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In the Trouble
Tactics for technoscientific art practice and curation

Deborah Lawler-Dormer

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Fine Arts and Dance Studies, University of Auckland and Doctor of Philosophy in Media Arts, University of New South Wales, 2017.
ABSTRACT

Recent currents in contemporary art practice that span science, art and technology, reconfigure the limits of the human and nonhuman. This research probes into and questions the tactics that can be engaged to reveal and attend to these complex posthuman ecologies. How can artists and curators expose and explore the volatile relations that are meshing in unprecedented ways between technology, biological matter, artificial and human intelligence?

This particular field of experimental arts practice builds on a collaborative ethos in order to stimulate the emergence of new modes of discourse and a new aesthetics at the interface between the disciplines of science, technology, art and curating. The emergent practice of *labile-technics* offers an alternative logic that engages with feminist, posthumanist and new materialist theories. Writings by Rosi Braidotti, Donna Haraway, Karen Barad and Lucy Suchman, support transversal technological experimentation. Creative art practice, science, technology and theory combine to create the conditions for encounters with the uncanny, the unpredictable and the unseen.

The research generated three practical outcomes: *Alter: Between Human and Non-human*, an evolving exhibition model; *Leah*, a self-simulated avatar; and *Witness*, an intra-active version of *Leah*. The research stages the implications of the techno-sci engagement in a trans-art context. *Alter* featured artists Nina Sellars, Stelarc, Jane Prophet, Agatha Haines and Elena Knox. In these research projects, entanglements arise within intra-acting zones of neuroscience, computational and robotics engineering and creative arts practice. Installed at the Gus Fisher Gallery, *Witness* reveals the curator and artist as present. *Witness* invites the participant to entangle, in the moment, in liveliness and embodied sensibility. Through these three
projects *labile-technics* offered a condition for negotiating movement between the *laboratorium*, the gallery and virtual reality environment.

*Labile-technics*, emerges through this creative practice research, as a speculative method that foregrounds non-linear, unstable and dynamic relationality. *Labile-technics* is an ethical challenge towards the development of kinship and intimate relations between embodied and embedded engagements within the advanced technological systems we inhabit.
I dedicate this thesis to my husband Michael, and to my daughters Kényekele and Sophia, who support and accept with love my creative journeying.

I dedicate this also to my mother who has had a very debilitating stroke and lost her ability to speak, write, read and move freely.

At the point she lost her voice, I tried to find mine. The striving to locate both my unique voice in writing, and in practice, is one that I enact conscious of my freedoms.
I would like to thank my supervisors from University of Auckland, Associate Professor Carol Brown, Associate Professor Megan Jenkinson, Associate Professor Mark Sagar and Associate Professor Paul Corballis and my supervisor from University of New South Wales Associate Professor Michele Barker. Thanks so much for the generous support, encouragement, patience and guidance over the last four years. Particular appreciation to Mark and Paul for the access to the Laboratory for Animate Technologies and the privilege of working alongside the development of a new framework for developing artificially intelligent and emotionally expressive avatars and the associated neuropsychophysiology research practices.

I would like to acknowledge the wonderfully stimulating conversations, collective negotiations and artistic adventures with the Alter group of artists and the openness with which they participated in this evolving project.

My thanks also to the staff of the Gus Fisher Gallery, in particular Linda Tyler, for the privilege of exhibiting twice at the gallery, and for her unwavering enthusiasm and support for the project.

Special thanks to Werner Ollewagen for the patient and skilled design work, along with the acceptance of my artistic and philosophical leanings, over the last four years in the construction and reconstruction of Leah, my self-simulated avatar and the virtual Alter. My thanks also to computer artist, Oleg Efimov for the initial capturing and build, to Garling Wu and Vincent Beatty for their sound work, and to Nick Young for his assistance with the build of the virtual reality exhibition. This creative practice journey has been a collective exercise and I am very grateful for the stamina and interest that has gone in to its creative evolution.
Finally, I would like to thank family and friends for the words of wisdom, meals, indulgence and love throughout. Special thanks to Marcia Lyons for the editorial skill and Shelley Simpson for the layout assistance. To Michelle Baddiley and Tony Osborne for the four years of occasional sleeping in the spare room, morale-boosting and hospitality, in Sydney.

A special place is reserved for my husband Michael, and his enduring love, that made it possible to take these four years to experiment and grow.

Arohanui
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**LEAH, WITNESS and VR version of ALTER**

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<tr>
<td>Werner Ollewagen</td>
<td>Lead CG Artist &amp; Designer, LEAH, WITNESS and VR version of ALTER</td>
</tr>
<tr>
<td>Vincent Beatty</td>
<td>Audio programmer and sound designer for WITNESS</td>
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In the Trouble brings to the fore the entangled relations that emerge in my experience as a curator and artist. Troubling, as an emergent action, points to the elusive, paradoxical and sometimes disruptive, indirectly creating a condition. This energetic febrile state, inspired me to search for a mode that allowed me to acknowledge porosity. In turn, this led me to develop a propositional series of tactics entitled labile-technics. Labile can be expressed as a shared pulse, an impulse that questions and accepts the uncanny, changeable and troubling. This strategy of labile-technics allows for the discordant sensibility between systems, disciplines, and the messy aspects of practice that contemporary paradigms often don’t recognize. The approach is adaptive and stays in the present in a current activated condition.

This particular field of experimental arts practice builds on a collaborative ethos, in order to stimulate the emergence of new modes of discourse and a new aesthetics at the interface between the disciplines of science, technology, art and curating. My research probes into and questions the tactics that can be engaged to reveal and attend to these complex posthuman ecologies. Posthumanism alerts us to the predicament in which the human is no longer singular, authoritative and unique but rather is enmeshed in dynamic relations with nonhuman agents. Reimagining and reconvening relationships between artist, artwork, curator and exhibition site, recent currents in contemporary art practices that span science, art and technology, reconfigure the limits of the human and nonhuman.

Technoscientific art practices explore novel ways of thinking, experiencing and making that encourage fresh insight into practices operating
– intentionally or otherwise – within the framework of posthumanism and new materialism. The emergent practice of *labile-technics* offers an alternative approach that engages with feminist, posthumanist and new materialist theory. Writings by Rosi Braidotti, Donna Haraway, Karen Barad and Lucy Suchman, are explored to support and underscore transversal technological experimentation. In this thesis, creative art practice and theory combine to create the conditions for encounters with the uncanny and the unpredictable.

Specifically, this enquiry is situated within an area of transdisciplinary art making that traverses neuroscience, medical imaging of the anatomy of the human brain, neuropsychology and biomimetic artificial intelligence. What ties these arguably diverse fields together in this thesis is the position of the artists – and their corporeal bodies – in rethinking of dominant discourses around more disembodied technoscientific investigations that drive many developments within these disciplines. This research argues that such a position can contribute to our understanding of a still emerging posthumanist engagement with neuroscientific, biomimetic, robotic and artificial intelligence practices. Discrete examples of technoscientific arts and imaging practices will be explored, referring to transdisciplinary case studies that assemble complex transversal performative assemblages. I ask, how can artists and curators expose and explore the volatile relations between technology, biological matter, artificial and human intelligence that are meshing in unprecedented ways?

Contemporary art practices increasingly integrate scientific and artistic research with emergent technologies, scientific visualisations and modelling along with art practices. In recent times, this field of practice has been termed technoscientific art. This is an elaborate ecology of practices and systems that involve intricate interweavings of human and nonhuman breaking down humanist conceptions of subjectivity often described as stable, and bounded. A posthumanist framework brings to the fore a creative framing that emphasizes a non-linear, unstable, multi-layered encounter that is entangled with technologies, phenomena and materials that are engaged within and across the relational, and between human and nonhuman entities.

A doubling of investigative action will be undertaken through combining curatorial and artistic forms of enquiry. Through experimental and speculative practices related to making, writing, curating and exhibiting, there will be an activation of *labile-technics* in the context of the studio-gallery-virtual-laboratory positioned as a laboratorium. A laboratorium is a site where work is to be done transversally in understanding and working with the materials, forces, agents and instruments that intra-act in the formation of technoscientific art practices. This is on-going work always

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1 See continued explanation of technoscience art in Chapter One. Also see: (Reichle, 2009, p.7).

2 Over the last thirty years as a curator of technology, film and video, interactive and live performance projects, I have become increasingly challenged and intrigued by the complexity of practice. My curatorial practice, as a Pakeha woman, took a variety of roles within public art institutions culminating in leading the not-for-profit MIC Toi Rerehiko (Moving Image Centre) for 16 years. MIC profiled and encouraged playful enquiry processes, intercultural collaborative engagement and creative research and development in emerging technologies. During this time, I developed a creative technologies research initiative as one of three founding co-directors of CoLab, initially founded on a partnership between MIC Toi Rerehiko and Auckland University of Technology. It is this convergent territory of research and development, curatorial and programming, directorial and artistic outputs that has led to this creative practice led enquiry.
in a state of transformation and always in relation across an ecology of the individual, the psychic, social and environmental. In this context the exhibition is considered both as a medium and a laboratorium. Labile-technics offers a condition for negotiating movement between the laboratorium, the gallery and virtual reality environment.

Labile-technics, emerges through this creative practice research, as a way of foregrounding, and questioning, the non-linear, the unstable, the paradoxical and troubling aspects that often emerge in this field of creative practice. This approach is not prescriptive but rather is encouraging an opening up and a questioning of practices. In part, this strategy enables the diverse intermingling of collaborators, sites, materials, disciplines as well as scientific, technological and societal forces to enter in to the discourse. I am proposing it as a way of engaging with embodied, disembodied and embedded capacities enabled by the advanced technological systems we inhabit.

0.1 The Creative Practice-based Research Framework

This research contains the following transversal practice-related undertakings that intra-act in an open ecology:

- The creation of Leah, an autonomous character animation collaboratively developed with the Laboratory for Animate Technologies [LAT]. This is a self-simulated avatar. Leah was installed twice for public exhibition at the Gus Fisher Gallery in May 2016 and in July 2017;

- Alter: Between Human and Nonhuman is a curatorial project and evolving exhibition model. The core curatorial project comprised of a group exhibition featuring specific works by international artists staging the implications of a techno-sci engagement in a trans-art context. Alter featured artists Nina Sellars, Stelarc, Jane Prophet, Agatha Haines and Elena Knox. This exhibition was staged at the Gus Fisher Gallery in May 2016 and reconfigured as a VR experience at the University of Auckland Science Visualisation Lab in July 2017.

These technoscientific art projects required a diverse array of human and nonhuman agents. For the production of Leah, specialist expertise was recruited through a carefully designed collaboration with a team of scientists and computer graphic artists led by Associate Professor Dr Mark Sagar at the Laboratory for Animate Technologies (LAT), Auckland Bioengineering Institute at the University of Auckland. Sagar and his team are building neurocomputational models of the brain and face from which emotionally intelligent and autonomous avatars are constructed. Since embarking on the doctoral programme, I have been working collaboratively with these models both curatorially and artistically across differing manifestations.

