

From Participation to Collaboration: Reflections on the co-creation of innovative business ideas

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Abstract: Design-led innovation interventions are predicated on the importance of establishing complex disciplinary collaborations. This paper reflects on the effects of different co-design methods to support knowledge exchange and the co-creation of new business ideas with multidisciplinary participants. It draws on data collected from sandpit style events entitled Chiasma, undertaken as part of the knowledge exchange hub, Design in Action (DiA) in which co-design methods were used to bring designers, entrepreneurs, and academics together to develop innovative business ideas in Scotland. Employing a thematic analysis of idea generation, team formation, and idea development, we suggest that a more nuanced range of methods, tools, and techniques can strengthen multidisciplinary engagement and participation. We argue that such approaches can be enhanced by designers and researchers' shifting focus from co-design methods to supporting collaborative mindsets in knowledge exchange towards innovation.

Keywords: co-design methods; knowledge exchange; collaboration; design-led innovation

1. Introduction

The research presented in this paper is drawn from a case study of the Design in Action (DiA) knowledge exchange hub, which has been in operation since June 2012. DiA is one of four UK hubs, funded by the Arts and Humanities Research Council, and draws together six universities and art and design institutions across Scotland. The key focus of DiA is investigating design as a strategy for business growth in Scotland and the chosen approach is the Chiasma method, which is a sandpit-style event for open innovation (Kearney & McHattie, 2014). The term 'Chiasma' is taken from genetics meaning the exchange of information between two chromosome strands, which is here used analogously to mean the



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exchange of ideas at the point of creation (Ballie & Prior, 2014). Chiasma brings together multidisciplinary teams, from a range of business, design, and academic backgrounds, to stimulate knowledge exchange and develop commercial ideas. At these 2–3 day residential events, participants form teams around ideas aimed at addressing particular societal issues and develop pitches for presentation before deciding to apply for up to £20,000 funding to prototype and take the idea to market. During the Chiasma participants are introduced to design-led thinking and provided with design methods, tools, and techniques, which aim to support the co-creation of innovative business ideas.

The paper begins with a brief review of the literature regarding the growth of interest in design-led innovation activities and their strategic use by Higher Education Institutes (HEIs) in the development of SMEs. Attention is then drawn to a range of co-design methods aimed at enhancing collaboration amongst multidisciplinary teams and supporting them in developing solutions to creatively address complex societal challenges. Following the presentation of a case study of the very first Chiasma event, a thematic analysis of the co-design methods used across the subsequent twelve Chiasma events is presented. The paper concludes with a summary of the initial research learnings, before highlighting limitations and making recommendations for future research.

2. Scope of Context

2.1 SMEs and Knowledge Exchange

SMEs constitute more than 99 per cent of all private sector businesses, and, as well as making a disproportionately large contribution to job creation, play a key role in driving competition and stimulating innovation. They face considerable barriers to growth and sustainability, however, and these have been identified as particularly acute for smaller businesses as they have fewer resources available to overcome them (BIS, 2013).

In recent years the role of universities in economic growth and innovation has been emphasised with increasing encouragement for them to become strategic actors in the knowledge economy (Deiaco, Hughes, & McKelvey, 2012). Despite this, it has been argued that the art, design, and humanities subjects have been somewhat neglected by formalised knowledge exchange programmes between higher education and industry, with their traditional focus being on Science, Technology, Engineering and Mathematics (STEM) subjects (Comunian, Gilmore, & Jacobi, 2013; Crossick 2006). The very linear models of innovation which have emerged from models of technology transfer, associated with these subject areas, are also seen to neglect the reality of virtuous cycles of multiple engagements and new knowledge generated through the act of collaboration, often across disciplines (Davenport, 2013).

Unsurprisingly, developing fruitful exchanges of knowledge between universities and industry is complex, and multiple barriers to engagement are apparent. Within the Dowling Review (2015) it was found that there is a degree of commonality in the barriers faced by

both businesses and academia when becoming involved in knowledge exchange, but due to their operation in spheres with distinct financial and cultural pressures, there were differentiated attitudes towards collaboration (BIS, 2015: 28). Some of the common barriers related to a lack of mutual trust and understanding, different timescales and limited resources for collaboration (BIS, 2015, p.29). Further challenges can be seen around bringing together diverse teams; different languages; negotiating power relationships; promoting the exchange of tacit knowledge; balancing risk and trust.

Although the nature of work within the design discipline is often naturally collaborative with an emphasis on interdisciplinarity, there has been limited progress in finding ways to capture methods, tools, and techniques for promoting good exchanges in order to replicate successful relationships (Cruickshank, Whitham & Morris, 2012). Comunian et al. (2015) advocate “third or shared spaces” as a crucial component for embedding people and knowledge from academia and specialist knowledge in particular places. One key example they give of such interventions was the 2011 Arts and Humanities Research Council funding of Knowledge Exchange Hubs for the Creative Economy, which included the DiA Hub, from which this paper’s focus is drawn.

