

Design and the Innovation Agenda – A Scottish perspective

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Abstract

Against the backdrop of increasing focus by UK policy makers and international academics on the links between design, innovation and economic growth, this paper details an ambitious research project being undertaken in the UK. The project is titled 'Design In Action': a knowledge exchange hub running from 2012 to 2016 through which interdisciplinary teams will engage in collaborative design to pilot a new model of design-led innovation.

As Design In Action (DIA) is in the stage of early development, this paper will outline the research that is being proposed and how the 'sandpit' method of intensive workshops will be used to enable collaborative innovation. It will detail the planned aims of the project, both in concrete terms (i.e. the number of products created) and in terms of how it is intended that the project will promote design as an economic driver. The paper will address the theories that have influenced the development of DIA, touching on the role of design in the innovation process and how the DIA team has defined the creative process that will be fostered. Finally the paper will, through the lead author's doctoral research, add to the debate on the model of 'design-driven innovation' championed by Roberto Verganti, how the model compares to the approach of user-centered design and how the conflict between these two models has impacted the discussions of the role of the user in the development of a toolkit for innovation.

Keywords: *design as strategy, design-driven innovation, design thinking, user-centred design, knowledge exchange, economic growth*

Design and the Innovation Agenda

– A Scottish Perspective

Introduction

The UK Government is placing creative and cultural industries at the heart of its plans for achieving future economic growth, competitiveness and innovation (HM Spending Review, 2010). In this proposal, design is identified as one of the main drivers, having a proven capacity to grow the economy through new business development and knowledge exchange. The Universities and Science Minister David Willetts (2011) noted:

“Design forms an integral part of the Government’s plans for innovation and growth and it will be a prominent feature in our upcoming Research and Innovation Strategy. Good design can help business to thrive and improve public services and with over 230,000 people employed in our design industry it makes a significant contribution to our economic wealth with £15 billion spent on UK design in 2009”.

The Chief Executive of the Technology Strategy Board (UK) also highlighted the critical importance of Design to the (technology-led) innovation process during the Science & Innovation 2011 conference (Gray, 2011), advising the scientific community to ignore design at their peril as it offers deep knowledge and understanding of the ‘human factor’.

Design as a strategic discourse and tool has been developed in the areas of, for example, Design Management (Borja de Mozota, 2003; Cooper & Press, 1995) and Service Design (Kimbell, 2011) where the phrase ‘Design Thinking’ has been adopted to market and communicate the strategic potential of the discipline. Despite this progress, it remains little understood with many companies still viewing design as peripheral despite its potential for cross-sector multi-disciplinary application.

This paper will introduce Design in Action (DIA), which is a hypothesis, a proposition for testing and communicating knowledge of design as a strategy for national economic and cultural growth. DIA is major research project, one of four new Knowledge Exchange Hubs for the UK Creative Economy funded by the Arts and Humanities Research Council (AHRC) that promote sharing of ideas and approaches in design research and seek to avoid duplication of effort across a nation while encouraging greater strategic working across agencies, organisations and partners who traditionally have competed for the same public funding and/or audiences. The paper will outline the research, its methodology and reference key operational aspects of the concept of design as a driver of innovation; the approach that DIA will eventually take is still in its early development stage. The intention of this paper is to explain the planned outcomes of the DIA project, and to introduce theories of innovation (identified to date by the lead author’s doctoral research) relevant to the development of DIA research into the role design can play as a strategy for innovation and as an organisational tool.

Design in Action

Design In Action is a strategic intervention where industry and academia and other partners will engage with the process of design to identify and develop opportunities. It is

a national network of organisations committed to working in effective collaborations¹. The objectives of DIA are to communicate the transformative potential of design; use collaboration and co-design to challenge and change the understanding of design as a force for sustained economic growth in business.

DIA will use a method of disruptive thinking - the sandpit², to provide a unique space for participant companies to explore entirely new methods of visualising and problem solving with individuals from different disciplines. This disruptive thinking approach seeks to enable participants to find new perspectives on and opportunities for their own organisation's growth and development that would not be possible in the existing environment of their company and team.

