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Closing in on open design: comparing casual and critical design challenges

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Closing in on Open Design: comparing casual and critical design challenges

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Abstract

Open Design has become an umbrella term for a wide range of approaches to design and creativity where professional design is challenged. These range from seeing designers as simply irrelevant (in democratized innovation) to an active and creative collaboration between designers and non-designers (co-design) to the dissolution of the distinction between designer and non-designer altogether.

While supporting open design in general, we argue that there are important instances where open design approaches may not be appropriate and that there will be a polarization between casual design activity (for cups, t-shirts and so on) and critical designs (medical equipment, very complex systems like mobile phones).

KEYWORDS: Open Design, Innovation, Ethical Design, Cystic Fibrosis

Introduction

In this paper we present two contrasting case studies exemplifying some of the challenges when open approaches are actually applied in real world contexts. The first of these looks at the generation of radical new ideas in open practices. Drawing on the well developed literature in this area in addition to primary research we question the notion the 'sticky' knowledge of the user

supersedes the problem finding / solving training of designers, especially where a creative leap is required.

This leads into a second, more focused case study, looking at the potential for open approaches to design with people with chronic health conditions, in this case Cystic Fibrosis. This research highlights the real ethical issues of designing critical (potentially life preserving) products through an open design process. Who is responsible for problems caused by an open designed product in this context; what role do the medical professions play?

Using the case studies, we make the argument for a more nuanced view of the application of open design approaches that acknowledges the weaknesses of the approach in addition to celebrating its advantages.

Case Study 1 Open Design in Context

Harnessing (one could say exploiting) the potential for everyone to be creative together first posited by people like Don Tapscott in '*The Digital Economy: Promise and Peril In The Age of Networked Intelligence'* in 1997 has spread throughout the public consciousness. This is especially evident in business and innovation literature but also increasingly in design writing. This is forming a large and quickly expanding body of thought spanning magazine articles, internet resources and journalism as well as books and academic publications. Without attempting a comprehensive taxonomy a representative book sample would include:

Open Design Now: Why Design Cannot Remain Exclusive by Bas Van Able, et al.

The Wisdom of Crowds by James Surowiecki.

Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business by Jeff Howe.

Wikinomics: How Mass Collaboration Changes Everything by Don Tapscott

Here Comes Everybody: The Power of Organizing Without Organizations by Clay Shirky.

We-Think: Mass innovation, not mass production by Charles Leadbeater.

Around these books there is a cloud of activity, seminars and TED talks promoting terms like Hyper-craft, brand fanatics, Lead Users, the Possibitifation movement, Pro-ams and so on. Some of these are really significant contributions, for example Leadbeater's 'We Think' is a thoughtful and intelligent exploration of the phenomena by which the 'pro-am' and enthusiast with some professional skills make contributions to innovation. Others are closer to the frothy quick fix aimed at anxious businessmen and women at airports looking for the fast track to the next level.

There is an interesting resonance between this mass creativity writing and the growing interest in design thinking (for example Roger Martin's *The Design of Business* (Martin, 2009) or Tim Brown's *Change by Design* (Brown, 2008). Both mass creativity and design thinking are associated with the freeing up and exploiting creative potential and in an often non-defined way enabling non-

designers to design. Some of the reasons for the energy and enthusiasm for mass creativity (and to a lesser extent design thinking) are some very visible success stories using mass creativity and group collaboration. From Wikipedia, to entrepreneurship in the online environment *Second Life* to massively multiplayer games such as *World of Warcraft*, there are case studies of successful mass collaboration that have saved lives, transformed the educational opportunities available to millions and made billionaires.

In the context of this paper, Open Design can be defined as the internet-enabled collaborative creation of artefacts by a dispersed group of otherwise unrelated individuals. As a purely creative exercise, open design promotes the unprecedented sharing of knowledge between the professional and amateur designer, breaking down unnecessary barriers. When carried out for the common good rather than for capital gain or commercial profit, open design allows the sharing of creative skills between developed and undeveloped nations for humanitarian benefit, countering the more negative ramifications of global product consumerism. In this paper we want to pause and both celebrate the potential of Open Design but also reflect on the problems with this approach, moving away from evangelism to a more nuanced debate around open design in the real world.