2.2 Design-led Innovation

In 2005, former chairman of the UK Design Council, Sir George Cox, underlined how design-led creativity can propel business strategies and help to revive the British economy (Cox, 2005). To implement new ideas and bring about innovative change, Cox emphasised the social and commercial benefits of the design process, explaining that it “shapes ideas to become practical and attractive propositions for users or customers” (2005, p.2). Eleven years on from Cox’s assertions, the Design Council’s evaluations of the impact of design in a number of sectors across the UK (2015) propose that ongoing economic growth can be supported by integrating increasingly diverse perspectives and skills into design processes (2015, p.4).

Design-led Innovation establishes creative coalitions of design practitioners, design researchers, multidisciplinary experts, entrepreneurs, users, and communities (Norman & Verganti, 2014). Drawing from the democratic, inclusive, and creative principles of co-design, participatory design, and design thinking (Ehn, 1989, 1993; Sanders & Stappers, 2008), groups of people with a shared interest or collective motivation to address a complex set of challenges collaborate together through stages of exploration, ideation, and iteration. In their recent reflections, Sanders and Stappers assert that these practices allow for teams to share and develop insights and ideas, which in turn can enable collective creativity to inform innovative products, services, and systems (2014).

In unpacking design-led innovation in its introductory phase, Sanders and Stappers visualise the *fuzzy front end* as an entanglement of complex, spontaneous, and iterative activities (2008, p.6). They recognise that this broad and open-ended phase offers an exploratory space for scoping the design context and clarifying research aims and questions. The fuzzy

front end supports designers in aligning their project with the needs of prospective end users and thus frames and directs the process towards increasingly defined co-design stages of concept development, testing, and production (Sanders & Stappers, 2008, p.6–7).

2.3 Supporting Collaboration: Methods, Tools, and Techniques

From these perspectives on the design process, success depends on the team's capacity to approach the problem from a user perspective (looking), visualise information (make things visible), and rapidly evaluate ideas (prototyping) (Burns, Cottam, Vanstone, & Winhall, 2006, p.18–19). Grounded in design practice, these approaches have spawned a wealth of creative and generative methods constituting drawing, illustration, and three-dimensional making to enhance communication and strategic idea generation within multidisciplinary teams and render the design process more open to participation and development from a range of stakeholders (Hanington & Martin, 2012; Sanders & Stappers, 2014).

Bjögvinsson, Ehn, and Hillgren (2012) cite various designed artefacts including prototypes, mock-ups, and models as stimulating shared understandings between designers and prospective end-users, and providing a route towards their framing of responsive design solutions. This notion of collective knowledge is framed methodologically and materially by Lucero, Vaajakallio, and Dalsgaard in their *dialogue-labs* studies (2012). Here, the designers appropriate Eriksen's participatory design tools as basic materials (paper, clay, and pens) and pre-designed images and artefacts (printed cards and models) (2009). Lucero et al. observe that a diverse array of materials with varying levels of specificity and provocation gave way to “a relaxed atmosphere since participants are not forced into activities they are not comfortable with”, and stimulated “a structured but flexible way in order to spark dialogue between the co-design participants and thus support idea generation” (2012, p.19–20). Investigating participatory design games, Vaajakallio notes that the ambiguity of her co-design workshop tools allowed their seamless adaptation in future sessions with diverse participant groups (2012, p.83). Following these distinctions, tools and techniques can be generic and transferable to subsequent design projects, or actively designed as field/project specific (Eriksen, 2009; Lucero et al., 2012, p.6).

With these design-led innovation principles, practices, and methods in mind, we go on to set out the methodological underpinnings of our approach.

3. Methodology in Practice

As shown in the diagram presented in Figure 1, this paper draws on data gathered from multiple Chiasma events, thirteen in total, in order to reflect on the co-design methods created for and used in the process. For the purposes of this paper a case study is applied to the first Chiasma, as it can deal with multiple causation and complexity (Bell, 2005). A further twelve Chiasma were delivered by DiA's institutional partners according to their agreed sectors: one in the sport sector, three in the food sector, three in the ICT sector, three in the rural economies sector, and two additional in the wellbeing sector. The

methods, tools, and techniques used within these later events are used as subsequent ‘case examples’ and provide material from which to carry out a thematic analysis on their effects within Chiasma. This follows the distinction drawn by Yee (2010) who argues that such snapshots can provide examples to help find underlying principles of the research methods being used.

Our methodology concurs with Biggs' views of the case study as bridging creative practice and research (2004). Building on concepts of experiential knowledge and the role of the artefact in practice-based research, Biggs deconstructs this iterative interplay of research approach and research context, and values generalisations derived from artists' and designers' experiences of practice (2007, p.184). Advocating the case study method, Breslin and Buchanan encourage design researchers to carefully and critically evaluate their practice in order for “universal ideas to be extracted” (2008, p.38).