DIA harnesses the strategic thinking capabilities of design and designers to work on problem identification. It intends to establish dialogue with multiple stakeholders to envision multiple scenarios for emergent issues and complex problems (in the areas of food, sport, ICT, rural economies and wellbeing). The core knowledge exchange activities to be undertaken include 15 'Sandpit type' events (an extreme model for facilitating innovation.) The purpose of these events is to promote the value of design as a catalyst for innovation and strategic development among Scottish businesses and agencies as well as to provide businesses with a chance to engage with a new model of design-led innovation. The sandpit events will allow DIA to test and adapt its approach to design-led innovation with the input of participating companies from around Scotland, resulting in numerous real-world outputs of processes, products and services (see table 1 below for details of DIA's predicted outputs) as well as a finalised model for design-led innovation that will be disseminated internationally through DIA's online portal. Support (from the leading national agency for supporting creativity) through 40 awards of up to £10,000 will allow the design community to engage with the process, and these will be specifically targeted at the design sector's micro-enterprises and sole traders. Successful ideas emanating from the sandpits will be eligible for further awards of up to £20,000 for the development of prototypes. Businesses can also access 40 one day Change Audit Grants to evaluate current processes.

The companies involved range from independents to SMEs to multi-nationals and collectively they have pledged over £1.5M in support of DIA and its activities. The following chart indicates the level of activity and the expected outcomes.

¹ After the UK Government's funding settlement announced in December 2010, the AHRC initiated a two-stage process for knowledge exchange to encourage expressions of interest and, following that, full applications from consortia of universities working in strategic partnerships with creative businesses and cultural organisations to strengthen and diversify their collaborative research activities. Following two rounds of peer review the following four were selected as lead institutions for the KE Hubs for the Creative Economy: University of Lancaster, University of Dundee, Queen Mary, University of London and University of the West of England.

² *The Sandpit* is a new yet demonstrably successful tool for nurturing innovation. It is an intensive discussion forum where freethinking is encouraged in order to delve deep into real world problems and uncover innovative solutions. The sandpit is a residential interactive workshop over 3 days usually involving 15-20 participants: a director/leader, a team of expert mentors and a number of independent stakeholders. An essential element of a *Design in Action* sandpit is a trans-disciplinary mix of participants taking part, comprising industrialists, researchers and potential users of the outcomes. The aim is to drive lateral thinking and radical approaches to addressing today's most pressing challenges.

Predicted outputs, results and impacts of DIA (2012-2015)

| | <i>2012</i> | <i>2013</i> | <i>2014</i> | <i>2015</i> | <i>Total</i> |
|--|-------------|-------------|-------------|-------------|--------------|
| OUTPUTS | | | | | |
| No. of events held. | 8 | 8 | 8 | 8 | 32 |
| No. of SMEs attending events. | 70 | 80 | 90 | 100 | 340 |
| No. of SMEs assisted with High Level support | 20 | 30 | 40 | 30 | 120 |
| No. of SMEs undertaking Design Innovation | 12 | 18 | 20 | 21 | 71 |
| RESULTS | | | | | |
| Increased investment in RTD by SMEs. | £300,000 | £500,000 | £600,000 | £700,000 | £2,100,000 |
| Products, processes or services developed | 20 | 25 | 30 | 35 | 110 |
| No. of new companies formed. | 1 | 2 | 3 | 4 | 10 |
| IMPACTS | | | | | |
| Increase in turnover in assisted business. | £100,000 | £200,000 | £300,000 | £400,000 | £1,000,000 |
| Total no. of gross new jobs. | 20 | 30 | 40 | 50 | 140 |
| Total no. of gross jobs safeguarded. | 5 | 10 | 15 | 20 | 50 |

Table 1
Predicted activity and outcomes of DIA

The Team delivering ‘Design in Action’

DIA will operate as a centre with a Directorate (see fig 1) under the Principal Investigator, Professor Georgina Follett OBE. Professor Follett, as a contemporary craft practitioner and Deputy Principal of the University of Dundee, is in a unique position to bring together the design and business communities with the knowledge bases of the University of

Dundee and other strategic academic partner institutions. Professor Follett will preside over a Project Steering Group, which will include representation from partner organisations in industry and in the public sphere and from academic institutions in the form of Co-Investigators from each institution³, The collective skills and experience of the Co-Investigators along with the resources and networks of the partner organisations provide a strong management base and the ability establish a knowledge exchange hub, the outputs of which will be disseminated throughout the Scottish business and research communities. The Project Steering Group will be chaired by Sebastian Conran, designer and MD of Sebastian Conran Associates, further attracting designers and industry to engage with the DIA project.