This practice-led research project has meant that, at times, I have worked both from within and apart from this research laboratory and have weathered the challenges involved with working with emergent prototypes that through experimentation, research and development coalesce in several divergent iterations and formations. It has also meant working within the

3 Autonomous here refers to a computer studies usage of the term defined as: ‘a system or agent that is able to behave independently of any external control. This does not necessarily place it outside the effect of external systems, but simply means that it is able to initiate actions on itself or its environment. Also used to refer to teleological, or active, agents – which are those with their own goals that often serve to cause different outcomes in situations that otherwise have identical circumstances.’ Retrieved 18th August, 2017 from https://www.complexityexplorer.org/explore/glossary.
Leah forms part of the dialogue of the curated aspect of this thesis framed by an exhibition of international artists entitled *Alter: Between Human and Nonhuman* at the Gus Fisher Gallery at the University of Auckland. This project investigated how artists working in the interstices of contemporary art practice, biomimetic, computational, robotic, medical imaging and neuroscience contribute to an emerging posthuman enaction. Many of the works selected were developed through a specific artistic collaborative process enmeshing a neuroscientist, computer scientist, engineer and/or medical imaging laboratory. In doing so, their work manifests an emergent, iterative, transdisciplinary, technoscientific arts practice.

Accordingly, a creative practice research enquiry is activated, combining both curatorial and artistic practice. The specific outcomes of the enquiry are a thesis; an exhibition of relevant technoscience art installation at the Gus Fisher Gallery; an accompanying series of talks; A VR recreation of *Alter*; an installation of *Leah* and *Witness*. Both *Leah* and *Witness* involve the self-styled avatar connected to neuropsychophysiological and biomimetic computational practices.

### 0.2 Structural Overview
In order to support this field of technoscientific art practice, I develop *labile-technics* as a strategy involving a series of actions that draw upon feminist and new materialist approach that recognises a posthumanist perspective. These complementary theoretical approaches, will together, assist in building a processual encounter with the field of technoscientific art practice, allowing underlying systems and apparatus, permutations and transversal concerns to come into view.
Figure 1: *Leah* installation at Gus Fisher Gallery, University of Auckland. Photo: courtesy of Sam Hartnett
Chapter One proposes the term *labile-technics*, as a means to assist the tactical artist-curator to navigate technoscience art assemblages. It is conceived as a course to foreground agile tactics to reveal dynamic relations between human and nonhuman and the ways we can engage with this field, in which advanced technological, scientific and artistic systems come together.

*Labile-technics* is sited in the transversal interconnections between theory and creative practice, technoscience art, the laboratorium, posthumanism and new materialism. I begin this chapter with Section One that gives a preliminary introduction to posthumanism and new materialism. In Section Two, I then draw on these theories to describe *labile-technics* and its four principle actions of mapping, speculating, diffracting and intra-acting. In no particular order, these processes are porous enabling continuous combinations and entangled movement.

Chapter Two: The laboratorium
Chapter Two looks to the concept of the *laboratorium* and how it provides a scaffold to house the processes encapsulated in technoscientific art practices. It extends *labile-technics* into the site of the laboratorium, an experimental research and development site that is part studio, part laboratory, part online and part gallery space. I look at the etymology of laboratory and give an introduction as to why the older term laboratorium is being used. Aspects are then described of what constitutes a technoscientific laboratorium.

I move on to looking in sequence at the actions of mapping, speculating, diffracting and intra-acting in relation to the laboratorium, continuing to draw on Donna Haraway, Rosi Braidotti, Karen Barad and Iris van der Tuin when considering posthumanist and feminist new materialist concepts. I explore emergent relations manifesting with apparatus, modelling and imaging practices, process and materials. I variously draw on additional cultural theorists when specific aspects relating to procedures or apparatus are required.

Following this, there is an introduction to ways in which the exhibition can be seen as laboratorium and the gallery specifically as an unstable territory for unexpected engagements. The role of the participant in encountering technoscientific art work is examined briefly, along with the ways in which human and nonhuman are intra-acting within the space of the gallery. I look strategically at the role and value of the exhibition within this practice. This chapter concludes with a brief exploration of the actions of the artist-curator in connection to the laboratorium of the exhibition and gallery.

Chapter Three: *Alter*
Chapter Three introduces the curatorial premise and exhibition project of *Alter: Between Human and Nonhuman*. This exhibition foregrounded the works of international artists working within a technoscientific space, teasing out the relations between corporeality and technologies that allow a rethinking of the posthuman. Each artwork was a product of a shifting collaborative process involving artists, engineers, computer scientists, neuroscientists and medical practitioners, often incorporating the artist’s corporeality as data or characteristics as part of the technoscientific artwork.
Elena Knox’s (AUS) art practice challenges and plays with embodiments of gender, variously employing text, performance, sound, video, robotics and installation. In the two works exhibited in Alter, Knox has programmed and operated a gynoid robot developed jointly by the University of Osaka and Tokyo’s National Institute of Advanced Industrial Science and Technology. Comfortable and Alive witnesses the gynoid performing a hypnotic trance-like meditation sourced from the internet and Canny sees the gynoid seated in the Google data centre searching for information on female game show hosts with mathematical expertise.

STELARC (AUS) is a renowned performance and multimedia artist who has long used medical technologies, prosthetics, robotics, suspension and virtual systems as alternative anatomical architectures augmented with the body. He installed Prosthetic Head which is an embodied conversational computational agent that speaks to the person questioning it.

The next two chapters (four and five) explore the performative construction of the avatar Leah with LAT and her subsequent appearances and experimental testings.

Chapter Four: A Posthuman navigation of an avatar system. This chapter explores the foundations of the transdisciplinary laboratorium of LAT. It explores the practices that have gone in to assembling the computational systems for generating the family of avatars, their purpose and their connection to knowledge formations and histories. It reveals the research and development perspectives of Sagar and Associate Professor Paul Corballis. This provides the foundational territory from which Leah, who belongs with the Auckland Face Simulator project, emerges. This
enables an understanding of the apparatus and the relational forces and contextual uses Leah has, aside from my artistic practice.

Chapter Five: Leah and recalling her stories traces the evolution of the autonomous computational avatar Leah and the collaborative transdisciplinary processes entailed within the production stages led by LAT. It will look at the task of shifting an avatar, constructed within a bioengineering lab with relations to neurophysiological and neuropsychological research, to the art installation context of two exhibitions in Gallery Two at the Gus Fisher Gallery. This journey entails a corresponding look at the enacted event of the installations and the participation of general art audiences drawn from outside of the specialized research and technical communities involved in the avatar’s development. It will then speculate on kinship relations through embodied and embedded relations using neurophysiological and neuropsychological data. The case study draws on the development of a second iteration of the avatar Leah and this project’s artefacts that were developed in terms of data readings from biosensors, incorporated into a sound generator of human and nonhuman samples providing an imploding zone for Leah. This exposes and condenses layers of embodied and embedded relations that have emerged through the entangled process of producing the avatar and speak to the specific apparatus and processes discussed in the preceding chapters.

Finally, in the Conclusion I will summarise the findings in each of the chapters and draw out some determinations relating to tech-sci-art practice, posthumanist and feminist new materialist notions of the corporeal and the way these re-workings are played out in the context of the laboratorium. The chapters interweave with each other, and overall will show slippages, shared flows between the chapters in a material-discursive process-driven practice that mobilises theory into practice and vice versa. Due to the breadth of the literature and sources used in this creative research enquiry, the literature review is integrated throughout the thesis. Attention in the conclusion will be paid to exposing some of the differences, changes and resistances. Toward the end of this chapter, time will be spent in defining the potential further research directions that the findings of this thesis and its associated technoscientific creative practices could lead to and what the future relevance and importance of such thinking could contribute.
Chapter 1: *Labile-technics*

**technic |ˈtɛknɪk|**
1. Of or relating to the arts or sciences; (later) of or relating to technology. Also: of or relating to a particular art or science or its techniques;
2. Skilfully made or constructed.
...
b. A technical method; a scientific procedure ...

**labile |ˈleɪbɪl, ˈleɪbʌɪl|**
liable to change; easily altered.
1.1 of or characterized by emotions which are easily aroused, freely expressed, and tend to alter quickly and spontaneously.
1.2 *Chemistry* easily broken down or displaced.

1.0 Section 1: *labile-technics*

1.0.1 Introduction

*Labile-technics* is my term for a process designed for application in technoscientific art practices that are highly volatile, fast moving, rapidly developing and complex. *Labile-technics* is designed for use by artists and curators within collective transdisciplinary projects where the need to alter, adjust, to displace and change is necessary. *Labile-technics* foregrounds agile tactics for use in unstable, evolving simulated and real

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enactments. I am using the term labile precisely here to describe a combination of technology, technique and method with the capacities to alter quickly and spontaneously while being capable of being broken down.

*Labile-technics*, as a term and tactic, emerged through this creative practice research, as a speculative strategy that foregrounds non-linear, unstable and multi-layered dynamic relationality and multiplicity. Contemporary technoscientific art practices reconfigure and reconstitute the human and non-human in processes that demand a reimagining and reconvening of the relationship between artist, artwork, curator and exhibition. This research probes into and questions the tactics that can be engaged to reveal and attend to these complex posthuman ecologies. *Labile-technics* can be conceived as a conceptual and ethical challenge to develop intimate relations between embodied, disembodied and embedded engagements within the advanced technological systems we inhabit.

*Labile-technics*, as strategem, plots a course of action, or tactics, that enables the tactician, as artist or curator, to navigate the complex machinations embedded in tech-sci practices. It is informed by feminist, posthuman, science and technology studies and new materialist theory, guided by a set of key theorists consisting of Rosi Braidotti, Donna Haraway, Karen Barad, Iris van der Tuin and Lucy Suchman. These theorists provide a conceptual framework that enables and supports the strategic practices associated with collaboration, mapping transversal associations and technological experimentation. Engaging *labile-technics*, the tactician

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is inviting the restless, the uncanny and the unseen into a dynamic experiential ecology.

### 1.0.2 Labile-technics as stratagem

*stratagem* |ˈstrætədʒəm|
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a plan or scheme, especially one used to outwit an opponent or achieve an end: a series of devious stratagems.

[...] archaic skill in devising plans or schemes; cunning.⁴

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*Labile-technics* as a strategem consists of a series of tactics associated with the four principle actions of mapping, speculating, diffracting and intra-acting [Fig.3]. I propose that these processes are in no particular order and are not fixed categorisations but rather activities that hold a porosity that enable spontaneous combinations and movements. These tactics can be applied at any point of the cycle of creation and performance spanning the idea, research and development, prototype, exhibition and virtual staging and in to discursive practices including public programmes such as symposia, workshops and publishing practices and ongoing iterations.

There is an underlying conundrum regarding the complex relations between human and non-human in this practice. *Labile-technics* therefore resides within the porous interconnections between theory and creative practice, technoscience art, the laboratorium, posthumanism and new materialism [Fig. 2, 4]. An attention to the entanglement of matters, bodies and forces and their emergent properties is required.

### 1.0.3 Posthumanism

Posthumanism, in general, is concerned with the: ‘Radical decentring of the traditional sovereign, coherent and autonomous human in order to demonstrate how the human is always already evolving with, constituted by and constituent of multiple forms of life and machines’ (Nayar, 2014, p. 2). The human within posthumanism is perceived as being part of a technological ecology where technoscience is integral to an expansive and emergent world of life-forms in which the human is not exceptional or central. Recent framing of the posthuman has largely been brought about by the increasingly rapid proliferation of advances in both science and technology. The posthuman is in opposition to a humanist tradition which

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New frameworks are needed for elaborating the posthuman. This thesis is interested in the ways the human and non-human are interconnecting and bound into an assemblage of intersecting technologies, species and ecologies. The emphasis is on the relation between entities. This requires a form of experimentation that acknowledges the interrelations between the human and non-human and how we are collectively bound in a form of co-presence.