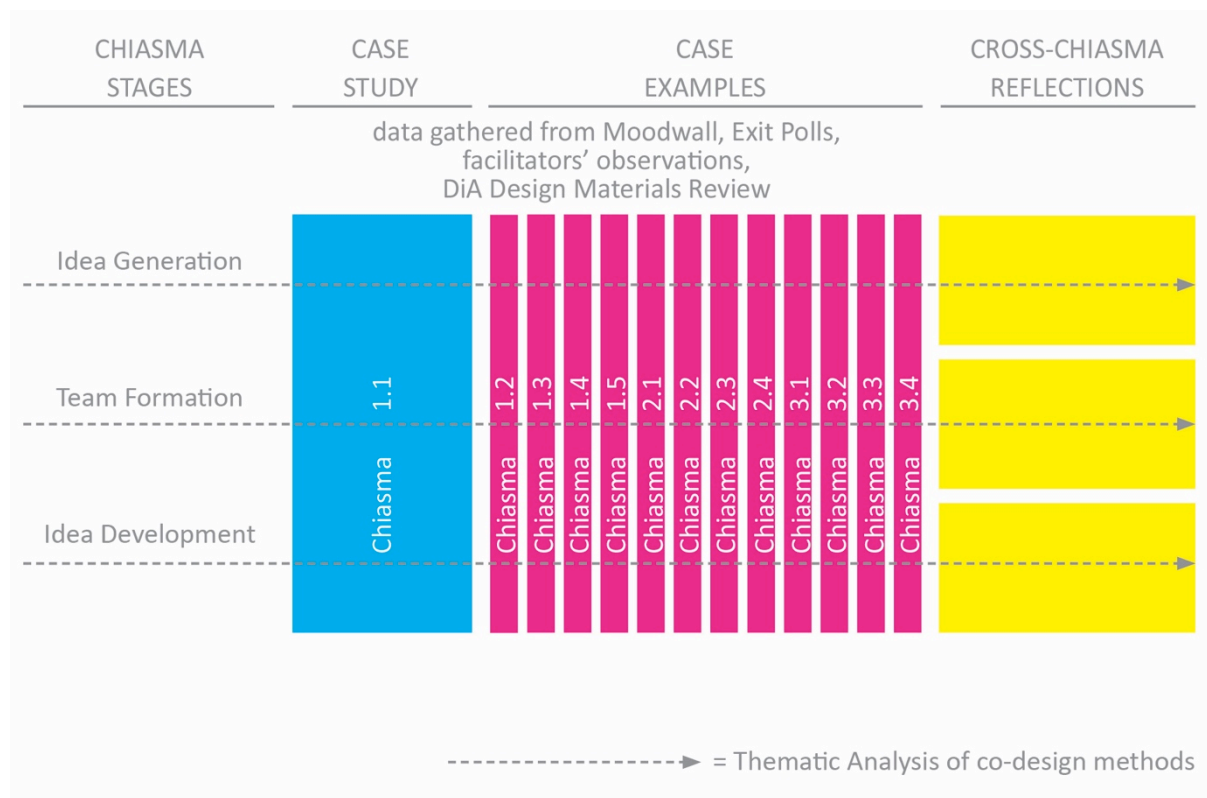


Figure 1 Methodology in Practice: drawing on data gathered from thirteen Chiasma in order to reflect on the co-design methods created for and used in the process. Diagram by DiA (2016).

3.1 Data Gathering

The first event was held in February 2013 in Glasgow, and targeted the wellbeing sector, focusing on the topic of type 2 diabetes. As part of designing this initial Chiasma, methods of data capture were also prepared to best support the understanding and delivery of future Chiasma. These included methods of observation by facilitators, providing each participant with stickers identifying them by a colour and number, which participants attached to the tools they had used during the Chiasma. The *Chiasma Moodwall* shown in Figure 2 was

employed to document participants' emotional responses to each stage in relation to the accompanying tools and techniques. This was supported by *Exit Polls* taken at the end of each day on which participants wrote reflections on their high point, low point, most valuable and most challenging moments they had experienced.

