercial success. Continuing research is exploring the design of medical connection systems with the objective of reducing misconnection errors in surgical environments in partnership with medical researchers and Braun Medical.

Reflecting on Graham Whiteley's PhD and the other research projects carried out at Sheffield Hallam, Professor Jim Roddis considers that their value has been considerable:

We have demonstrated how a hands-on approach to design research – very much workshop and process based – pays dividends in understanding problems and coming up with creative and workable solutions. But more than this, we have achieved two other things. First, we've shown how design research can make a very real difference to people's quality of life when we focus on issues of well-being. And second, we can contribute to business development and job creation, whether it's through spin out companies or SME's we have worked with.²

New ways of seeing

Jane Harris was always interested in tactile things. 'I knitted at 4,' said the 24-year-old graduate of the Glasgow School of Art. These days, she rarely knits. Most of her time is spent creating minutely pleated silk textiles in a rainbow of hues that shimmer and change shades as the fabric moves. Miss Harris has made fewer than a dozen one-of-a-kind garments using this fabric. But these were sufficient to bring her first place, and an \$800 prize, at the Chelsea Crafts Fair here recently ... She works on commission and her works start at \$4,000. 'It's a Liz Taylor kind of market, but I want to keep everything unique,' she said. (Trucco 1989)

Jane Harris remains interested in tactile things, although not quite in the same way as when the *New York Times* profiled her in 1989. Following graduation she was hailed as the future of constructed textiles – a weaver whose sculptural approach to cloth and its dynamic interaction with the body had resulted in a vibrant body of work that commanded both critical attention and the front cover of *Crafts* magazine. Within ten years she was completing her PhD at the Royal College of Art, but in place of the shimmering silks that characterized her graduation work was a projected Quicktime movie that displayed virtual textiles. Taking the place of unique pieces for an exclusive market was a unique contribution to knowledge with an application that could be enjoyed by everyone.

Jane's PhD represented an exploration of the value of material skills in developing alternative aesthetics for digital media. The interaction of the worn textile garment with the body remained a central creative focus, but the research took this in new directions using motion-capture, body-scanning 3D computer animation and other digital technologies, rather than the loom. She was interested in the potential of new creative hybrid practices that fused textiles, performance, fashion and film. As one of the pioneering 'new researchers' who helped to define PhD research in design from the mid-1990s, Jane has made a significant impact on research in textiles, and she

is now Director of the Textile Futures Research Unit at Central Saint Martins College of Art and Design. Her research has attracted support from the AHRC, NESTA, the Arts Council and Channel 4. The very nature of her research has effected a fundamental shift in how she works, which reflects a wider trend in art and design research over the last decade: 'Software and hardware tooling has become more accessible and it has been possible to apply established material skills, within a broader frame of research and visual art practice. This has necessitated a shift from working as a solo maker, to collaborating and working with a range of individuals, institutions and industry' (Harris 2004).

As the recipient of the first AHRC Innovation Award, Jane had the opportunity to demonstrate the value of practice-centred research that could apply her intimate creative knowledge of material, process and clothing to the possibilities presented by computer-generated animation. Collaboration with other performance and visuals artists under her creative direction led to an innovative project for the Museum of London. On the screen she brought to life a fragile eighteenth-century dress, enabling Museum visitors to see how the garment would have looked when originally worn. As she explains, this makes museum collections more accessible and vivid: 'Once textiles and dress enter this type of (museum) environment, there are constraints on the handling of such objects. So for example, garments won't be worn again and various handling policies are required' (Harris 2004). Jane's research demonstrates how computer animation that is informed by material knowledge can create unique forms of visualization that have application in museum and other contexts.

Design is about communicating an idea, whether it's to a product, whether it's to a graphic, it's about using the tools you have as a designer and as a creative person to try and communicate that message. The beauty of this type of research is that it shows how the designer can be brought into quite a clinical environment and be of use.³

John McGhee has much in common with Jane Harris. Both come from a materials-based design education, and both are now applying that knowledge in their current research in the field of computer animation. Similarly, both are applying animation in novel ways that have attracted considerable attention from specialists and from the media.

As mentioned, in 2007 John was shortlisted for the Morgan Stanley 'Great Britain' awards in the science and innovation category. This was in recognition of his pioneering work in applying computer animation techniques to a clinical context. Originally a student of product design, John retrained in computer animation, but considered that the gaming industry was too limiting an environment to explore the full potential of this fast-evolving medium. An AHRC-funded doctoral studentship at the University of Dundee has enabled him to explore the use of 3D visualization techniques to enhance medical

scan data, particularly in the field of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scanning. The work has focused on how these scans might be combined with the digital 3D visualization tools commonly used by artists in the computer animation and games industries. The aim of his research is to evaluate whether improved imagery might offer a greater understanding of illness and disease, among different patient groups.