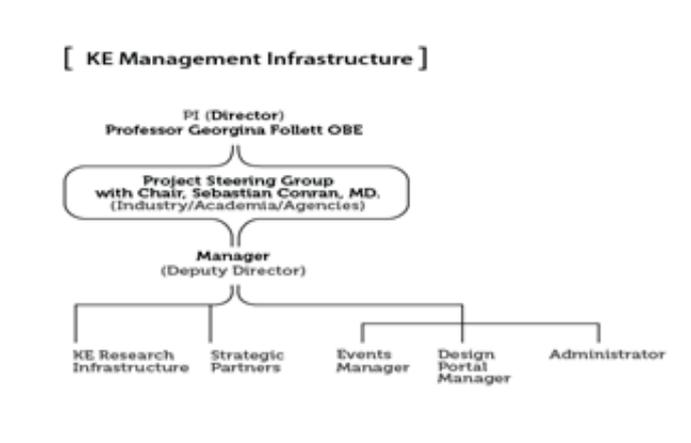


Fig 1
Management infrastructure of the Design In Action Knowledge Exchange Hub

Communication and Dissemination Strategy

Outside of the issue of leadership, a crucial factor in the success of DIA in fostering innovation through design is the effective communication of its findings with the relevant audiences - local, national and international, new and old. DIA will adopt a wide-ranging dissemination strategy to build understanding of design across Scotland for all audiences and, build understanding of design in Scotland across the globe. Central to the dissemination strategy is an online portal that will be well-publicised and will aim to communicate the processes and toolkits for fostering innovation with audiences using a variety of visual and multi-media methods. The discoveries of DIA will also be exhibited across Scotland and beyond in a variety of traditional and non-traditional spaces to build momentum, visibility and an appetite to engage with the process of design and build audience understanding.

³ Co-Investigators for DIA are Professor Barbara Townley from the University of St Andrews, School of Management, Professor Paul Harris from Gray's School of Art at Robert Gordon University, Professor Simon Briggs at Edinburgh College of Art, Research Department, Dr. Louis Natanson from University of Abertay's Institute of Arts, Media & Computer Games, Professor Alastair Macdonald from Glasgow School of Art and Dr. Louise Valentine from the University of Dundee's Duncan of Jordanstone College of Art and Design.

To achieve this objective partnerships with existing organisations and emerging cultural institutions have been nurtured, most notably with the V&A London and through the development of the new Victoria & Albert museum at Dundee (V&A at Dundee which is a national project aligned with strategic priorities for Scotland)⁴.

Support requested by firms engaging with DIA

DIA aims to be responsive to the areas that Scottish firms have self-identified as being integral to the increased innovative capacity of their organisations. This can be described as addressing the *micro-level* of fostering innovation through design, namely through directly working with a diverse group of partner organisations to support innovation through a variety of tools and support systems. The following details the help that has been specifically requested by the 34 companies that are supporting DIA:

- 88%⁵ of companies requested provision of **networking** opportunities both within the design sector and across other sectors
- 88% of companies requested promotion of **collaboration**, both within the design sector and with the wider business community, especially larger, ‘non-creative’ firms that may be considered by some designers as ‘hard-to-reach’ for the purpose of developing joint-ventures and sharing resources.
- 15% of firms requested tools to **inspire creativity** provided in a dedicated ‘space’, free from the day-to-day demands of running a business.
- 82% of firms requested **knowledge exchange and access to design research** being undertaken at Universities for the purpose of identifying potential new products and services as well as mitigating the demands of R&D.
- 6% of firms requested opportunities to discuss emerging social, technological and design **trends** with access to future-thinkers.
- 32% of firms requested opportunities to **engage with the public** and potential end-users to inspire product and service development.
- 50% of firms requested **promotion of the role of the design sector** in Scotland.

