Chapter 22

Curating digital experiences: Insights in extending the senses and embodying technology in arts and performance, a journey through time and space

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Abstract

The landscape of digital media has changed radically since I took an interest in it in the late 1990's. One could say that we both grew up and diversified together during this time. This chapter delves into my curatorial, research and artistic practice, revealing various approaches to interactive arts and performance through extending the human body with wearable devices and other technologies expanding the senses, blurring physical and virtual. The practices explored here feature a variety of approaches for making and presenting performance and interactive media, as well as enhancing the experience for audience. The chapter takes a winding path, exploring edges of conventional performance practices and perspectives within a technological context. It picks up in some ways from previous chapters on related areas of practice in Chapter 13 on hyper/transhumanism and Chapter 14 on art performance and VR.

Introduction

Attracted to the arts and performance since I was a child, influenced by having an actress, poet, and singer mother, I was encouraged to pursue a career in dance in my early 20's. Since the early 1980's in Canada and more recently in the UK, I have been exploring various artistic mediums and modalities, but choosing interactive arts and performance, to experiment with various methods to communicate non-verbally, using emerging technologies as the conduit or as extension of the senses. Over the years, three strands of focus have emerged for my professional career: 1) interactive art and performance curation, 2) digital art and performance practice, and 3) art and technology community engagement, collaboration, event organisation. My expertise in these areas developed concurrently, however the curating activities have been more intermittent, and opportunity based. Sometimes I have been invited to be a curator or producer, while at other times I initiated the event or curatorial activities, such as with the *Escape Artists Society* activities (2005-2007) or the 2022 *Extended Senses Exhibition and Symposium*, with co-chair Ghislaine Boddington.

 My artistic background includes modern dance performance, alternative/ indie rock music song writing and performance, video art and production, as well as dabbling in creative coding, such as in Arduino, Processing or MAX/MSP/Jitter, and experimenting with wearable devices and electronic textiles, mobile phones, and more recently with virtual reality (VR) or extended reality (XR). My artistic practice has been primarily concerned with how different technologies can interface with or be worn on the body to enable new types of communication with others through the body, at the centre and involving a range of modalities. My work crosses over participatory performance, smart fashion, interaction design, and electronic textiles domains, but now primarily is focussed on performative, immersive and sensorial experiences connecting to the body through haptic interfaces.

The community engagement aspects of my work have been developed primarily through EU consortium Horizon 2020 and FET Framework 7 initiatives, through projects, such as *FET-Art/ ICT & Art Connect* (2012-13), *WEAR Sustain* (2017-19), and *STARTS Ecosystem* (2019-21). These projects have been concerned with developing common strategies for connecting artists with technology experts and scientists; organising matchmaking events; supporting collaboration; initiating residences and partnerships for novel modes of collaboration across arts, design, technology, and science, to create policy recommendations; and often involving organising individuals and groups to meet and collaborate, engagement activities, and public exhibitions.

My research is situated in the in-between space at the intersection of art, technology, engineering, and communication, with a focus on emerging technologies, performance, through a network or telematic means. I

have collaborated with experts across disciplines and have gained enough knowledge to work across on diverse research and artistic teams. Similarly, my teaching has been across a range of academic disciplines, from engineering to graphic design, to film and performing arts, and more recently located in a games department for 4 years until 2022. Thus, I am aware of a lot of different disciplines and try to incorporate this awareness in my teaching, research, and collaborations. My current role as Senior Tutor in the Digital Direction programme at the and Professor of Interactive and Immersive Arts at the Royal College of Art brings all my experiences, research, art practice and interests into one more coherent place.

As an academic I have been responsible for undertaking artistic or practice-based research outputs, which usually involves a cycle of applying for funding, making the work, dissemination in exhibitions, festivals, conferences, and writing in academic publications to elucidate the thinking and practice. In addition, since 2018 I have been invited to evaluate academic programs, examine PhD candidates, jury open call artistic or research development funding and artistic residency competitions, so I have been lucky to see and select a wide range of art and design projects for further reading and development.

Throughout my career, there have been core theories that have consistently woven through my practice, research, and artworks. One of these is the concept of non-verbal connectivity through electronic networks, linking people across distances, whether across a room or across the globe. I have always been intrigued by how technology can embody our flesh through touch, affect and other aspects of the sensing body to expand our experiences and interpersonal interactions (Due to the space constraints, contexts and focus of this chapter, I cannot go into my theoretical influences on these concepts, see other writing elsewhere, especially my book *New Directions in Mobile Media and Performance* (Baker 2018)). While investigating how wearable technologies can enhance the experience of presence in virtual performance, haptic interfaces have become my chosen means to connect the body and the external world, while employing a first-person phenomenological stance. I continued to be fascinated in how one can exist both in corporeal flesh and embody networked technologies, like the internet or mobile phones as they have evolved, not just in physical space and time together, but entwined within the context of an extended global consciousness.

The above different dimensions of my practice, curation, research, and community engagement activities as they have developed, will be further unpacked within the chapter.

Artistic trajectory

My artistic journey began with modern dance studies, first during high school in British Columbia, Canada, and then while studying dance and sociology in my undergraduate degree in Vancouver, during the late 80s/early 90s. It was then that I first explored performance as my primary modality, but soon realised the modern dancer's life was not for me. After completing my bachelor's degree, I took summer courses in various fine art sculpture techniques and since I could not afford film school, I instead took a summer video art and production class and made a lot of video artworks between 1993 in 2005, which few saw. Alongside this activity, I also was involved in running an art gallery and attempting to start a media production company with my boyfriend in the late 1990's.

Fig. 22.1. Tales of Slacker Bonding website interface ©2000 C Baker

After attempting to secure funding for a TV documentary that I wanted to make, without success, I instead became intrigued by the potential of early web and multimedia design, teaching myself HTML to create a

multimedia documentary, since I did not want to wait for a producer or gatekeeper to make creative work. In 2001, I launched an online magazine and created a community focussed on Generation X relationships (based on Douglas Coupland's book Generation X) called, *Tales of Slacker Bonding*. *Coupland's book and my project was aimed at* the generation born in North America between 1964 and 1980, a smaller generation sandwiched between the Baby Boomers and Millennials, who had also been victims of mass divorce rates, first use of birth control so smaller families, mothers out to work and who had to fend more for themselves, and often considered forgotten (Coupland 1991 and Wikipedia).

. *Tales of Slacker Bonding* [**Figs. 22. 1, 2 & 3**], which featured a combination of animated soap opera stories (rotoscoped in Macromedia Flash, a long defunct technology), poetry, personal stories, and video interviews with the contributing community members, filmed during our many live cabaret events. It was an exciting venture, but the video and other web features were very small (postage stamp size) and slow to load on dial up, since the Internet was still at its infancy. It was bit like the wild west on the Internet then, an extremely creative time but few with a revenue model to support them, until Google and Web 2.0 startups arrived in the early 2000's. The *Tales of Slacker Bonding* online community was nominated for a Webby Award in 2002 at South by Southwest (SXSW) in Austin, Texas, but the magazine could not survive without funding and was shelved during the "dotcom bomb" era. This time was called the 'dotcom bubble' since the euphoria of the internet burst around 2000 but it was referred to by some at time as the "dot.com bomb". Some insight into it can be found in book *Digital Hustlers: Living Large and Falling Hard in Silicon Alley* by Casey Kait and Stephen Weiss (March 2009) and others (see also TED Ideas story "A revealing look at the dot-com bubble of 2000 — and how it shapes our lives today" by Brian McCullough. This was when I decided instead to start my Master's degree in 2001.

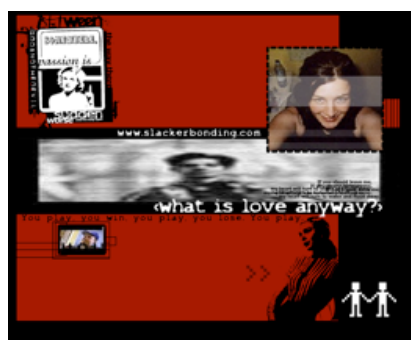**Fig. 22.2 *Tales of Slacker Bonding* 3D ©2000 C Baker   Fig. 22.3 Flash animation ©2000 C Baker**

In addition to visual arts activities, I was a singer/ songwriter and played bass guitar in various alternative bands in Vancouver in and primarily led the group *Spiritual Heroine* from 1993 to 1998, and then joined electronic band *ultrapuss* from 2005-2007 (**Figs. 22.4 & 5** below), in which I sang and occasionally played keyboards. I also sang in several other bands before, after, and in between since 1985.

Fig. 22. 4 Band photo of *Spiritual Heroine* photo ©1997 S Brogan

Fig. 22. 5 Band photo of *ultrapuss,* photo J Tilley ©2007 ultrapuss incl. C Baker.

In the early 2000s, while studying for my master's degree at Simon Fraser University in Interactive Arts and Technology, I became a research assistant for dancers/technologists/innovators, Thecla Schiphorst and Dr Susan Kozel, for their experimental artistic research project *whisper(s)*. *whisper(s)* used medical-grade physiological sensing devices embedded in designer skirts, which were significantly bigger than their counterparts today, such as the massive RFID chip sewn into a skirt (See **Figs. 22. 6 & 7** below). These sensors were used to transmit breath and heart rate data between extravagantly colorful skirts, worn by the performers. This experience was hugely thrilling for me and sparked my excitement for wearable technologies and how they could be used in other types of performative and interactive works.

