Distributed Capabilities: Towards hybrid ways of making in collaborative arts/design practices

G Jaramillo

Introduction

You could feel the amicable energy flowing across the group in the lofted space on that sunny September afternoon. The planned weekend gathering had our collective of practitioners engaged in multiple activities on the upper floor of the Helmsdale museum, Timespan. There were gasps of interest, giggles with the clay from one table, clangs and banging from another, and the ever sigh of relief when the screen was lifted from the print and paint. Our group had come together from across the length and breadth of Scotland to meet for our second curated gathering. During this active afternoon, we discussed our respective practices—a weaver shared their design process, while ceramicists shared different ways of working with clay; each participant exploring, sensing, growing and feeling through the motions and movements of their respective craft (Figure 1).

Figure 1

This ongoing practice-based research covers the developing co-creative relationships that arise through integrating data-driven inspiration processes within collaborative distributed networks of design and making, formed in the Aural Textiles-Distributed Capabilities project. It builds on an analogue/digital transformation process for sound-inspired pattern creation. This paper takes the relationship one step further by inviting practitioner participants to co-create this text with the research team, reflecting on their own experiences of the collaborative process and responding to common themes across each other's experiences. We situate these reflections within a framework of an evolving ecology of practice, which considers three key areas of collaboration in the development of collectives:

- Shared Experiences
- Shared (but Distributed) Expertise
- Shared Meaning

We invited all eleven participating practitioners to join this co-created paper and three took part. They were invited to reflect on the collaborative aspect of the project and to focus on elements that were important to them (without any further guidance or direction from the researchers). These reflections were collated and discussed between the three practitioners and the researchers. Here, we present these reflections (in full) and discussions, with common themes explored and considered in the context of a 'sharing ecology'. The aim of this paper is to explore the evolving collaborative aspects of collective working and provide agency to practitioners within this developing practice-led research-participant project.

We first provide a background into participatory design-led innovation and its role as a methodological underpinning within the study. We focus on collaborative writing as a way of providing participant agency in this narrative assemblage. We then share our reflections and commentary exploring perspectives of collaboration, cooperation and communication. We link these themes through consideration of shared values, technology and experimentation before returning to 'ecologies of practice' and reflecting upon what collective and collaborative mean within our context of the project.

Participatory Design-Led Innovation

A design-led innovation approach was used to promote hybrid ways of making and working by supporting interdisciplinary collaboration within the group of designers/makers. Design-led innovation can be defined as the design of participatory activities and ways of working that facilitate innovative collaboration and reflective practice towards new knowledge creation. Design innovation approaches support new collaborative and interdisciplinary knowledge that 'emerge from the creative recombination of existing assets (from social capital to historical heritage, from traditional craftsmanship to accessible advanced technology)'.

Distributed Capabilities: Gathering 1

Huntly
29-30 April 2019

Original Group - Expectations and Reflections
Welcomes and reflections on what's to come from the original group.

Setting the Scene
Introducing new practitioners to the original group.

Speed Dating
Designed speed interaction to welcome the original and new groups of practitioners.

Jigsaw Puzzle Reflections
Personal and group activities to support collective thinking, through the creation and sharing of jigsaw pieces.

Gathering Sounds and Reflections
Original and new group members collected sounds together during a contextual walk and reflections were captured throughout by a facilitator.

Distributed Capabilities: Gathering 2

Helmsdale,
6-8 September 2019

Sharing Experiences
Each collaborative groups showcases their work in progress and provides a narrative overview of their processes.

Skills Sharing Pattern Playground
Each individual brings a pre-prepared hands on activity that demonstrates their working processes. A 'playground' of stalls is set up to allow everyone to experience each other's activities.

Collective Reflection
Quotes from the previous day were played back to the group. Each collaborative group was then asked to map out their working journey.

Planning
Participants and researchers then discussed plans for hosting a public-facing exhibition and the intended impact of the work.

Distributed Capabilities: Gathering 3

Zoom Digital Event
21 March 2020

Team Sharing
Each collaborative group participated in a 'show and tell' discussion of their work and process development.

Reflective Task
Using breakout rooms, the collaborative groups then privately discussed their learnings, working practice, outputs, and ambitions.

Reflective Sharing
All participants were then brought back together to share their collaborative group reflections and plans going forwards.

Next Steps Planning
Participants and researchers then took part in an open discussion about concerns relating to physically-distanced working and potential for exhibition work, including contingency planning and opportunities to maintain informal and regular communication.

Figure 2

In the first phase of the project, "Aural Textiles", six textile practitioners were introduced to the process of visualising sounds and each created individual work inspired by self-selected sounds. In the second phase, "Distributed Capabilities", the textile practitioners worked with five practitioners from different craft disciplines to share knowledge of the multi-sensory Aural Textiles process and co-create discipline-spanning objects (Figure 2). In this, the project questions existing ways of making and collaborating using digital/analogue avenues that augment, but do not replace, the influence and expertise of the practitioner on the design and creation process; promotes new hybrid ways of making and working within a twenty-first century context; and encourages conversations and knowledge-/skills-sharing between practitioners from different disciplines.