Walsh et al (1992) details the route by which products, services and processes are developed and consumed as the “creation-production-consumption” triangle. DIA

⁴ The vision for V&A at Dundee is that it will be an international centre for design housed in a world-class building at the heart of Dundee’s waterfront. Designed by Japanese architect Kengo Kuma, the building which embodies world-class design and innovation, will host major exhibitions of international design, helping people understand their own and others’ cultural heritage. It will celebrate Scotland’s design heritage, inspire and promote contemporary talent, and encourage design innovation for the future. V&A at Dundee will become indispensable to makers, teachers and industry nationwide as a place for the cultivation and exchange of knowledge, opportunity and design innovation. It will develop opportunities for diverse communities to engage with, learn from and enjoy design creativity, past and present. It is an ambitious project driven by opportunity and need, conceived and led by the University of Dundee in partnership with V&A London, University of Abertay Dundee, Dundee City Council and Scottish Enterprise. It is an initiative that has received financial support from The Scottish Government to the tune of £15M (2011-2015). It is an integral part of The Scottish Government and its agencies and partner’s vision to position Scotland as a leader in design-led innovation, leading to cultural and economic well-being.

⁵ Figures rounded to whole number.

supports each of these three stages identified by Walsh by enabling the creation of ideas (tools to inspire creativity and the promotion of networking, knowledge exchange, public engagement and trend analysis), the production of new products, processes and services (collaboration; financial and prototyping support) and consumption (promotion of the value of design among the business community; promotion of the design sector among the public as discussed in greater detail below). However, DIA recognizes two new and equally important stages of the development cycle, namely those of *identification* and *reflection*. DIA posits that identification of the problem itself is a crucial stage in the innovation process and that it is necessary to use the approach and language of design to completely dismantle assumptions and interrogate what is known about an issue before agreeing on how to define the problem at hand. Finally the reflection stage will enable critical evaluation of the usefulness and meaning of the products, services and processes that are developed, which is critical to ensuring DIA's process of innovation is valuable to all participants and to the wider economy. Furthermore the identification-creation-production-consumption-reflection process is not a linear cycle but one with stages that are, to a certain extent, interchangeable. With continuous input of the participants, or 'users', of DIA's innovation process a considered approach will enable identification, consumption and reflection to take place throughout the course of development.

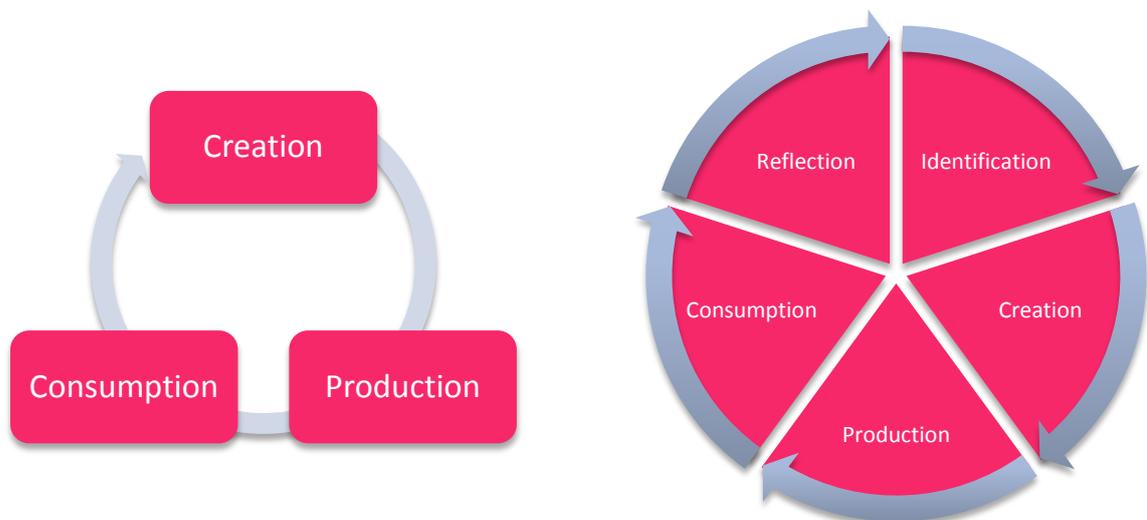


Fig 2

Comparison of “Creation-Production-Consumption” model (adapted from Walsh et al, 1992) (left) with DIA's adapted approach to the innovation process (right)⁶