Figs. 22.6 *whisper[s]* project led by Professor Thecla Schiphorst and Dr. Susan Kozel (2003-2006) Vancouver, Canada ©2005

Figs. 22. 7 *whisper[s]* project led by Professor Thecla Schiphorst and Dr. Susan Kozel (2003-2006) Vancouver, Canada ©2005

Simultaneously, for my master's project *The Dreampod,* the goal was to stimulate telepathy through the interactive installation. I designed the installation, with construction help for the pod tent itself from a friend, to use breath, heart rate, and galvanic skin conductive skin response, from affordable physiological sensing devices to trigger video, sound, and light in a predetermined way. I saw the potential of sensing inside the body to enable telepathy and the potential of transmitting images through our minds across distance but using technology to assist or as a conduit. I developed methods to use the sensors in a live interactive media context, using body data to trigger various media types to aid in calming the mind and body. The goal was to make a proof-of-concept approach for inducing a hypnagogic state or pre-dream state in participants, so that they were more receptive to experiencing telepathy or receiving images in their minds. In another room, other participants were focussed on "sending" images to those in the *Dreampod* (**Fig. 22.8** below) by thinking about the images. Essentially, the concept was to test how to extend our minds beyond our bodies although not proven, I had some compelling results. The concept of telepathy became a recurring theme in my work that continues to intrigue me.

Another dimension of my interactive art and performance practice is that it has always involved collaboration in some capacity. Always having had big project ideas that I cannot always fund, I have usually found ways to make the work, or at least create a prototype to seed other funding. Making work is unfortunately often the smallest part of the project, while seeking funding takes most of the time, and disseminating and exhibiting takes another chunk, which is a typical cycle for many artists. My early urge not to involve 3rd parties (producers, funders, etc.) to realize my ambitions has not really been possible to make the work. Between 2011 and 2019 my artistic practice was mostly artistic research in collaboration with long-time collaborator Dr Kate Sicchio, read more in the next section.

Fig. 22.8 *Dreampod: Internal Networks* **Master's Project ©2004 C Baker**

Fast forward to 2020, I was commissioned with artist Susanne Palzer to participate in a 6-week online collaborative residency called *The Intangible Threshold* (**Fig. 22.9** below*)*, to examine the threshold between the real and the virtual, and how artists and performers can collaborate when they cannot work together in person, especially during the pandemic from 2020 to 2021. We undertook various experiments to determine what connection over distance might mean, how to collaborate virtually, and what form performance might manifest when using only computer screens and other available technology. We were also concerned about the role of touch, or lack of it, and the ways we could touch each other through other modalities, such as touching nature and taking photos of touching nature, then touching the photos, then photographing that process, then sending the work through the post – which would be touched by many people in the process of transporting it to each other. We did this using cameras, mobile phones, performative acts using video conferencing tools, explored ways to address the meta-concepts of virtual touch, distant relationships, connecting with nature as replacement for human physical interaction, not to mention lockdown restrictions and the impossibility of collaborating and performing live in-person. We developed an online performance, choreography of gestures, and discussion on how performers can explore screens and technology to develop more in real time embodying some form of tangibility, materiality. We developed a different form of touch communication through image exchange, layers of images, layers of paper, layers of travel, layers of ideas, layers of nature, layers of gestures, layering experiences — exploring layers of touch and layers of inquiry.

Fig. 22.9 *Intangible Threshold,* **Access Space Residency online performance ©2020 C Baker and S Palzer**

We discovered through the act of rehearsing the gestures as choreography, juxtaposed with recorded video tests, multiplied layering, or collaging of recorded videos of the gesturing - we became confused as to which were the 'real', and which were recorded versions which we were performing — resulting in a blurring of these presences. This confusion led to new reflections on how to distinguish these different modalities and versions since so many layers were performing simultaneously. It underlined previous issues and concerns around liveness and presence in real, and virtual performance that other key theorists and artists (Auslander 1999), have explored previously, as well as my own discussion (Baker 2018) addressing the durationally constrained collaboration

dimensions. *The Intangible Threshold* was performed live online in November 2020; there is archival video on Access Space (October 2020).

The most recent work, which has been touring since June 2021, is an immersive haptic project called *INTER/her: Intimate Journey Inside the Female Body*. *INTER/her* reveals the diseases that women can develop and experience that are not discussed openly in society or are socially taboo in some places but is not meant as a literal or even representative work. The project is intended as a conversation starter, featuring real women's voices about the illnesses they suffer and treatment (or lack thereof) they endure, including abstract animated natural visual representations. The haptic interface that was designed for it, is a belt with vibration motors embedded in it, positioned in region of the body where these diseases would be located inside. Inspired by my own Ovarian Cancer experience and being in the hospital after surgery and speaking to other patients, it seemed that women are often advised to have various reproductive surgeries without much explanation on the pros and cons on the outcomes of these procedures, nor any discussion on their lives afterward and long-term impacts on their bodies, or future quality of life after these surgeries. The women I spoke to, seemed to have no idea of was going on inside their bodies or why they needed (or if) the types of treatments they were told to have and / or they just did as the doctor advised without question. I was shocked and thought "*oh my god what's going on here, I have got to do something*".
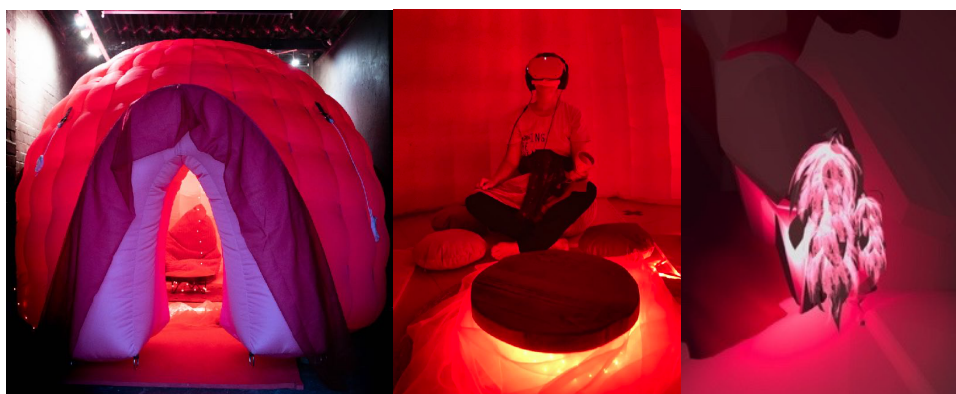

Fig. 22.10 *INTER/her: Intimate Journey Inside the Female Body* **Brighton Digital November 2021, New Malden Audience testing May 2021 and VR early visuals January 2021 photos © C Baker**

My intention with *INTER/her* (**Figs. 22.10** above) is to prompt women to think more about their bodies and the functioning and diseases that can reside inside them, to educate themselves, to share their experiences with each other, to open up the topic publicly to become less taboo and for women, to talk to their GP's and gynecologists and to demand their MP's make better policies on their treatment, to improve education and have more funding for research on women's reproductive diseases and menopausal related issues. In European and Western countries, we have only begun to talk about menopause, never mind all these other reproductive diseases and conditions that women suffer. The goal for *INTER/her* was to encourage women to bring their partners and children, to help them to understand what they are going through, but not purely as an educational, science museum-style piece, but as an emotive storytelling piece, while also intending it to inform healthcare workers, sex education, GPs etc., some of whom seem ill-informed or old fashioned in their advice to women. This project is discussed more in the *Body Space Technology* piece (March 2023).

While I have been involved in creative art since my teens, I feel like bit of a late bloomer with my own artworks as I lacked confidence in my own creativity in my 20s and 30s, so I started curating and then became an academic, which also provided a career and financial security for future creative explorations. Also having lost my mother when I was 22, much of my career has been dedicated to her and driven by a desire to find and make some meaning in my own life. Going forward, I continue to follow opportunities as they come. Women's health, while very close to my heart now, is not the only theme that I am passionate about, but since my brush with cancer I have found a stronger artistic voice through *INTER/her* and will use that to continue to focus on emotional storytelling, through immersive XR haptic experiences, creating fully embodied engagement. My focus has shifted now to making more fulfilling audience experiences, and to be a more responsible creator who cares about the best practices for making work for others.

The main artistic works discussed here are *Tales of Slacker Bonding* (my first online community / community engagement project), the *Dreampod* (MA project), *MINDtouch* (PhD project), *Hacking the Body* and its follow up performance project *Hacking in the Body* 2 (HTB 2.0) with two dance pieces, which was also artistic research as discusses further on. There also was *The Intangible Threshold* residency performance project, *INTER/her*, and starting in summer 2023 *Mammary Mountain*, to be completed in late autumn 2023.

Artistic research

My MA project *Dreampod* was my academic starting point in 2002, which was both practice and research, followed by the PhD project *MINDtouch* 2006-2010 (see **Figs. 22.11** below), which was also both practice and research activity. In 2006, I started my PhD studies at the SMARTlab Digital Media Institute, then located at the University of East London, UK. In 2007, I received a sponsorship from the BBC R&D fund to cover my fees and equipment costs to explore the use of physiological sensing devices in mobile media performance context, this enabled me to move to the United Kingdom. I had had a vision during my masters in 2002, that I wanted to make telematic performances with mobile videophones, when they were available, and this became the primary motivation for my PhD, however when I was awarded the BBC sponsorship, I was asked to incorporate body sensors as well. My thesis topic was "*exploring new understandings of the sensations of liveness and presence that emerge from using wearable devices and mobile technologies in performance contexts*". This focus combined with my passion for mobile performance and telematic video.

