Supporting the Open Innovation Process in Small and Medium Enterprises

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Abstract: *Small and medium enterprises (SMEs) encounter specific barriers in engaging in innovation. This paper explores the concept of open innovation and how best conditions conducive to this can be created to support SMEs to engage in innovation. It presents Chiasma - innovation workshops - as a method towards a collaborative approach that brings together SMEs, designers and academics. Design in Action (DiA) is a knowledge exchange hub, funded by the Arts and Humanities Research Council, which draws together six universities and art schools across Scotland. Adopting a qualitative approach, the paper presents an ongoing process, whereby the approach emerges from action research in conversation with the actors involved.*

Keywords: open innovation; collaboration; design; small and medium enterprises; SMEs; entrepreneurship; universities; Scotland.

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1. Introduction

This paper focuses specifically on how conditions conducive to supporting open innovation in small and medium enterprises (SMEs) can be created. It explores the role creativity and design can play in fostering and supporting innovation in SMEs and engaging relationship-intensive links towards developing collaborative practices.

The paper begins by reviewing the extant literature on innovation focusing on the concept of open innovation. The role of innovation in SMEs is explored and the challenges that SMEs encounter in practice are discussed. Attention will then turn to introduce a new approach that has been developed to provide fora and the conditions for innovation to occur. A case study of innovation workshops, called chiasma, will be presented with early impressions from the case study discussed. The paper will conclude with a summary of the research findings, a discussion of the research limitations and recommendations for future research.

2. Literature Review

In a comprehensive review of creativity and innovation in businesses, Cox (2005) defined creativity as "the generation of new ideas" and innovation as "the successful exploitation of new ideas" [Cox, (2005), p.2] noting that it is design which links creativity and innovation, shaping ideas into practical propositions for customers.

Innovation is a broad concept with a plethora of definitions for different types of innovation causing ambiguity in how the term is understood (Garcia and Calantone, 2002). In practice, discussions regarding innovation often have a new product, technology based focus. Hence there have been calls to adopt a broader basis for what constitutes innovation to help widen the discussions (Freel and Harrison, 2006). As a broad conceptualisation innovation can be thought of as being radical or incremental in nature. Here radical innovation involves a "change of frame" whilst incremental innovation is concerned with "improvements within a given frame of solutions" [Norman and Verganti, (2012), p.5].

Different actors may also accord different interpretations to the concept; entrepreneurs, academics and policy makers have been found to have very different definitions of innovation (Massa and Testa, 2008). While entrepreneurs defined innovation as anything that makes a profit, academics regarded it as a significant breakthrough derived from new knowledge and policy makers considered it as the output of a dreamer; who looked for support to fulfil this dream *(ibid)*. As each actor ascribes different interpretations and understandings to innovation this may create difficulties when seeking to bring different actors together in the process.

SMEs, defined as those with less than 250 employees (Commission for the European Communities, 2003), play an important role in national economies and are a key driver in innovation (European Commission, 2011). Indeed major breakthroughs tend to come from small new enterprises with large firms making the incremental progressions (Baumol, 2004). However regarding the practice of innovation, there is a lack of research into how small businesses innovate (Hausman, 2005) and a failure to improve our understanding, as studies of innovation in SMEs have not kept pace with advances in the innovation literature (Edwards et al., 2005).

It is widely recognised that SMEs encounter a number of resource barriers to engaging in innovation including a lack of time, money and available staff (Kaufman and Todtling, 2002; Larsen and Lewis, 2007). Notably SMEs also face particular challenges in engaging in the research activity that may underpin innovation and are less likely to undertake research than their larger counterparts (Kaufman and Todtling, 2002). The barriers to research and development (R&D) for SMEs include minimum project sizes due to the resources required, and here small businesses must invest a higher proportion of their resources than large businesses, limiting the resources available for other business functions (Rammer et al., 2009). Projects are also inherently risky and unlike larger businesses who can spread the risk through a portfolio of projects small businesses may be unable to do so (Rammer et al., 2009). To help overcome these obstacles Rammer et al. (2009) advocate that SMEs should focus more on managing innovation processes and exploiting the use of external knowledge.