Furthermore DIA will identify steps to strengthen the Scottish design ecology as a whole and will implement these steps. This can be described as addressing the *macro-level*, namely promoting growth and innovation indirectly throughout the Scottish design sector as a whole by making toolkits, research findings, idea generation techniques and online resources available to firms throughout Scotland through the well-publicised DIA online

⁶ It should be noted that this diagram does not indicate the weighting that will be applied to each of these activities. An accurate weighting will not be possible until the after the sandpit workshops have taken place and their activities analysed.

portal. This will complement the work that the V&A at Dundee museum will undertake, promoting the importance of the design sector and of design thinking among the Scottish public, so as to foster a public who are educated in the role of design in their cultural life and who demand high quality design in their products and services.

In order to understand how the Scottish economy can be strengthened at the national level using design-led innovation we can look to other nations that have successfully nurtured strong design and manufacturing sectors. The strength of Italian design in fostering growth of the Italian economy has been of particular interest in the discussion of the future development of Scotland as a design leader. Verganti (2008) outlines a number of ways in which Italian design firms have achieved both sustained growth and the creation of numerous innovative products, far beyond what would be predicted for companies of their size and with their available resources, including:

- An established and talented arts and crafts sector
- The ability to attract the best design talent from around the world
- An industrial base of small, flexible firms
- A consumer base who have been educated in the ways of design and demand highly-stimulating, well-designed products.

In order to provide a strong base from which to develop a new model of innovation, DIA has fulfilled these criteria through the partner organisations that are supporting with the Hub. Not only do the firms include a number of experienced arts and crafts firms and a large number of small, flexible SMEs⁷, DIA has attracted the internationally renowned designers and prioritises the professional development of the Scottish design sector through the work of the DIA Professional Steering Group. The aim of DIA is to move from a project-to-project approach to partnership working towards a strategic approach, utilizing the expertise of the members of this group in order to foster an effective and sustainable approach to nurturing national cultural and economic growth through design, enabling greater understanding and use of the value of design as a strategic tool.

Finally, as identified by some of the organisations engaging with DIA, promoting the role of design in the cultural and economic life of Scotland is an important element in fostering demand among the public for well-designed processes, products and services. Importantly DIA is linked to the construction of the V&A Museum of art and design in Dundee, which will play a large part in promoting the importance of design in Scotland. The more educated a consumer base is in the language of design and the more used they are to being surrounded by well-designed products and environments the greater the demand will be for well-designed products (Verganti referencing Gelant, 1994). Verganti (2008) notes that this is a large reason for the success of the design firms in Italy as consumers are highly demanding of meaningful new products. Through the founding of the V&A in Dundee, it is the aspiration of all involved that the profile of design in Scotland

⁷ 22 of the 34 of the partner organisations fit the description of flexible SME, being small to medium sized firms with wide networks and a range of freelance associates to call upon.

will be raised and a greater demand for innovative new products and services will be fostered. V&A at Dundee presents a unique opportunity to promote consciousness of the role of design in everyday Scottish life among the public, this will be complemented by DIA's efforts to promote awareness of the potential value of design thinking in the innovation process among Scottish businesses and a willingness to utilize design approaches during strategic development.

Push and pull of innovation

The terms push and pull refer to the factors that are seen to be the catalysts of innovation, whether driving innovation forward (i.e. push), such as new technological developments, or a need (i.e. pull), such as a demand fostered by a new social trend or the opening of a new market (Kaiman & Schwartz, 1982). It is when both push and pull factors occur simultaneously that successful innovation is most likely to occur and to be adopted (Zmud, 1984). Past innovation literature has frequently focused on the importance of the push, usually a technological innovation that makes developing new products and services possible (Roussel et al, 1991) before eventually moving to a more integrated approach to the drivers of innovation that also considers the importance of the pull of the market and the influence of the increasingly well-informed, demanding consumer (Nobelius, 2004).