For my PhD project *MINDtouch,* as described in my thesis abstract:

> "*This practice-based thesis investigates the four key qualities of 'liveness', 'feltness', 'embodiment' and 'presence' in mobile media performance, in order to shed light on the use qualities and sensations that emerge when mobile technologies are used in tandem with wearable devices in performance contexts. The research explores mobile media as a non-verbal and visual communication tool that functions by repurposing the mobile phone device and its connection to a wireless network, not only for communication but explicitly for the expression of 'emotion' in the form of a video file representing an interpersonal connection shared over distance. The research aims to identify and supplement existing scholarly discourse on the nature of these four key strands of kinaesthetic philosophy made 'live' in the online network, applying knowledge gained through the practice of enhancing participant experience of the use of simple ubiquitous mobile tools with bespoke biofeedback sensors and an online repository for the playback of users' visual expressions...*[The research] *seeks to identify and clarify new ways of simulating or emulating a non-verbal, visual exchange within a social participatory context, with particular attention paid to a sense of 'feltness' as an element of 'presence' or 'liveness', and with attention to the experience of a sense of 'co-presence' arising in real-time collaborative mobile performances at a distance.*"(Baker 2011)

The practiced-based research was an experimental exploration, pushing the possibilities of mobile phones of the time, with the internet transmission of comparatively small video files (by today's standards). 2006 was also the year the iPhone was released, however the phones I acquired for the research were Nokia N95 videophone handsets, and even though I knew streaming was only starting to be developed and not yet easy, I wanted to see how it might work. I developed and facilitated video collection workshops with non-artist participants; I asked them to participate in relaxation exercises to help them later to make abstract video expressions with the mobile phones that I had provided (since most did not have one with video capabilities yet). Participants were asked to try to translate the sensations they felt inside their bodies, based on their immediate surroundings, either emotional or physical, into some kind of video expression as a means to simulate telepathy (a continued fascination of mind-to-mind communication).

Fig. 22.11 *MINDtouch* **PhD research - beta garment by Tara Baoth Mooney & Rachel Lesebikan with embedded electronics photos ©2009 C Baker**

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The videoclips were collected and added to a database, and a do-it-yourself (DIY) wearable garment system was developed to be worn to incorporate sensors, designed by fashion designer Tara Baoth Mooney. It collected muscle electricity, galvanic skin response, heartbeat, and breath, to trigger the video mixes to be sent back to the phones via the internet. Different sensors were experimented with to understand the real-time sensations/ data methods to trigger the database videos. Influenced by live visuals scene in Vancouver in the early 2000's and by those performances, I sought to use the body's sense data to trigger video clips in collaborative VJ (video jockey) mixes and shared through phones. The concept was to create live participatory visual/ vj-ed performances that could only be experienced on mobile phones, but that participation could take place surreptitiously during in-person social environments. These were crowdsourced collaborative VJ performances, which would take pace online concurrently with real-life activities, allowing participants to affectively be in two places at once, physically, and virtually. The goal was to create a global, collaborative, visual remix live streamed performance. This was ambitious piece/ research in a time, since it was not quite possible to live stream video on mobile phones yet, so I was stretching what was possible, but it was exciting trying to bring these disparate technologies and creative practices together. This led me to more efforts in working with ways to extend the body through the network, using wearables and haptic interfaces. The final network performances post-PhD for *MINDtouch* were

performed telematically for a festival called *Low Lives 3* (2011) in the US from my flat in London. See the visuals from live events in the accompanying stills (see **Fig. 22.13** below).
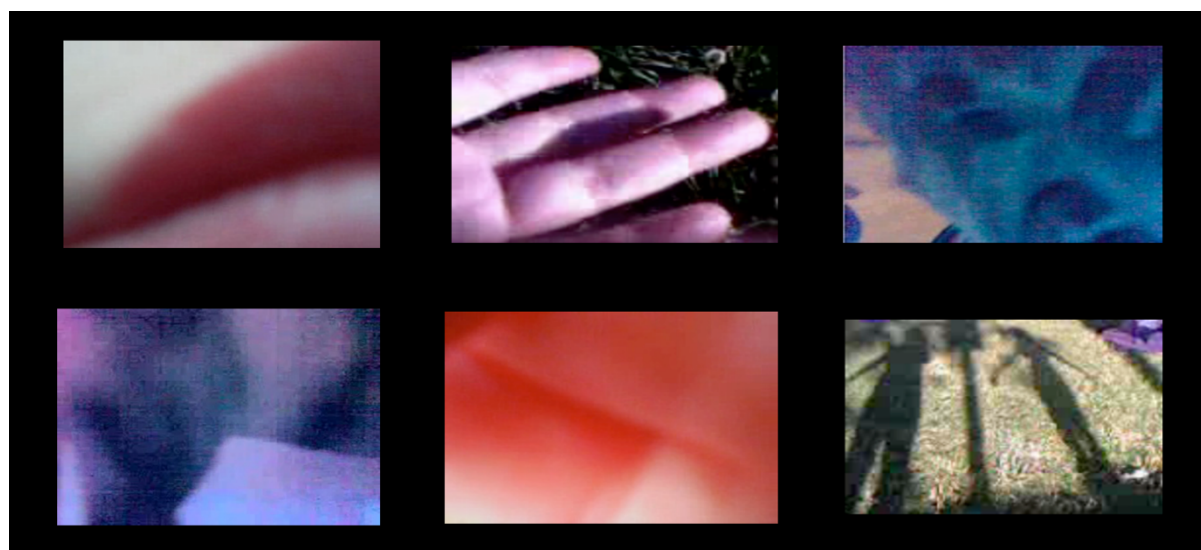

Fig. 22.12 *MINDtouch* **PhD research - participants' videos from Vancouver workshop July and Dublin workshop photos©2007 C Baker**

The director of the SMARTlab, Professor Lizbeth Goodman, was a great influence during my PhD, not only as my Director of Studies, but both as a strong female academic leading her own PhD program, seeking to support other women to gain a PhD, as she brokered the BBC sponsorship to finance my education, that would not otherwise be possible. Goodman's generosity and guidance impacted the type of researcher I am now. She had confidence in me and encouraged me to push myself confidently in my career and to improvise where possible. We remain close professional friends and try to work together where possible, as I do with many of my peers whom I met during my PhD. Having strong female academic/artist mentors was hugely crucial to my success and confidence and something I now try to pass on, especially to female students in the arts, design, and technology sector.
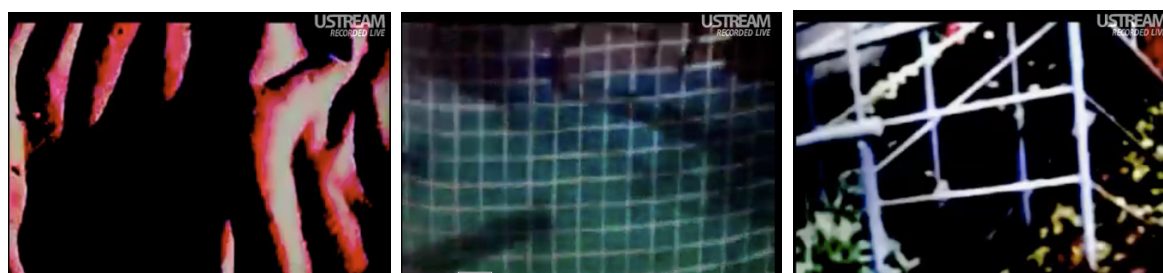

Fig. 22.13 *MINDtouch* **telematic performance for** *LowLives 3* **photos ©2011 C Baker**

After completing the PhD, I started working with Dr Kate Sicchio, whom I met during my PhD studies. Sicchio is an innovative choreographer and digital artist/performer. We started what became a multi-project performance research collaboration, and our work spanned from 2011 to 2018, exploring is e-textiles and sensing devices in dance and participatory performance. The *Hacking the Body*, our first effort, was a practice-based research project using e-textiles and smart fabrics to investigate novel uses of body data as choreographic material, examining the materiality of data. This had a direct trajectory from the early 2000s with the *whisper[s]* project, when I was a research assistant when we were using the clunky, expensive, not easily available physiological technology. Ten years after I started the *MINDtouch* project, we could then use more readily available off-the-shelf DIY sensing technology, with conductive materials and wearables in combination with small electronics, incorporating bespoke sensors and smart garments for dance costumes. It was a huge leap in terms of cheaper, experimentation with off-the-shelf technology and performance with low funding.

Our collaborative investigations soon began to grapple with emerging ethical concerns surrounding data collection, and how knowledge of data ownership might influence a dancer's sense of identity, or how they express that sense in their performance. In 2015, we initiated and participated in a self-led residency for a new instantiation of *Hacking the Body,* called "*HTB 2.0*," wherein we sought to apply the knowledge gained from the initial research phase, but within in a performance context. We developed two different garments and corresponding performances, with a focus on nonverbal communication between dancers, through sensors and actuation on the body, and how the sensations triggered could influence the choreography and movement. This was an investigation of how different states of the body or proprioceptive senses responded and how to 'hack', a term borrowed from von Busch, and Palmås' *Abstract Hacktivism: The making of a hacker culture (2006) and* Coleman's *Coding Freedom* (2013) and in Baker and Sicchio 2018 - the resulting data generated from the sensing technology to make novel performances. Initially, they were intended as participatory performances, but instead we developed several experiments with dancers, which evolved into HTB 2.0 and narrowed in on sensing during movement improvisation and examined body data like breath, or heart, or EEG, to create new forms of choreography. We also began to research the ways in which body data is collected and used by corporations and governments, and how dancers' knowledge of this might influence their sense of data identity or their bodily expression in the performance. As one of the research outputs and outcomes, in addition to performances, we made bespoke hacked sport garments, taking them apart and utilising the data to create our own mobile app, and custom software applications. One of the garments for the project embedded conductive threads, materials, wearable electronics, and a range of sensors that were used within the choreography. The resulting in two performance pieces included *Flutter Stutter* and *Feel Me,* which were structured improvisational dance pieces.