The Aural Textiles process established a baseline understanding of innovative practice at the intersections between analogue and digital processing, and traditional and contemporary craft. The process allowed practitioners to explore attunement to landscape within a context that was not bound to their existing disciplinary thinking and was intended to support their ability to cross interdisciplinary boundaries. Opportunities for interpretation and creative ownership were encouraged through the formation of partnerships between textile and non-textile practitioners that promoted sharing of the Aural Textiles process within their collaborations. This sharing process acted as a bridge between disciplines and between project phases. Using participatory design methods to enable practitioners to explore traditional and local knowledge in this way supports

the harnessing of collective knowledge and novel collaboration. Reflective practice was prioritised during the gatherings to support active and contextual knowledge creation, primarily through tacit exploration and social interaction during group activities.

Co-design of the project between practitioners and researchers was embedded within the process through inclusive planning sessions and open-ended group discussions. This participatory design approach supports shared value creation and learning, and inclusive engagement, embedding the intended collaborative ethos. The value of designing for open-ended collaborative participation in this way connects everyone involved in the project to shared concepts, 'unlocking, amplifying and analysing individual creative potential'. It is this idea of co-creation that is promoted throughout the project, especially in the formatting of this paper.

Setting up Collaborations

The practitioners from the first phase of the project were introduced to the Aural Textiles process, in which they could independently develop textile patterns relevant to their own specific disciplines. By framing sound capturing and spectrogram processing as the context from which to innovate from, practitioners were allowed to delve into the complexity of sound and "take a step back" from their professional perspectives, creating 'themes that are neutral, in the sense that they don't presuppose a discipline'. This allowed the practitioners an established process from which to 'see' the translation of sound into a tactile form.

Figure 3

Safe and creative shared spaces were valued as catalysts for collaborative exploration, fostering trust between practitioners and with the researchers (Figure 3). Collaborative learning strategies underpinned the creative exploration, with the shared goal between practitioners and researchers of understanding what sounds were amenable to translation into textile patterns for the different textile disciplines, and exploring the range of pattern possibilities. Practitioners first learned together about the acquisition of sound data and use of sound visualisation software, and then explored both sounds and software individually and in subgroups (at and between organised gatherings), sharing their findings with the wider group at the following gathering. This process was intended to set a tone of collective learning and knowledge creation by facilitating a shared understanding of each other's practices, separate from individual disciplines.

Though the knowledge acquisition was collective, each practitioner in the first phase expressed their new knowledge through their expertise with familiar techniques, creating individual works. The desire to expand collective exploration into different making disciplines and the co-creation of objects underpinned by sound-inspired design led to the second phase of the project.

Forming Collaborations through partnerships

In this second phase, textile practitioners from phase one paired up with non-textile practitioners to creatively explore how they could use the sound-inspired design process to underpin object co-creation that represented both their making disciplines. This required the original textile practitioners to share the knowledge they had acquired collectively about the sound design process with their new partners while each pairing simultaneously exchanged technical information about their disciplines, explored areas of shared interest, and identified and refined the different ways in which their practices could be combined.

Transitioning to Collaborative Partnerships

Cally (a handweaver) collaborates with Jen:

'My partner in Distributed Capabilities is Jen Stewart, a jewellery designer. There are some obvious points of difference in our practice. Jen's work is in brass, which is hard and unyielding. My work is chiefly in wool, which is supple and forgiving. I make my work by hand at the loom, so I can improvise as I go. Jen's work is cut for her, so she must fully commit to a design in advance. But we have plenty in common as well. We both love sampling and prototyping. We're both quite nerdy about process and want to understand structure at a deep level. We both think with our hands.'

'And we got off to a good start. Our individual desires for the project fitted well together, and we developed a vision of a 'suit of armour' which would bring together brass and fabric in a collection of wearable pieces. There would be scope for us each to make an individual as well as a joint contribution, and it would take us both into new collaborative territory. The focus of our first few meetings was on the practicalities. How would we combine our materials?'

'Our initial sampling included yarn woven into brass and brass woven into fabric. The latter approach poses several technical challenges, and our process of sampling led to a better understanding of these.'

'At the second gathering we developed the next iteration of our idea. Jen took away our sketches and developed them into a prototype design. She had samples cut in brass before we next met at her studio. We started to play with the pieces, combining them with yarn samples I had brought along.'