Research and Development (R&D) plays an important role in the innovative push, as this activity is necessary to discover new forms of technology, or discover new ways of using existing technology. While R&D investment does tend to be reflected in innovative capacity, R&D frequently puts a large financial strain on SMEs that, in the short-term, can negatively impact their profitability (Heimonen, 2011). This is possibly why such a large percentage of the partner companies gave access to research and knowledge exchange as reasons for their involvement with the Hub as they may struggle to make available sufficient resources to undertake their own in-house R&D.

Conversely, the pull factor can most easily be described as the needs of the user and the demands of the market for products and services that respond to the changing demands of modern life (Kamien & Schwartz, 1982, pg 35).

Verganti (2003) proposes a new form of innovative push that is distinct from the traditional binary push-pull innovation model; that of the innovation of meanings or of the "design-push approach", whereby a product is designed so that it communicates a new socio-cultural meaning. If we acknowledge that "no design works unless it embodies ideas that are held in common by the people for whom the object is intended" (Forty, 1986), designers taking the design-push approach (or 'design-driven innovation' approach) are borrowing their images, language and messages from the cultural zeitgeist. This approach is classified as a push factor, rather than the pull of the market (i.e. the pull of user demands) as it is not the consumer or society at large that is creating the demand for these products with innovative meanings and new symbolic values, it is

the designer or design team that reinterprets the meaning of the object and impresses their unique vision for what this object should signify on the consumer through the presentation, appearance and marketing of the object.

Verganti's model of design-driven innovation could be said to be quite seductive and has been implemented by many firms (Leavy 2010), offering the possibility of creating iconic, emotionally affecting products that are also commercially successful. It has also found support in design management theory given the way in which it elevates design to the level of technological innovation, arguing that designers have the power to play an equally important role in economic growth.

Design in Action and Verganti's Design-Driven Innovation

It is DIA's belief that it is necessary for organisations to participate and collaborate in diverse networks in which actors share both knowledge and discourse, using the language of design in order to extrapolate shared cultural understanding, discuss emerging social trends and to deconstruct understanding of the issues facing society, from which new products, processes and services can be created. The model proposed by DIA will decentralize the innovation process from the design 'gurus' who are so central to Verganti's model, so that design can be fully utilized as a key business competence and organizational tool by all the participants in DIA's sandpit events, both designers and non-designers alike. While useful in encouraging discussion of how design can function as a driver of innovation, Verganti's supposition that innovative design takes place within experienced design teams is counter-productive to the collaborative approach of DIA and to DIA's goal of disseminating design as a business competence throughout the Scottish business community. To do this non-designers must be able to see the value of DIA's approach and understand how design can be used in the boardroom to shape company strategy, rather than being the impenetrable domain of design experts.

Furthermore, restricting ourselves solely to a push-pull model of innovation, with design merely taking the place of technology in the equation, takes an overly reductive view of the developments in recent decades of the conceptualization of the innovation process. As the first generations of innovation models, as outlined by Rothwell (1994), focused mainly on linear processes of push and pull, definitions of innovation have since evolved to that of a more integrated approach in which systems integration, networking and communication between diverse actors are key to innovative success. The approach of DIA is akin to the definition of innovation as described by Leonard & Sensiper (1998) as being largely dependent on the social and communicative process through which diverse groups of actors can engage, share knowledge and express new ideas and approaches. The organisations engaging with DIA have demonstrated a clear understanding of the importance of this though their desire to expand their networks and to take part in formalised activities to enable, not only traditional networking but also, profound dialogues on trends and socio-cultural phenomena in order to create new products and services that have impact with the wider public.

Verganti's research is very much rooted in the Italian product design sector so that the design-driven innovation model he proposes is one that demonstrates how emotional messages can be communicated through tangible objects. As such this greatly limits the degree to which this model of design-driven innovation can inform the development of DIA's innovation model, given that DIA aims to foster product, service, system and process innovation. This is not to say that tools that have emerged from Verganti's school of design-driven innovation, such as 'language brokering' as described by Dell'Era et al (2011), may not be useful in enabling collaboration and problem identification. But their influence and use will be predicated by their ability to equally foster innovation of services, processes and products and the degree to which they can be utilised by those participants who do not have a design background. Developing a model that is able to provide a framework in which product, service, process and system innovations are equally supported and that enables collaboration between both designers and non-designers will be of chief importance as DIA's model is developed.