Flutter Stutter (**Fig. 22.14** below), one of the performance pieces in the project, involved dancers touching each other's garments, resulting in them feeling a vibration in their own garments/ bodies, and use this stimulation to change their movement, while the vibrations in each of their own garments were triggered by the other dancer's heart rate and breath. The pink garment had conductive threads in the sleeve, so that the dancer wearing could transmit a signal to through vibration back to the other dancer. There were three permutations: 1) dancer to themselves, 2) dancer to dancer, to influence a change in the choreography / movement, and 3) the choreographer could change the interaction between the dancers, by remotely triggering the 'tickle motor' (a feather on it worn around the neck of the costume) for example. Using the 'Internet of Things' (IoT) through WIFI, the data was sent from one dancer to the other and was used to involve / inform the audience of what was happening through the triggered sound interactions. Musical responses or mappings were designed by Becky Stewart, collaborating e-textiles, wearables, and sound engineer, to accompany what each dancer was intimately experiencing and to help them to improvise with. On discovering that the electronics were so fragile and that they would break every performance, Stewart joined us for the performances to repair the garments on site. For any future versions of these e-textile costumes, we determined that we would require that the electronics be able to be taken out to be washable, alongside further research and prototyping, to develop more robust versions.

Fig. 22.14 *Hacking the Body 2.0 part 2 Flutter Stutter London* **February 16th, 2016, ©C Baker & K Sicchio**

For 2nd piece *Feel Me,* we modified materials, used recycled materials, and repurposed existing wearable technologies or sports garments. The garment created for it was a hacked sports shirt, that measured heart rate, breath, position, rotation, and gyroscope data. Working with designer Tara Baoth Mooney, who hacked the visual look of the sports garment. We also worked with the sport tech company *Om Signal* to make our own custom iPad software to access and transmit the data to our bespoke system that controlled the music in response to the electronic signals from garment and the dancers. The choreography for *Feel Me* featured a structured movement

improvisation, using the breath and heartbeat of one dancer to communicate to the other dancer, to change their direction, speed, or the choreographic pattern. This was intended as a different mode of way of communicating, aided by the garment, by triggering the improvised music to correspond to the movement. Performances of *HTB 2.0*, featuring these garments took place in February 2016 in Sheffield and London, see the accompanying images illustrating the interactions between dancers and the garments, including touch and vibration feedback loops between dancers' indifferent permutations.

Since 2020, while posted at two different UK academic institutions, I have published articles where and when possible, on the different research projects that I have been involved in, sometimes as the only academic. One of my publications includes one co-edited with my long-time collaborator Kate Sicchio, essay series in the book *Intersecting Art and Technology In Practice: Techne/Technique/ Technology and* was released in the same year we concluded our *HTB 2.0* performances in 2016. This book focusses on how, as an artist, the process of creating technology-based art is not only an outcome, as many in academia and industry are focused on outcomes. We saw value in examining the artistic thinking process and exploring the similarities and differences between programmatic and artistic thinking. It featured tech-based artists sharing their artistic process and insights in sometimes alternative forms of writing. The book was intended to be shared with our non-academic artist peers and students, but the publisher only recently lowered the price to an affordable rate for students and artists, so where we could, we shared it directly with them when asked.

Simultaneously, I was writing the monograph *New Directions in Mobile Media and Performance*, started in 2014 and after illness and delays it was finally completed and published in 2018, which started as a rewrite of my PhD thesis, but involved a comprehensive upgrade to reflect changes in the mobile phone industry and its impact on performance. I stripped out other areas of the mobile phone's impact on art other practices, like photography, filmmaking, and drawing. It included the advancements in technology, such as in virtual reality (VR), augmented reality (AR), and various types of integration of wearable devices with mobile phones, and I narrowed the focus on digital performance and new mobile practices. This was a showcase of the novel ways that artists were experimenting and working with mobile phones and connecting wearable devices, using VR, AR, immersive experiences, or ways of reinventing the VR headset, or layering and augment reality over dance and performances, or using the mobile as an instrument for experimental electronic musicians. Some of those artists include Kasia Molga with Invisible Dust, Marshmallow Laser Feast, Atau Tanaka and Sander Veenhof, who were also interviewed at the end.

Other research activities included work on the *Defragmentation*, a contemporary music festival research project from 2017-2019. I was invited by four music festival directors from Germany and Norway, funded by the German government to join as a technology advisor/ expert. Its focus was investigating artistic research methods by which to update and modernize these festivals, to better incorporate gender and diversity, decolonisation, technology, and curation in new music. The impetus for the project as that they had found they were continually attracting mainly white, male, north-western European participants, and wanted the genre to evolve. They also aimed to expand their practices and events to become more inclusive, but also needed to further develop their programs with new forms of curation, and to include new emerging technologies like Artificial Intelligence and Machine Learning. The project culminated in a conference, a music journal special issue with an article I wrote, a self-published book (by me), and a 2-week technology making and writing workshop for women exploring the edges of new music and technology, with videos documenting the activities held during the Darmstadt New Music Festival in 2018.

Later, in 2020, during the global pandemic, *StoryFutures Academy* selected the *Sensory Spaces* (**Fig. 22.15** and **16** below) project proposal for a collaboration with colleague and expanded animation/ performance drawing artist, Professor Birgitta Hosea, and Dr Ivan Isakov, CTO of SME company Valkyrie Industries. The goal was to use Isakov's newly developing haptic glove technologies to sculpt in virtual reality. While he was perfecting the software to work with his gloves in VR, Hosea and I led the user testing of it with our games and animation students. Sadly, the hardware development on the glove was never completed during that time, but the VR software was and used to translate VR sculptures into physical 3D printed sculptures, which was an exciting result.

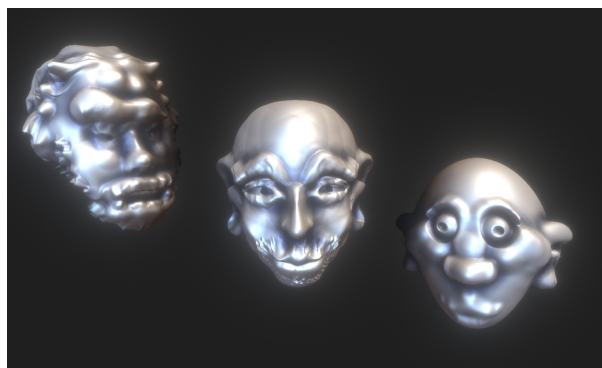**Fig. 22.15** *Sensory Spaces* **©2020 Valkyrie Industries**   **Fig. 22.16** *Sensory Spaces* **©2020 Valkyrie Industries**

Later that year, in November 2020, I launched a cross-course/school, art and technology, research laboratory for established and early career researchers, as well as doctoral and master's students at the University for the Creative Arts where I was located at the time, called *X10DD Senses Laboratory*. It focussed on extending the senses across various art practices: film, animation, fine and digital art, textiles and fashion, and games, immersive experiences, and haptic interaction, and brought together the research/practice interests of the group's members. It received internal funding to host the *Extended Senses* symposium and Exhibition in September 2022, in collaboration with Greenwich University discussed later.

As this section has demonstrated, my artistic research, in both practice and scholarly outcomes, has mainly been situated in the context of performance and emerging technologies and ways in which to make meaningful communication and experiences for performers, and the audiences.

Curatorial practice

While not educated in curatorial studies, I have sometimes been invited to take on a curatorial project and devise a theme that connects the artists' works together in a cohesive way. Then I reach out to and work with artists, and where possible other producers, to help fundraise or find sponsorship for those artists and to cover costs of venues, equipment, technicians etc. Most of the time is spent in the organising, fundraising, and preparation, as well as dissemination reflection/ reporting, which always seems to take far longer than the event itself. My curatorial approach has been to expose underexposed artists, especially those who are exploring social and politically urgent issues that critically explores society, the world and technology.

In 2002, I was invited to curate and produce the *New Forms Festival* (**Fig. 22.17** below) in its early days for three years in Vancouver until 2004. Initially, it was an electronic music and live cinema festival, which has since grown and returned to being. During these three years I led, curated, and produced about three performances per night, over the week-long festival, with an exhibition of up to 20 interactive works, including robotics, interactive dance performances, and a 2-day artistic and academic symposium.

After I left *New Forms*, I went onto co-found a short-lived (2 years) arts organization called the *Escape Artists Society* (**Fig. 22.18** below) with a performance artist friend, Victoria Singh, and together we produced and curated performance and electronic arts events, with the support of our Board of Directors made up of mentors and artists. This organization hosted the first video iPod film festival in a café, followed by other novel electronic performance events. This continued until I was accepted to start my PhD and move to the UK in 2007.