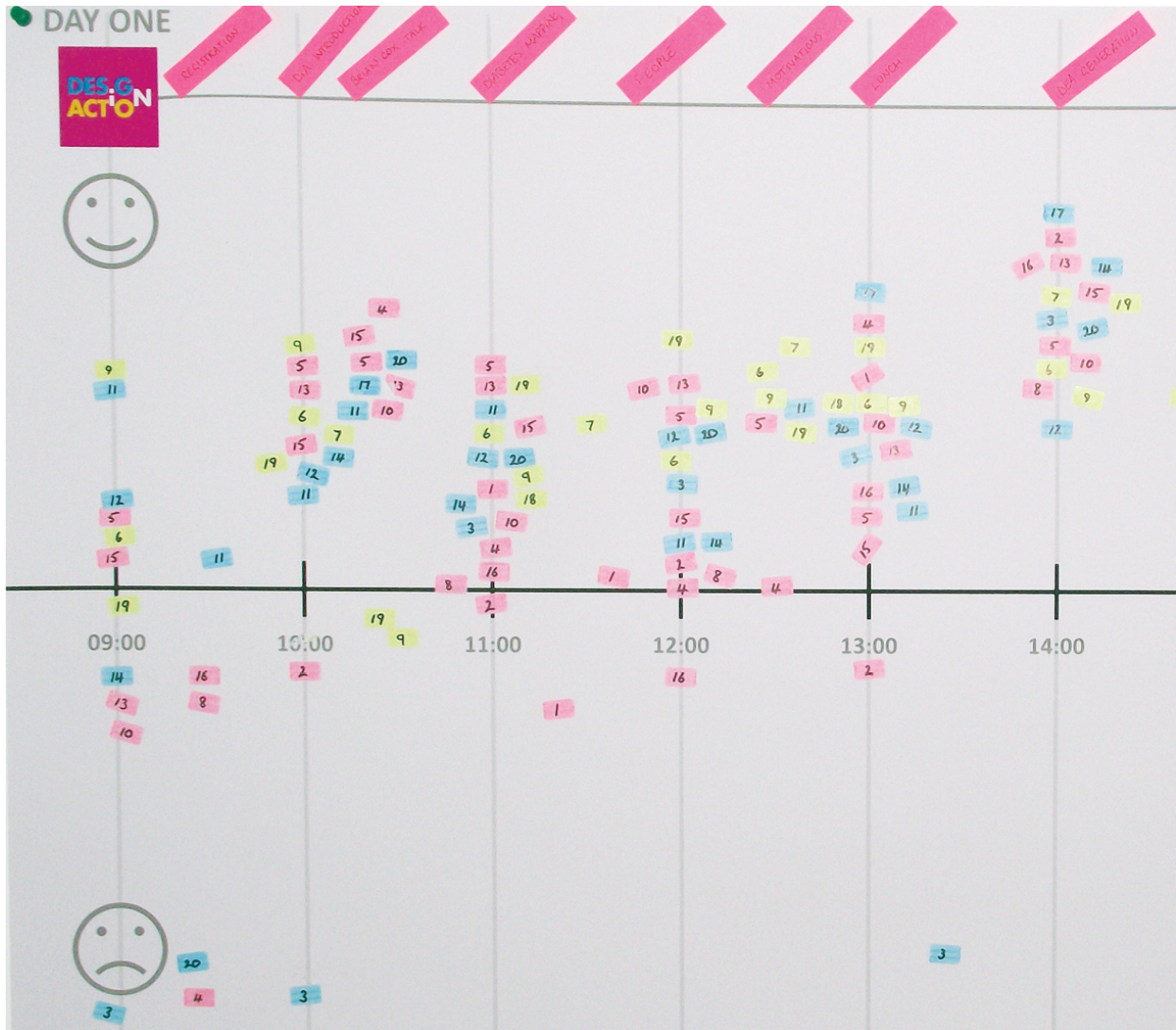


Figure 2 Chiasma Moodwall: timeline of activities, emotional scale, and colour-coded stickers used to track participants experiences across the Chiasma. Photograph by DiA (2013).

The model of activities for the initial Chiasma was designed to take the participants through three key stages, largely based on the Design Council's model of the stages of the design process, *The Double Diamond* (2007): 1) idea generation (discover/define), 2) team formation, 3) idea development (develop/deliver). These provided the initial themes from which to perform thematic analysis of the tools and techniques used in subsequent Chiasma. Thematic analysis is particularly useful for researchers as it is a flexible method well suited to large data sets and allows categories to emerge from the data collected (Creswell, 1994; Miles & Huberman, 1994). Our reflections on the tools and techniques applied across the

Chiasma allow us to identify emergent themes that evaluate the impact of different co-design methods in supporting collaboration for innovative business development.

4. Chiasma 1.1

For Chiasma 1.1, part of this process involved scoping the context of type 2 diabetes and finding ways for activities to best represent these issues to the participants, who had a mix of understanding and experience on the topic. As this was the first iteration of a Chiasma, a variation of co-design methods were prepared and brought together to establish an initial model.

4.1 Idea Generation

In the discover/define stage, participants were split into four rooms for an activity called *Design Whispers*. Each room had a theme – learning, eating, living, treating – around which participants were encouraged to discuss and map facts and statements in the context of type 2 diabetes, develop user personas representing key issues, explore their hopes and fears of living with diabetes, then brainstorm ideas on sticky notes responding to these motivations. Participants moved between rooms for each of these stages to contribute to each theme.

In the Exit Polls carried out, many participants cited the intensity of these activities and the idea generation that followed as a high point of the first day of the Chiasma. Among participants' comments was recognition of a "positive atmosphere", enjoying "learning about how diabetes can affect people" (Chiasma 1.1 Participants, 2013), and valuing the mapping and development of ideas from a person with diabetes' perspective. Difficulties were cited by participants in being able to focus during ideation, just when ideas were flowing, as well as lacking the understanding of diabetes to fully represent people with the condition.

The key concerns of the co-design methods at this stage of the Chiasma consisted of representing issues around type 2 diabetes for discussion whilst allowing participants to build relationships and generate ideas. The considerations designed into the activities aimed to reinforce a visual flow from engaging with the topic of type 2 diabetes, to setting user-centred briefs and opportunities that the ideas generated would address. As the ideas were only briefly formed and written on sticky notes, they only provided a divergent process of rapid idea generation.

4.2 Team Formation

The ideas were taken from each of the rooms and clustered into new emerging themes for plenary discussion and team formation. Facilitators from each room presented the themes, highlighting key ideas constituting potential briefs, before participants were asked to vote for the most inspiring ideas with stickers. After protracted group discussion, the lead facilitators asked for explicit teams to be set out by encouraging participants to commit to

headline themes; ensuring a designer was present in each emerging team. The teams were then designated a separate room each and continued to develop the idea together.