DIA will provide partner organisations with access to the research of national academic institutions that, in turn, will provide the push of new knowledge and technological developments, along with opportunities to explore and discuss new ideas. The complimentary work of the V&A at Dundee's 2011 to 2014 pre-opening programme will foster a greater appreciation of the role of design, which will lead to an increased demand for quality design among Scottish consumers while the support of DIA will help open up new, international markets for Scottish firms.

Furthermore DIA will work alongside governmental organisations and funding bodies to secure the finance and policy support to ensure a fertile environment for design-led innovation within DIA itself and eventually throughout Scotland. While the approach and the tools that will be used by DIA to foster design-led innovation are still very much in the early development stage, the planned result is the implementation of a fully integrated approach, taking into consideration push, pull and policy factors affecting the innovation process with the hope of providing the best opportunity for the successful conception and adoption of design-led innovations.

Collaborations and User-centred Design

Collaboration was overwhelmingly reported by partner organisations as a main reason for wanting to engage with DIA; firms not only wanted to widen their networks and identify potential new business-to-business customers but also to share resources and skill-sets, to be able to take on larger projects than they are currently able and to identify and conceive new joint-projects. Co-design was seen by these firms as an important way of effectively innovating by gaining the outside perspective of professionals from another sector or discipline without the expense of contracting consultants. It should be noted however that in complex, cross-sector partnerships the process of innovation must be carefully managed to maximize the benefits, manage expectations and minimise tensions that arise between partners (Bidault & Cummings, 1994). As recommended by Bidault &

Cummings an organisational assessment will be undertaken by DIA during the sandpit events, before partnerships are formed to assess the best management techniques to efficiently guide the innovation process. However given that designers and other creative professionals are adept at project work and frequently move between different working teams, collaboration, even with teams from other sectors, is often smoother and more productive for designers and skills and knowledge are effectively shared for the benefit of the whole team (Vinodrai, 2006). It is particularly beneficial for those SMEs wanting to break in to foreign markets to pool resources, networks and skills through partnerships thereby reducing the risk associated with entering new markets (Li & Qian, 2007).

Some partner organisations desired to use DIA to better understand and connect with new audiences, which raised the important question of the role of the end-user in the innovation process. Visciola (2009) clearly describes two differing approaches to user-involvement in the design process, firstly that of the incremental user-centred design whereby the way in which users interact with existing products is carefully researched and these products are then developed to better accommodate user behavior; and secondly that of radical “deterministic design”, so called because it aims to affect new behaviors through the meaning a product is designed to convey and is devised with the input of small groups of designers, rather than using the direct input of large numbers of consumers. This latter form of innovation is commonly referred to as “design-driven innovation” as already discussed and has been defined and championed by Roberto Verganti, describing it as “the innovation of meaning” (Verganti, 2008) potentially using a “Rhetorical Innovation Process... that foresees the application of figures of speech as semantic operators” (Dell’Era et al, 2011).

Visciola (2009) and Verganti’s (2008) explanations of the differences between incremental user-centred design and radical design-driven innovation are thought-provoking and the design-driven innovation model provides an exciting iteration of designers innovating the meanings and significance of objects. However, these models of innovating may not be mutually exclusive, with Lettl et al (2006) detailing how motivated, entrepreneurial lead users can inspire radical innovation at the beginning of the innovation process.

There are key advantages to user-centred design in that it provides new perspectives from those outside the design ‘circle’; a greater affection for the product if users believe they had a hand in its creation and can result in products that better address functional-concerns and real-world issues (Read, 2005).

Verganti (2008) states that the drawbacks of user-centred design is that it leads to incremental innovation rather than radical, and while it may be suited for improving the use of existing products and technologies, users are immersed in pre-existing social context which restricts their ability to re-interpret products in unfamiliar ways and ask for change. It is the designer who has looked at social trends and has the background of visual language and design history so as to create radical new products. Furthermore

Redstrom (2006) states that in focusing so completely on the end-user there is the risk that the experience will become too well planned and the user can become “trapped” by the designers’ intentions, denying the opportunity for the user to find their own ways of interacting with, experiencing or instilling their own meaning in the product or service.