'As we played, a new idea emerged, and we had a eureka moment. This shape had been intended for incorporation on the loom, but in fact we had created something with even more potential for interlacement off the loom. Our co-creation was launched.' (Figure 4)
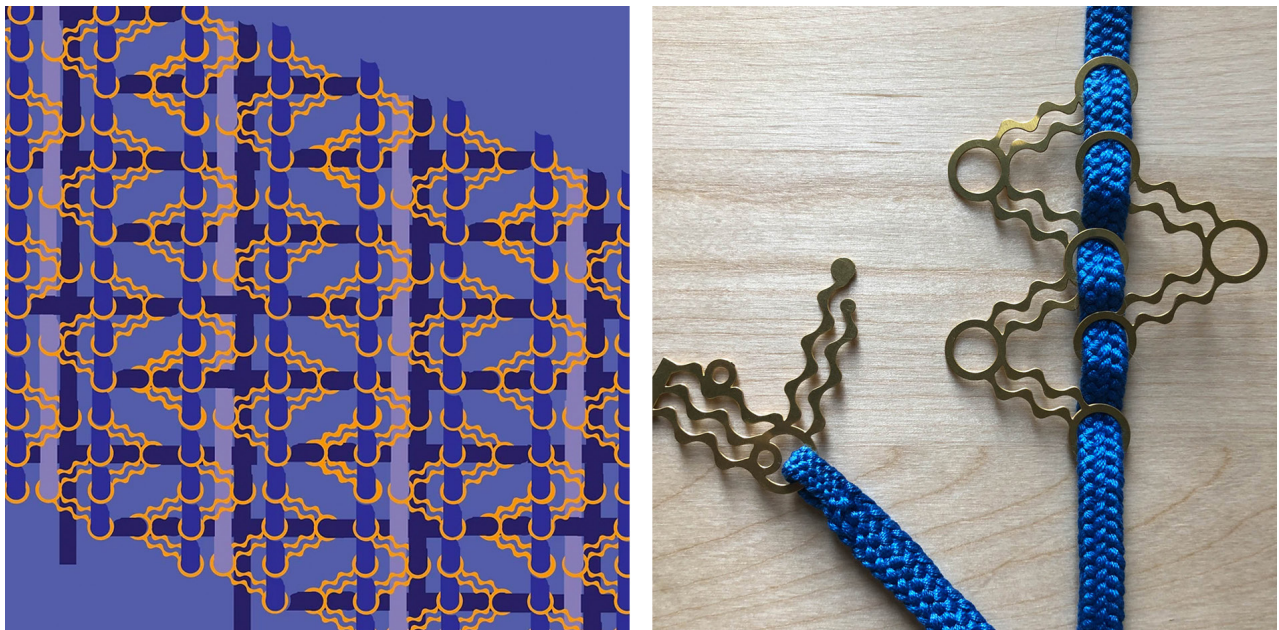

Figure 4

'With Christmas approaching we had to pause the project to focus on our respective businesses, but in the new year we were excited to get back to our plan. Jen drew up some digital sketches which riffed on our original shape, while I began creating braid samples in different yarns to test the flexibility of the structure. Then we went into lockdown.'

'Our collaboration didn't immediately screech to a halt. We tried setting up a regular schedule of digital meetups but struggled to use the time productively. We wondered whether we were incapable of collaborating digitally when the hands-on magic had been so important for us. However, I am not sure that this was the main issue.'

'With hindsight it is obvious that we were both reeling from the impact of the lockdown on our livelihoods. With events and workshops cancelled, and retailers shutting their doors, we were needing to reinvent ourselves on the fly. It was hopeless to try and force ourselves into that playful, creative space that had been so fruitful before.'

'As I write we have begun to pick up the pieces and rediscover the vision that we had for our suit of armour. The collaborative, experimental process we have engaged in so far has been just as exciting as I had hoped, and I think we can create interesting work that would not have arisen from either of us individually. But we still face

*extraordinary challenges to our businesses, which have to be a priority, and it looks
as though our collaboration will be carried out remotely for some time to come.'*

Co-creation is a word that is used in contemporary design, business and strategic
development disciplines. Founded within the ideas of participatory design it describes a
collaborative creation of value. Yet, it only answers a part of the evolving idea of co-creation
when it is viewed mainly as a connection between a creator and a group of users/consumers.
It can also be considered an interactional creation of socio-material assemblage, where
value is considered not only in the artefact/service but also the experience embodied in the
agency of its creators/materials. Furthermore, we also see co-creation as 'a creative process
that taps into the collective potential of groups to generate insights and innovation' allowing
a perception and inclusive understanding of the value and the multiple agencies present
in its making. Co-creation offers opportunities for innovation as collaborating partners are
exposed to different resources and expertise that they can integrate and apply in novel
ways. In this project, co-creation embodies both serendipity and innovation. The idea of play
mentioned in Cally's reflection shows this co-creative energy from which new ideas emerged
spontaneously that neither partner could have arrived at in isolation: the 'eureka moment'.

Knowledge Transfer

Various show and tell-based activities were scattered across the three gatherings
of Distributed Capabilities, which acted as spaces for wider sharing within the
collective of experiences, expertise, emerging processes, and shared meaning
between the partnerships. The partnerships were encouraged to agree their own
rhythms and rituals for collaborating in-between the gatherings, supported by
the researchers who provided a blog space and website, and a WhatsApp group
initiated by the practitioners, in which the researchers were included.