MRI and CT imagery allows clinicians to far better understand a patient's condition and to make an accurate clinical diagnosis, but such imagery means little to the untrained eye, and can often cause misunderstandings when shown to patients. John explains how his task has been to turn this imagery into something more useful for the patient:

In this PhD research, computer visualisation techniques from the field of digital animation (storyboarding, 3-D modelling and rendering) have been used to create a hybrid image: an image that uses MRI data and artistic imaginative vision to create a new aesthetic that supports communication of complex medical data to patients. The work involved the digital artist being embedded in the hospital environment and interacting with patients, medical physicists and clinicians. (McGhee 2010)

Clinical trials with eighteen patients who suffer from hardening of the arteries have proven most positive. Not only did the patients, whose average age was seventy-one, understand what the images were showing, but it enabled them to engage with their treatment in a new way. In an interview with BBC News, John said: 'It was about imparting information but more importantly about getting a dialogue going on to help to get the patient discussing what is going on. When they talk to health professionals they now go armed with better questions and knowledge of their anatomy' (Ward 2007).

John's research is one example of an established area of expertise for design research at Dundee – the exploration and application of digital imaging techniques to fields that lie well outside those of entertainment and gaming. As we have seen from the work of Jane Harris and John McGhee, digital cinematography can be used to communicate issues and ideas in curatorial practices and medical imaging, but it has also been applied to forensics, archaeology, environmental preservation and some even more surprising fields.

In June 2007 a Russian frigate left the port of Murmansk heading north into the Barents Sea to locate Russian nuclear submarine B159 which sank four years earlier with the loss of all ten crew. A G8-funded international team and NATO unmanned submarine were aboard to help with the search and to identify the condition of the wreck, in particular the condition of the submarine's two nuclear reactors. Under heavy military supervision, the international team included the Head of Animation at the University of Dundee.

Chris Rowland has a background in television graphics and 3D animation, working for broadcast clients including Channel 4 and BBC before running a TV graphics company in Glasgow. His current research is focused on the 3D visualization of historic shipwrecks as they lie beyond the public gaze on the seabed. He has developed software tools for the aesthetic rendering of sonar data which enables far clearer and more vivid visualization of the wreck, and the impact it is having in the local marine environment. He has worked collaboratively with maritime archaeologists from St Andrew's University in developing a unique system for marine wreck visualization and analysis. They have been commissioned by government departments, English Heritage and other bodies to provide visualizations of shipwrecks such as HMS *Royal Oak*, and the *Stirling Castle*, a battleship that sank in 1703. Their work for the Russian government showed that the submarine, although damaged, is relatively intact and viable for recovery.

Our visual culture has been redefined by computer animation, providing a new richness in visual storytelling as exemplified by the wise-cracking characters in the latest Pixar movies and the massed armies of Daleks in the skies above London in the new 'Doctor Who'. But creative researchers in the UK's art schools have shown that the tales that can be told with this medium can go beyond a toy story. We can tell stories about how clothing was worn 200 years ago, we can tell stories to patients about their medical condition and we can tell the story of what has happened to a shipwreck half a mile beneath the sea.

Beyond the city limits

Innovative design has played an important role in driving down crime overall by a third over the past decade. Much of the 51 per cent fall in vehicle crime in particular can be attributed to design improvements such as immobilisers and toughened glass. The Design and Technology Alliance will seek to build on these achievements. They will champion the message that designing out crime is about sustainable and innovative design of products, spaces and places to make crime unattractive and make communities feel safe. (Home Office 2007)

Former Home Office Minister Vernon Coaker was unequivocal in his view that design plays a critical role in crime prevention when the Home Office launched the Design and Technology Alliance in August 2007. The six member alliance, which aims to raise the profile with industry of how design can tackle crime, includes Professor Lorraine Gamman, Director of the Design Against Crime Research Centre at Central St Martins School of Art and Design.

Lorraine has been a committed and vocal advocate of 'Design Against Crime', an approach to designing that recognizes and addresses its

implications for crime prevention. Its Research Centre has been responsible for initiating a number of projects in partnership with police authorities, local government, the Home Office and other agencies that have focused design on addressing specific crime problems. The centre's 'Bikeoff' project has developed designs to address cycle security. As a result, Lorraine and her team won the 2007 'Best Cycling Initiative' at the London Sustainable Transport Awards. This centre has focused on a practice-centred approach to research, developing design exemplars that seek to raise the profile of design as a crime beating strategy and demonstrate the value of design thinking. While Central St Martins pioneered this within an art-school context, others have taken design against crime in more strategic directions, embedding design researchers within cross disciplinary teams to address issues of policy and planning with the objective of enabling safer public environments. Such research has been driven by the priority of addressing the urgent needs of urban development – the future of the city.