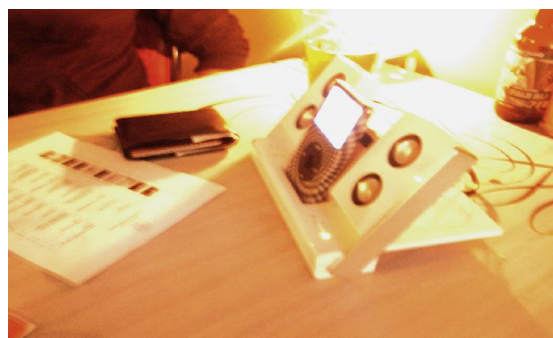**Fig. 22.17** *New Forms Festival* **circa © 2003 C Baker**

Fig. 22.18 *Escape Artists Society* **Vancouver photo ©2005 C Baker**

I learned a lot from *New Forms Festival* and the *Escape Artist Society*, particularly about working with artists and taking care of them, trying to secure sponsorships to augment shoestring or zero operating budgets, not to mention methods of calling out for, selecting and curating the works, displaying them appropriately, dealing with security issues inherent with tech-based artworks, promoting the artists and events, working with and managing volunteers, liaising with venues, working with lighting and other venue technicians. Ultimately, the primary learning was on how to put on an engaging exhibition that appeals to a wide variety of people, to showcase the novel approaches that digital and interactive artists take to interpreting and reflecting the world back to audiences, which I take into my own artistic practice. I also learned that the better the exhibition theme, the better the submissions, and that in the stronger exhibitions, curators bring their own voice to guide audiences and provide an overarching narrative that toes the work together and says something meaningful about the current state of our society and the world. However, if artists are not well treated by organisations (I worked hard to support the artists, but the organisations I worked for did not always have enough money to pay them properly), the organization and the curator's reputation will suffer (understandably). I also learned that if you are not assertive you will not get credit for your efforts and others will take credit for your ideas – hard learned lesson – also: contracts and payment are essential.

Many years later in 2020, during the first year of the pandemic and as the principal investigator of an EU funded consortium project, I was offered the opportunity by *Ars Electronica* colleagues, to curate an online exhibition for the *Kepler Gardens* as part of *Ars Electronica*. *Ars Electronica* festival is a massive organization of over 40 years, focussed promoting and celebrating on digital and electronic art, design and innovation, and it produced the festival entirely online that year. The festival has been hosting the event with hybrid elements since then. I was involved as part of my university, along with organisations in 120 other countries around the world, to present exciting works, artists, and events, crossing art and technology and science and art. I gathered a UK-based hub and invited several other UK arts organisations from Dundee, to Manchester, to Birmingham and London to create a program of online activities to showcase current works with an art-science focus, reflecting on topics such as ecology, democracy, uncertainty, humanity, reality, and autonomy – the themes of the festival. The organisations that participated in 2020 were: University for the Creative Arts, Art in Flux, University of Wolverhampton, FutureEverything, NEoN Digital Arts Dundee, Serpentine with 12 events, 58 artists viewed by 12 different countries. Again in 2021 we did it again with: University for the Creative Arts, Electronic Visualisation in the Arts (EVA) London, York Mediale, The National Gallery X, Art in Flux, Kinda Studios, and artist Lily Hunter Green.

For the 2020 International Symposium of Electronic Art (ISEA) Montreal, I curated a virtual fashion exhibition of a fashion designer and performance artist Valerie LaMontagne (see **Fig. 22.19** below), who was an early innovator in smart fashion, e-textiles, and performance, since the late 1990s and early 2000s, long before most others. This was a self-initiated project, in collaboration with her family and PhD supervisor, Head of Hexagram lab at Concordia University, Professor Joey Berzowska. We had originally planned to organize an in-person exhibition for the ISEA 2020 in Montreal that year, with support of and alongside the festival. Sadly, it did not happen in person since everything moved online due to the pandemic. In response, I curated and made her a virtual exhibition of images and videos of her work and organised an online panel memorializing her, with other experts and friends who knew her, her work, her professional contribution, and its impact on the e-textiles and smart

fashion developments that have taken place since – so she would not be forgotten, and others would know her work.

Fig. 22.19 Peau D'Âne: Celebrating the Work of Valérie Lamontagne online exhibition as part of the 2020 International Symposium of Electronic Art (ISEA) Montreal screengrab ©2020 C Baker

In 2022, I initiated and co-chaired the *Extended Senses Symposium* (**Fig. 22.20** below) of talks and artwork/performances in September 2022, in collaboration with Greenwich University and will again in 2024. This cross-disciplinary symposium brought together research and practice that explored different approaches to extending and expanding the body through new and emerging modalities. The event had presentations, discussion and an exhibition of work and ideas at the intersection of technology and the arts, a diverse landscape of specialties in the wake of this crossover. Focusing primarily on the body as a site of knowledge production, the focus was on artists and researchers working immersion, haptic engagement and using various methodologies bridging the analogue and the digital. This included but was not limited to electronic or smart textiles, multimodal interfaces and human-technology interaction, dance, theatre, music and other performance modes, and artistic and design work that engages with technology to translate different embodied senses and experiential sensations. The exhibition and talks were hosted at Greenwich University, funded by the University for the Creative Arts, resulting in several papers being published in a special issue of the Intellect Journal *Virtual Creativity*.

Fig. 22.20 Extended Senses Symposium and Exhibition 2022 with co-chair Ghislaine Boddington photo ©2022 C Baker & G Boddington

It is my opinion that the role of the curator in digital arts is in shaping the landscape and conversations, and investigating, selecting, and integrating innovative works and artists' works to expose to audience and expand their experience digital arts and performance.

My main curatorial projects have been: *New Forms Festival* (2002-2004 inclusive), the *Escape Artist Society* events (2005-2007 inclusive), the online magazine *Vague Terrain* on art, technology and culture (last issue 2012), the *Ars electronica Kepler Gardens* (2020 and 2021 online), the *Valerie Lamontagne virtual fashion exhibition*

(2020-2021), and most recently I co-chaired, co-curated, and co-produced the *Extended Senses Symposium and Exhibition* (2022), alongside digital bodies and telepresence founder of Body>Data>Space, Ghislaine Boddington.

Community engagement

The focus of my community engagement activities through various EU projects, has been centered on bringing artists, designers, scientists, technology specialists, and companies together. This work has been developed primarily through EU consortium projects within the Horizon 2020 and FET Framework 7 initiatives, such as FET-Art, WEAR Sustain, and STARTS — all concerned with developing accessible strategies collaboration and innovation for public use, such as connecting artists with technology experts and scientists and mentoring the teams; organising matchmaking events; supporting collaboration; initiating residences and partnerships for novel modes of collaboration across arts, design, technology and science, to create policy recommendations; often involving organising people to meet, and creating public exhibitions, events and engagement activities, developing opportunities to support collaborative residencies and project/product development between these groups. I have facilitated logistical elements like facilities, equipment, time, as well as providing mentoring services and access to or partnerships with fablabs, maker space, utilising research tools to enable art-science/technology connections and has also included developing new strategies for engagement and recommendations for government policy. Ultimately, these collaborative initiatives are essential for addressing societal issues and providing critical solutions to the challenges that we face as a society.

The path that led me to these larger community engagement activities was somewhat accidental, in a fortuitous development after completing my PhD, while seeking research funding for another project (*Hacking the Body*). While in a teaching post at Brunel University (2007-2014), I approached the research office and was encouraged to become involved in the early stages of an initiative that eventually became the *FET-Art* project (also referred to as *ICT and Art Connect*), for more information on this project see references. As a result, I was invited to facilitate the inaugural workshop which subsequently led our team to secure funding from the European Commission as part of a small consortium, focussed on community engagement. *FET-Art* aimed to demonstrate how collaboration between artists and technologists or scientists could generate novel thinking and new innovations (not only artworks). The project partners organised a series of events, including hackathons, meetups, workshops, and exhibitions throughout Europe, which gained the attention of Neelie Kroes, then the European Commissioner. She expressed great interest in our work and the ability to integrate art and technology to produce novel concepts and outcomes. In addition, the project held a call for, selected, funded, and mentored nineteen short residency projects, each awarded €10,000 euros each over three months, to develop prototypes, either commercial or experimental, with innovation potential. These residencies were intended to serve as a proof of concept that artists and technologists could collaborate to create novel outcomes and processes, including artworks, products, IP, policy recommendations and services.

Simultaneously in 2012, as part of the *Hacking the Body* research, Sicchio and I developed several maker/ do-it-yourself (DIY) e-textiles workshops, focussed on teaching non-technology savvy artists and performers on how to make their own digital costumes using conductive materials electronics. Our goal was to share our discoveries and skills with other performance artists, dancers, theatre people, and other creative practitioners by facilitating e-textiles making workshops, so they could make their own smart costumes and learn basic electronics. We focussed on how to make simple interactions, like blink or changing colour or sound, showing participants how to integrate DIY electronics into their own practices. Through these quick workshops, we aimed to whet their appetite to explore the use of electronics and conductive materials to make small but powerful outcomes, and to consider how to use technology in performance and costume making. We hosted several of general, public maker workshops, such as one at the science museum in 2014, teaching both adults and/ or children (**Fig. 22.21**) as well as with my digital design students to get them excited about interaction design and making interactive work to expand their design palette.