Laura (a ceramicist) reflects on her collaboration with Beth (screen printer):

*'Being selected to be part of the second phase of participants within the project has
meant so much to me. To be involved in an initiative that has challenged my own practice,
introduced me to the process of collaboration, and acquainted me with such a creative
and welcoming group of practitioners has been inspiring, uplifting and rewarding.'*

*'I met my fellow collaborator, Beth during our initial meeting in Huntly. It was through an ice-
breaker task that took a 'speed dating' format, where all the participants were given a few
minutes to chat and give a brief overview of who we were, that Beth and I connected due to
our mutual love of surface pattern. Initially, I thought that we were going to be paired up with
collaborative partners in advance, however this organic approach allowed us to 'suss' each
other out and naturally find a common creative connection. I believe that if we had been paired
up in advance of course we could have worked with our assigned partners, but this more
organic approach to finding a collaborative partner has worked out well for Beth and I.'*

*'During our initial meet-up back in Glasgow, Beth and I discussed several possible ideas
that we could develop for our collaborative piece. As Beth was part of the original six
participants, she brought knowledge and experience of the project that gave me confidence
to suggest several options. We agreed on using sounds from our practice as our starting*

point. Recording sounds from equipment we use in our practice gave us a focus and enabled us to discuss and learn about each other's working methods. We felt that the 'sounds of our practice' theme was accessible for all the participants in our group and so, for our project submission, it has been easy to receive data via email from the other members of the group (Figure 5). This data has given us an insight into the environments we all work in and allowed us to continue with our idea, even through the restrictions of Covid.'

Figure 5

'Beth and I live near each other. With family and work commitments this close proximity made meeting-up on a regular basis straightforward. Initially we met in a local cafe before progressing to visiting each other's studios. This access to each other's workplaces and being able to meet-up on a regular basis has been invaluable to the trajectory of our collaboration and has definitely fast tracked our friendship. When the Covid lockdown was issued in

March, Beth and I managed to adapt, like everyone else, with the use of Zoom. Not only did we join the group wide Zoom meetings with the rest of the Aural Textile participants, we also conducted our own. We benefited from being able to have so many face-to-face meetups prior to Covid, which resulted in a solid and professional working relationship quickly. During our online meetings we continued to share ideas about our project, showed examples of pieces we were working on, and continued our collaborative friendship. I enjoyed being able to continue the accountability aspect of working alongside someone. Throughout the lockdown, having the project to work on gave me a focus and keeping in touch with Beth was important to me - not only for the creative element of the project but also for well-being.'

'Beth is highly competent in Photoshop and since she is one of the original members of the group, is familiar with the functions of the programme Audacity. Working with this new technology seemed impossible to me at first, but once Beth demonstrated what the programme could do, I had enough of an understanding to experiment and was able to produce exciting samples of colourways and patterns. Having technology we could both utilise helped us keep track of our progress, generate evidence, send out requests to the rest of the group and share data, all while keeping in contact via online meetings. Initially I was self-conscious about having meetings online, finding it difficult to read cues and nervous about the format, and although I prefer face-to-face meetings, having created a solid creative bond with Beth; our online meetings were the next best thing.'

'Working in collaboration with another artist is a first for me. Although I was enthusiastic and completely open to new ideas, I was apprehensive as to how the process would work but as our professional relationship has developed and strengthened, we are more confident in our approach and trust each other's opinions. We are both on the same wavelength creatively and have bonded as friends. I am looking forward to seeing what our creative future holds.'

Rather than imposing pre-assigned pairings on practitioners, the practitioners were supported by the researchers to identify their own collaborative partners from amongst the collective, based on initial conversations around shared interests and desired outcomes. The only requirement was that textile practitioners who took part in phase one work with non-textile practitioners in order to share expertise and experiences of working with the Aural Textiles process. This immediately embedded the concepts of shared values and goals at the centre of each collaborative partnership.

Supported gatherings with designed workshops were interspersed with meetups between practitioners that were self-directed in timing, frequency, location and scope. As demonstrated within similar parameters by Nascimento, designed workshops that demonstrate both traditional craft and contemporary design processes can act as catalysts for knowledge transformation and innovative product creation. This was exemplified during one gathering where practitioners delivered curated activities that showcased elements of their practice as part of a 'skills sharing pattern playground' session. Within this session, practitioners shared narratives of their own making processes and intrinsic ways of doing through demonstration, which gave rise to spontaneous new processes and made objects. Without prompt, the practitioners did not remain within the boundaries of the processes that each station introduced; rather, they produced objects at one station and carried them over to the next for further development. For example, the practitioners began visualising machine knitted patterns

in punch-cards and then imprinting the pattern punch-card into porcelain to create a new hybrid process. In this case, the ecosystem of place, people, expertise and activity combined to support creative exploration and generate unexpected artefacts.

Many of the encounters and engagements came about through self-directed (encouraged by the research requirements) 'meetups' and encounters between collaborative partners. These could include discussions in person or by phone, or visits to each other's studios. These interactions served to delve deeper into and to embed areas of shared interest and purpose, and to explore cross-disciplinary practice specific to each collaboration and distinct from the others. Evolution of thought or practice within collaborations as a result of these unstructured encounters were then shared with the wider collective at the next gathering, serving to transfer and cross-fertilise knowledge around the wider group and provide an ecology of practice that extended beyond the collaborations and the collective.