Co-presence, that is to say the simultaneity of being in the world together, defines the ethics of interaction with both human and non-human others. A collectively distributed consciousness emerges from this, a transversal form of non-synthetic understanding of the relational bond that connects us. This places the relation and notion of complexity at the centre of both the ethics and the epistemic structures and strategies of the posthuman subject (Braidotti, ibid., p. 169).

Labile-technics offers a way to explore this concept of co-presence that is defined by its activating, revealing and engaging strategies to intensify our porous and tangled relations of being in the moment with the non-human. The non-human may be a technological avatar, an air current, a wave of sound, a prosthetic arm, a flax seed or an avian companion to name a few. What is important is the intensity of: ‘collectively enacted, non-profit-oriented experimentations with intensity, that is to say with what we are actually capable of becoming’ (ibid., p. 92). By being co-present we are operating from a perspective that places the relations between human and non-human, non-human and non-human and human and human, and our collective active evolving, as important. Both Braidotti and Haraway em-

Figure 4: Labile-technics as theory and practice

broadly defines the human subject as rational, conscious, self-directed, autonomous, singular and authoritative. In this thesis, I am advocating thinking in entanglement with fluid porous participants who are always in activation.

Posthumanism is a response to the complex relations that exist between human and non-human within a contemporary global economy that has a technoscientific structure. Rosi Braidotti explains: ‘It is built on the convergence between different and previously differentiated branches of technology, notably the four horseman of the posthuman apocalypse: nanotechnology, biotechnology, information technology and cognitive science’ (2013b, p. 59). It is at this intersection that the technoscientific arts practice referred to here, in this thesis, is concerned.

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6 Rosi Braidotti is a leading feminist post-Deleuzian and Guattarian digital humanities scholar and philosopher. Her book *The Posthuman* is a key text for posthumanism, particularly for feminist scholars.
phasise the notion of becoming that acknowledges the transitional states we find ourselves in when we are in co-presence.

Braidotti’s posthumanity calls for a radical rethinking in terms of how we approach this new form of being and is utilised here in the context of tech-sci-art practices. She encourages developing transdisciplinary cartographies which account for place, power, space and time in order to ‘acknowledge the partial or limited nature of all claims to knowledge’ (ibid., p. 164). These cartographies are non-linear, ethically accountable, and oriented towards dynamic process seeking non-unitary\(^7\) figurations. One of the key features of labile-technics is cartography. It is the mapping of the environments and relations, human and non-human, to whom we are being co-present with, that define what we are experimenting with, whom we are bound to and what might then lead to what we are, in process, becoming. It requires attention and awareness, placing the emphasis on volatile relations, rather than stable and authoritarian fixed representations. Braidotti explains: ‘Art is […] posthuman by structure, as it carries us to the limits of what our embodied selves can do or endure’ (ibid., p. 107). She recognizes the critical posthumanist principles of embodiment and embeddedness.

In posthumanist thinking, the human is located within an ecology that consists of a blend of species, technology and environment and is experienced through the perceptual and sensing capacities of the organic system.\(^8\) Matter is therefore not ‘dialectically opposed to culture, nor to technological mediation, but continuous with them’ (ibid., p. 35). This is a complex process ontology that acknowledges as Pramod K. Nayer summarises: ‘In place of the self-contained consciousness, we now have a consciousness that can only emerge within an environment and through distributed, beyond-the-brain networks’ (2013, p. 39).

1.0.4 Transversal practices

New materialism proposes ‘active theory formation’ (Dolphijn & van der Tuin, 2012, p. 86) through the actions precipitating mingled thought and material practice. This theoretical position actively seeks differences within relations between matter and meaning, movement, change and flux. This is a form of both practice and method where meaning emerges in the ongoing and entangled acts of relation. Concept and creation are perceived as interwoven. It is a performativ ontology. Matter is seen as ‘a transformative force in itself, which, in its ongoing change, will not allow any representation to take root’ (ibid., p. 107). It is interested in what is emergent from the acts of relating and is aware of the expanded process leaving behind linear and bounded thought.

Transversality is an important principle in new materialist thinking as it actively breaks with the convention of dualisms. In this sense, transversality is the capacity to move across disciplines, across dualisms and between meaning and matter seeking to invoke ‘a new frame of analysis’ (ibid., p. 101). Braidotti draws on the transversal theorisation proposed in Guattari’s The Three Ecologies, in which he appreciates the relations moving between the environmental, social and psychic. He stated: ‘Now

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\(^7\) Non-unitary here is used in a Braidotti context meaning that the nomadic posthuman subject is formed through ‘an enlarged sense of inter-connection between self and others … by removing the obstacle of self-centred individualism (Braidotti, 2013b, pp. 49-50).

\(^8\) For a more extensive description: (Nayer, 2013, p. 9)
more than ever, nature cannot be separated from culture; in order to comprehend the interactions between ecosystems, the mechanosphere and the social and individual universes of reference, we must learn to think “transversally” (Guattari, 2000, p. 29). Within transversal new materialist analysis, this capacity to think through the relations between the environmental, social and psychic is important, and led to why labile-technics proposes engaging an expanded field of reference and activation when approaching tech-sci-arts practices.

In *A Cyborg Manifesto*, Haraway, first proposed the notion of the cyborg which influenced the later formation of concepts around posthumanism. Here, she calls for ‘pleasure in the confusion of boundaries’ and for ‘responsibility in their construction’ (Haraway, 2016a, p. 7). Originally a biologist, Haraway developed certain terms to help construct the territory for addressing what she saw as ‘co-constitutive and co-evolutionary’ practices (see Blackman and Venn, 2010, p. 10). She assigned the term natureculture to merge the areas of nature and culture in order to examine the ways both co-constitute each other in the formation of materialities of bodies and ecologies. She explores these ecologies where she advocated living with ‘lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines’, not afraid of ‘permanently partial identities’ and ‘contradictory standpoints’. The political struggle is to see from both perspectives at once because each reveals dominations and possibilities unimaginable from the other vantage point’ (Haraway, 2016, p. 15). Ultimately she argues for the denial of any dualism including that between human and machine. As she states: ‘It is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what is body in machines that resolve into coding practices’ (ibid., p. 60). Braidotti and Haraway both advocate an approach that is anti-dualist, actively and fundamentally interested in destabilizing the boundaries between nature and culture, machine and organism and both emphasize a monist (mind and body) perspective.

New materialism, as a recent shift in feminist thought, is useful for analyzing crossovers between the corporeality of the body, science and technology as it enacts a perspective that denies categorization, celebrates process, entanglement and flow in the redefinition of subjectivities, and re-shapes relationships between human and non-human. It questions bounded constructions of knowledges and practices allowing for more emergent and open processes to be explored. These processes will be excavated through labile-technics within the thesis to show how emergent posthuman relations are being mobilized by these technoscientific art practices.

New materialist thought advocates seeking the differences, resistances, disruptions and breaks that occur when the social, technological and the biological come together. Thinking through the complexities of the forces of power and capital, along with the interpenetration of the technological with the biological has been important to approach the development processes for my creative practice surrounding *Leah* and *Witness*. This involves paying attention to the tools that are being used, and the problems being posed, in order for an agile theoretical exploration regarding issues, such as representation and objectivity, to emerge.10

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10 These concerns have become the content of recent publications on feminist new materialism in connection to science and technology. One such text is Victoria Pitts-Taylor’s *Matterings*. Here she explains in further detail that new
Karen Barad, a physicist and philosopher, in *Meeting the Universe Halfway*, proposes a line of action where: ‘Performative approaches call into question the basic premises of representationalism and focus on inquiry on the practices or performances of representing, as well as the productive effects of those practices and the conditions for their efficacy’ (2007, p. 28). Her theories address the matter, forces and agencies within science and technology practices and their participation in posthuman reshapings of relational events blurring human and non-human, subject and object. In this thesis, many of the technoscientific art works are dealing with rapidly evolving technologies and are, consequently, raising questions of ethics and responsibilities in the context of studio-laboratory-gallery projects. Barad observes: ‘the recent convergence of biotechnologies reconfigures the human and its others so rapidly that it is already overloading the circuits of the human imagination’ (ibid., p. 27).

Key to Barad’s proposition is the notion of ‘entanglement’. I embrace the term ‘entanglement’ in the context of *labile-technics* as this device also denies categorisation or separation of any element of a relation or entity. All matter co-produces and co-evolves together in ecologies that are always in flux. There is no privileging of human over non-human, matter over discourse or observer over observed as each co-constitute the other.

To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence. Existence is not an individual affair. Individuals do not pre-exist their interactions; rather, individuals emerge through and as part of their entangled intra-relating (ibid., Preface).

It is Barad’s performative ethico-onto-epistemological theories

through her concept of intra-acting that resides at the base of the final principle of ‘intra-acting’ at work in *labile-technics*.

### 1.1 Section 2: the four actions of *labile-technics*

#### 1.1.1. Mapping

*Map*

Represent (an area) on a map; make a map of

[...]

Record in detail the spatial distribution of (something)

[...] map something out

Plan a route or course of action in detail.”

*Cartography*

The science or practice of drawing maps.

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Footnotes:

11 Barad’s ethico-onto-epistemology is an: ‘entanglement of what is usually taken to be the separate considerations of ethics, ontology and epistemology’ (Kleinman, 2012 p. 77).

The drive to produce new mappings, cartographies, plotted plots and genealogies is a specific tactic to expose and generate transversal relations in movement. To evoke cartography is to show theory formation in action where ‘movement alludes to cartography rather than classification’ (Dolphins et al., 2012, p. 111). ‘Questioning fixity thus opens up the possibility of thinking about theory formation in a non-linear, cartographical way’ (ibid., p. 112). Thinking through the practices in this thesis has required that I let go of fixed classifications and focus on movement, change and action and how and when it is manifested.

Mapping strives to prioritise movement in any direction and to acknowledge underlying forces and affects at work in the relations between human and non-human. Labile-technics can assist in revealing and moving with the artworks and collaborative practices as they form through conception to creation This is inclusive of the participatory event of intra-action unfolding through environmental, social and psychic manifestations. It acknowledges porosity and fluidity concentrating on the connections activated within these ecologies.

In my research, these non-linear mappings emerge in the way that the artworks and development of Leah and Witness emerge and, on occasion, reveal specific changing dynamic of power, scale, and visibility. This activates the engagement of the embodied and embedded self as an ‘intelligent-flesh-mind-matter self’ (Braidotti, 2013b, p. 352). Being embedded means we are located in order to be in an encounter with external, different and often non-human others in the present. This conception of subjectivity is transpersonal and collective.

Haraway also advocates a form of multi-dimensional cartography that firmly locates and situates the act of mapping as being located, of holding a partial perspective, and being implicated and caught in the ‘networks of technobiopower’ (Haraway cited in Timeto, 2011, p. 155). She champions questioning as a ploy to reveal the territory, power structures, dynamics and overall field of practice. Her questions include such provocations as:

How to see? Where to see from? What limits to vision? What to see for? Whom to see with? Who gets to have more than one point of view? Who gets blinkered? Who wears blinkers? Who interprets the visual field? What other sensory powers do we wish to cultivate besides vision? (ibid., p. 155).

Questions such as these have been useful provocations to think about when in the midst of tangled and complicated transdisciplinary projects.