Most businesses cannot innovate alone and those that engage in collaboration are likely to be more successful innovators (Freel and Harrison, 2006). Indeed research found that continuous R&D activities were a main driver of innovation success in SMEs particularly when combined with external knowledge (Rammer et al., 2009). Yet attempting to access external knowledge also presents barriers to SMEs. One barrier is the difficulty in identifying suitable partners for collaboration (Freel, 2000). Given the fewer employees in SMEs, there are less links to innovation networks which in turn, limit SMEs' ability to either search for or become involved in collaborative projects (Kaufman and Todtling, 2002). In a study of SMEs participating in a government innovation support programme, Parrilli and Elola (2011) noted the importance of qualified interactions between SMEs and external partners in the innovation process. Despite the importance of external partners and whilst there is much research on how external relations impact on performance there is less on how firms decide with whom to collaborate (Dahlander and Gann, 2010).

In practice, many SMEs take a narrow focus with innovation dependent upon their customers as they are less likely to maintain contact with a broad range of partners or information sources (Kaufman and Todtling, 2002). In exploring collaborations, Kumi-Ampofo and Brooks (2009) found that while most SMEs had some form of collaboration, this was likely to be with their customers or suppliers with universities the least frequent partners. Relying upon a narrow range of partners leads to a greater danger of 'lock-in', where lack of

interaction, restricts the external influences that can enable or encourage innovation (Kaufman and Todtling, 2002).

These challenges may also be compounded by the support mechanisms commonly available to SMEs. Given the diversity of businesses, that comprise the SME sector, one difficulty is how to target innovation support in order to meet the needs of the varying businesses with differing requirements (Kaufman and Todtling, 2002). SMEs may also lie out with the scope of existing support mechanisms and this may reflect the narrow interpretation often given to innovation with its conceptualisation as a high-technology product influencing the type of support available. Indeed most innovation support tends to focus on businesses that are already innovation active and the impact of support could be greater if focused on less innovative or low technology businesses (Todtling and Kaufmann, 2001).

To overcome the barriers to supporting SMEs in innovation scholars have proffered a range of suggestions. These include the creation of infrastructure to provide a partnership forum (Freel, 2000); initiatives that recognise the key role of external partners and offer financial support for collaborations with SMEs (Rammer et al., 2009); support to identify the obstacles preventing SMEs from collaborating successfully with external partners (Chun and Mun, 2012) and initiatives to provide incentives and support for SMEs to form joint projects with sources of external knowledge such as universities, centres of excellence and technology centres (Parrilli and Elola, 2012). Given the key role of external partners in innovation attention will now turn to the concept of open innovation.

2.1 Open innovation

Traditionally when engaging in innovation it was common practice for companies to adopt a self-reliant approach, generating ideas and developing, building, marketing and financing them on their own, a practice Chesbrough (2003) termed closed innovation. However, this practice has been eroded with a shift towards open innovation, where firms look out with their own boundaries and use external ideas and paths to market, as well as their own internal approaches (Chesbrough, 2003). Consequently open innovation relates to companies "use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" [Chesbrough, (2006), p.1].

Open innovation recognises that knowledge is widely distributed residing in external sources such as universities, small companies, start-up companies and individuals and this knowledge can be accessed through collaborations (Chesbrough, 2006). One advantage of open innovation is that these collaborative projects may find value in a new market or may add value if combined with other markets, a benefit, which may have been previously overlooked (Chesbrough, 2003).

As the concept of open innovation is relatively new (Huizingh, 2011) it is a young research field (Gassman et al., 2010) with early research focused upon large firms operating in the high-tech sector in the USA (Chesbrough, 2003). However, the need to explore the validity of the concept in a wider range of contexts is acknowledged (Chesbrough, 2006). In practice, there is evidence of open innovation being adopted in a broader range of industries (Chesbrough and Crowther, 2006) with the spread of open innovation practices to 'low tech' industries and the service sector (Gassman et al., 2010).

The focus of research on open innovation in large businesses led to its role in SMEs being neglected (van de Vrande et al., 2009) with relatively little research into the practice of open innovation in SMEs (Bianchi et al., 2010; Spithoven et al., 2013; Roper and Hewitt-Dundas, 2013; Wynarczyk et al., 2013). Consequently there are calls for further research into the role of open innovation in SMEs (Lee et al., 2010; Spithoven et al., 2013).

Recent research explored how SMEs engage in open innovation. For instance, van de Vrande et al.'s (2009) study in the Netherlands, found SMEs were increasingly, extensively, practising open innovation activities and that it was as important for service firms as manufacturing firms. In comparing practices in SMEs and large enterprises, Spithoven et al. (2013) found not only were SMEs more dependent on open innovation than large enterprises and collaboration with partners increased their likelihood of launching new products and services, but also that SMEs used different open innovation practices to large firms.