Design Responses

Beyond the tactical responses of design firms to 'recruit' lead users to do their job for them there is also a movement to explore the more fundamental, strategic implications of this shift. In particular Peter Troxler, one of the leading authors behind the excellent book 'Open Design Now' and Paul Atkinson a co-author of this paper and prolific publisher on DIY and Open Design, see a more fundamental shift in designer / user relationships. This includes the view that there are fundamental changes occurring in the design field and that these are mandating a re-evaluation of what it means to be a professional designer. Including the dissolution (in certain circumstances) between amateur and professional design. These changes also point to the development of product in an open source mode, with multiple, on-going and distributed authorship.

There are a number of facets or perspectives on this transformation in the way design is developing in response to the possibilities of Open Design, open structures, design personalisation, distributed design and finally new business models.

Open Structures: In this approach, designers or creatives create structures or frameworks that facilitate user/citizen creativity without direct contact with them. This could be an online portal, or a set of principles, a toolkit or a process. The advantage of this is that the designer is not able to occupy the hierarchical gatekeeper role of the traditional designer (and users are less likely to place the designer in what sociologists describe as an authority context – trying to please the professional designer rather than following their own desires). There is a down side to this approach as well. There is a danger such proposals appear to be utopian and removed from the

real world as they need a critical mass of engagement to be convincing although initiatives such as Wikipedia are helping in this respect.

An early example of this would be Constant Nieuwenhuys` 'New Babylon' project (Constant 2001), a modular urban space proposal developed over 20 years by this Dutch situationist, more practically this creation of creative structures is evident in proposals such as Charles Jencks' and Nathan Silver's *Adhocism: The Case for Improvisation* (1968, 1973). These were largely conceptual implications of computer-controlled design and manufacturing and were still largely science fiction.

Generative Design Tools (GDT) took a very different approach to providing structures developed as part of a large research project in the late 1990s. GDT reacts directly to the contemporary issues around Open Design, the proposal takes the creation of typographic fonts as a model for creative tools that are both highly designed and facilitate great creativity in non-designers through their use (Cruickshank, 1999). The essence of GDT is that designers can create problem solving approaches or methodics that others can use to help them design.

While GDT is a concept that has not (yet) progressed beyond the prototype stage the blogging service Wordpress (and Blogger and even Facebook) have established the utility and popularity of digital structures that help the creation of web sites in a very straightforward, non-technical way. The potential impact of this as a communication medium is not to be underestimated. Clearly many blogs are of niche interest in the same way that fanzines and local news sheets used to be popular but some of these have become very successful, with the blog The Huffington Post recently sold for $315 million and blogs such as The Drudge Report (http://www.drudgereport.com/) in the US and Guido Fawkes (http://order-order.com/) in the UK having a real political impact. This technology has also been refined to allow small companies to create their own websites without the need to employ a web designer.

Here we see communications leading practical possibilities in creating something 'from the ground up'. This is largely explained by the volume of communication we indulge (as opposed to say the amount of clothes we use, or furniture we need), the ephemeral nature of most communication and the low barriers to production, but we are seeing these ideas of creative structures to assist in production spreading quickly into physical design mediated by computers (Atkinson, 2010a).

Design Personalisation

It is now very easy to find companies online who offer customisation services for furniture, communication design and especially fashion (Atkinson 2011). In reality the personalisation services offered by companies in this space are still very much emerging and patchy in terms of reliability. Indeed, there is a degree of 'vapourware' to some services so while iTailor supply jeans

well within the delivery time, MES promised a 10 day turnaround for custom shoes right up until the time creditors were informed of the liquidation of the company.