Many participants cited this activity as a low point in the day as it was seen as “lacking structure” (Chiasma 1.1 Participants, 2013), moved away from the previous activity’s focus on core problems and needs around diabetes care, and was underpinned by a sense of disparity amongst participants’ knowledge of the surrounding issues. This led to clashing views within teams, overlaps of expertise in some teams, and gaps in skills for others, all of which could be argued to have disrupted each team. Dividing the group into individual rooms also had mixed effects. Some participants identified this separation as creating a competitive dynamic between teams, inhibiting knowledge exchange, yet others felt that the opportunity to focus on a specific idea was the most productive point in the day.

Aiming to stimulate connections and inspire team formation, the key concerns of the co-design methods at this stage of the Chiasma were to expose participants to a range of themes, support them to identify their own key areas of interest, and enhance their awareness of participants with a common interest. Whilst the facilitators provided sticky notes to cluster ideas and the participants voted with stickers in an attempt to demonstrate visual thinking and democratic decision-making, participants commented that teams formed without a useful understanding of the individual areas of expertise comprised by their members, or their shared interest in the theme.

4.3 Idea Development

Following their formation, teams were encouraged to expand on their ideas and consider their potential impact in contributing to diabetes care. The progress of idea development differed greatly across the teams, but a suite of design tools – including storyboards, network mapping exercises, and user personas – were provided on the second day as printed templates, with instructions provided within a slideshow on a monitor. During idea development, facilitators visited the teams for critical feedback and support in preparing their final presentations.

A proportion of designers and participants demonstrated their familiarity with the tools and completed the templates provided, applying their own methods in tandem. Other participants were less confident when using the tools, often struggling to complete them or to recognise their value in relation to their own expertise. These tools were largely used for refining the teams’ concepts, but only partly informed how each team chose to present. Participants also reflected that tools were introduced at too late a stage in the activities; teams desired early idea refinement from which more considered business proposals could be presented.

The key concerns with the co-design methods at this stage of the Chiasma were to enable teams to explore, refine, and model aspects of their concepts. Having simple pre-designed templates for complex activities allowed participants familiar with design tools to use them with relative confidence, however those unfamiliar with them needed tutorials, and this

turned out to be a protracted process for facilitators. The focus of activity for these teams appeared to be on questioning the rationale of co-design methods, tools, and techniques, rather than developing the idea according to their own expertise. The variety of progress made from team to team in their final presentations heightened a sense of skill gaps and the lack of attention paid to the capabilities of the design participants.

5. Cross-Chiasma Reflections on Co-design Methods

An overview of the subsequent twelve Chiasma in chronological order of their delivery is presented below in Table 1. The table lists the key co-design methods used within the previously identified stages of idea generation, team formation, and idea development in order to provide a consistent framework for comparison during thematic analysis.

Table 1 Co-design methods used across stages in subsequent twelve Chiasma.

Chiasma	Co-design methods within Chiasma Stages		
	Idea Generation	Team Formation	Idea Development
1.2 Food: <i>Building Opportunity Without Losing Sight</i> – April 2013	Film clips to represent issues. Brainstorming on sticky notes.	Clustering themes. Drawing and pitching ideas.	Paper prototyping materials.
1.3 Rural: <i>Made in Scotland</i> – June 2013	Likert scale provocations. Card prompts and statements. Future headlines. Brainstorming on sticky notes.	About.me profiles. Clustering themes.	Paper prototyping materials.
1.4 Sport: <i>Inclusion Outdoors</i> – September 2013	Video animation to represent issues. Card prompts and statements. User personas. Future headlines. Brainstorming on sticky notes.	Clustering themes. Participant profile cards.	Paper prototyping materials. Knowledge exchange cards. Assigned design tools.
1.5 ICT: <i>Beyond Mobile</i> – February 2014	Likert Scale provocations. Floppy disk prompts. Brainstorming on sticky notes.	Clustering themes. Participant profile cards.	Assigned design tools. Knowledge exchange cards.
2.1 Food: <i>The Canny Consumer</i> – April 2014	Card prompts and statements. User personas.	Clustering themes. Participant profile cards.	Business model canvas. Paper prototyping materials.

	Brainstorming on sticky notes.		
2.2 Wellbeing: <i>Ageing Well</i> – June 2014	Likert scale Provocations. Narrative drawing. Card prompts and statements. Flag ideas over narratives.	Clustering themes. Participant profile cards. Participant avatar groupings.	Paper prototyping materials. Assigned Design tools.
2.3 Rural: <i>Sustaining Rural Scotland</i> – October 2014	Likert scale provocations. Knowledge bank. Inspiration cards. Brainstorming on sticky notes.	Clustering themes. Participant profile cards. Team roles.	Hat critical personas. Idea library card. Design tools.
2.4 ICT: <i>Technology Accelerator Chiasma</i> – January 2015	Likert scale provocations. Knowledge bank. Fast idea generator. Brainstorming on sticky notes.	Clustering themes. Participant profile cards. Team roles cards.	Participant feedback cards. Assigned Design tools.
3.1 ICT: <i>Creative Currencies</i> – February 2015	Brainstorming on sticky notes.	Clustering themes. Participant profile cards.	Participant feedback cards. Paper prototyping materials.
3.2 Rural: <i>Zero Waste Scotland</i> – March 2015	Likert scale provocations. Knowledge bank. Inspiration cards. Brainstorming on sticky notes.	Clustering themes. Participant profile cards. Team roles cards.	Critical hat personas. Idea library card. Assigned Design tools.
3.3 Food: <i>Food Futures</i> – October 2015	Likert scale provocations. Knowledge bank. Inspiration cards. Fast idea generator. Brainstorming on sticky notes.	Clustering themes. Participant profile cards.	Critical hat personas. Idea library card. Assigned Design tools.
3.4 Wellbeing: <i>Surviving and Thriving</i> – November 2015	Likert scale provocations. Knowledge bank cards. Fast idea generator. Brainstorming on black canvas.	Clustering themes. Participant profile cards. Knowledge bank cards.	Paper prototyping materials. Assigned Design tools.