SMEs' shift towards open innovation necessitates increasing understanding of how they manage this process due to the inherent barriers they encounter from their size and lack of

resources (Gassman et al., 2010). Whilst SMEs can gain from open innovation because their own resources are limited they also have fewer resources with which to build and maintain collaborative networks (Huizingh, 2011). There may also be organisational issues in how SMEs interact with external partners (van de Varde et al., 2009) and to participate they may need to change their structures, norms and values (van de Vrande and de Man, 2011). Indeed more tools and practical instruments to help SMEs adopt an open approach towards innovation could be beneficial (Bianchie et al., 2010). The requirement for further support for SMEs turns attention to the university and its role in open innovation.

2.2 The role of the university and open innovation

There has been an epistemological shift in the role of the university regarding who creates knowledge and how knowledge is disseminated (McNiff, 2013). Moreover, in light of the emergence of open innovation the role of the university is particularly interesting and has undergone significant changes. Traditionally under the parameters of closed innovation businesses used internal ideas and as such universities were unimportant, however in the shift towards open innovation and with the recognition that knowledge is widely dispersed, universities have an increasingly important role in the process (Chesbrough, 2003). Changes in the university sector may also lead to a greater involvement in collaborative projects in the future with Gassman et al. (2010) arguing that changes in funding structures, may lead to universities moving from acting as 'ivory towers' to 'knowledge brokers', prompting them to collaborate more closely with business.

However, collaborations between industry and universities are not without challenges. A survey of UK businesses that had undertaken collaborative research projects found many barriers including the orientation of the university and the researchers, the university administration and the technology transfer office (Bruneel et al., 2010). Here inter-organisational trust was found to be an important mechanism in overcoming the barriers (Bruneel et al., 2010). Similarly in an overview of open innovation in SMEs in the UK, Wynarczyk et al. (2013) noted how such collaborations encounter challenges due to differences in culture between the academic and SME organisations. In supporting collaborative projects Kamp and Bevis (2012) found that the use of voucher funding provided

a mechanism to encourage SMEs to participate in collaborations with universities however it was a 'baby step process' which required further support to institutionalise the practice.

2.3 The Scottish innovation context

In a review of the Scottish innovation system, Roper et al. (2006) found whilst there was a relatively good performance by universities in spinouts and licensing, the major weakness is in the interaction between universities and the indigenous commercial-base. Here Scottish universities had closer links with externally or other UK-owned businesses than with indigenous SMEs and it was externally or other UK-owned businesses, who were more able to utilise and benefit from the knowledge generated by the universities (Roper et al., 2006). At Scottish Government level there is acknowledgement of the need to extend innovation activity beyond the push from science and technology to meet the demand-pull from business and better connect knowledge and knowledge needs and shift towards open innovation (Scottish Government, 2009). Notably in a recent study of publicly funded Research Centres of Excellence in Northern Ireland based in both universities and businesses, it was the university centres on average, who were found to develop more external connections, more local connections and were also more likely to work with SMEs (Roper and Hewitt-Dundas, 2013). Thus the potential exists for universities to increase their links with SMEs with the appropriate support mechanisms. This is particularly important in Scotland where SMEs play a pivotal role in the economy, representing 99.3% of private sector enterprises, 54.5% of private sector employment and generating 37.7% of turnover in the private sector (Scottish Government, 2012).

Innovation in Scotland is also of interest as research indicates it may be lagging behind other comparable countries. An international study of countries in the Organisation for Economic Co-operation and Development (OECD) found that only 43% of businesses in Scotland were 'innovation active' placing the country 17th out of 21 countries and in the fourth quartile. Moreover to move into the top quartile Scotland would require an additional 5,000 innovation active businesses (Scottish Enterprise, 2012). Furthermore, R&D expenditure by businesses is lower in Scotland than in most other OECD countries with Scotland ranking 23rd of 30 countries with the gap between it and the top quartile of countries widening over the previous

decade (Scottish Enterprise, 2012). This indicates there are particular challenges to businesses engaging in innovation in Scotland.

Given the barriers and issues identified particularly amongst SMEs, which are of crucial importance in the Scottish economy, it is pertinent to consider how disparate actors in the open innovation process can be brought together to facilitate collaboration. To explore this research question this paper will consider if an emerging workshop model that utilises design techniques could help to create conditions conducive to the open innovation process.