Understanding the act of exploration and making as a cognitive activity where new knowledge is constructed, the activities within the gatherings were designed to allow for both unrestrained creative exploration and structured reflective practice. Reflective practice in this case can be defined as the creation of new knowledge and learning by continuously reflecting on practice-led experiences towards identifying new perspectives and understandings. This was used as a method to capture changes in practice as a result of both designed activities and self-directed collaborative explorations. Facilitating 'reflective conversations with the materials of a situation' in this way was intended to support the integration of new tacit knowledge within future collaborative development after the moment of learning.

Bending the Rules

Each time the collective reconvened, partnerships had formed and reformed. While this created some feelings of tension due to 'rule bending', it was neither encouraged or discouraged by the researchers and benefits to this approach were identified. Carol (ceramicist) reflects on collaborations with Dwynwen (hand knitter), Olive (machine knitter), and Marie (handweaver):

'Having initiated and facilitated projects to support makers to collaborate, and witnessed the impact on their practice, I was drawn to the opportunity provided by Aural Textiles (AT) so that I could be the collaborator and recipient of support to foster my own creative exploration. I am a ceramic artist with thirty years practice behind me, but still need time, space and structure for reflection. It was the opportunity to travel in new unexpected creative directions that really appealed to me.'

'I believe the key to enabling successful collaborations is identifying a shared purpose. That may be a problem to solve, a topic or theme to explore, experimentation time with no fixed outcome, or a specified outcome but with no predetermined path. All of these permutations work as long as the framework for the collaboration is clear and agreed by all parties at the outset.'

"Distributed Capabilities (DC) provided three specific sets of parameters:

1. A like-minded partner - a requirement to work collaboratively with at least

one textile practitioner already within the existing AT network.

2. *A methodology or topic - sound as inspiration and an introduction to the technology for transforming sound into pattern.*

3. *A timeline - to create new work for an exhibition and deliver public facing workshops within a specific timeframe.*

'At the first DC gathering we all met in person and talked about our experiences and professional interests (Figure 6). We ate, drank and laughed together. We began to build trust and understanding, as we each searched for that shared purpose. In the pre-Covid world I firmly believed that productive collaborative partnerships could only evolve if people had met in person, preferably twice, to fully cement the relationship. However, our perceptions of the role digital plays in brokering professional relationships has been abruptly altered, and while there is no doubt that existing relationships can thrive online, I have found these new digitally based professional relationships to work surprisingly easily. The group and individual collaborative pairs have met regularly to share skills and creative ideas, but also to support one another to process our new working environments and in so doing building ever greater trust and understanding.

Figure 6

Rather than just undertaking one collaboration, I have developed three. Working with different textile practitioners each with their own ways of working has been a liberating experience and has pushed me to think more laterally about my own creative processes and re-examine how I arrive at my own creative decisions.'

'My collaboration with Dwynwen draws on our shared interest in loss - my previous work exploring the theme of dementia through the creation of punctured sculptural objects that highlight that which is missing, and Dwynwen's work from the first stage of AT using dropped stitches in her hand knitting to express the lost sounds in hearing impairment. We connected quickly through a shared respect for a fellow maker comfortable in dealing with difficult subject matter and quickly decided on how we would work together. Dwynwen's focus and clarity made our collaboration very straightforward and satisfying, and by sharing our existing creative processes we quickly found our shared purpose' (Figure 7).
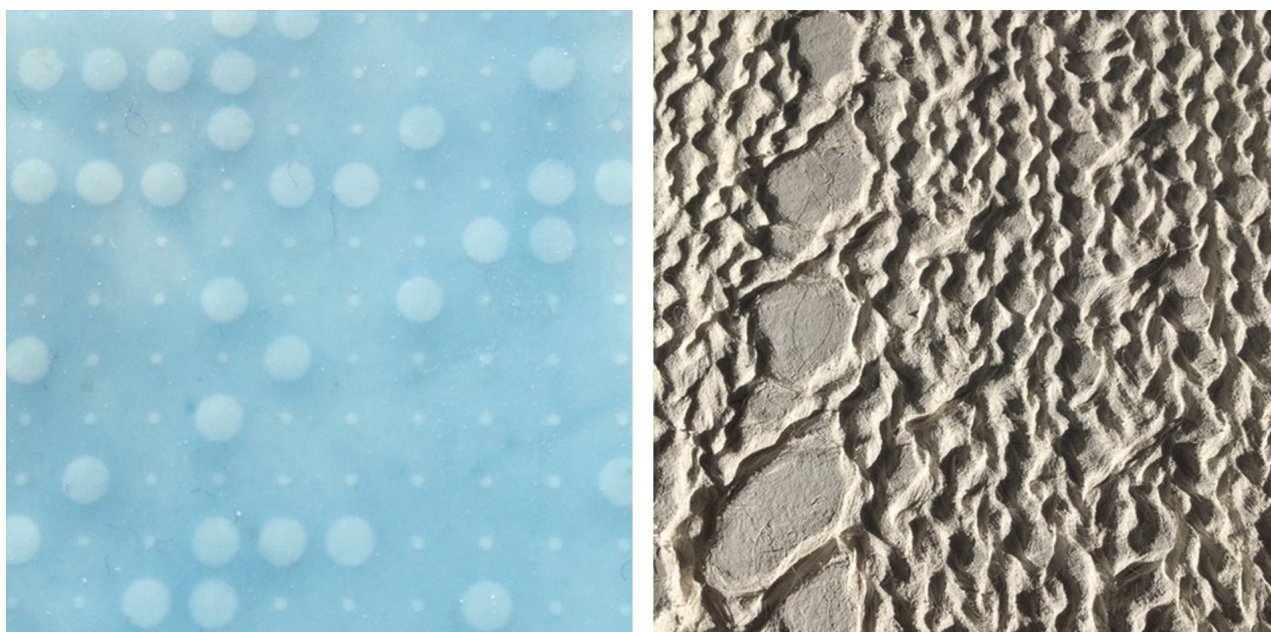