The following section summarises the methodological decisions and alterations made across the subsequent twelve Chiasma. Reflecting on the information presented in Table 1, we articulate three key findings – *revealing participant insights and concerns*, *aligning interests and expertise*, and *sharing the vision* – that demonstrate the value of iteratively and responsively developing co-design methods.

5.1 Revealing Participant Insights and Concerns

From the first Chiasma presented above, there was a key shift in approach in how the contextual challenges were represented to participants. Prior to each Chiasma, the DiA team carried out an intensive scoping period to gather key facts, trends, issues, and organisations relevant to the chosen theme. Applying their design skills, the DiA team then represented these through animated videos, fact cards, posters, and other tools, such as the *Sports Chiasma Fact Cards* shown in Figure 3, and explored user perspectives within these issues. This focus on explicating defined contextual issues surrounding each Chiasma theme became less important to the wider process due to the DiA teams' recognition that participants often had strong associations, experience, or expertise in relation to the sectors and issues.



Figure 3 Sports Chiasma Fact Cards: artefacts created by DiA team to represent key issues around the Chiasma theme, and encourage participants' insights in response. Photograph by DiA (2013).

Representing the issues dynamically and authentically, expert speakers were also invited to present at all Chiasma. As a result, later Chiasma activities focused on drawing out the knowledge of participants through *Likert Scale Provocations* and discussions. Represented

by signage and printed statements, this activity, shown in Figure 4, allowed participants to reflect in action on contextual issues and reveal their insights and concerns to the wider group through physical movement. The dynamics of this activity provided participants with an overview of the knowledge and expertise in the room, the positions of participants in relation to the context, and skill sets that could be useful for developing ideas.



Figure 4 Likert Scale Provocations: activity designed to stimulate participants' discussions around contextual issues. The DiA team printed textual provocations and read these aloud, before encouraging participants to move to the corner of the room that best represented their response – strongly agree, agree, disagree, strongly disagree – and engaging the group in a collective discussion on their varying perspectives. Photograph by DiA (2015).

5.2 Aligning Interests and Expertise

One of the major challenges within Chiasma was learning how to support effective team formation towards successful funding applications for business development. In early Chiasma, team formation was driven by issues expressed through service design tools and techniques, which often led to service design solutions within teams that contained disciplines unable to deliver such concepts. By introducing *Participant Profile Cards* and *Knowledge Bank Cards* shown in Figure 5, the DiA team shifted the approach to render participants' knowledge, experience, skills, expertise, and interests more visible and tangible. These tools aimed to reveal participants' assets and empower them to strategically construct their team to converge on a defined idea. As the Chiasma presented limited time or scope for prototyping or testing ideas, facilitators commented on how the co-design methods applied were often more effective in supporting participants to think divergently rather than focusing on convergent processes. The challenge for teams in Chiasma was therefore to demonstrate the potential for convergence in their final presentations. The

onus moved from facilitating activities for individual participants to engage with, to providing the space and materials for participants to become active collaborators. While this has not been uniformly successful across all the teams and presentations within Chiasma, it is expressed here as a learning from DiA in delivering effective facilitation.



Figure 5 Participant Profile Cards and Knowledge Bank Cards: tools given to participants during day 01 and day 02 of Chiasma to assist in introductions, knowledge exchange, and making connections. Photograph by DiA (2015).

5.3 Sharing the Vision

One of the major aims within Chiasma was to integrate designers into the process from the start of idea generation to enhance design-led innovation throughout. Designers have accounted for at least a third of all participants within each Chiasma. Prior to the event, they are provided with a distinct brief to lead creative activities and distribute themselves between the teams formed. Upon reflection, the dispersal of designers allowed for some bespoke methods to be created within Chiasma, such as the *Narrative Drawing* activity shown in Figure 6, as it was felt the design participants would be comfortable to visually engage in drawing. Tools and techniques for idea development were provided within each Chiasma, but whereas in the first few cases these were introduced as ways of developing ideas, they were backgrounded in later Chiasma as potential methods to introduce if needed, according to the design capabilities within each team. As in the first Chiasma, some design participants demonstrated a familiarity and capacity to use the tools, others struggled to appreciate their value, and a limited number sought to actively learn about and apply the tools presented. Later Chiasma would replicate and repeat tools and techniques that were intended to represent an identifiable DiA Chiasma toolkit, which focused on the emerging importance of *Participant Profile Cards* and *Knowledge Bank Cards*.