2.4 Open innovation and design

Businesses often perceive creativity and design as aesthetic issues but it has a much broader reach as innovation in essence comes from the creative imagination and exploiting creative skills (Cox, 2005). Consequently, one recommendation emanating from the Cox review (2005) was to raise the profile of creativity and design in business support. The importance of creativity and design in the innovation process was re-iterated by the Scottish Government (2009) who stressed that "Creativity provides the inspiration for innovation while design is the key element that transforms ideas into actions. They represent respectively the 'new ideas' and the 'successful exploitation' that go together to make innovation such a powerful agent for change" [Scottish Government, (2009), p.25].

In previous research Bruce et al. (1999) found that small businesses, whilst having a requirement for design, had different levels of awareness and competence to manage the design process with companies dividing into two groups those of 'confident' or 'apprehensive' design users. This apprehension in including designers in the innovation process was also identified by Berends et al. (2011) who found that only small businesses that had previously worked with designers included them in an integrated role in new projects. The inclusion of designers however prompted iterations in the process that enabled learning and the designers' skills were complementary to the firms nonetheless small businesses appear to need the experience of collaboration to appreciate the potential contribution *(ibid).*

Furthermore, Acklin (2010) found that due to the fewer financial resources available, SMEs were less likely to include designers in their innovation processes and activities, than their

larger counterparts. This led to Acklin (2010) calling for the development of possible tools based on design methodology that could support SMEs in integrating design in their innovation process.

Accordingly the role of human or user-centred design could confer benefits and could be utilised to help construct an open innovation approach. Human or user-centred design stems from the assumption that innovation is based on involving users in the entire innovation process and in so doing; design adds value during the process and not merely added at the end. User-centred design, in terms of design process, involves 'users' in one or more stages of the design process. Deep insights into the needs, beliefs and imagination of users are necessary for creating new design-led products, services and experiences. Thus the understanding and implementation of user-led design systems and innovative networks can create products, experiences and services which are relevant to target markets.

Sanders and Stappers (2008) refer to co-creation as any act of collective creativity; creativity that is shared by two or more people and define collaborative design or co-design, as collective creativity applied across the whole span of the design process. Thus co-design, is a specific instance of co-creation and can encourage collaborative approaches and facilitate interdisciplinary design solutions. Indeed von Hippel (2005) uses the term, user-innovators, that is, lead users who get involved in the development and creation of products, but as 'users' rather than being production professionals. Such innovation usually happens outside of institutions, through collaborations, rather than from within organisations. This practice has resonance with a more open approach and could help to construct open innovation practices within SMEs.

3. Methodology in practice

Various concepts have been put forward to understand the non-linear, iterative and multi-agent character of innovation processes (Perkmann and Walsh, 2007). The relevance of inter-organisational and collaboration for innovation related processes is rooted in a contemporary approach to innovation that is embedded in the understanding of collaborations which are aligned to the demands of the times, including: impact, creativity and responsiveness on the one hand and, on the other, towards new ways of thinking that

emphasise innovation as emergent through nonlinear design processes and in particular, how modes of interaction and connection can give rise to innovation.

These complex networks and adaptive systems offer new lenses for observing the co-evolution between environment and strategy (Tan et al., 2009). Here qualitative methods such as observation and critical reflection of situations, events, individuals, interactions and transactions (Dana and Dana, 2005) are useful. Moreover reviewing an array of established approaches including action research, action science, participatory research, action learning, grounded theory, clinical method and cooperative inquiry (MacLean et al., 2002) encourages a narrowing of methodological focus and for the purposes of this research action research and grounded theory provide a useful methodological approach. Critical reflection is central to the approach. Action research therefore becomes an enquiry, which is primarily social in nature, with participants and co-researchers as critical learning partners (McNiff, 2013). In this manner action research is relational however this only makes sense when practice is seen as in relation with others, a process of dialogue and encounter (Buber, 2002). In turn, grounded theory (Glaser and Strauss, 1967) has behavioural implications whereby its application would seem appropriate.