Fig. 22.21 soft circuits workshop run by Kate Sicchio & Camille Baker Byron Bay, Australia, June 15, 2013, © C Baker

Fig. 22.22 e-stitches collective workshop run by Camille Baker & Melissa Coleman © 2015 C Baker

This activity led to the launch of the e-textiles meetup maker community called, *the e-stitches collective* (**Fig. 22.22** above), in November 2014, with the co-host support of Melissa Coleman who had organised similar meetups in the Netherlands at the reputable V2 Arts Centre. The *e-stitches collective* held knowledge sharing meetups approximately every six weeks since 2014, enabling fashion and e-textile designers, interaction designers, and other artists and engineers, to share their work and knowledge, supporting them to develop new practices and approaches to their innovative practices. The collective continues to organize meetups, show-and-tell events, and discussions to foster skill-sharing and networking opportunities sharing new techniques, materials, or methods. It has been aimed at more advanced level practitioners, postgraduate students, artists designers, engineers, interaction designers, and fashion designers, experimenting with innovative materials and textiles industries. It has had speakers and workshop leaders who have gone onto have exciting careers in the tech, fashion design, and textiles. For years, from 2014 to 2018, the meetups were held in-person, primarily at the Victoria and Albert Museum hosted by Irini Papadimitriou, then Head of Digital Education, until she moved to Manchester to become the Artistic Director of Digital Arts and Research organization FutureEverything in 2018. However, with the onset of the pandemic in 2020, the *e-stitches* community was able to expand its reach wider and further, attracting e-textiles artists from across Europe and the world. *e-stitches* for a time established seven chapters in different locations across Europe: in Limerick, Berlin, Barcelona, Rotterdam, and recently in Dundee, as well as the first two in the UK, in London and Bristol. Although we have been eagerly anticipating the return to in-person meetups, which will start again this autumn 2023, with the transfer of the organization (due to lack of time that Emilie Giles and I have), to new leadership of Sara Roberson and Lucie Hernandez, long term members with and exciting designers in their own right, with new initiatives. The e-textiles and smart materials field continues to grow and has had some exciting new developments at the intersection of art, material science, fashion, and engineering recently, especially in biotextiles, 3D printing, and soft robotics. Leading this activity has been hugely satisfying, educational and fun, but my practice is moving in another direction now.

Over the years my professional concerns have evolved to exploring ethical and sustainable technologies and one of my aims was to secure funding for the *e-stitches* community, to support practitioners developing innovative e-textiles and smart materials, and so I formed a consortium of partners from across Europe and applied for European Commission funding, which many of the *e-stitches* practitioners were involved in various ways, either as recipients of money or as mentors. As a result, in 2016, I initiated and put together a consortium to apply for and eventually won the funding for the *WEAR: Wearable Technologists Engage with Artists for Responsible Innovation* (also called *WEAR Sustain*), whose aim was to provide €50,000 Euros to 46 projects for six-eight months, supporting interdisciplinary teams to collaborate, and to develop prototype risker ideas that might be taken to more advanced levels.

Running from 2017-2019, *WEAR Sustain* supported designers in collaboration with technologists and /or scientists, to prototype and make new ethical and sustainable materials, products, services, processes or techniques for e-textiles and wearable technologies. Once formed the collaborative teams worked together to create prototypes that might eventually to go to market. Each team was mentored and evaluated on how well they planned and implemented the whole life cycle of the project, using circular design principles as much as possible. The *WEAR Sustain* consortium developed a framework consisting of four pillars in terms of exchanging knowledge and demonstrating to textiles, fashion, and technology industries how to be more ethical and sustainable from: sourcing materials, to labour practices, to manufacturing and production, to distribution, to waste management, and finally end-of-life. *WEAR Sustain* was more design focussed than my other projects, born out of *e-stitches* and intended to reframe methods of developing smart and wearable technologies, devices, techniques, and approaches to manufacturing and advancing sustainable, digital fashion, and related e-textiles and smart materials. The project resulted very exciting and cutting-edge outcomes, such shoes made of mushrooms or mycelial leather, electronic jewelry, bespoke small batch manufacturing equipment, labour models, and small batch circular manufacturing approaches to e-textiles and textiles that employed local communities, and electronic gestural gloves for music production and performance.

In 2019, I was invited to and was involved in a subsequent project called *STARTS Ecosystem,* which brought together the broader art-tech community through the STARTS.eu website portal, to enable scientists, artists, technologists, art and cultural institutions, maker and living labs, private research organisations and universities, to congregate (virtually) under one community hub or umbrella. The S+T+ARTS (Science, Technology & Arts) initiative's aim has been to catalyze innovation, with a focus on collaboration, cross-pollination innovation processes, to foster catalytic thinking, nurturing it to evolve into tangible outcomes, create new shared knowledge while nudging tech industries to recognize the value that artists contribute to society and industry and to consider incorporating them into their innovation cycles. Its focus was, as stated on the European Commission funding portal, it provided "*services to the global tech-art and sci-art community: collaboration methodologies, single-entry point for STARTS media presence, talks, meetups and exhibitions, mentoring, a toolkit on art-science-tech collaborations, resources, and an exclusive acceleration programme that supports the emergence of unconventional products and solutions.*" And the "*creation and animation of a STARTS ecosystem by coordinating artistic and innovation relevant aspects of the two lighthouse pilots and of other European/international R&I projects that put artists and creatives at the centre of innovation.*" (EC website)

More exciting activities came out of the *STARTS Ecosystem* initiatives and were boosted by the pandemic and people's desire to meet and collaborated virtually when it was not possible in person. Yet the most practical outcome was the development and release of a Collaboration Toolkit (see references for details) – with important guidance on collaboration practices for industry with artists and vice versa. It has met its other goal of providing a "*solid framework for actors, activities and results generated under the first wave of STARTS projects, to meet and consolidate with newcomers, in the form of an ecosystem that can raise interests and drive artistic/creative talent towards the large-scale activities, to be demonstrated under the Lighthouse projects and other R&D & innovation projects, where artistic potential can be leveraged*" as is evidence, but it has launched many subsequent projects that have since been funded and/or are in progress (see STARTS.eu for more info).

I have been fortunate to have been at the right place at the right time at the start of all this activity, as I was involved in the STARTS EU initiative projects since 2012, before it was called *S+T+ARTS*, with the *FET-Art/ ICT-Art Connects* project, demonstrating how they all are interconnected. As a partner and principle investigator on several EU projects, I usually lead on artist engagement, matchmaking and mentoring frameworks, most notably in: *FET-Art/ ICT&Art Connect* (2012-2013), *WEAR Sustain* (2017-2019), which supported wearable and e-textiles collaborations to prototype new innovations and I led the selection process, monitoring and evaluation process of team support; and with the *STARTS Ecosystem* project (2019-2021) I organised, trained, mentored community members, and supported activities and events that promoted innovation in art/design and science/technology collaborations, and advised on the creation of a community online hub (STARTS.eu) for such shared activities, and led the mentoring and support mechanisms for collaborative teams, and also the organization and dissemination of events.

Through the *e-stitches, WEAR Sustain* and the *STARTS* networks, I have been involved in increasing awareness on the importance of interdisciplinary collaboration, but also the critical role that artists play in stimulating new approaches and perspectives, essential to new ways of thinking and developing as a society, leading to a breadth of impact benefitting a wide community of practitioners in the haptics, e-textiles, digital arts, design, engineering, interaction design, computing and beyond. The newly funded EU Horizon Europe Project called *VOICE: Valorising Artist-led Innovation through Citizen Engagement*, that is starting in January 2024, in which I am Principal Investigator for RCA as an associate partner [1]. While it is not part of the STARTS initiative, it is related and will focus on supporting artists to lead community art interventions intended to enable engagement in social, environmental sustainability, capability in the use of new and necessary technologies, in collaboration with under-supported communities across Europe.

All the European projects that I have been involved in are focussed on improving the collaboration of interdisciplinary teams of science and technology experts, but with artists in Europe at the centre, to instigate the development of novel ideas, processes, techniques, etc., leading to new research, policy recommendations, and insights that benefit society. They are all about community engagement, with a focus on empowering artists especially, bringing them to the forefront with more visibility and to be better valued by industry in science and technology sectors in particular, but society in general, as catalysts, pushing at the edges of knowledge.

Judging, mentoring & teaching

I have served on many competitive juries aiming to fund and support digital collaborations, projects, and prototypes between artists and scientists and / or technologists. I have also been an advisor on projects and mentored many artists in various digital art residency projects, visited many digital art exhibitions, not to mention supported many student projects during my teaching in digital media since 2002. I have taught web design and new media, interaction design, game design, performance and technology, and range of other permutations of electronic, interactive, digital art, performance, and design. Of the works that I have witnessed, those which stand out are those that play at the edge of what emerging technologies are capable of and the artists can make, pushing the boundaries of social or political issues, how they can change the minds of the audience, challenging them to think differently about the world.

Throughout my career, I have experienced a vast number of both art and design works and have been able to share my expertise, while staying open to new expressions of digital art, performance, and design. Of course, one starts to see a lot of repetition of ideas explored in similar and different ways, and it is clear that some artists clearly have no concept of computer and digital history that led to their entry, or the exceptional artists who have come before them. Thus, where I can, I try to ensure these young artists, mentees and/or students are aware of others who have innovated before them, but through different, earlier technologies available at the time. I have been lucky to have close friends who are brilliant artists of varying forms, from commercial sculpture work by artists like Elise Jones, to climate change sound artists like Kat Austen, to community placemaking artists like Anita McKeown, to multidisciplinary / multi-talented artists like Tara Baoth Mooney, and the many other exceptional digital artists like Kasia Molga, Kate Sicchio, and Maf'j Alvarez, not to mention digital performance pioneer performer and curator Ghislaine Boddington - and many other amazing women making socially relevant art, not always with technological dimensions.