In regard to technoscientific art practices, I am proposing that mapping entails examining how, in our artistic and curatorial practices, are we addressing our embodied and embedded relations. Through iterative non-linear mappings, we can follow the lines of movements across disciplines, through multiple perspectives and transformations. This thesis looks at artists who are disquieting, measuring, mapping, reconfiguring and ul-

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14 Braidotti describes subjectivity as: ‘a-subjective, beyond received notions of individuality. It is a transpersonal mode, ultimately collective’ (2013b, p. 346).
timately questioning through an experimental artistic practice. These practices expose our inability to be impartial, separate, fixed, objective or evidential. Instead, devices, actions, materials and tools are applied to precipitate substance for differing relational trials and transmutations. Out of these practices emerges a situated knowledge created from processual and performative enactions. These are necessarily flexible and mobile practices that reveal changing intricate dynamics with agility, with a propositionnal labile-technics.

From a curatorial perspective, understanding the research, thinking and development trajectories of both artists and their works, and their associated partners and technologies, enables framing public engagements with the work more precisely. The transversal relations operating within each artistic collective can make for rich contextualization both within exhibition or screening platforms and within workshop and symposia opportunities. Enabling the visibility of aspects of the extended network, such as science collaborators, enables a revealing of the multifarious within the work and its interconnections with economic, social and artistic sectors and ensuing issues. Developing collaborative relationships within the extended networks can also have potential for exploring ongoing iterative engagements from both artistic and scientific perspectives. This enables an opening up of the network for freer more imaginative and dynamic collective processes across all aspects of the creative cycle.

Overall, this strategy enables and encourages a responsive and accountable relationship with the assemblage of technologies, artistic collectives and their extended human and non-human communities. Mapping the changing ecologies of these collaborations, and shifting practices, is part of the agility and strategy of labile-technics. It reveals power structures, positions, tactics, convergences and differences whilst encouraging nuanced rich practices.

1.1.2 Speculating

Speculate
Form a theory or conjecture about a subject without firm evidence. Invest in stocks, property, or other ventures in the hope of gain but with the risk of loss.

[...]Late 16th century: from Latin speculat- ‘observed from a vantage point’, from the verb speculari, from specula ‘watchtower’, from specere ‘to look’.\(^{15}\)

The labile-technic act of speculating is a form of transversal practice and is inherently related to mapping. To speculate is to place the emphasis on the act of questioning, on developing new sensibilities and ethics, on creating an opening up of the readings and potentials of the generative and unpredictable spaces that will often emerge in technoscientific art practice. It also makes space for imagination and to acknowledge being perturbed and destabilised.

Thiele, Van der Tuin and Asberg observe that speculation must contain a degree of troubling that does not recede but stays constant so that the speculative practice does not sink into dogmatism and remains both situated and accountable. It is, therefore, a form of onto-epistemological work that makes ‘leaps and jumps’ (2015, p. 156) in thinking and practices and is prepared to go into unsettling territories.

In her recent text, *Staying with the Trouble: Making kin in the Chthulucene (Experimental Futures)*, Haraway develops the notion of ‘SF: science fiction, speculative fabulation, string figures, speculative feminism, science fact, so far’ (2016b, p. 2). This mutable list is further elaborated: ‘Relays, string figures, passing patterns back and forth, giving and receiving, patterning, holding the unasked-for pattern in one’s hand, response-ability’ (ibid., p. 13). This passing back and forth involves speculating regarding changes, patterns, reciprocal exchanges and evolving practices that is pertinent to *labile-technics*.

Speculative practices that work across the relational and porous divisions of disciplines, that embody the virtual and real, and that traverse internal and external physical territories, investigate the idea of alternative figurations. With this encouraging of speculative figuration, the human is part of this patterning, or figuring, in which it has no more significance than other species, objects, naturecultures or technologies. In effect these are all formed in the practices of interweaving at the moment of figuration. This is a practice of process. The human and non-human is not contained with fixed and clearly defined boundaries but rather in continuous reconfiguration with others.

*Labile-technics* is interested in the hybrid indeterminate zones of relation that deny unified or universal classification. Rather the human, along with non-human others, are conceived of as in-process, in ongoing machinations that have in many cases occurred as a result of our increasingly mediated technological societies. This relational communal intermeshed binding, between human and non-human, stresses the need for responsibility, care and empathy. Figurations such as Haraway’s cyborg start the work of kinship through establishing a figure for bringing together in relation non-human and human in ways that break binary definitions. These are entangled zones of technology, the environment, the non-human and the human who co-evolve together.

Within technoscientific art practices, the human is set in motion along with all other technical, material, cultural and non-human others in a intermeshed relational assemblage. It is in this transmutation that *troublings* emerge.\(^{16}\) *Labile-technics* is a way of thinking through this interwoven web of unstable relations, territories and ecologies. As part of the aim of *labile-technics* is the act of ‘staying with the trouble’ (Haraway, 2016) and entering into a connection with each featured art work, to be co-present with them and to not pre-suppose what any aspect they offer might hold, but to trace variant pathways through.

To speculate is to question, to allow the tensions, mistakes and conflicts to be. To enable certain figurations and questions to emerge is an ethical role that embeds you into the speculative ecology as an integral part of the unexpected and unpredictable troublings and insights that are ongoing and emergent.\(^{17}\)

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\(^{16}\) Barad along with Haraway speak of troublings. Barad explains: 'This is not about solving paradoxes or synthesizing different points of view from the outside, as it were, but rather about the material intrapimplication of putting 'oneself' at risk, troubling 'oneself', one's ideas, one's dreams, all the different ways of touching and being in touch, and sensing the differences and entanglements from within' (cited in Kleinman, 2012, p. 77). Haraway notes: 'Asking questions comes to mean both asking what another finds intriguing and also learning how to engage that changes everyone in unforeseeable ways' (2016b, p. 127).

\(^{17}\) Examples of these unpredictable troublings and questions are discussed when addressing specific case studies in Chapter 3, 4 and 5.
1.1.3 Diffracting

Diffract

[...] Cause to undergo diffraction.

Origin: Early 19th century: from Latin diffract- ‘broken in pieces’, from the verb diffingere, from dis- ‘away, from’ + frangere ‘to break’.¹⁸

Diffraction is a way of attending to difference. Barad states: ‘First and foremost […] a diffractive methodology is a critical practice for making a difference in the world. It is a commitment to understanding which differences matter, how they matter and for whom’ (2007, p. 90).

Diffraction is defined in physics and developed through Niel Bohr’s experiments, where electrons are seen to shift as matter between wave and particle as they are observed. The two-slit screen experiment is a key example which is often cited in new materialist accounts of diffraction. In the two-slit experiment electrons are fired at a two-slit screen where they pass through the two slits and overlap with patterns of interference on the detection screen which reveal the change in behaviours from particle to wave and the effect of which slit they passed through. A more accessible visual metaphor to understand the interference pattern is to think of a pebble tossed into a lake and the interference patterns visible in the resultant ripples on the water surface.


Barad discusses Bohr’s experiments as they exposed that variously: the measuring device influenced the process as it affected both what could be observed and measured; the inseparability of the observer performatively observing and measuring; that the device, observer and observed are entangled in intra-action and their intra-action made changes to measurement, representation and description. Diffraction challenges being able to clearly separate and acknowledge fixed positions within the entanglement in all human and non-human engagements. Barad considers diffraction to be an ethico-onto-epistemological matter in which matter is practice, doing and action with ethical responsibilities and consequences and performed from a situated stance.

In technoscientific art practice diffraction is a useful process to consider. It enables being able to assess how the technologies, materials and devices may be effecting/affecting the outcome. For example, in collective teams everyone is enmeshed in the experiment – there is no impartial observation perspective. It is also relevant to check for differences in interpretation and approach that emerge through experimentation and effect/affect the outcomes of the experiments, the designs of devices and procedures, measuring standards, building models and simulations and other aspects of experimental technoscientific processes.

Jane Prophet and Helen Pritchard perceptively note that: ‘The diffractive reading and writing process illuminates differences as they emerge, amplifying how such differences get made, revealing what gets included or excluded through practice, and prompting us to question how those exclusions matter’ (2015, p. 7). Artistic experimentation is not striving for repeatable results oriented evidential proof of hypothesis as in scientific research, but rather exists in the speculative acts of welcoming in the sur-
prising, strange, unpredictable, immeasurable, changeable, unfixed and in flux. It looks for differences, disruptions, resistances and changes.

1.1.4 Intra-acting

The move toward performative alternatives to representationalism changes the focus from questions of correspondence between descriptions and reality (e.g. do they mirror culture or nature?) to matters of practices or doings or actions (Barad, 2007, p. 28).

Intra-action replaces interaction. In interaction, the various entities pre-exist prior to interacting, in intra-action there is no prior fixing of reference as entities are always in processes and ecologies of complex entanglement. Interaction is a commonly utilised term in media installation work in particular. Through intra-action it is possible to see a series of decisions and acts occurring that contribute to the emergence of subjects, objects, forces, processes and materials. This is a relational and performative ontology that is interested in the actions between arising differences, positions and identities. Labile-technics asserts the active stance of performativity rather than representation.

In labile-technics, meaning and matter co-emerge in intra-action. Thinking through performatively and collectively in acts of co-constitution exposes the potential fluid agile flow between human and non-human, non-human and non-human and human and human. This posthumanist position is actively enacted in ongoing process of relations between and in negotiation. The paradoxical or unfamiliar is embraced and brought into more intimate relation within the ecology.

With an acknowledgement of the role of instruments, tools, materials and other apparatus that are active performers within situated engagements:

Knowing is a distributed practice that includes the larger material arrangement. To the extent that humans participate in scientific or other practices of knowing, they do so as part of the larger configuration of the world and its ongoing open-ended articulation (ibid., p. 379).

The richness of the work I have curated for this thesis, lies in the doings and actions encapsulated within, and the reciprocal affective actions of the audience who participate in, these works. The doings and actions intertwined within an intra-active artwork, are inextricably bound in practice to a specific interpretation of the term performative. This notion of the performative acknowledges both the technological, human and non-human as operating performatively together within the specific logic of their unique ecology. As Martina Leeker describes: ‘While human users may not be able to comprehend the entire technological performance, they are without a doubt intertwined within it. The digital performs, the human reacts to the agency the technologies suggest, and vice versa. “Performing (the) Digital”’ (Beyes, T et. al, 2017, p. 21). Within these ecologies there is a non-hierarchical dynamic, intra-action between all human and non-human participants.

This specific view of the performative encapsulates the actively displaced boundaries that is a feature of posthumanism. These displaced boundaries can, to some degree, be seen as those ‘between the organic, and the

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19 For a discussion of interaction in media installation (See: Kwastek, 2013, Chapter One).
The dynamic in these technoscientific artworks can be characterised as a processual exchange between bodies, machines and processes coded and uncoded. Their fracturing actions and changing mutable affects create a fluidity in bodies, identities and environments. The next chapter will explore labile-technics in action within the laboratorium.

1.2 Conclusion

Labile-technics provides a pivotal strategy for analysing and understanding what is troubling in the moment of experiencing the ecologies bound into these transdisciplinary art practices revealed through utilizing the four actions of mapping, speculating, diffracting and intra-acting. This is perceived as being like a fidget spinner [Fig. 3]. If one could imagine the figure spinning at rapid motion then all four principles of mapping, speculating, diffracting and intra-acting would blur and become merged into one formless wheel of motion. It seems like an appropriate conception for illustrating labile-technics – one rapidly spinning interconnected and indistinguishable motion where the principles have lost their form to form one merged cyclical mass [Fig. 5].