An interesting (if disturbing) example of services not (yet) based in reality but advertising and taking orders is the Rayfishshoe company (http://rayfish.com/). They are offering a service where you can combine the markings of a range of stingray fish and then genetically manipulate a stingray embryo to match these markings, as they say on their web site…

"Our patented process of bio-customization allows you to design your own living, transgenic stingray. Using our genetic library, you can select and combine skin patterns and colorations from dozens of species, producing a nearly infinite variety of shoe designs. First came mass production, then mass customization. Bio-customization is the next step"

http://rayfish.com/index.php?chapter=faq

This is rather extraordinary and highlights some of the potential ethical issues around Open Design. In this case what happens to the fish that don't match the specified colours? There is bound to be a high degree of variability in results to begin with - are those fish released? Is there a cheaper 'seconds' option, or are they destroyed? In addition to this it will take many months for your $1800 shoes to be engineered, gestate and be made for you. It seems likely that in this time Ray Fish inc. could cease trading or not be able to deliver as promised.

Distributed design

So far we have looked at open structures that lay the foundations that challenge the conventional designer / manufacturer / user relationship. Personalisation offers the person buying a product (or possibly a service) the opportunity to intervene in the manufacturing process to create something specifically tailored for them. Distributed design is distinct from this in that the design and manufacturing process takes place at the point of use rather than being manufactured centrally. This shifts many of the decisions and restraints of the design process beyond the control of the companies and designers that initiated the product in question.

DIY and Self-fabrication: While 'do-it-yourself' has received some attention from design thinkers in recent years (Atkinson, 2006), it still represents an area of creative activity that by its nature is difficult to study. The connection of professional design to DIY is through TV programmes, magazines, instructional books and most indirectly through the ranges of materials and examples of use provided by chains of shops in this area, for example B&Q. The political aspects of DIY have been discussed, especially in connection to fanzines (Triggs, 2010) and Punk music (Marcus, 1989) but most DIY is *not* a statement against commodification or the spectacle, it is driven either by the pleasure of making or the prohibitive costs of paying someone else to do the making. The other distributed design approaches attempt to tap into these motivations. For an extended example of an overtly non-political mass creativity project involving over 700 people

see the EU INTERREG IVB funded PROUD project www.imagination.lancaster.ac.uk/activities/PROUD.

Proto-design and post-consumption design

Proto-designs are products that are sold deliberately unfinished inviting purchasers to complete the design and manufacturing work themselves. In some ways this is a very old approach with a history of mail order kits for production of clothes and craft work going back at least into the 1890s. While many of us will remember painting by numbers, this is quite different from distributed design. In the former (and in many kits) there was an ideal to follow and deviation from this was a subversive act, the sort of act that could be used to appropriate any object. With distributed design there is a deliberate space left in the design process that requires creative input by the purchaser for the product to come into existence.

Innovation studies and lead users

So far we have looked at Open Design in a typically art school way concentrating on the invention and distribution of new ideas from a very designerly perspective even if professional designers are not actually contributing to the process. There is an alternative approach that addresses these issues from an empirical, business science perspective broadly described as innovation studies. Innovation studies is not infused with the mystique of the designer as romantic genius, indeed the designer and design is very much on the periphery of innovation studies.

Without these hang ups on the role of the designer, the 'special' quality and rarity of creativity it is no surprise that some of the key works relevant to Open Design are to be found in Innovation Studies. These include *Design-Led Innovation* Roberto Verganti (2006), *'Open Innovation'* Henry Chesbrough (Chesbrough, Lim, & Ruan, 2007) and *'Diffusions of Innovation'* Everet Rogers (1995). Leading these is the seminal book '*Democratising Innovation*' by Eric von Hippel (2006), this has sent ripples of influence well beyond innovation Studies into design, creativity studies, open source and open innovation and mass creativity.

Von Hippel's central argument is that professional innovators (he does not mention designers) find it very difficult to access the 'sticky' information gathered by individuals that have an intimate, embedded experience of a particular problem space or situation. More precisely he argues that accessing this information is prohibitively and disproportionately costly. He goes on to argue that this places individuals that already have access to this sticky information in a potentially advantageous position to be innovative. Building on this hypothesis he goes on to argue that this advantage is amplified in a particular type of user to an extent that they are better

able to innovate than professional innovators in R&D departments or New Product Development teams. He calls this group 'Lead Users' and for von Hippel they have very specific characteristics. Firstly they experience the needs felt by the general population of users in a particular activity or context more strongly and crucially a long time before the general population of users. Secondly there is a perceived benefit to these individuals to modify or innovate in their situation. (von Hippel, 2006).