Of the projects I have encountered over the years, those challenging the politics and government policies, influencing audiences to question the powers-that-be more critically are highlights. As an example of one that stands out to me, is the work of Julian Oliver and his *Critical Engineering Collective* with their *Critical Engineering Manifesto,* and the work they have produced through this manifesto. Their approach to using technology as art, and as a mode to critically challenge the ways that governments and companies behave. The group has occasionally operated at the very edge of what is legal to make a pollical statement, exploring contradictions of governments and corporations and how they get around the laws they make, especially with activities such as surveillance and data collection on citizens, and on so on. James Bridle's work is similar and there many others. Furtherfield.org, led by artists/ curators/ researchers Ruth Catlow and Marc Garrett, has always

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[1] Sadly, due to the effects of Brexit between the UK and Europe at the time of this writing, UK partners must become Associated Partners that get paid through the UK Research funding bodies not directly through the EU, but in essence of the workload it is the same role.

been at the forefront of showcasing artists who critically engage with technology, and as a curatorial organization they have led the way in challenging social, political, and economic developments and issues, through art that they curate, their community projects, challenging audiences out of their comfort zones, writing, activism, presentations, etc., fostering discourse a variety of art, theory, politics and social issues, and through the artists and thinkers they bring together, confronting the rest of us to do and be better.

Some of the other key artworks and artists, and there are so many, too many to mention, include artists discovered through STARTS and Ars Electronica, such as Japanese musician Etsuko Yakushimaru's *I'm Humanity: Music for Eternity* the 2017 STARTS Prize winner, who used DNA as a storage medium for music notation and song lyrics, or choreographer Gilles Jobin, Swiss dancer, choreographer and director working with dancers in motion capture with Virtual Reality for live virtual performances, which were especially important during the pandemic. There is Charlotte Jarvis, feminist bioartist, currently making the world's first female sperm; and Anna Dumitriu also specializing in bioart making installations, interventions and performances use digital, biological, and traditional media, including working with fatal bacteria, digital technology, and craft techniques, and often also collaborating with equally excellent artist Alex May in robotics or other digital works. Yet there are so exciting artists working in many other mediums making exciting work.

Ars Electronica has had a pioneering and important catalogue of artists showing exceptional work, and especially those who engage with science and technology in provocative and confounding ways. Other exhibitions or festivals where I have encountered ground-breaking digital works, including those at the Somerset House *Big Bang Data* in London in 2015, or at several of the ISEA (International Symposium of Electronic Art) exhibitions I was able to attend, but especially in 2016 in Hong Kong. It has been important for my teaching, mentoring and my own practice to experience as much as I can, to witness how the digital and computational art world is continually evolving. Christiane Paul (2003, 4th ed 2023) has been an excellent guide through the years, documenting and providing the long view of how this work has changed and evolved. She points out that,

> "*Digital art did not develop in a vacuum either, but has strong connections to previous art movement, among them Dada, Fluxus, and conceptual art. The importance of these movements for digital art resides in their emphasis on formal instructions and in their focus on concept, event, and audience participation, as opposed to unified material objects.*" (Paul, 2023:10-11) and

> *The public of audience becomes a participant in the work, reassembling the textual, visual, and aural components of the project…the artist often plays the role of a mediator or facilitator for audiences' interaction with and contributions to the artwork the creation process of digital art itself frequently relies on complex collaborations between artist and a team of programmers, engineers, scientists and designers.*" (Paul, 2023: 18-20)

However, it can feel frustrating when some of the most amazingly profound and transformative works of earlier eras of digital and computer art are utterly forgotten by the ever-changing tide of emerging technologies and new young artists. Since I first became aware of digital and new media art in the late 1990's and the dawn of the Internet, I have become more and more curious about how all early digital, net, digital, virtual and computer art has been and continues to be archived, documented, and preserved, so I have joined the UK Computer Arts Society to be involved in those conversations and activities. This is a more difficult task than in other artforms, as the march of new tech makes some work immediately obsolete and/ or expensive to preserve.

My teaching has been focussed on digital, performance and video art, aesthetics and production, and interactive art in its various forms (wearable tech & soft circuits, interaction, and interface design, now VR/AR/ MX), as well as web design, and motion graphics, for over 20 years, in academic institutions in both Canada and the UK. I began my academic teaching in digital media, video art and (post) production, and filmmaking in 2003, and have always covered a range of topics in critical, contextual, historical, theoretical, cultural, and technological developments, as well as some specialist disciplinary discourses and topical concerns. In the UK, I started teaching video production and visual aesthetics (including an introduction to art and design principles) in an engineering department, while undertaking my PhD research into performance using sensor devices for video mixing for the *MINDtouch* project and research, and then my collaborative work on *Hacking the Body* with Kate Sicchio. Then I changed institutions in 2014, and taught interaction design for web and mobile apps in a graphic design course

(the digital design course I applied for was cut within six months. Due to poor recruitment and marketing), so I was then moved into leading a Games design MA (not my area of expertise, but I was the only one who could at the time), while making an VR installation artwork. I am finally in a program and institution where I can perform research, teach, and make artwork that are all in alignment and overlap with each other, after many years of not being able to. It is exciting to merge my art practice and academic pursuits, an interdisciplinary approach has finally born fruit in academia and industry, sectors that are now finally also embracing it.

I have been critical of NFT's alongside friends and colleagues alike, as it seemed that it was not developed to help existing and emerging digital artists to make a living, as much as it was creating a new way for people to get-rich-quick, suddenly calling themselves digital artists, without training or real interest in digital arts more broadly. (for a definition of NFT's go the references). Incidentally recent news states that these are now worth virtually nothing and the fad is over (Klee, 2023). In the advent of NFT's, and AI as well now, it is important that artists continue challenge technological fetishism, examine and engage with urgent, critical, social, environmental, and ethical issues, that push the medium, not just focussing on cashing in on technological trends for their own benefit, or scraping the Internet for other people's visual, creative or intellectual works to be reconfigured or mimicked with AI without crediting or paying the original artists. As someone who always worked to make sure that artists whom I have curated or collaborated with were paid, this is an issue I am passionate about, as it seems like another way to instrumentalize and devalue the massive social and cultural contribution artists bring to society.

New technology has always provided new potentials and new exciting affordances, but the most innovative works or their artists usually try to break, reconfigure, hack, or deconstruct the intended purpose, to create something truly unique and engaging. With the influence of AI and XR, I am continuing to be concerned with the impact it has on the creative process, such as how it can enable new forms of storytelling and narrative in performance and virtual contexts or be disruptive in the way it is used to design more immersive, emotive, and personal experiences for audiences. My interest is in authentic expressions of embodiment and extended self through technology, the making and sharing of meaningful work that can impact and help others, or to solve real world problems. This seems more important than ever in these times of renewed existential crisis of climate crisis, economic uncertainty, war, increase of extreme views, cultural wars, disinformation and pervasion surveillance, and the dawn of a possible threat of artificial intelligence (either on a long-term existential or immediate disinformation and bias level).

Key insights from artistic, curatorial and community practice

While I am not trained as a curator, I have been fortunate to showcase artists who I feel compelled to share with new and larger audiences, and those who may need a little extra support, not only through events and exhibitions, but also through publishing on and promoting community engagement work. One of the key insights from my curatorial practice is to approach each exhibition or event from the perspective of the artist, considering the best ways to collaborate and realize their vision, but also to tie together different artists through a common thread or theme. Having clear themes to connect the works and ideas is central, be it through their processes or outcomes. Ultimately, it is to take the audience on a journey, whether it is through an individual work or the exhibition as a whole, to engage the audience in the artistic expressions, in a larger cultural discourse of social, political, or even technological concerns.

From a curatorial perspective, whenever there is an open call or a brief for residency projects, or even for student briefs, the more specificity and limitations put in place, the more creativity that artists and student artists/ designers implement. Therefore, having strict directions and a clear focus and parameters the better, rather than an open brief which leave them unfocussed and floundering, unable to easily narrow the topic and approach, or make decisions, as most curators and all educators alike realise.

In terms of art-technology or art-scientist collaborations and creativity: friction and intersection are where all the boundary-pushing activity happens, where real disruptive approaches happen, which may never have been considered purely through industry, scientific or technical approaches alone. Scientists and technologists expand and see an alternative perspective from how they normally approach development and the way they see the world. Artists become more inclusive, open, rigorous, and methodical in the way the work is undertaken and developed. This is where the magic happens. Key insights from cultural and community event organization that have surfaced

are about communication and collaboration: ways to support artistic practice focussing on, thinking, and standing up for the artistic/catalytic thinking, approach, and contribution that artists make, particularly in terms of working with and questioning emerging technological development. Through their work, artists reveal dimensions and perspectives or expose what others in society, and particularly those in technological companies, expert fields, and science, may not see. Artists often explore social, ethical concerns surrounding technological expansion, and social impact that affect both humanity and the environment. They explore and use unique methods when working with technology in order to find solutions to these urgent concerns and challenges, through story or conversation, experimenting in unconventional or unsanctioned ways, or by exposing missing dimensions or underdeveloped perspectives. Artists encourage the audience to think deeply about the world and consider how to create change. Ultimately, artists, technologists, and scientists when they collaborate, use their distinct skills to help develop solutions to the problems we face, inspiring audiences to make changes in their own lives, surely this needs ongoing support and nurturing?

The insights that have emerged from my artistic practice are similar to my curatorial insights: finding ways to create an experience for someone else is paramount in order to enhance reflection, awareness of something unknown or invisible, or to encourage one to think differently about something. I have been involved in creative arts since my teens, but always had imposter syndrome and now I feel like a late bloomer in my own artmaking activities, and this is another reason I collaborate as I feel more confident with someone else to test and improve the ideas and outcomes with. I lacked confidence previously and this led me instead to curating, and then to become an academic. The more able I was to financially support myself through teaching, curating, and researching in digital arts, the more confident I felt eventually in my own artistic voice and expression.