Figure 7

'In contrast my collaboration with Olive has taken us both off on completely different creative paths to those we normally take, and we have experimented with new materials, processes and shapes. We have gone through many possibilities before finding something we both feel excited to pursue, and the process of creative play has been as important to us as the resolution. The sound we have used for inspiration is our own laughter, recorded as we have talked and imagined a wealth of possibilities (Figure 8). Working with Olive has been fun, comforting and enriching, and our ongoing communication has been important to both of us throughout lockdown. We have discovered our shared purpose is to celebrate and express joy.'

'Reflecting on these two collaborations I see that they have each fed a different part of my practice and enabled it to evolve. The work I have been doing over the last eight years in exploring loss, and specifically dementia, has been very personal and I have been driven to make so that I can process and deal with grief. Working with Dwynwen has provided a bridge into a completely new body of work on this familiar theme, while my collaboration with Olive

has encouraged me to work with the completely opposite emotional range to express joy and celebration. These two apparently opposite sides to my practice are both still important to me, and I now have much greater clarity over how I bring them both into one unified practice.'

'My third collaboration has only just begun, although Marie and I have been talking sporadically since the project began as we have slowly searched for our shared purpose - to draw attention to the fragility of our natural environment. Due to lockdown our access to materials and equipment has been restricted, but this has had the positive effect of forcing us to reign in the ambition of our ideas and focus on what can realistically be achieved. We have not been able to meet in person to develop our experiments, and this has limited our skill sharing opportunities and experience of one another's materials. However, we are determined, and will be using our digital connections to direct one another through remote ways of working.'

'Reflecting on the way the DC project has evolved, I believe that all successful collaborations must have these three sets of parameters. Practitioners all crave supported time for creative experimentation to reinvigorate and refuel their practice. But they also need a set of project themes or topics to work with, or even against, as subverting the rules of engagement can also generate interesting results. However, it is the timeline that is vital in converting the experimentation into tangible outcomes. Creative play has never been more important than now as we all seek to rethink our professional lives due to the Covid-19 pandemic. But we also need the certainty of deadlines and agreed outputs on which to focus our creative endeavours. And accountability to my fellow collaborators continues to give me energy and reminds me of our shared purpose.'

These examples of multiple cross-disciplinary collaboration demonstrate collective development of new processes, practices, artefacts and products, arguably supported by the designed activities. As demonstrated by Carol's new understanding of how to unite two sides of her work into 'one unified practice', the development of expertise and meaning within personal practice can also be identified as a result of participating within a wider collective.