The introduction of the notion of mixed-use, day and night-time economies has resulted in what is termed 24-hour cities. Cities such as Manchester have restructured to realise this vision, and with this has arisen conflicts of interest between stakeholders with different objectives. For example: security versus free access; the needs of older people versus conditions that support other interests such as youth culture; and commercial activity versus environmental quality. (Cooper *et al.* 2009: viii)

This passage comes from the introduction to a book, *Designing Sustainable Cities*, that arose from a five-year £2.75 million research project – VivaCity 2020 – which addresses the dimensions of sustainability in the urban environment. This major project brings together specialists in architecture and design, acoustics, air-quality and pollution, thermal quality, sociology and crime to develop new perspectives and methods to deal with the seeming conflicts facing urban development and planning. It has analysed issues of urban planning and sustainability in Manchester, Sheffield and the Clerkenwell district of London, drawing policy recommendations on design decision-making processes and new tools that can be applied to them. Led by design researchers from Salford and Lancaster who have a track record in design against crime research, the project demonstrates how design research – an embryonic field little more than a decade ago – can now play a role as an equal alongside other academic disciplines. According to project director Professor Rachel Cooper: 'Ten years ago, a major project such as this would not even have thought about design in this way, let alone have it as a central focus. We have now proved our worth as an academic community that provides unique insights and knowledge on some of the critical issues facing our future.'⁴

New roles and possibilities

The emergence of a research culture in art and design has initiated a transformation in the role of the creative practitioner, providing new opportunities to explore and redefine the scope and interests of art and design, and its relationship with other disciplines. There is evidence of this both within dedicated art schools and those which are located within research-focused universities. Crossing disciplines has opened up new possibilities and a new relevance for creative practice. Three distinctive new directions or values are now clearly developing.

First, artistic practice working within a research framework is demonstrating how it can contribute directly to other disciplines through its power of visualization. Dundee-based printmaker Elaine Shemilt explains how she worked with scientists from the Scottish Crop Research Institute, developing a series of prints and projected animations from the full genome sequence of a bacterial potato plant pathogen:

With the screen prints I used a very subtle range of silvery blues and grays and worked with some very specific inks ... It was from looking at those prints the scientists noticed the occurrence of new elements and a very specific event of gene acquisition. My approach was to simplify the diagram into tonal variation and in so doing I recontextualized the data in such a way that it revealed information that the scientists had completely overlooked. Their scientific approach to the data was systematic and empirical. Purely by chance, my artistic reinterpretation of the scientific data contributed to a new insight ... Rather than simply identifying genes unique to a pathogen, the screen prints and animations revealed the presence of other genes present in all of the bacteria, possibly representing genes essential to all forms of bacteria. (Shemilt 2006)

This science-art project has led directly to a new programme in pathogen research.

Second, applying the methods and processes that are embedded within creative practice provides distinctive ways of thinking that can contribute to complex problem-solving. Alastair Macdonald at Glasgow School of Art has been directing a project on healthcare delivery, as part of the Designing for the 21st Century research initiative. Working with a team of senior clinicians, the project has established the case for design in playing a key role in healthcare delivery in the context of an ageing population. As one of the clinicians observed: 'Design thinking seems to be "boundary-less" or at least to cut across traditional boundaries in medicine, that is one of its strengths, and this approach can assist the patient or the staff perspective with more ease than someone who works in the medical world. The design perspective therefore brings clarity to medical problems' (Macdonald 2007).

Third, research is suggesting a new role for the practitioners in which they can act as cultural intermediaries and indeed as leaders in social and community development. At Gray's School of Art, Anne Douglas has been exploring this through the 'On the Edge' project:

Research into the role of the artist working in public indicates that artists are uniquely placed to inform and creatively develop public life. In seeking to understand the nature of creativity in public contexts, this research focuses on the concept of 'leading through practice'. It opens up a new trajectory of thinking about leadership that is not predominantly management based, in which the role of artist operating within social, cultural and environmental contexts is scrutinised for what it can reveal about creativity in general. (On the Edge 2010)

It's a bit like the scene in Monty Python's *Life of Brian*: So what have researchers in art and design ever done for us? Isn't it all just useless beauty? Certainly art and design are disciplines that pursue beauty and meaning. But in that pursuit they create knowledge and insights that have widespread application and can contribute powerfully to our culture, economy, innovation and well-being. We see evidence of its value in scientific research labs, in declining crime statistics, in new approaches to urban planning, in new healthcare and in manufacturing technologies. We see evidence also in visual storytelling, where researchers are applying new technologies in novel ways to tell stories that help us to understand historical artefacts, clinical diagnosis and the state of wrecked nuclear submarines. And for all the stories told in this essay, there is an economic story that has been largely untold – of new products securing new markets, of new innovations that have a significant commercial potential. In their pursuit of a more beautiful, useable and understandable world, art and design researchers provide essential pathways to a better and more economically sustainable future.

Notes

- 1 Personal communication.
- 2 Personal communication.
- 3 Personal communication.
- 4 Personal communication.

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