The concept of open innovation would suggest that actual relationships between actors in the research situation rather than generic links play a stronger role in generating innovation (Perkmann and Walsh, 2007). Against this backdrop it is the relationships that are of interest as opposed to academic-industry links to identify the main forms in which the relationships are practiced and to synthesise early impressions. An approach for innovation support has been developed which seeks to weave together different threads from the fields of: business, academia and design. Following the concept of open innovation interactive, interdisciplinary, iterative - innovation workshops - known as chiasma, provide fora for actors to collaborate, create relationships and develop new ideas and innovations.

4. Chiasma case study

Design in action (DiA) is a knowledge exchange hub funded by the Arts and Humanities Research Council that draws together six universities and art schools across Scotland. The project aims to embed design as a strategy at the heart of business to help create new products

and services and in turn generate jobs and economic value. By focusing on the five specific sectors of wellbeing, food, sport, rural economy and ICT, DiA seeks to support the development of innovative products, services and processes thereby increasing Scotland's competitive advantage both in domestic and international markets.

An interactive innovation workshop called chiasma (meaning ideas at the point of creation) has been developed to provide a forum to enable businesses, designers and academics to collaborate. Through forming interdisciplinary teams and tackling complex issues in each specific sector, new thinking can be generated and innovative solutions may emerge, creating new market opportunities. Following the chiasma workshop, teams can note their interest in developing innovative ideas further and can proceed to apply for investment of up to £20,000, which along with further business support, is available to help commercialise ideas. By developing the chiasma process, DiA aims to create a mechanism that is complementary to existing innovation support services and is differentiated through the focus on the use of design in the process.

The chiasma workshop consists of a residential workshop of two to three days and includes an intensive, interactive process designed to facilitate new thinking through a disruptive approach. It is conceived as an experimental space wherein participants have the opportunity to collaborate collectively in a 'bazaar-like' (Raymond 1999) fashion to explore issues in the specific sector and construct innovative solutions and develop new approaches. The chiasma process can be summarised by the following three stages: defining the scope of the business challenge; developing a shared understanding of the issues and participating in interactive sessions focused upon generating commercial ideas and business solutions.

An initial pilot three-day chiasma was held in Scotland in early 2013 and focussed on the wellbeing sector and specifically upon Type Two Diabetes. A growing number of people suffer from Type Two Diabetes and it is estimated that 3.8 million people in the UK have diabetes whilst a further one million people remain undiagnosed (Diabetes UK, 2013). Thus, there is scope to develop innovative new offerings, which could have significant benefits for both individuals with the condition and the National Health Service, creating an opportunity for new products and services to help and encourage self-management of this long-term condition. Therefore by focusing Type Two Diabetes, the aim of the Chiasma was not to

develop medical solutions, but rather to generate ideas that through the use of design, could be developed to provide innovative new person-centred products, services and processes to empower those with the condition to manage it more effectively.

Participants were recruited for the chiasma through an open call that was circulated on the DiA website and was disseminated widely through both professional and social networks. Applications were invited from individuals in the following fields: design, business, academia, charities and professionals who were willing to share ideas, speculate on future developments and collaborate to address the issues and challenges facing both individual and collective wellbeing. Participants were required to submit an application proposal which encouraged them to reveal details about themselves and their suitability to address the theme, their particular individual approach, interests and skills and experience in team working and collaboration and to agree to the chiasma terms of engagement.

A selection panel considered the 27 online applications and assessed them against the criteria of: experience, individual approach, interests and skills and team working and collaboration, subsequently 20 participants from a diverse mix of backgrounds were recruited. Participants were then broadly categorised either as a 'designer', 'academic', 'business' or 'other expert' in order to obtain a balance of skills within the chiasma. However, categorisation was not absolute, for instance, some designers operated SMEs and could have also been categorised as a business whilst others were also involved in academia and could have been classified as academic. Participants categorised as other experts had a range of backgrounds including those from charitable and healthcare organisations. Whilst broad in its approach, the practice did ensure that participants were selected from a wide range of backgrounds in order to form interdisciplinary teams with diverse perspectives and experiences.

Table 1 Classification of participants

Participants' designation	*Number*
Academic	2
Business	4
Designer	9
Other expert	5
Total participants	20

The chiasma model was based on a three-phase process; phase one included unpacking the complex challenge through a user-centred design process. During the first phase of the chiasma participants formed small groups and rotated around four interactive methods: insight mapping, designing for the person, motivations and idea generation. These exercises enabled participants to work together in order to garner insights around the issues and develop initial ideas. Insights were mapped around four pre-designated key themes of: learning; living; caring; and eating which had been developed through both secondary desk research and primary research with clinicians and people who had Type Two Diabetes to substantiate assumptions around developing the key thematics.