Evolving ecologies of practice

We set out in this paper to explore collective, cross-disciplinary creative collaboration through the experiences of project participants. We consider that the collaborations between participants have evolved into an 'ecology of practice', which can be defined: 'the catalyst and intention of groups of individuals coming together to design together varies from a desire for community, economic necessity and/or political intent.' Enabling knowledge sharing between the partnerships during the gatherings, and providing digital platforms for wider-group conversation beyond these, contributed to novel organic collaborations and the formation of a wider collective of practice. Within Vaughan's definition of collective, it is the 'many points of interconnection and the co-production of ideas, products or actions' that defines an 'ecology' of practice, beyond collaborations or collectives. Ecologies of practice in this study are where interdisciplinary making, learning, and influence arise from direct participation in activities, conversations, and reflections that support the sharing of experiences, expertise, and meaning (Figure 8). These social learning systems play a key role within the creation and production of new tools, methods, artefacts, and products.
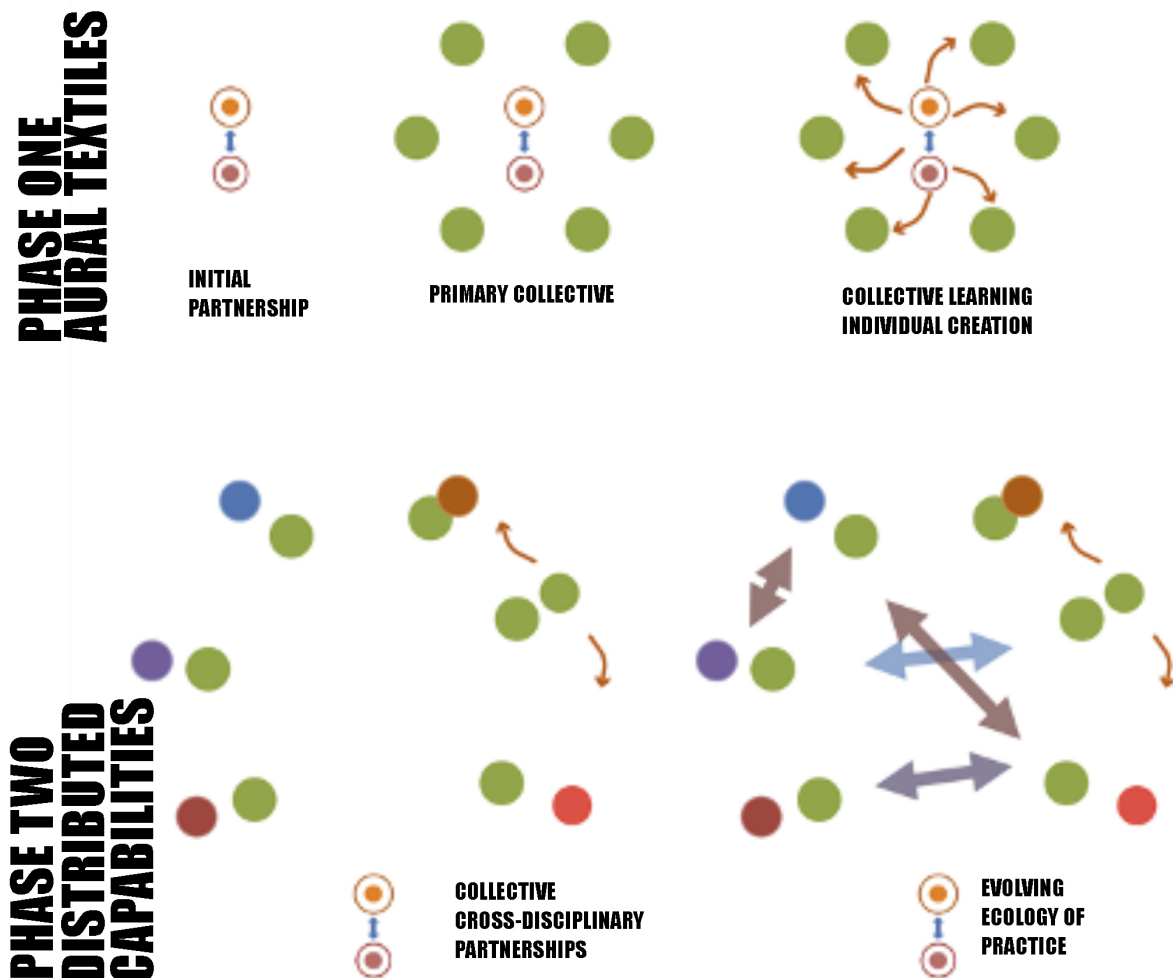
Figure 8

Common Themes

A number of themes were found across the practitioners' reflections that offer insights into the ecology of practice. The practitioners identified three key areas of transition between individual and collaborative practice: experimentation, shared values, and digital/analogue communication.

Firstly, taking part in this collective and collaborative research project offered the practitioners the opportunity for creative exploration underpinned by peer support and accountability to their partners and the collective community. Creative exploration and experimentation are often 'unpaid' activities and can be difficult to prioritise for makers with a solo practice, whose income is typically generated across a portfolio of work that can include making for wholesale and direct-to-consumer sales, teaching (of their craft, of art/design/making more generally or business support), and/or separate paid employment that may or may not be directly related to their practice: 'With many activities competing for time in my practice, experimentation is always the first thing to be dropped' (Carol).

Being able to experiment and explore within the context of both collaboration(s) and collective offered practitioners' multiple structures (or ecosystems) of both accountability and peer support that required and encouraged them to prioritise experimentation and exploration. This reinforces shared experience as one component of the ecology of practice.

Secondly, the identification of shared values was important for successful collaborations. Most (if not all) practitioners in this project define overall 'success' as engaging with a collaboration underpinned by a shared sound-inspired design process that allows space for creative exploration with a shared goal of co-creating work for exhibition: *'Recording sounds from equipment we use in our practice gave us a focus and enabled us to discuss and learn about each other's working methods'* (Laura). The method(s) applied by each collaborative pairing to achieve that success has been different, but all depend on four components:

- Sharing knowledge of the underpinning process
- Trusting in the discipline-specific and general designer/ maker expertise of collaborative partners
- Spending time with partners to understand shared interests
- Committing to partnership-authored programmes of work.