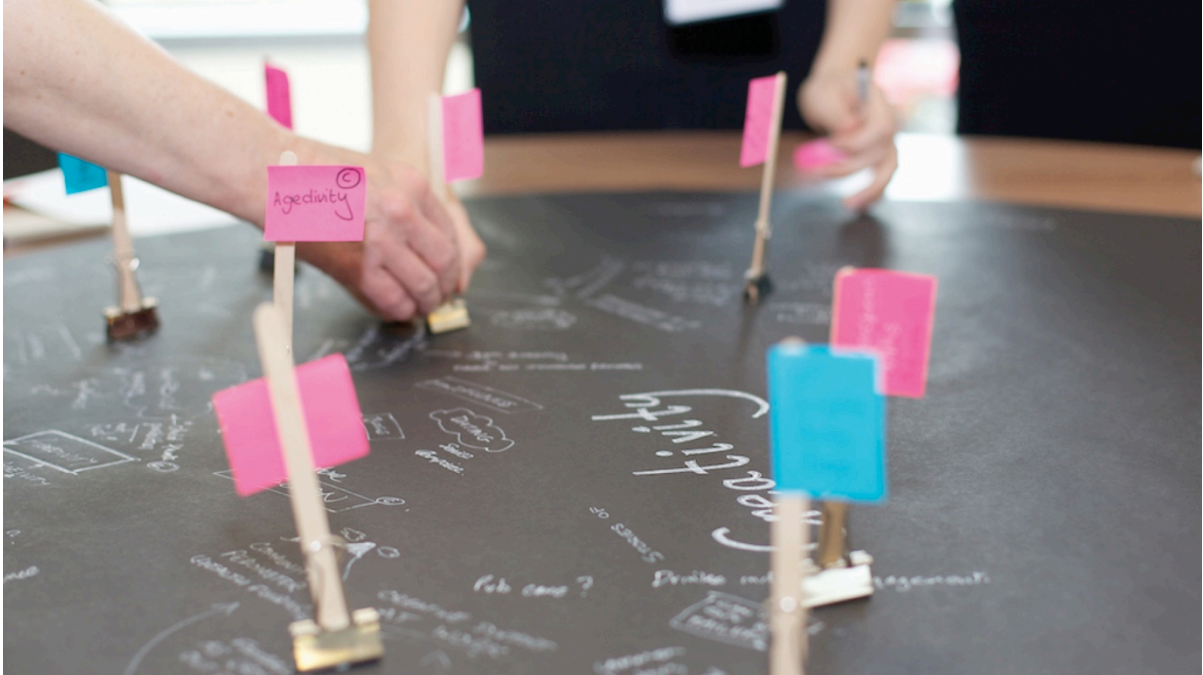


Figure 6 Narrative Drawing: black paper table cloths, white marker pens, and flags used to stimulate participants' collective responses to contextual issues and represent their shared perspectives. Photograph by DiA (2014).



Figure 7 Floppy Disk Prompt Cards: bespoke cards designed for ICT Chiasma to metaphorically connect Chiasma tools and techniques to Chiasma theme. Photograph by DiA (2014).

These bespoke methods, such as the visual *Narrative Drawing* activities, *Floppy Disk Prompt Cards* used in the first ICT Chiasma (Figure 7), and a range of playful icebreaker activities were often differentiated as resonating activities within each Chiasma. Whilst this learning was not explicitly applied across later Chiasma, the experiential differentiation from simply completing sticky notes is seen as a valuable asset to co-design methods. The caution is that this highlights a need for careful facilitation, such as demonstrating the activity beforehand, allowing an iterative understanding of the purpose and effect of such visual methods. This also brings the design and preparation of such methods into play, rather than rolling out a prescriptive toolkit. The design and facilitation of such co-design methods brings much more of a performative dimension (Johnson, 2016), tuning into more suitable appropriations of such methods according to, not just participation, but active associations of interest, collaboration and, ultimately, enrolment towards new business development.

6. Learnings on Knowledge Exchange within Design-led Innovation

From our case study descriptions and thematic analysis we have attempted to demonstrate the conceptual and material nuances of the co-design methods applied across the thirteen Chiasma held by DiA. Reflecting on the potential value of these tools and techniques for participants and facilitators of knowledge exchange events, we go on to discuss the key learnings gleaned from this research.

6.1 From Participation to Collaboration

Participants were encouraged to tailor their experience by integrating their skills, techniques, and knowledge; therefore an ethos of openness was essential for the Chiasma process. Set out in our presentation of Chiasma 1.1, the introduction of user-centred design tools exposed the participants' varying levels of familiarity with such methods, which reinforced disciplinary boundaries and disrupted team collaboration. Critiquing the proliferation of a range of toolkit resources that prescribe the use of creative methods within defined stages of the design process (Aldersey-Williams, Bound, & Coleman, 1999; Hanington & Martin, 2012; Helen Hamlyn Centre for Design, 2013; IDEO, 2002; Tassi, 2009), we believe that participants' sustained engagement is predicated on their ability to identify with the aims of the process, interpreting and adapting each method in ways that are meaningful for them.