Personas or fictional characters were then introduced to embed user-centred design approaches. These were developed around two 'stereotypes' with Type Two Diabetes and one created by participants. Following development of personas' motivations (needs, wants, hopes, and fears) they were then unpacked to encourage empathy and to reveal and build further themes of investigation relative to the ideation process. Participants were then encouraged to develop ideas from the overarching themes in order for the process to move from philosophical constructs and abstract concepts into concrete realities that could be taken forward and developed into potential opportunities.

Phase two involved an ideas exchange and market whereby participants could coalesce around ideas, which they had an affinity with and could actively participate in the development of them. An analysis of key areas was conducted and resulted in clustering ideas in five key themes: reinventing retail; wearable technology; policy reform; behavioural change and community support. Participants then selected two themes that they would be most interested in developing ideas in, this process was facilitated and five groups of four people coalesced around themes in order to form small teams. It was stipulated that each team include at least one designer. Participants then in their teams and with the support of expert facilitation, worked together to iteratively develop ideas.

Phase three was predicated on focussing the ideas within the five groups into definitive concepts and applicable solutions. Feedback and support was given to the teams and they worked intensively to create a short presentation of their idea to pitch to an expert evaluation panel. The expert evaluation panel was comprised of experts from out with DiA, to enable

ideas to be assessed objectively and allow teams to gain constructive feedback. On the third day of the chiasma, the teams presented to the expert evaluation panel and received constructive feedback. The panel included a business angel investor, clinician, leading charity expert and IP lawyer and was chaired by a DiA co-investigator. The expert evaluation panel completed feedback forms on each presentation against the criteria of: the idea; the team; the market; innovation and 'magic'. Constructive feedback was then given to the teams in order to inform future funding applications, if applicable.

Following the chiasma teams were given one week to register a note of interest to take the idea forward and apply for investment. Four of the five teams registered their interest to take the idea forward. Four groups continued to work together and submitted Seed Investment Proposals for funding. These proposals were reviewed by a further Funding Panel comprising of: a representative from Scottish Enterprise (the government economic development agency for Scotland), a legal expert from the lead university, the director of the DiA project and the business relationship manager from the DiA project. Following the review of the seed investment proposals, three projects were funded: (1) multi-platform experiential retail operation based on healthy lifestyles (2) a health app. integrating patient and professional care (3) a shopping basket health assessor at point of sale. The progress of the teams will continue to be followed as an embedded part of the research process to understand how they develop both the ideas and as a team in the future. The afore mentioned case study illustrates that DiA are in the process of creating multi-disciplinary fora to help address the key barriers identified in the literature and specifically towards overcoming the barriers for collaboration in building capacity and appetite for innovation through the role of design as a strategy for creating economic value.

5. Reflections

DiA is an ongoing iterative research project and in so doing critical reflections are keys to the process of engendering an understanding of the chiasma process, from both researchers and participants. Reflections were triangulated through:

1 exit polls - collected at the end of each day

2 online surveys - submitted electronically post chiasma

3 researcher observations - ongoing field notes and reflections.

The researcher situated as a central component of the research is therefore actively engaged and embedded in the research situation.

Exit polls were elicited from all participants at the close of day one and day two during the chiasma workshop, with participants encouraged at any point of the day to articulate specific comments in anonymous post boxes. Following the chiasma an online Timba Survey was sent to all participants and nine completed surveys were received. Finally, three researchers embedded in the process compared and contrasted observations through reflective sessions following the chiasma. The data was coded in line with grounded theory conventions whereby early concepts emerged and in particular, reflecting the voice of the participants.

The positive reactions or high points on day one centred around brainstorming and the development of ideas as a group: *"meeting new colleagues […] seeing scope to really make a difference".* What is of note is the notion of 'making a difference': *"feeling that something worthwhile could come out of this"*. This would suggest that innovative and collaborative opportunities, which are aligned to substantive social issues, is an important ingredient in the innovation mix, *"having a motivation to solve a problem"* that are relational both to individuals and their communities to design solutions for *"such an important subject area, a lot of people can relate to this […] especially with people with diabetes being in the room".* As a caveat open innovation processes need to consider the mix of participants as potential collaborators that are in the room, *"… we could be designing 'marble palace' solutions for the wrong end of the market".* Day two exit poll reflections built on the granularity of the ideas relative to the substantive issue, in this case Diabetes 2: *"Discussion with another participant on mechanics behind diabetes methodology […] helped understand the scope of process"* reiterates the importance of having real life experiences of participants and prior desk research as both an embedded aspect of the process and an intrinsic part of the model aligned to supporting the development and refinement of ideas: *"being able to talk to facilitators when we got stuck and to practice pitching".*