These two factors, experiencing real need before the problem becomes accepted as the norm and mass use and the perception of benefit of innovation have been shown to result in significant ground up innovation independent of companies and formalized R&D. While in design research this argument has been advanced in a polemic or propositional way, von Hippel's (and many other academics) work is based in empirical, evidenced based research. This has substantiated lead user innovation in areas as diverse as CAD tool production, library systems, kite surfing, software engineering, medical device design and mountain biking.

Building on the first work in this area by Allen (1984) looking at free revealing and co-innovation in iron production in the 18th Century, von Hippel has popularized the notion that innovation is not restricted to R&D labs and provides real evidence for the capacity of lead users to add value to (and sometimes usurp and supersede) traditional New Product Development facilities in a company, for example, see the example of the community driven emergence and development of kite surfing.

The notion of people outside the company being a resource is exemplified by the crowd sourcing approach. Coined by Jeff Howe in Wired (Howe, 2006) this has developed into a business model defined as

'an online distributed problem solving and production model whereby an organization leverages the collective intelligence of an online community for a specific purpose' (Brabham, 2008)

Howe goes beyond this in his book *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business*, requiring crowd sourcing to also result in mass production by a company.

The fundamental idea that informs the crowd sourcing approach is that some problems can be solved more effectively by mass engagement by heterogeneous groups rather than smaller specialist interventions. There are a number of case studies that crop up repeatedly in the literature in this area.

Threadless (www.threadless.com) is a portal that invites designs for T-shirts. These are voted on by the community and the most popular manufactured and distributed for a limited period of time.

iStock (www.**istockphoto**.com) is a website that allows individuals to submit photos, illustrations and animations that can then be purchased and used royalty free by others.

InnoCentre (www.**innocentre**.org.hk) is a challenge based portal that offers cash prizes for the solution of technical / scientific problems by 'garage scientists'.

These are all characterized by a low rate of return for the time invested, creative effort or intelligence invested with the intention of appealing to a wide range of people facilitated by online communication. While there are strong proponents ((Satullo, 2008), Howe 2006, 2007) in terms of offering an alternative to traditional professional production and firm operation there is a significant underlying problem.

Problems with Open Design

Setting aside the heavy reliance on a relatively small pool of profitable examples a close analysis of the participants contributing to the examples cited above reveals a particular profile (Brabham 2008). Most of the people contributing to threadless and almost all of the successful contributions come from either design professionals or students in the design professions. A similar pattern is evident in the other examples of crowd sourcing. In this context then, rather than seeing the crowd as a heterogeneous group these portals are in reality a global stage for professionals drawn from a relatively homogenous background and education. While there is some evidence for the willingness of people to contribute high-level thinking for little or no return the evidence for a more egalitarian, vernacular approach is just not there. Dan Wood in Forbes magazine goes further, declaring "*There is no crowd in crowdsourcing. There are only virtuosos, usually uniquely talented, highly trained people who have worked for decades in a field*' (Wood, 2009)

Similarly, when one looks more closely at democratized Innovation there are problems with it as a general system of innovation. This can be illustrated by looking at Apple. Apple have been criticized for maintaining an old fashioned, closed innovation approach (which, it has to be said, is completely at odds with the company's roots as the subversive 'other'). The argument is that Apple is a (beautiful) dinosaur breaking the rules of Silicon Valley and beyond in shunning any open or democratized innovation variants. This is not the forum to evangelize for Apple, although it was interesting to see that in the 2011 International Forum of Creativity (www.flandersdc.be/en/events/cwf11), keynote speakers from Malcolm Gladwell, to Jimmy Wales to Scott Bleksey were talking about Apple as an example of innovative new product and service development. The closed nature of Apple innovation development presents an apparent dichotomy, the general feeling is that open design and innovation is the route to success in the 21st century but one of the most innovative companies is operating in a very closed way. This has some interesting implications for the design profession, and professional innovators as a more general and helpful description).