In the past, experience design and interaction design were thought of mainly in terms of web, mobile and Internet application design. However, as my peers and I have focussed on the interaction design, audience engagement, and context of performance practices, the more the concept and practice of experience design seems appropriate. Designer Nathan Shedroff wrote about sensorial design and the engagement of all the senses and the body in an experience design in the early 2000's, but it was only used in the context of commercial and product design contexts. What is exciting about the digital arts and performance developments in recent years, especially in virtual reality and immersive experience design, is now the conversation is finally going beyond the web and mobile design, returning to the technique of creating a complete suite of engagement techniques for people for deep, completely immersive, full body, narrative, and transformative experiences.

The spatial dimension of XR storytelling also needs to be better incorporated, as unlike film and TV, it is not about faking the sense of depth of 3 dimensions through a 2D space illusion on screen anymore. It is about creating a more realistic and life-scale 3-dimensional spatial experiences and vast worlds in which the immersant can experience subjectively. Theatre companies are also expert at creating this, especially within immersive theatre. It is all about taking people on a narrative journey through space, thus more work needs to be created in development spatial narrative design in XR, not just for games, but also adding more of the physical aspects into extended reality, such as haptics (see Justin Baker's definition of haptics in the references), which theatre experts are best placed to guide XR designers. In terms of the future directions of XR, anything involving engaging and interfacing with the body as the site of knowledge and/or expression, is where designers and tech companies alike need to explore more deeply, as well as making more sensory, felt experiences that engage audiences with real empathic stories on important issues of our time – these are going to be more exhilarating works.

What I have learned in recent years, working specifically with immersive VR, is that my performance background noticeably informs the experience design focus for my teaching, research, and projects, such as in the creation of the worlds, is not just about inside 3D virtual environments. However, even before viewers get there, designers / artists need to set the scene, literally, by creating a physical context that will transport the "immersants" (Davies 2004) into the virtual context and mindset of the virtual narrative or journey they are to be transported into. It is critical that the storytelling does not only begin inside the headset but begins when the artist or invigilator greets the visitor. "Onboarding", as it is called the digital design industry, but not yet taught to VR/XR students and designers, is essential for supporting visitors to understand how to use the technology, but also to prepare them psychologically and physically for the experience, to help shape how visitors engage with the virtual narrative. Also, the debrief or 'offboard', when visitors come back to the physical world is equally important in

terms of helping immersants return to the real world mentally, emotionally, and physically. These dimensions of the audience experience needs to be better considered for an engaging journey of the immersant.

This is where performance excels, as in the short history of interactive arts in the last 20 years, it is about creating a whole experience, encompassing the visitor from the minute they arrive until the moment they leave. It is akin to taking people on a place: it starts when the passenger buys the ticket, but more so when they arrive at the airport, and especially at the gate to the plane - this should be the goal of designing in and exhibiting XR work: to design the whole experience, not just the virtual experience in the headset. The best immersive XR/virtual reality works that I have experienced, have been created by immersive theatre companies and practitioners, such as PunchDrunk, DotDotDot (now LayeredReality), La Fura Dels Baus, and others, who have the best understanding of active and spatial storytelling, as well as in creating a narrative journey for audience engagement. This is where the development of XR needs to evolve. Performers and dramaturgs understand how to best convey narrative and how to pull the audience into it, and this is why immersive and extended reality designers need to learn from immersive performance, to add staging, pacing and the spatial dimension for the transition between the real virtual, and to consider the experience for each individual as bespoke within a structured framework, and what might be necessary in order that they have the best experience.

Over the last ten years, I have more highly valued working with other women, as well as supporting other women and girls, whether they be friends who are artists, my students, or mentees, or those I have met at various conferences and events. I have been fortunate enough to make a lot of amazing female artist friends, who are making fantastic work, which I try to learn from. Thus, in addition to bringing together predominantly female research teams, I strive to help women advance and create connections between producing impactful work and empowering other women to succeed. As a Professor, I aim to support and mentor younger women in research and art practice, recognising the importance of their input which has been less emphasised in the past. I was fortunate enough to be mentored and supported by amazing and strong women artists and academics and attempt to do the same.

Conclusion

In the global picture in the broad context of computational culture in my view, the public is more receptive and better grasps digital and computational art, and as an artistic medium having lived in the background and side-lined by the art market until recently and with the emergence of NFT's, its artists have been able to be more critical and even activist in both the content and form of their works. As a curator and artist this lack of inclusion in the mainstream art world has been a blessing and a curse for artists trying to have their work seen, since for the longest time they were unable to show their work as easily other artforms in mainstream galleries and museums. which has changed radically in the last 10+ years. It also means that in some ways they – by using emerging technologies that are often expensive or complicated to use, and now seen to contribute to climate change through their role in blood mineral extraction, poor working conditions in some parts of the world, using huge energy supplies, resulting in huge e-waste – must be critical of the very tools they are using and more broadly the current world we live in. Digital and computational art are now taking a greater responsibility for making critical art works that also act as education of the public on the problematic nature of technology and its role in many of the problems we face globally: surveillance capitalism, the rise of AI, the impact of social media on self-esteem and mental health issues of the world's young people, political disinformation leading to increased fascism again, huge tech billionaires and vast social inequality and more. This global picture influences my own curation and performative and interactive works by in different ways. In terms of curation, it influences me to make sure the works chosen work together and say something meaningful, critical, and challenging. In my personal practice I have become focussed on aging women's health issues that are often ignored as a feminist focus in a world obsessed with beauty, youth, health, and fitness, especially of women and aim to keep bringing older women, who now live longer, to the foreground both as amazing contributors to society but who have also been persecuted and forgotten through the ages.

 I have been curious about the connection between artistic and communicative dimensions of emerging technologies, while also supporting the role of artists, performers, and designers in shaping the trajectory of these technologies. As a practitioner in interactive performance and immersive arts, I am driven extending the senses of corporeal bodies, and utilising technology can support embodied, nonverbal communication, haptic interfaces,

telepathy, immersive embodied experiences, presence in online-only contexts (like distance and pandemics), to tackle issues of privacy, climate change, social and political challenges, identity, and responsible technology use. However, navigating the complexities of emerging and ever-evolving technology as both a facilitator and a potential disruptor of these issues remains challenging.

From my career, I have come to realize that interactive and immersive arts must engage their audience completely: mind, body, and emotions. While cultural institutions and theater professionals understand this, it may not be equally prioritised by some digital artists, who may undervalue its significance for their personal own vision. Creating an interactive work involves preparing audiences for the experience, guiding them through it and making sure that their experience is comfortable, accessible, and insightful, and then they are aided to exit the journey. However, many interactive and immersive artists have unfair, unrealistic, or unclear expectations of their audience. They often do not consider the audience at all, or they make the work either too simplistic, kids' game-like with no meaning and not giving their audience the benefit of intelligence, or they expect too much of the audience's knowledge or ability to engage with the work than is realistic. My biggest outtake is that many artists or designers and curators do not think about the audience experience enough and need to spend more time and care on this aspect. Those artists who are the most successful tend to get this: they focus on and understand how to engage their audience. As an educator, with an aim to make ensure students have a good experience, this is what I have learned for art making as well, however it has taken me my whole career for this to really sink in. A lot of young artists, whom I see in universities and in residencies or collaborative projects, are focused on their own ideas, trying to express themselves and find their artistic voice and individuality, which is understandable, but they often do not consider the bigger picture nor contextualize themselves in the greater social, cultural, historical or global context, or know how to express themselves in a way that communicates effectively to their audience. I share this with young artists and curators, from my own artistic practice and as a curator and educator: think beyond yourself, consider your audience and the bigger global picture.

This chapter has taken the reader on a journey of my career curating, making and leading community engagement in digital and technology-based art and aiding in collaboration at the intersection of art, technology and sciences, leading to the professional insights to share with other artists and similar practitioners. Other chapters in this book with some related material is Chapter 13 on hyper/transhumanism and Chapter 14 on art performance and VR.

Artist Links

Kat Austen https://www.katausten.com/

Ghislaine Boddington https://ghislaineboddington.com/

DotDotDot https://www.itsnicethat.com/news/somnai-dotdotdot-interactive-210318# (now LayeredReality) https://www.layeredreality.com/

Anna Dumitriu https://annadumitriu.co.uk/

Furtherfield.org https://www.furtherfield.org/ Founders: Ruth Catlow https://www.linkedin.com/in/ruth-catlow/ and Marc Garrett www.marcgarrett.org

Charlotte Jarvis https://cjarvis.com/

Elise Jones https://www.e-l-i-s-e.com/

Gilles Jobin https://www.gillesjobin.com/en/

Intangible Threshold https://access-space.org/online-residency-programme-2020/

Julian Oliver https://julianoliver.com/ and Critical *Engineering Collective* https://criticalengineering.org/

La Fura Del Baus https://lafura.com/

Alex May https://alexmayarts.co.uk/

Anita McKeown https://educationinfluence.com/dr-anita-mckeown-frsa/

Kasia Molga https://www.studiomolga.com/ABOUT.html

Tara Baoth Mooney https://tarabaoth.wordpress.com/about/

PunchDrunk https://www.punchdrunk.com/

Kate Sicchio https://www.sicchio.com/

Etsuko Yakushimaru https://starts-prize.aec.at/en/im-humanity/

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