The on line survey elicited that collaborative opportunities around a substantive theme, in this case wellbeing and Type Two diabetes were key motivation to attending the chiasma: *"I wanted some first hand experience of a mechanism for bringing people from different sectors together and apply their collective knowledge in an innovation process. I was looking to see*

how the process worked, as well as participate myself". And of particular interest was that participants felt they brought significant skills that could contribute to the focal issue: *"... to investigate generating something new, […] and to offer my own to gain understanding about the issues associated with diabetes"* and in particular the relevance to the specificity of the call *"I am interested in cross-sectoral working and innovation and have direct experience of the three sectors relevant to the call i.e. Life Sciences, Food and Drink and Digital Media".* Early impressions would suggest that the opportunity for collaboration is a key driving force for participants to engage in chiasma and a fuller understanding of participant skills and the specific design roles could enhance the process of selection and team formation within the chiasma.

Researcher observations were substantively around:
1 engagement
2 energy
3 efficacy (quality of ideas).
Research observations regarding the levels of engagement of participants in the chiasma suggest that participants were engaged during the entire process however engagement was enhanced within functional teams during the refining and development of ideas. Of particular interest was that there appeared to be enhanced engagement when there were more designers in a team and as such this would substantiate the deeper understanding of designers and their specific skill set relative to the chiasma. A visual tool whereby participants plotted their individual energy levels allowed the director and facilitator of the chiasma to track the collective energy in the chiasma and to aid responsiveness in the planning, reflection and iteration of the process.

Efficacy or the quality of ideas were developed on the basis of prior research to develop 'four hooks' upon which participants could develop their ideas, this was supported by a design approach which underpinned the process through using principles of open innovation and encouraging engagement in the issues. Early impressions towards immersion in the chiasma experience indicate that the key aspect of the chiasma was the support and critique of the facilitators-as-mentors as a roving group to critique and develop ideas and further research is required to refine and develop this process as separate from the high energy and engagement facilitators.

6. Conclusions

The subsequent synthesis and analysis suggests that the interest in design approaches from the chiasma reveals an instinct for collaboration with design disciplines and the wider business landscape which, if nurtured, could become a driver of innovation and contribute to creating economic value. The chiasma is an emerging model which offers participants an opportunity to engage in new working practices, providing a forum to allow collaborative working and active network participation, bringing together designers, academics and SMEs and facilitating these interactions through design techniques to encourage the generation of new ideas for complex issues. The enthusiasm that this offering was met with in the wellbeing sector, the ideas generated and the teams resolve to develop these ideas further demonstrates the benefit of the chiasma model. In the future this model will be applied to different sectors to understand if the same outcomes can be achieved.

Adopting a collaborative approach may change how we design, what we design and who designs, transforming design from a closed practice to an open and organic structure (von Busch, 2008), contributing to the practice of open innovation. Utilising a collaborative approach involves a culture shift from a closed innovation system to an open innovation system that encourages and embraces new forms of engagement with the network. Drawing on Raymond's (1999) analogy of the bazaar is illuminating as conventional closed innovation could be viewed as analogous to building a cathedral: central planning, tight organization and a linear process from start to finish whereas open innovation is more akin to "a great babbling bazaar of differing agendas and approaches […] out of which a coherent and stable system could seemingly emerge only by a succession of miracles" [Raymond, (1999), p.24]. In an interpretation of his view, open innovation represents the bazaar: a place where people freely trade their wares and skills and here the chiasma model offers both a forum for this to occur and specific design techniques to encourage collaboration.

There are limitations to the chiasma model, it is an early stage, emerging model, developed and utilised in one country, in one specific context. Innovation is open to external influences and it should not be assumed that what is beneficial in one context will necessarily apply in others. As such future research into the role of the chiasma in different contexts would be

beneficial. Nonetheless this exploratory study indicates that the chiasma model offers a useful approach to drawing together disparate actors in the open innovation process and embedding the process of design to help develop new ideas for complex issues.

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