The fundamental role for professional design in the future

While there is ample evidence of specialists in a field untrained in design or innovation being intensely creative (as I think most of us are). Looking closely at democratized innovation but also the ideas put forward by people like Charles Leadbeater in his book '*We Think, the Power of Mass Creativity'* (Leadbeater, 2008)*,* we see that most 'ground up' innovation is incremental in nature. In this literature we do see exceptional examples of radical invention (e.g. the Heart/Lung machine, created by a team of surgeons, or kite surfing equipment developed by enthusiasts) but day-to-day, most examples are incremental in nature offering beneficial variations on established practices and products. One could simply say that this is because radical or disruptive innovations are hard, most designers do not make these sorts of suggestions either. This is of course correct, but the underlying reason for this has interesting implications for open design.

One of the principle reasons for a lack of radical innovation in ground up innovation is the trial and error nature of creative invention and the advantage of situational awareness and experience (sticky information) gives non-professional innovators embedded in a specific context. Innovation (the successful exploitation of an idea, rather than a brilliant inventive idea) is hard, especially as increasingly this is reliant on a system that includes intertwined hard, soft and really soft (human) components for success.

The case for the role of trial and error in idea generation is well made by neurologists of creativity like Vinod Goel (1995) and more accessibly by writers such as Lawson and Dorst (Dorst, 2006; Lawson, 2000). This is also supported by Donald Schon in both understanding creative people and in looking at how to facilitate the growth of these skills in others (Schon, 1991). The implications of this are that to become skilled at innovation takes practice, time and lots of mistakes. These are the guiding principles of traditional design education, where studio teaching and constant peer review encourages iterative prototyping and a freedom to explore many ideas with a very low cost for unsuccessful ideas as part of this process.

This capacity for low cost experimentation both cognitively and logistically is less common with individuals or groups fixed in a specific context. Added to this such individuals have an advantage because they can benefit from the situational awareness and life experiences that professional innovators do not have. This makes serial democratic innovation very difficult as moving to a new challenge often means relinquishing the advantage of deep personal experience.

This is where professional innovators have the advantage, they have many opportunities to learn how to innovate across challenges and contexts so that while there may be disadvantages in some contexts they also have an implicit advantage that their innovation abilities can be more easily developed. The same applies for conceptual leaps that mark disruptive innovation. The mental agility developed through the practice of making many conceptual leaps are more likely to be available for someone while being trained in innovation than someone developing more specialist skills (this is an argument for universal innovation training).

The results of this research popularized in his book *The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business* (Christensen, 1997) undermined the assumption that companies fail because they do not keep up with technology. Rather than a race for the latest technology, he uncovered through a meticulous examination of the evidence that there were waves of innovation repeatedly resulting in generations of companies going out of business but this was not due to technology advance or that they were isolated from their customers.

The evidence presented by Christensen is that in 4 separate waves of disruptive innovation companies in fact listened very carefully to their customers, invested heavily in R&D and actually had a very good knowledge of the technology used in the devices that would make their products obsolete and their companies bankrupt. They discounted these advances because the criteria set down by their customers, company and target sector the new advances were a poor alternative. They were undone because larger strategic changes resulted in a change in the parameters used to judge the desirability of a product. Christensen shows how makers of 12 inch hard drives for room sized computers ignored 7 inch drives because their capacity was too small but for manufacturers of desk sized computers physical size was the critical issue, not capacity.