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20 The figuration of the fidget spinner came about as a friend recently saw Fig. 3 diagrammatically outlining Labile-technics and observed that it appeared like the Fidget Spinner – a spinning children’s toy [Fig. 5].
Chapter 2: The laboratorium

2.0 Laboro

laboratory, n. ...

Etymology: post-classical latin -laboratorium workplace (12th cent. in a British source) < classical Latin labórât-, past participial stem of labórâre labour v. + -ôrium -ory suffix...

Originally: a room or building for the practice of alchemy and the preparation of medicines. Later: one equipped for carrying out scientific experiments or procedures, esp. for the purposes of research, teaching, or analysis; [...] Something likened to a scientific laboratory, esp. in being a site or centre of development, production, or experimentation.¹

The laboratorium is a location where singular creativity gives way to collective mutable, and often fragmented, development - a nexus which I have identified as being a feature of techno-sci arts practice. Labile-technics extends further into the porous site of the laboratorium. It is a swarming space of intra-activation; an intensive, entangled territory where radical shifts in logic put to task becoming comfortable with reconfiguring and therefore reconstituting disciplinary zones of inquiry. Evolving studio-lab-gallery-virtual-performative operations, generated by human and non-human participant engagement, and a speculative and experimental re-conditioning alters the implications of technical apparatus.

Labile-technics advocates the creation of new strategies able to accommodate posthuman and new materialist shifts in logic. I propose that the

The term *laboratorium*, and its encompassing of both labour and laboratory, is of service when considering technoscientific art practices as it lends insight into the art form’s particularities. I use it to help to provide a framing device for inspecting and recognizing the experimental tools, materials and approaches toward research and analysis, flowing through the development, production and dissemination of the activated art works. This chapter broadly gives several strategies to ascertain how the idea of the *laboratorium* can be actuated: how these techno-sci art environments construct a range of attributes concerning testing and speculation involving

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3 Parikka has surveyed key historical examples of laboratories, and looked at the role of imaginary. For further information see ‘The Lab Imaginary: Speculative Practices in Situ’ in Bishop, E.; Gansing, K.; Parikka, J; Wilk, E. eds. (2016, pp. 76-89)
Harnessing specialised facilities and expertise through partnership is common within tech-sci art, resulting in unusual collaborative practices often set in a laboratory setting. The interrelations between the inherent disciplines, practices and materials have meant there is an ongoing reshaping of the characteristics of the laboratory when art and science converge. There is a changing status of the science and technology laboratory and its functions when other disciplines including the arts enter into these research paradigms and physical resourced sites. Arguably, this meeting of practices, disciplines, mechanisms and spaces of work is occurring as a result of the speed of technological development causing new relations, accidents and unexpected engagements to occur. Reconfigurations of these relations have become fluid with the increasing entangled ecologies in which the human and machine, biological matter, artificial and ‘human’ intelligence are enmeshed, often causing the boundaries or limits to mutate in striking ways. These porous thresholds require a different way of plotting a new understanding in our encounters with this art-sci form.

I am proposing that technoscientific artists are experimenting at the sites of these complex entanglements where, additionally, posthuman relations are being performed. The artists that I have curated for this research produce artwork that defy clear definitions in respect of disciplines and have

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4 For a history of the studio-lab since 1960 see Century (1999).
all participated in experimental exercises, interfacing with the working practices of engineers, technologists and scientists active in a ‘laboratory’ culture. A richer more open-ended process for comprehending the complexity of these artworks is required and this thesis contributes to this perceived need with proffering labile-technics as a useful set of tactics.

As such, the remainder of this chapter takes the four actions of mapping, speculating, diffracting, and intra-acting, as discussed in Chapter One, that constitute labile-technics and applies them to this space of the laboratorium.

2.1.1 Navigating the transdisciplinary
Characterized by their co-lab actions, pulling together unique re-combinant staging of personnel, sites, apparati requires mapping these demanding ecologies of practice. A diverse spectrum of operations, intensities of overlapping or merging disciplines and an influx of changing conditions will influence the development and production of each experience. It is an ongoing, evolving and re-generative process.

These ventures are frequently positioned as art-science research projects and are promoted as giving rise to new and sometimes innovative practices, as in the work, Neuro Memento Mori, created by Prophet in collaboration with two practicing neuroscientists. The artistic outcomes of these processes are complex, caught in a myriad of relations between people involving facilities, instruments, materials, methods, funding, data, incongruous forces, intellectual property, commercial interests and outcomes at cross-purposes. Negotiations are prevalent throughout the progression of research, development and production. These recurrent negotiations can highlight differences in disciplinary interpretations of experience, methods and definitions whilst being immersed in additional economic, environmental and community constraints. Inherently, the intertwining of commerce with research and development instigates different manifestations of control and influence. In my own practice, working with the Laboratory for Animate Technologies, there has been the need to navigate between the conflicting needs, resourcing and scheduling of the commercialised development, the academic research initiatives and the creative practice projects. This has emerged more prominently at different intersections of the project such as the self-styled avatar Leah that was used across commercialised and research communities. This is further discussed in both Chapters Four and Five when the expanded territory of the research and development of Leah is outlined in depth.

These contemporary ecologies are intermeshing techno-geo-political-eco-philosophical spheres that often work through varying scales of networking and networks. The movement across disciplinary boundaries is a key concept within posthumanism. The notion of porous boundaries is critical. As Braidotti notes: ‘The point of encounter or assemblage for the critical posthumanities is the acknowledgement of the porous nature not only of their institutional boundaries, but also of their epistemic core, which gets redefined in terms of relational capacity’ (Braidotti, 2017, p. 89).

New feminist theorists often discuss the different boundary negotiations encapsulated by ‘multi-, inter-, trans-, and postdisciplinarity’ (Nina Lykke, 2011, p. 138). As Lykke notes, the issues that surface through such ‘boundary-crossing’ (ibid, p.138) is a result of the complicated questions arising that cause disciplinary transgressions. I would argue that much of the work referenced in this thesis, belongs in the transmutable domain
which is ‘characterised by blurred boundaries between basic and applied research, as well as between disciplines and academic specialities’ (Nowotny, Scot and Gibbons (2011) cited in Lykke, p. 139). ‘[A] space for the unfolding of research questions’ that are not necessarily discipline-specific can lead to a more innovative and unpredictable dialogue. The notion of transversality is key and that any decisions to shape disciplinary boundaries are, as Barad purports, ‘provisional, temporary, nonuniversal, embedded in the discursive-material flow of knowledge production, social change and cultural-natural re/generation’ (ibid, p.147). Lykke uses Barad to argue for a ‘discipline which is not one’ in an Irigaran sense (ibid., p. 147). However, it has been important at times to acknowledge disciplinary knowledges as well as as well as a zigzag, circuitous route beyond them in this creative practice endeavor that I advocate with the intervention of labile-technics.

‘Trans-’ as a prefix implies the acts of or to cross beyond or over and implies movement between. My doctorate is trans-mediated moving between the university-sited disciplines of fine arts, media arts, dance, neuropsychology and bioengineering, involving both theory and practice-based applied research. The foundation of this project has taken a transversal approach actively transgressing university disciplinary and research process boundaries. This recalls Michel Century’s discussion of transdisciplinarity that states:

Further than inter-disciplinary work, in which different fields address separate problems inside a common framework, transdisciplinary research involves a stronger ‘interpenetration of disciplinary epistemologies’. Effectively, this means new fused horizons become possible, beyond or transcending paradigms existing within single disciplines. Consciously pursued, transdisciplinarity is an approach to problem-solving suited to settings where disciplinary modes prove inadequate (1999, para.12).9

Mapping open tech-sci-art ecologies can be conceived as laboratories, presenting novel ways that reflect a transversal approach with complex systems behaving in a co-activated relation with each participant and/or collaborator. These human and non-human participants will both enable and limit the work’s evolution. The art work, the artist and their transdisciplinary teams, and the transversal material-discursive flows at work, means that these are emergent relational assemblages. The act of mapping these ecologies can also be conceived as participating in the laboratorium. As Guattari observes:

7 Luce Irigaray is a Belgian psychoanalyst, feminist philosopher and French linguist who is particularly known for her opposition to Freudian and Lacanian psychoanalysis. She developed a theory of sexual difference to counteract her perception that Western philosophy and psychoanalysis was founded on the male perspective. Her theory was first outlined in the book, Speculum of the Other Woman. Retrieved August 22, 2017 from https://www.britannica.com/biography/Luce-Irigaray.


9 Century drew upon Gibbons for this definition. Gibbons was a former director of the Sussex University Science Policy Research Unit (SPRU) and worked with a team of social scientists to investigate research and development modes. He recognised in his work the mode of transdisciplinarity as being important for research and development. See: (Century, M., 1999, n.p.)
Maps themselves are like laboratories where experimentations on tracings are set in interaction. Thus, here the map is opposed to the structure; it can open itself in all its dimensions; it can also be ripped apart; it can be adapted to all kinds of assemblies. A pragmatic map can be started by an isolated individual or a group, it can be painted on a wall, it can be conceived as a work of art, it can be conducted as a political action or as a mediation (2010, p.173).

However, the notion of an open sense of mapping is what is advocated; hybrid physical-digital-spatial operations in the entirety of their networks or systems, both human and non-human, and their enmeshed relations. As Adrian Miles observes, an examination of such ‘specific qualities as the media, network, authors, users, screens, operating systems, servers, and protocols, forms a unit operation (or assemblage, […] it is the general sense of a complex, operative techno-human ecology that matters’) (Miles, 2014, para.11). The analysis and complexity of these environments shifts between each unit and the whole network as a movement enacted in time.11

To understand the components of the assemblages operating in constant dialogue within all stages of the creative processes – from initial ideas through to final outcomes - is, not simply, a means of mapping technologies, but to understand how knowledge is being constructed; its implications and our own embedded roles within the system. Haraway’s advice in working with specifically technoscience projects is:

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10 Miles, A. (2014). Materialism and Interactive Documentary: Sketch Notes. Retrieved 12th October, 2014 from https://www.academia.edu/8150318/Materialism_and_Interactive_Documentary_Sketch_Notes. Here, Miles is discussing specifically new media technological systems, however the same examination is also pertinent to technoscience art practice as it often draws on complex technical systems including, but not exclusive to, media technologies.