Both partners wanting the same thing from the collaboration was also key, whether that was about exploring a shared concept in a new way (such as the expression of loss by Carol and Dwynwen), testing methodologies across disciplines (surface pattern design for Laura and Beth), or a shared desire to push at the technical edges of what their particular disciplines could achieve (Cally and Jen). None of these factors are unique to craft or design collaborations, but the examples here demonstrate the diverse ways in which the identification of shared values can influence the collaborative direction, and chime perfectly with the shared (distributed) expertise and shared meaning components in an ecology of practice.

Third, was the juxtaposition of physical versus digital interactions. Digital technologies have supported collective endeavour throughout this project and are a crucial component of this ecology of practice. They have been necessary for the data-inspired design process, as a platform for sharing knowledge across geographic distances and, crucially, as a means of remaining connected to each other throughout the period of physical distancing imposed during the global response to Covid-19. These digital interactions served important purposes of knowledge acquisition and sharing as well as peer support, but have always been aligned with in-person gatherings and collaborative meetups. Digital technologies have never completely replaced the physical interactions with objects and techniques that are fundamental to the experience of craft and making and for building trust and mutual respect: 'Although the online meetings allowed us to keep some sort of momentum within our project, seeing someone face to (socially distanced) face has been much more impactful' (Laura).

Thinking of how ecologies of practice might need to adapt in response to longer-term needs for physical distancing, it is not yet clear how the process of establishing trusted relationships and sharing tactile aspects of craft practice could be translated to a digital-only environment. Cally provides a critical perspective on digital collaboration:

'I have mixed feelings about digital collaboration. I'm grateful that the technology exists to allow us to keep meeting and sharing work, but I don't find it as engaging and compelling as working together in person. As far as tools are concerned, I've benefited enormously from many platforms which offer free services, but I'm also aware of the limitations of 'free' and of leaving a trail of once-tried-never-adopted accounts littered across the internet. As makers we aren't necessarily aware of what is available, and the suggestions I've found most useful have come from people in completely unrelated fields but who are accustomed to working and sharing resources online, e.g. in software development. How can we tap into this knowledge across disciplinary boundaries?'

As recognised by the practitioners in this group and our extended maker networks, practitioner-led explorations of immersive digital technologies are now needed in order to support collaboration over distance (short and long), skills sharing, and user engagement with the process of making and with the objects created. In particular, there is a desire to understand the ways in which digital interactions can provide unique object- and process-embedded experiences, over and above simply seeking to recreate that which is missing from physical interactions. As we write, work to address this is about to launch with makers in Scotland, and will build on experiences from museum and heritage communities where rare and fragile objects/places and poorly understood processes cannot be handled. The results from this new work will complement the findings described here and will also feed into the final presentation of outcomes from this project.

Towards Dynamic Digital/Analogue Ecologies

More widely, we discussed the concept of this project as an ecology or ecosystem of practice. In the unusual circumstances that Covid-19 created, many participants needed to withdraw their time from this project to focus on rethinking their rhythms as normal revenue streams and activities suddenly disappeared and the way we live our lives changed dramatically: 'With events and workshops cancelled, and retailers shutting their doors, we were needing to reinvent ourselves on the fly' (Cally) and 'The Covid-19 pandemic temporarily removed the DC timeline, resulting in all of my collaborative activity being put on hold while I prioritised my personal and professional needs' (Carol).

Despite the reduction in time available to create work as part of the collaborations, the collective still supported participants to sustain creative threads throughout this period of transition. This occurred through peer support at informal weekly creative coffee breaks organised by the researchers as well as through shared purpose and accountability: 'Not only did we join the group wide Zoom meetings with the rest of the Aural Textile participants, we also conducted our own. We shared ideas about the project, showed examples of pieces we were working on and continued our collaborative friendship, but just on a different platform' (Laura). A sustained focus, in terms of continuing to create work for presentation, also helped to maintain a link across pre-, peri- and, we hope, post-Covid ways of being.

Figure 9

In these respects, this longitudinal project demonstrates resilient digital/analogue ecosystem dynamics as adaptations in response to external factors and supports consideration of the project in terms of ecological theory (Figure 9). We acknowledge that our ecology of practice does not exist in isolation, but is part of a much wider community of making practice, 'a worldview that is participative, relational and complex', and it is that wider community which is 'the pond in which this particular ecology of [design/making] practices continues to evolve'. Through this paper we have expressed the overall ideas of our distributed collective, explored our reflections of its purpose and experiences, and identified what common threads there are within these practices. The ecology of practices that are developing are varied from individual pairings to growing networks. There are supporting roles and expectations to maintain and mitigate, as well as the challenges of life (such as Covid), but also the uncertain energies and anticipations that come from these evolving collaborations. This collaborative paper

has shown the intricacies and evolving natures that these practices play within co-creation and exemplifies the growing need to support these experimental engagements and enable new ways of working within the creative and practice-based disciplines.

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