This has implications for mass creativity, the tidal forces that influence innovation are beyond the scale of an individual company or even community; engaging in 'game changing' innovation requires either a strategic overview that encompasses many dimensions or the good fortune to be developing something that happens to chime with the zeitgeist at that particular time. It could be argued that the successful ground up innovations that have changed the game fit very much into the latter category

This brings us back to Apple, a notoriously closed, secretive company that in many ways exemplifies this requirement to simultaneously have a strategic vision not shared by others and a human-led focus. This is achieved by concentrating on the intersection between product, systems and people and waiting for the balance of these to be right (by their own measures) before intervening. This focus means that Apple do not develop really new blue sky technology (such as Microsoft or HP) neither are they first to market in exploiting new technological advances: iMac, iPod, iPhone, iPad all had precursors on the market for a long period of time before Apple intervened (Atkinson, 2010b). The reason for their pre-eminent position is that they wait until they understand what factors are going to determine if there is a disruptive potential and focus on that from a technical, service and human perspective.

This integration is extremely difficult, requiring a constant shifting between fine detail and grand(iose) vision and crucially this integration requires a coherent intervention across both scales at the same time. This means it is not suitable for a modular approach with components created individually and then plugged together. This is in contrast to projects such as open source software production that has flourished because it is exactly the opposite, it is eminently suitable for modular production and improvement.

In this section we have explored some of the perspectives innovation theory has on Open Design and sounded a note of caution: mass creativity is not a panacea, there will never be an open source challenger to the sorts of innovations Apple excel at. There will however be new creative ecologies (like the Android approach to phones and applications) that will be more dynamic and will continue to develop into new unknowable opportunities for open design and innovation. Equally there will always be a professional design and innovation profession that are not open and democratic in their approach.

In the following case study we problematize Open Design from a different perspective, looking at the practical and ethical issues when Open Design approaches transfer from the design of casual products and services (T- shirts, cups and websites) to real world contexts where design quality, safety and expert knowledge can have long term, life changing implications and the impact this has on the ethics of Open Design approaches

Case Study 2 Medical / Ethics

A common criticism by designers of products produced through open design processes is that the makers are not the creative originators of an idea, rather they are passive reproducers and adapters of professional designers' creative endeavours. This is an ethical issue of concern to many professional designers, but rarely a concern to those adapting and making the products themselves. Another criticism in defence of the designers' profession is that the objects being produced are most often superficial, simple decorative objects where personal taste is the driving concern, and where functional considerations are minimal. The understanding seems to be that where complex products are concerned, or where there are functional design requirements, including issues of safe use, there will never be a replacement for the trained, objective view of the professional designer. Whether or not this is true, or just wishful thinking of people threatened by new technologies (the limitations of which (or lack of them) they do not really understand) remains to be seen. However, these objections do raise a number of interesting ethical dilemmas. If a handle falls off a mug designed and manufactured at the point of use, or a t-shirt is incorrectly printed, it is unlikely to be a serious issue. However, where complex functional products are concerned, the considerations are of course more serious. The implications of using electrical products designed and manufactured in an amateur domestic environment having faults could be potentially fatal. While the putting in place of safeguards in any such system of production are surely possible, so is the possibility of those safeguards being sidestepped. If a product is one designed specifically to ensure a patient's health, then who would take responsibility for any alteration to that design which might impair its intended function?

Whatever the implications, however, it cannot be denied that although collaborative design work in general is viewed with suspicion by many designers, there are strong arguments, both from a moral and practical perspective, for employing end users as co-designers (Carroll, J. M., &

Rosson, 2007). From a practical viewpoint, if consumers can influence the design of products, then arguably this can result in more sales. From a moral standpoint, as Dexter has noted, those whose lives and wellbeing will be directly affected by the design of a product should have the right to have a say in how that product comes about (Dexter, M, Atkinson, P, & Dearden, 2011).