11 Actor Network Theory (ANT) has been influential in analysing the meshing of agents participating in science laboratories and medical sites in particular. (See: Latour, 2005; Latour and Woolgar, 1986; Annemarie Mol, 2002, 2010). From a social scientific perspective Bruno Latour looked at the system of a technoscience environment giving equivalence to human and nonhuman actors, and through this, exposed its underlying non-objective foundations. Instead, this technoscientific system is seen as a continuous chain of relations (Ride and Dewdney, 2006, p. 302). A chain of relations that, in effect, interweaves science and society into a complex network with human and nonhuman ‘actors’ including instruments, scientists, phenomena, communities, materials and laboratories. Today, there is a wide and varied group of researchers using ANT as a tool to analyse and unpack complex situations. Annemarie Mol is one such researcher. She has reframed ANT, asserting that it is best seen as a repertoire implemented to reveal multiple networks ‘co-existing in tension’. Mol states: ‘Actors are enacted, enabled and adapted by their associates while in their turn enacting, enabling and adapting these. While the verbs keep moving between active and passive, the relations that make actors be, may take the form of stable syntaxes or, alternatively of fluid associations. But as actors come to participate in different “networks”, discourses and logics, modes of ordering, practices, things start to get complex. The “actors” start to differ from one network, discourse, logic, mode of ordering, practice to the other’ (Mol, 2010, p. 260). Alongside Bruno Latour and Annemarie Mol, Andrew Pickering also theorized the space of the laboratory from a sociological perspective. He delineated and exemplified ‘a view of science as a field of emergent human and material agency, reciprocally engaged by means of a dialectic of resistance and accommodation – the mangle’ (Pickering, 1993, p. 559). He saw the scientific laboratory ‘as a realm in which instruments, devices, machines and substances […] act, perform, and do things in the material world […] in the real time of practice (ibid, pp. 563-566). Recently Pickering has further extrapolated that knowledge of nature is performative and not centred on science and the laboratory. Rather, it is centred more on performance and agency and the actions of people and things (Pickering, 2013, p. 77). He proffers a performative perspective that ‘opens up the possibility of foregrounding and actively conjuring up emergent dances of agency in practice rather than casting a scientific veil over them’ (ibid, p. 81). These different ways of looking, analyzing and understanding the systems at work in laboratories are important and at times may be useful in analysing a technoscientific art installation. However, in this thesis the emphasis has been placed on a new materialist and feminist posthumanist stance.
If technology, like language, is a form of life, we cannot afford neutrality about its constitution and sustenance. The point is not just to read the webs of knowledge production; the point is to reconfigure what counts as knowledge in the interests of reconstituting the generative forces of embodiment. I am calling this practice materialized refiguration; both words matter (Haraway, 2013, p. 61).

In relation to the laboratorium, the labile-technics aspect of mapping is a tactic to assist with not only understanding the technical and participant ecologies, but understanding the diverse and peculiar outcomes of them, in terms of knowledge constructions that include new forms being manifested. The new forms can be perceived as materialized refigurations. In Chapter Three, each of the technoscientific art case studies is treated as its own laboratorium and its respective ecology is mapped out as part of the exploration. Labile-technics contains the notion of breaking apart or breaking down. This suggests that any mapping is an open-tracing mode able to be reconfigured and is not a fixed representation.

2.1.2 Speculating models and simulations
To speculate requires a variety of tactics to expose the complexity of the transversal issues surfacing when mapping the terrain of activation. For instance, simulations, models and visualisations are key tools, often implemented as a way of exploring hypotheses by both scientists and artists. These are of mutual interest, as they can encourage discursive practices revealing ethical, philosophical and political frameworks. Through using these models, practitioners are enmeshing mechanisms for observation and measurement while consequently embodying knowledge formations, both theoretical and material, and, on occasion, as a means of questioning and speculation. I propose that some artists, such as the artists discussed in this thesis, are working with models, simulations and visualisations in a way that can be considered as belonging in the realm of Haraway’s figurations, as they are being reconfigured and repositioned in a newly conceived evolving encounter. By using these models and simulations, the practitioners are employing them in unconventional ways, contexts and settings allowing previous knowledge formations to be destabilized, consequently allowing troublings to rise.

With consideration, these modelling and simulation tools often reveal both what is being represented and what is not. As Reichle elaborates: ‘If one examines the methods of production and operation in both art and science, many commonalities come to light: collecting, archiving, observing, speculating, abstracting, modeling, experimentally examining and using analogies and metaphors’ (2009, p. 215). Frequently, artistic practice will question the objectivity and neutrality of disciplinary methods, tools and instruments and highlight the problematic and the contentious. The notion of ‘representation’ is a frequently negotiated and debated term within science and technology and art research studies generally and arises in these technoscientific art practices. This debate is a result of the questioning of the correlation between image and fact, between what is represented from the world and so-called reality. As Daston observes:

the ideal of perfect representation has proved tenacious in the realm of the image, and nowhere more so than for the scientific image. Although the history of art was forced at last by the advent of photography to abandon its long fascination with mimesis […] the same spectre of the perfect copy still haunts the history of science (2014, p. 319).
This haunting will become evident in some of the scientific and medical imagings and simulations being used by the artists, as part of the case studies. For instance, this emerges as an aspect of interest in Chapter Four when the neuropsychophysiological aspects of the LAT research culture, involved in the development of Leah, are explored. Using scientific and medical images means that there should be an awareness, as well as a participation in, how these imagings are recurrently positioned within their respective disciplinary, social and technical networks.

Many of the works analysed in this thesis are speculating through redeploying scientific visualisation practices, commonly used in pursuit of evidence, knowledge or clinical data for analysis. Ever more sophisticated methods of visualising scientific data are emerging through rapid expansion of medical and technoscientific instruments, software programmes, and hardware and data-mining techniques. These visualisations are mutable with parameters that are adjusted according to technician, programmer, researcher and scientist’s requirements. They belong to a long visual history of medical imaging that date back centuries and have been used as the building blocks for information dissemination and theorising traditionally by scientific and medical research communities. They continue today as a core tool for the application, representation and distribution of scientific and medical knowledge.

Suites of technologies that draw on cognitive neurosciences and spin-off applications, will extend into convergent technologies including machine learning, artificial intelligence, software agents, robotics, various software driven methods for neurophysiological and neurobiological sciences for mapping and measuring. Significant labour and visualising resources are corralled for the purposes of medical imaging and visualisation including ultrasound, microscopic, MRI, CAT and PET scans, to wet biological processes such as tissue and gene procedures. These biomedical technologies cause a visualisation of the internal spaces of our body imparting an impression of a body of porous and transparent dimensions that figuratively moves between internal and external perspectives, micro and macro viewpoints.

Scientists and artists are mutually interested in imagings and visualisations and the sharing of data, that bring together ‘artificial and biological intelligences, processes, and creative forces’ (Carvalhais, 2016, p. 19). Examples include: optical imaging technologies such as brain and facial scans and modelling and biomimetic simulation. As artist/researcher Suzanne Anker notes some of those apparatus that are optical instrumented imaging systems contain an iconography of instrumentalisation (2015, p. 190). As Anker further details, that in addition to these medical imagings is ‘the incorporation of 3D modelling software, systems theory, artificial life, robotics, biodegradable scaffolding and an interest in emergent theories of life [that become] a source of techniques and subject matter’ (ibid., p. 192). Primarily engaged within the creative practice in this dissertation are artists who are extending the ways of seeing and experiencing the body within an ethical and political context of questioning notions of ‘authenticity, identity, and bodily integrity’ (Anker & Nelkin, 2004, p. 3). To reiterate, the imaging and simulation practices are not being perceived as either objective or representative. A critical discourse can, therefore, be activated, blurring boundaries between the fields of art, research and technoscience between materials, forces and processes, and between the artificial, the natural, the human and the non-human.
Regula Valerie Burri and Joseph Dumit, both social science and technology studies researchers, have assessed visualisations centering on their production, engagement and deployment with special attention given to their potential powers of persuasion. They suggest that:

When studying production, STS scholars examine how and by whom images are constructed by analysing the practices, methods, technology, actors and networks involved in the making of an image. The analysis of engagement focuses on the instrumental role of images in the production of scientific knowledge. Research on deployment, finally, refers to the use of scientific visualizations in different social milieus. It studies how images diffuse into non-academic environments and analyses the intersections of different forms of (visual) knowledge (2007, p. 300).

This three-pronged attack of studying production, engagement and deployment when approaching the analysis of medical imagings and simulations is pertinent as this method reveals shifts in meaning and applications outside of the laboratory and the academic environment. Speculation is a way of increasing the level of experimentation. As Born and Barry note:

[A]rt-science performs the mutual transformation of both the objects and practices of, and the relations between, science and art. In this way art-science becomes not so much a way of producing a public for science, but what we term a public experiment (2010, pp. 104-105).

Labile-technics is interested in the various ways that can be brought to bear on the acts of questioning, of revealing and troubling. Through repurposing scientific and medical tools, models and imagings, artists enable other possible outcomes, opening up the field of operation, resisting closed readings, introducing different processes and complex relations to arise in intra-action.

2.1.3 Diffracting through apparatus and imaging

Diffracting is both practice and method and brings attention to difference and interference. This perception of diffraction is drawn, as we have seen in Chapter One, from Barad and the extracted learnings that came from re-examining Bohr’s physics experiments. Through this analysis, Barad concluded that the apparatus in the experiment influenced the outcomes and the process. Critical to Barad’s analysis of the laboratory, scientific observer and the parameters of the experiment, and hence to the technoscientific creative practices, addressed in this thesis, is the understanding of what is meant by apparatus in this context. Within the scope of the artists discussed here, the apparatus is an instrument such as a scientific piece of equipment (eg. microscope, MRI suite, CAT scan) directly, and significantly tied to the development of the work. These instruments, usually housed in a ‘laboratory’ are frequently employed as observational instruments and as such frequently positioned as neutral.

Returning to Barad, we can see that her argument regarding the use of instruments or apparati play a crucial role in the production of phenomena rather than being separate from phenomena (2003, p. 816). She critically repositions the apparatus as an open-ended practice in itself, denying that apparati are simply laboratory instruments or observational mechanisms. Rather apparati:
are the local physical conditions that enable and constrain knowledge practices such as conceptualizing and measuring; they are productive of (and part of) the phenomena produced; they enact a local cut that produces “objects” of particular knowledge practices within the particular phenomena produced (ibid., p. 819).

Furthermore, she speaks of the observational cut as of importance, whereby in the act of observation there are also the acts of what is and what is not included. This entails paying attention to the differences that occur when interference conditions are activated and what are the implications of these consequential breaks with prior understandings or doings. Diffraction, here, indicates that matter and meaning are inextricably bound. The notion of diffraction as a tactic is of importance for both Haraway and Barad. This connects to the labile-technics tactic of mapping as this technique can also be applied to a mapping of difference or interference.

This is a non-dualist process as it does not polarise one practice against another or one discipline against another, but aims to read them through one another. This approach is a porosity, interweaving and intermeshing across thresholds rather than perceiving disciplines as separate, fixed and distinct. As Barad has outlined:

unlike methods of reading one text or set of ideas against another where one serves as a fixed frame of reference, diffraction involves reading insights through one another in ways that help illuminate differences as they emerge: how different differences get made, what gets excluded, and how these exclusions matter (cited in Bozalek & Zembylas, 2017, p.116).

In this approach there is no objective observer or outsider, nor neutral apparatus or imaging practices. It is also not a means to argue for a consensual outcome but rather to acknowledge contention, continuous rethinking and friction. As with the previous tactics this is another strategy to enable Troublings to arise and become evident.

Diffraction acknowledges the messiness of this situation and posits that the apparatus, in the act of measurement, is activating both meaning as epistemology and practice as matter and ontology. Apparatus and the user of the apparatus are inextricably bound into the production of what arises and what it means. Barad shifts the emphasis to phenomena that arise as shared and not belonging to independent and fixed objects or subjects.

Within artistic activations such as Prophet’s Neuro Memento Mori and Sellars’ Scan included in Alter, ‘the porous boundaries between experimental apparatus and humans’ (Gardner & Jenkins, 2016, p. 3) comes under consideration. This is especially applicable when artists and researchers are using their/our own bodies as generators of knowledge and entangled enaction. Biomedical technologies are often used to image the body when it is troubled by disease and are used as a form of establishing objective fact. The body is often perceived as an object by medical and

12 For a useful comparison of reflexivity and diffraction as methodologies for use in education environments (See Bozalek & Zembylas, 2017).