Returning to Sanders and Stappers' conceptualisation of the complexity and ambiguity characterised by the fuzzy front end (2008) and Comunian et al.'s emphasis on the need for shared spaces for knowledge exchange (2015), the openness of the Chiasma process sets the scene for participants to jointly explore contextual challenges. As Chiasma coordination and delivery progressed, the visual, material, and performative dimensions of the co-design methods blurred the boundaries between the idea generation and team formation stages by providing participants with opportunities to build relationships and articulate ideas through iterative dialogue and reflection (Sanders & Stappers, 2014, p.6).

For idea development to take place as a largely autonomous process, participants need to discover a clear rationale for each stage and activity, integrate their own perspectives from the offset of the design process, and draw from the shared reflections of the wider group gleaned from enacting design as a collective activity (Vaajakallio, 2009, p.8). The iterative development of accessible and inspiring co-design methods contributes to empowering participants to form teams and work as collaborative partners.

6.2 From Generic to Bespoke Techniques

Varying levels of specificity and provocation embodied the co-design methods used across the thirteen Chiasma. Recalling Eriksen's distinctions of basic and pre-designed materials (2009) and Lucero et al.'s discussions of methodological transferability (2012, p.6), we propose an additional distinction of *resonant materials* – those in which the content and format are intrinsically entwined with elements of the innovation context. Exemplifying the bespoke qualities of resonant materials, the Floppy Disk Prompt Cards' symbolic connections to technological innovation in the first ICT Chiasma, and the Visual Narrative Drawing activity, created in anticipation of the number of designers attending the second Wellbeing Chiasma both sparked participants' engagement in idea generation stages and functioned as artefacts to relay stories of their ideas in development.

Accounting for both *transparency* and *readability* in participatory design processes, Schoffelen, Claes, Huybrechts, Martens, Chua, and Moere (2015) affirm that visual representations engage people to interact with complex issues, and aid both sense-making and reflection. In turn, they propose that “representations of an issue are never finished and should allow for unforeseen and unpredictable uses by unknown users, and be flexible to evolve over time in asynchronous participative processes separated in time and space” (Schoffelen et al., 2015, p.12).

The presence of designers within the participant groups and the DiA delivery team enabled design expertise to be embedded within the teams that formed. Dorst voices concern that desires to rationalise design processes have overshadowed designerly skill and agency and dismiss the practitioner as the “missing person in design research” (2008, p.8). We do not put forward the methods applied in the Chiasma as a dogma of design-led innovation efficacy. Instead, we oppose the view of the seemingly impartial facilitator as a trainer, rather than a player, a social connector, and an agent of change (Julier, 2007, p.208; Manzini, 2009, p.11; Morelli, 2007, p.6; Sanders & Stappers, 2008, p.13–14). We argue that facilitators are immersed, relational, non-neutral collaborators in the innovation process, denoting Steen's notions of reflexivity as a means of “constructively combin[ing] practice and analysis” (2008, p.69; Broadley, 2013). This dual role is invaluable within fostering effective knowledge exchange and echoes Press, Bruce, Chow, and White's proposition that a liberation from methodological constraints enables our “valuing of the sensuous and creative qualities of design knowledge and the confidence to use this in new and appropriate ways to develop new solutions” (2011, p.9).

7. Conclusion: From Methods to Mindsets

In this paper we have acknowledged the growth of interest in design-led innovation activities for the development of SMEs through knowledge exchange between HEIs and industry. Design in Action's Chiasma method was presented, firstly through a case study of delivering the very first Chiasma process, followed by a thematic analysis of the co-design methods used across the subsequent twelve Chiasma events. Key concerns, reflections, and learnings were then presented around how co-design methods can reveal participant insights and concerns and align their interests and expertise, towards sharing their visions of innovation in ways that could engender meaningful collaboration.

This paper has argued for the recognition of more nuanced, resonant materials in co-design methods, and proposes these as opportunities for translating design knowledge to a wider range of stakeholders. From our perspective of delivering and reviewing co-design methods to support collaboration, stronger resonance came from establishing a constructive platform for participants to identify and engage their knowledge and skills in line with the chosen context (Sanders & Stappers, 2014; Vaajakallio and Mattelmäki, 2014). The balancing act rests on the ability for such co-design methods to serve the purpose of activity, yet prove bespoke and creative enough to facilitate new connections between participants. Concurring with Acklin, Cruickshank, and Evans (2013), we recognise through the development of Chiasma that a shift in focus from co-design methods to the role of the designer in supporting collaborative mindsets was critical.

Acknowledging the paper's limitations, we point out that without being directly involved in the coordination and delivery all thirteen Chiasma, we are unable to reflect fully on the rationale underpinning each activity or the participants' interactions with the corresponding co-design methods. In future similar processes, we would recommend the integration of methods to actively capture participants' experiential accounts to more fully evaluate the impact of co-design methods. As we embark on an extensive phase of evaluation, we point out that our accounts of Chiasma in this paper provide only a snapshot of the breadth and depth of activity carried out across the hub. There is limited evidence at this stage of Chiasma's impact in delivering economic growth through design-led innovation, yet as Chiasma is an innovative concept, we feel these learnings around co-design methods and knowledge exchange are of interest to the design community.

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