There is a role for both of these forms of innovation through design, particularly as there have been requests for both the opportunity to work with end-users to better tailor products and services to their needs, and for tools that foster creativity and provide a ‘space’ away from the demands of companies’ regular customers. Customers can often have a massive impact on the work of smaller firms and be seen to sometimes constrain the ability of firms to develop new offerings as they tend to respond to existing customers’ needs rather than thinking strategically (Laforet & Tann, 2006). While these two approaches might seem counterintuitive there is a role for both in the approaches to design-led innovation that DIA will facilitate. The innovation process that takes place through DIA will not be linear, allowing the opportunity for trans-disciplinary teams of designers, academics and managers to explore new understandings of products, services and solutions; engage with end users of products and services; and to reflect themselves as users of DIA’s approach to using design as a tool of innovation and strategy development.

The research methodology of DIA and its inherent requirement of interdisciplinary and transdisciplinary approaches offers opportunities to people from a broad spectrum of subject areas and skillsets to join together to conceive, plan and prototype innovative solutions. As such the approach of user-centered design will prove potentially influential in the development of the tools and models that result from DIA to ensure they effectively address the needs of the organisations that take part in the sandpit events. For example, it has been important to consult and respond to the self-identified needs of Scottish firms; however it has also been necessary to take a step back from the demands of companies and consider the recommendations of theoretical and practice-based research for developing successful innovation processes. In this we can see the conflicting approaches of the design-driven innovation model and of the more consultative user-centered design model in action. Members of the DIA team will inevitably bring their unique definitions of design as strategy and as a driver of innovation to the table as DIA’s toolkits are developed and they will have the luxury of taking a strategic view of the needs of Scottish industry as a whole, however the feedback of those firms that work directly with DIA and the support needs that they express will also inform the development of DIA’s eventual model of fostering growth through design-led innovation. The toolkit for design-led innovation that will result from DIA’s transdisciplinary approach will be disseminated through DIA’s online portal and will aim to enable users to visualize new solutions to existing and emerging scenarios, create new understanding using the language of design and to bring teams’ diverse skills and competencies to solving these issues.

Summary and Future Development

Numerous questions have been raised during the initial development of the Design In Action model of design-led innovation that requires consideration. As highlighted by Kimbell (2011, pg 286) a key difficulty in using design thinking as an organisational tool in diverse groups is that this approach can often “privilege the designer” at the expense of other group members with different backgrounds, leading to a situation in which designers are the arbiters of the innovation process and the input of non-designers is limited. designers are the arbiters of the innovation process and the input of non-designers is limited. How the DIA sandpit events are conducted and how design-led innovation is made accessible and useful to non-designers will be key in ensuring the DIA model equally engages all participants and gains traction in the business communities. Similarly as individuals who span knowledge domains and sectors often are the most proficient during ideation activities (Bjork, 2012) we will develop DIA in a way that fully benefits from those who are the most proficient in ideation activities as well as fully engaging those who are unfamiliar with such concepts so that all participants benefit from and contribute to the innovation process.

Furthermore it will be necessary to evaluate the *types* of innovation that are successfully fostered as a result of DIA’s sandpit approach as empirical research has frequently disagreed on the effects that different network structures can have on successful innovation e.g. radical innovation versus incremental innovation, continuous innovation versus discontinuous innovation (Hempala & Magnusson, 2012). It is the goal of DIA that it will provide a model that will successfully foster numerous types of innovation, but the analysis of the results of DIA may demonstrate greater success in fostering one type of innovation over another.

It must also be noted that as current knowledge of design is strongest in terms of product design it will be enlightening to see the DIA project develop and add to emerging research on innovation through design, particularly in terms of service and process innovation.

The twin investments over the next four years of the *V&A at Dundee* design museum and of the *Design in Action* knowledge exchange hub provide a unique opportunity for Scotland to push design to the forefront of debates around economic growth and cultural life. With both projects sharing complimentary objectives, the potential for the profile of the V&A at Dundee to bring attention to DIA’s resulting toolkit and model of design-led innovation provides a rare chance for the concept of design as a strategy for innovation and as a core business competence to be promoted and disseminated throughout the Scottish business community.

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