13 For a description of how this impacts on a feminist methodology refer to Iris van der Tuin’s chapter Gender Research with ‘Waves’. On Repositioning a Neodisciplinary Apparatus in (Buikema, Griffen & Lykke, 2011, pp. 15-28).
scientific disciplines and is observed through the use of apparati such as microscopes, magnetic resonance imaging amongst many others as well as through measuring pulse, taking blood samples to measure levels of substances such as haemoglobin.\textsuperscript{14} It is a subject when perceived as a fixed body that is private, bound, emotive, fleshy and situated. To reclaim these imaging practices and to use them consciously as part of a complex posthumanist performative artistic practice blurs binary dichotomies of subject and object. It does not see the body as fixed or bound to the fleshy subject but rather porous and cut through by multiple forces and technologies. Using these scientific and medical imaging procedures in a technoscientific artistic practice provides the artist/s with a contentious and risky platform in which an embedded performative practice emerges.

2.1.4 Intra-acting zones

Intra-action in relation to a technoscientific art project recognises the emphasis is on probing the processes and actions of the system as a mutable performative assemblage. An activation that forces, materials, knowledges, technologies, practices and bodies, human and non-human, intra-act and bound in a performative encounter. In the experience of these technoscientific art environments, Salter observes:

\begin{quote}
perception involves multiple scales of overlapping machine and human temporalities: the lived, real time of the event experienced by the observer/listener; the technical time of the mechanical or electronic apparatus and their inherent delays and latencies; the micro and submicro times between successive frames or samples; the speed of sound, light, and motion that go beyond human perception thresholds, and their respective second lives produced by reflections, diffractions, and reverberations (2011, pp. 215-216).
\end{quote}

The perception of sites and states is both a machinic\textsuperscript{15} and human intra-action and is manifesting and entangling in both the virtual and material laboratorium sites in action.

In the intervention of labile-technics, the computation system itself, is both experimental apparatus and performer. A computational system or procedure is designed as a set of rules that create a space of performative possibility, as well as, paradoxically, a space of logic and control. As Cramer notes: A computer program is a blueprint and its execution at the same time’ (cited in Carvalhais, 2016, p. 43). The designer of the computer programme designs a space of potential and complexity as well as ‘control and regulation because freedoms, constraints, and controls are embedded in the architecture of the code’ (ibid. p. 49). The programmer cannot preconceive all possible configurations as these will change according to the intra-action with other systems, human and non-human factors.

\textsuperscript{14} For an interesting example concerning a scientific reconsideration of the living body being perceived as an object and subject see Mol & Law’s chapter on ‘Embodied action, enacted bodies: The example of hypoglycaemia in (Burri & Dumit, 2007, pp. 87- 108).

\textsuperscript{15} ‘The body conceived of as a machinic assemblage becomes a body that is multiple. Its function or meaning no longer depends on an interior truth or identity, but on the particular assemblages it forms with other bodies’ (Deleuze and Guattari cited in Malins, P., 2004, p. 84).
sometimes more sustained state of relation as well as the passage (and the
duration of passage) of forces or intensities’ (2010, p. 1). In particular, is
the focus on the blurred, porous boundaries that emerge between human
and non-human when the nexus between artificial intelligence, robotics
and bioengineering is at work. This leads to a conscious involvement
of the biomediated body in relational engagement. This biomediated body\(^{16}\)
speaks to the intra-action of the digital with biological matter and forces
in general. The biomediated body can be seen as an informational substrate,
the biomediated body exists in an assemblage that extends into political
domains, including those of surveillance and security. Informational bio-
mediation includes the technologies that monitor bodily affect and effect
‘ranging from DNA testing, to brain fingerprinting, neural imaging, body
heat detection and iris or hand recognition’ (ibid., p.19). This list is specif-
ically mentioned here, as some of the case studies in this thesis use some
of these biomediated technologies.

Intra-action resists the common media art descriptor of the interactive
that perceives of each participatory element as pre-existing and able to be
referred to as independent. This is often a disciplinary-specific term that
refers to ‘computer-supported works in which an interaction takes place
between digital computer systems and users’ ( Dinkla, cited in Kwastek,
2013, p. 4). This is particularly important for conceptions around medium
specific definitions operating in new media environments. For instance,
Beryl Graham and Sarah Cook define new media art as ‘art that is made

\(^{16}\) Patricia Clough in her work on affect has outlined the formation of the
‘biomediated body’ (2008, p.1). This concept is a reconfiguration that ‘exposes
how digital technologies [...] attach to and expand the informational substrate of
bodily matter and matter generally, and thereby mark the introduction of a “post-
biological threshold” into “life itself”’ (ibid, p. 2).

using electronic media technology and that displays any or all three
behaviours of interactivity, connectivity and computability in any combi-
nation’ (cited in Quaranta, 2013, p. 251). This thesis has a position that is
not operating within the disciplinary debates of what constitutes media art,
new media art, contemporary art or interactive art. It is perceiving of these
artworks as participating in a wider field of practice and I am more inter-
ested in the active entangled zone between human and non-human porous
entities.

In my practice, thinking actively with awareness of the collective, who are
in acts of co-constitution, exposes the potential fluid agile flow, between
human and non-human, non-human and non-human, human and human.
This propositional position is activated in an ongoing process of evolving
relations. I have drawn on the ideation of Haraway and Barad regarding
matter as unstable and performative, not stable and representative. This is
an active and felt perception that has in part emerged from the experience
of working with the science and technology community, and the relations
with the neurocomputational research community, surrounding the making
of the avatar Leah.

2.2 Gallery of unstable engagements
When these works become part of the public sphere, their ecologies are
in action, and for the human participant, requires cognizance through
consideration, action, reaction, interaction and intra-action. The human
participant is often implicated within the installation as bound in intricate
co-present relations. The aesthetic experience becomes a working proce-
dure, and in some cases, the artwork has no defined end point. Dorothea
von Hantelmann has analysed the shifts in definitions of the performative
in relation to contemporary art practices with an emphasis on the expe-
panding, partially due to the human/non-human entanglement that occurs through the experience. I speculate that the gallery, when it displays contemporary technoscience art installation practice, initiates novel ways in which our awareness of our embodied and embedded performative co-structuration emerges. As Salter observes: ‘Perception is increasingly seen as co-structuration – a simultaneous coupling of body, brain and the lived spaces in which the body finds itself’ (2011, p. 201).

Exhibitions provide environments in which we have the opportunity to fully explore our intricate relations with emergent technologies. These encounters uncover, and in some cases, highlight affective and sensual engagements. Affects arise through the encounter causing shifting meanings. Wolodzko asks: ‘Within this dimension of an encounter, a new question reveals itself: what does affect actually do between the seen and the unseen, sensed and un-sensed, as opened to beyond, an excess, being of the material yet incorporeal?’ (2015, p.173). The participatory event of the exhibition of technoscientific art contains an affective potency. A concentration of ensnared in-between spaces of felt sensation.

Technoscience art installations often operate within controlled environs, where the viewer’s movements, and physical space of interaction, can be mapped and monitored through a combination of sensors, cameras and software. These installations can be designed using discrete sensory inputs such as facial recognition software, motion, light and temperature, amongst many others. Tech-sci-art installations are, therefore, systems limited by the capacities and designs of the devices, such as sensors, and by the computational array itself. However, in the intra-action of the dynamic responsive relationship, between the human and these non-human agents, unstable lively enactions prevail. This can be additionally
complicated when a technoscientific art exhibition project, such as Alter, fuses virtual and interactive technologies, where the experience moves from in-situ to a relationship with remote conditions, such as real-time networks or biosensors sourcing real-time data collection, or virtual conditions such as in VR or internet-sited virtual walkthroughs.

These works are encountered as ‘enactive’. Salter describes the enactive view as: ‘perception is not representation but action – a direct projection of the body into the environment and an ongoing ‘probing’ of that environment with the sensor and motor capabilities of the active body’ (Salter, 2011, p. 214). The process for experiencing and understanding is exploratory and one of sensual engagement. Through acting as embodied and active in and with the environment, the human participant is embedded. Hence, expanding demands are being set for the participants by the artworks and artists, culminating in the potential for curatorial practices that can traverse contextualization, teamwork and flexible staging with the ability to move between virtual and physical spaces.

Exhibitions can be seen as a testing configuration for unfolding practices for curators and artists. By positioning the exhibition as a ‘discursive event’ it is possible to capture an ‘emerging view of curating as creative authorship and discursive coproduction’ (O’Neill, 2012, p. 127). The exhibition can be considered a platform for traversing paths, interconnected with divergent contexts, communities and disciplines. As per labile-technics, this idea of exhibition requires agility within slippages, iterations, risks and experimental practice and welcomes performative, process and discursive outcomes.

In their development and staging within a gallery context, new methodologies and findings can potentially emerge for both scientific and artistic practices. For works that are more intimately bound to the scientific processes the research and development may entail elements of testing, feedback and analysis. This is of significance to curatorial practice as the gallery may become the site where data is collected, participants’ responses are sampled and overall public interaction analysed. In this sense, the exhibition as laboratorium is the site for both a speculative experimental encounter, a ‘knowledge-gathering’ event.

The ways in which technoscientific art projects encourage transversal speculative practices, in turn, inspired me to recontextualise the gallery as a site for work, testing, mediation and experimentation. Consequently, the gallery became a laboratorium from multiple perspectives and usages, particularly when considerations regarding inherent performative process and knowledge exchange are considered. The Laboratorium was also an exhibition project curated by Obrist and Vanderlinden (2001) which referred, in part, to ideas put forward by early 20th century historian Alexander Dorner. Dorner believed that the museum was a laboratory that bridged disciplines and presented relative rather than absolute truth.

As a curator-artist, I perceive the space of the exhibition as laboratorium, and it provides the place that audiences, artworks, collaborators and artists come together in intra-action over a defined period of time. In this shared moment, the work of the curator and artistic collective becomes visible marking a moment of performative engagement in an ongoing process of composing, making, assembling and gathering together.
As a transversal transaction, it acknowledges the interconnections between participants, cultures, histories and worldviews that emerge when these installations are mounted. The exhibition space, as a setting for practice, divulges these compounded, imploded relational operations between the artists and their collaborators, artworks, curator/s and audiences. They add to the level of experimentation and activate a multiplicity within shifting frameworks of experience. They problematize the contemporary and the historical and highlight our current political challenges of shifting, unstable identities.

Within my curatorial practice, being mindful that multiple flows are exposed, spoken about and enabled is how the curatorial role itself operates on a variety of levels that acknowledge not just the audience but the gallery, as well as the larger cultural environment that the gallery is part of. In other words, it is important to situate the practices grounding them in the context of both their production and their exhibition and dissemination. The gallery becomes a testing ground for these factors to circulate and the location for facilitating new emergent practices to unfold.

2.3 Conclusion
The laboratorium’s relevance to a technoscientific art practice has deep and complex roots that inform its contemporary positioning, encompassing the labile-technics of experimentation, speculation, mapping and performance. Arguably, within the current intersection of media arts, science and innovation technologies, the concept of the laboratory requires careful analysis: one that considers the intra-action of disciplines, materials, concepts and bodies. Labile-technics in activation accommodates sites of collaborative action where diverse transversal ecologies are in intra-action.