There are a growing number of cases where user-centred, collaborative (as opposed to open) design processes have led to successful designs for medical products. One such established location of these methods is the research initiative 'Lab4Living' in the Art and Design Research Centre at Sheffield Hallam University, which has successfully used co-design processes in the creation of suitable products for a wide variety of groups of people with specific problems (www.lab4living.org.uk). These have ranged from the design of better services for young people with type 1 diabetes, better hospital outpatient experiences for the elderly, and more inclusive bathroom products for an ageing population (Chamberlain, P, Reed, H, Burton, M and Mountain, G, 2011). In this instance, users were recruited not only as participants in co-design workshops, but also as 'lay researchers' in the field, with their unique experiential knowledge allowing them to more easily empathise and converse with others in the same position and so better elicit hidden concerns (Chamberlain and Yoxall 2012: 63). In collaboration with the Department of Health programme Devices for Dignity, a range of concepts for new assistive technology and urinary continence management products have been developed by Lab4Living through workshop based co-design approaches with sufferers (www.devicesfordignity.org.uk). Similarly, David Swann's much publicized project used co-design processes to produce an award-winning nurse's bag suited to 21st century healthcare practices (Swann, 2011). Co-design then, has proved to be a successful approach in these and other cases in the design for health arena, where it has not only enhanced the design process, but significantly improved users' satisfaction with the resulting products.

Dexter's work has focused on a particular case where although the benefits of a co-design methodology would be hugely beneficial, pragmatic difficulties prevent such approaches. In the design of medical products to aid people suffering from Cystic Fibrosis, the condition renders people immunocompromised, and therefore unable to meet others with a similar condition for fear of cross-infection. They cannot, then, partake in the usual co-design activities of design workshops and focus groups. It is in such cases that Open Design processes come to the fore, with geographically spread people able to collaborate through online communications media. Rather than gather people together in a single location, open design and the internet afford the option of the distributed design workshop where traditional paper-based recording media are replaced with digital alternatives.

Dexter's research is based in exploring the precise fora and ways in which such collaborations can most successfully be developed. The necessary steps to instigate such an online community can be time consuming, and there are clear benefits from the involvement of highly active 'expert' or 'lead' users. Without a critical mass of engaged users, progress can be slow, but when a valid community is established, the evidence is that the successful development and production of openly designed products to enhance wellbeing can be achieved. To date, the community

established by Dexter has worked on different product concepts including the development of personal medication storage designs and the adaptation (or hacking) of standard flat pack furniture cabinets to house specialised, bulky physiotherapy equipment. As the online community develops and grows, more product design opportunities should naturally arise and suitable solutions should be openly designed. The advantages are, of course, those described earlier in this paper - namely that many of the people involved in the design work have a level of contextual and situational awareness and experiential knowledge (or sticky information) that is more or less impossible for the professional innovator to access. Additionally, the high level of involvement of the users tends to lead to them taking 'ownership' of the designs created, and consequently to wholehearted adoption of the products created.

A number of difficulties remain, however, not least the problem of product liability. This is not an issue in all cases, and certainly not for the low-tech product solutions to particular patient problems created so far in Dexter's work. Yet when the time comes for the development of more demanding and complex product solutions, which may include higher technology, physiological intervention or the actual delivery rather than storage of medication, for example, the need will surely still arise for direct input from professional designers and a certain level of control from medical companies and their professional teams. The consequences of bypassing this specialist input in these circumstances could be significant and even life-threatening. For the foreseeable future then, it is likely that the amateur designer will, in some instances, face limitations best addressed by professionals. As Dexter and Jackson have noted, 'for open design to not appear as an esoteric and frivolous blip on the design history radar, the outcomes of such projects need to be functional, meaningful and engaging to the wider public. In many cases this means moving beyond the limited capabilities offered by the conventional low cost 3D printers and laser-cutters, and accessing additive manufacturing tools to produce increasingly sophisticated results, enabled and driven by trans-disciplinary expertise' (Dexter, M & Jackson, 2012).

Conclusion

The authors of this paper are long time proponents of Open Design processes and approaches, and we continue to be strong advocates but we want to encourage a more nuanced debate around this area. The danger is that these debates become rather polarised with traditional designers on one side and digital-3D prototyping evangelists or open design activists on the other. While it seems clear that design professionals are going to be transformed by the possibilities of open design and local manufacture, equally the research presented here problematizes a world without specialist designers. Perhaps, as is suggested here, the role of at least some of open design practice in the future will not be to replace professional design per se, but to expand and augment the capabilities of existing design approaches with the additional meaningful input of a wider range of users having relevant experiential and contextual knowledge.

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