This chapter has covered a wide-array of insights and interpretations regarding how the gallery-studio-lab can be encapsulated as ‘laboratorium’. In sympathy to the original definition of the word laboratorium, the exhibition and gallery locus have been inspected through the lens of comprehending how technoscience art installations employ the ideas and work of testing, speculation and experimentation from a transversal new materialist and posthuman perspective. I proposed that these articulations are happening in ways that reorient our performative engagement and inevitably leads to mutable, nuanced, transversal and relational encounters. These relational, unstable shiftings are embedded within the acts of participating and production and avail human machine relations and complex intersubjectivities and intercorporealities that will be examined more deeply in subsequent chapters. Opening up the conception of the laboratorium, the gallery, the studio laboratory, the technoscience art work and exhibition can be regarded as a dynamic and complex terrain for interweaving emergent material practices and discursive potentialities.
What do each of the technoscientific artworks, in the group exhibition *Alter*, tell of their materials, processes and entanglements? How are human and non-human bodies intra-acting in these operational and media ecological systems? What happens when artists use their own corporeality, personal data and medical imaging as part of their technoscientific art practices?

*Alter: Between Human and Non-human* [Fig. 7] is an exhibition of technoscientific artworks that engaged with the posthuman by activating a series of figurations revealing the non-unitary, fluid and transitory states discussed in the previous two chapters. The group of artists in *Alter* perform the troubling and unpredictable across biotechnologies, information technologies, cognitive science and social robotics. These particular works selected for *Alter* are examples of the novel, experimental processes that open this thesis up to such acts of speculative questioning as outlined above. The works locate and engage the notion of the laboratorium as a framework for looking at the complex mappings of a posthumanist engagement through the differing usages of the artists’ corporeality, research data and apparatus intertwined with an embedded tech-sci-arts practice.

Artworks that offer a critical rethinking of the porous physical boundaries of the body are positioned as posthuman entanglements oscillating between character, biomimetic and computational intra-actions. As active engagements, they raise questions around the role of objectivity, representation and measurement whilst recognising the inherent ensnaring of societal, cultural and political systems. Showing the melding of our embodied and embedded entanglement between apparati, corporeality, affect, environment and system, they expose complex relations within a technoscientific structure.
This particular group of international artists collaborate in a range of transdisciplinary practices and technological processes. The artworks in *Alter*, entail collaborative practices with medical, scientific and technological teams. Each of these disciplines routinely use imaging apparati to map, measure and model the human form. As such, artworks that draw upon these elements raise issues, relating to the specific application of their respective imaging apparati.

These encounters with tech-sci-art installations test the boundaries, limitations and relations between data, content, labour and service. They represent unique ecologies that bring together diverse elements into particular intra-action. Experienced as posthuman assemblages that bring to the fore displaced boundaries between the organic and the inorganic, attention is focussed on the liveliness crossing the borders between human and non-human. These lively practices are then automated in systems that re-mix the human and non-human in activation. This is corporeality in movement. *Alter* presents ecologies in which ‘specific bodies and machines are figured with and through one another’ (Stacey & Suchman, 2012, p. 35). These ecologies enact a posthumanist notion of what a body is and what a body can do. As Braidotti reminds us: “The body” […] is not a discrete entity but an interface, a threshold, a field of intersecting material and symbolic forces’ (ibid., p. 23).

Both Haraway and Braidotti, call for alternative stories, maps and figurations that reveal human and non-human relations co-evolving. This post-human postion is enacted in an ongoing process of encounter, entanglement and negotiation. It is the space of the nomad who fluidly navigates transitional states. The paradoxical, unfamiliar and surprising is embraced and brought into an intimate relation within the operative.

Sympathetic to Barad’s notion of intra-action, these works are: ‘moving away from the familiar habits and seductions of representationalism (reflecting on the world from outside) to a way of understanding the world within and as part of it’ (Barad, 2007, p. 88). The posthuman shifts in and out of focus while various knowledge constructions are in formation. Within these artworks can be seen the developmental diffractive differences that have emerged through experimental practices. As Barad notes: ‘the material-discursive practices through which the very distinction between the social and the scientific, nature and culture is constituted’ (2007, p. 141).

These material-discursive practices are specific to each work and attention is spent in this chapter on each of their respective ecologies including their production, development and circulation. Each artwork is discussed in detail and in turn, without drawing similarities or dissimilarities but paying attention to each artwork. Through what I call *labile-technics* practice, each artworks’ unique particularities surface and are engaged with. Time is spent discussing the relevance of a concept of ‘laboratorium’ to their practices including collaboration, systems and facilities.

The six works I selected, alongside *Leah*, for *Alter: Between Human and Non-human* were:

- Nina Sellars: *Scan* (2012)
- Elena Knox: *Canny* (2013) and *Comfortable and Alive* (2014)
ALTER
between human and non-human
Curated by Deborah Lawler-Dormer.
Featuring works by Stelarc, Nina Sellars, Agatha Haines, Elena Knox and Jane Prophet.
Friday 22 April – Saturday 21 May 2016

GUS FISHER GALLERY
Tuesday – Friday 10am – 5pm / Saturday 12 – 4pm
The Kenneth Myers Centre, 74 Shortland Street, Auckland
Phone 64 9 923 6646, gusfishergallery@auckland.ac.nz
www.gusfishergallery.auckland.ac.nz

Figure 7: Alter: Between Human and Non-human. Exhibition invite, May 2016.
Following this, I will discuss labile-technics as curatorial practice. This entails looking at the working model of the virtual walkthrough that was used for prototyping and collaborative negotiations, the Gus Fisher Gallery exhibition including installation challenges and finally the VR experience of Alter designed for examination documentation. The VR Alter experience was installed in July 2017 at the Science Visualisation Lab at the University of Auckland.

3.1.0 Jane Prophet

3.1.1 Prophet’s practice.

Prophet has developed a long-standing creative practice that features a transdisciplinary approach interfacing with engineers, medical researchers, surgeons and scientists. Her creative practice frequently engages with the life sciences in connection with new media, technoscientific art practices and ubiquitous computing. Additionally, her practice explores new materialism, feminist theories and artificial and ‘real’ presence [Fig. 8].

The artwork, Neuro Memento Mori, is a collaboration between Prophet and neuroscientists Zoran Josipovic (New York University) and Andreas Roepstorff (Aarhus University). Prophet, together with Josipovic and

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1 At the time of the Gus Fisher Gallery exhibition Prophet was Professor of Creative Media in the School of Creative Media at City University, Hong Kong.

2 Ubiquitous computing originates from Mark Weiser who in 1988 invented the term to describe making computers embedded throughout the physical environment and invisible to the human user. eg. mobile phone technology. Retrieved 5 May 2017 from http://pubweb.parc.xerox.com/weiser/weiser.html. (Also see: Beyes, T et. al., 2017, p. 34.)

3 Zoran Josipovic is a research associate at the New York University Cognitive Neurophysiology Lab with a focus on consciousness and the impact of meditation on visual perception, emotion and the functioning of anti-correlated networks in the brain. Andreas Roepstorff is the Director of the Interacting Minds Lab at Aarhus University and was previously an anthropologist. He is interested in investigating human interaction involving the holistic human as embedded in a cultural context.

4 Functional magnetic resonance imaging images the brain in action and is used to explore higher cognitive functioning such as motor or task activation. ‘It is based on the principle that changes in cerebral blood flow and metabolism are coupled to changes in regional neural activity involved in brain functioning.’ Most fMRI use a ‘contrast agent to reflect a complex interaction between the volume of blood, its flow and the transport of oxygen’. (See Asbury, 2011. pp. 38-39).

5 Alongside the generation of various artistic works, for both art and science audiences, Prophet and the scientists are collectively engaged in distributing knowledge gained from the research study in the form of scientific papers to be published in academic and professional journals. Prophet herself has also published papers regarding this work in various platforms including SIGGRAPH Asia and a recently published chapter for The Routledge Companion to Biology in Art and Architecture (2017) entitled: Self-Portrait of the Artist Meditating on Death. A Feminist Techno science Reading of the Apparatus of Contemporary
Figure 8: Jane Prophet. Self-Portrait with Neuro Memento Mori 2015. Photo: courtesy of Annick Lung
Figure 9: Left: Arcimboldo Giuseppe (1527-1593) - La Vanita. Right: Yermolai Kamezhenkov (1790) A Portrait of a young Lady: E. N. Likhachyova


Figure 10: Wax model of a Female head depicting life and death (Unknown 1701-1800). Image courtesy The Wellcome Trust and Science Museum London.

The project explored a mutually agreed upon speculative premise through a set of research questions. These were as follows:

Can contemporary neuroscience and new imaging technologies increase our understanding of consciousness?
When we look at memento mori artworks are we prompted to contemplate our own mortality?
What parts of the brain are active when we look at these artworks?
What parts of the brain are active when we meditate on death?

Brain images, sourced from the 3D datasets produced as a result of the fMRI sessions, were then processed and formulated to obtain the data required to create a 3D rapid prototyping print of the artist’s head. The outcome was a three-dimensional memento mori like sculptural bust, that peeled back layers of the head revealing the skull and grey matter of the artist’s brain. This sculptural bust was inspired by an artwork held in the Wellcome Trust Permanent Collection and the history of vanitas and memento mori [Fig. 9, 10]. Prophet is seeking to produce a contemporary memento mori artwork that could inspire a contemplation on mortality similar to the historical memento mori and vanitas images.

Bringing into the mix, her own speculative and diffractive practice, she further embedded both herself in the form of portrait and neurobiological data, to imaginatively create an artwork to inspire the affect of contemplation in the viewer. By inserting herself, and her chosen art historical references, she brought into the assemblage aspects that changed the meaning, framing and use of the scientific imaging away from representational and fixed objective ‘truth’ to a performative practice that shows the flux between these aspects. Her premise, she describes, as follows: ‘In creating this artwork, the intention was not to produce a Turing Test-related artwork that interacts with the viewer, nor to make robotic artwork. [...], but to use neuroscience techniques to make a contemporary memento mori, an object that brings together a sense of the living and the dead’.8

Both Neuro Memento Mori and the historical artwork hold a particularly ‘charged’ status as objects. Previously Prophet outlined how she perceived the art object to operate. She observed the role of an art object as: ‘an “art object for thinking” a piece of art through the way it combined images and objects might prompt the viewer to reflect on particular ideas’ (Prophet & Inverno, 2004, p. 4). Rather than perceiving of Neuro Memento Mori as a fixed object, I perceive the artwork as a work that sets its own agency through its intra-active encounters. This involves the diffractions occur-

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7 A rapid prototyping print is model made from 3D data using 3D printing technologies. For a guide about the steps in rapid prototyping refer to: https://all3dp.com/rapid-prototyping-3d-printing/

ring through the interweaving of the neuroscientific research, her own biological data, her thinking practices and the specific vanitas and memento art historical imaging. Contemplation is just one of many affects in emergence.

Prophet’s *Neuro Memento Mori* emerges from a transdisciplinary research project that, as a whole, addresses mapping neural plasticity or the ability for the brain to change. By learning nondualist meditation practices from a neuroscientist9 and then being monitored for changes in brain activity, Prophet is a participant in neural plasticity research. One of the original sources of attraction to being involved in such a project for Prophet, was the awareness of the large-scale neuroscience projects launched in 2013 – namely the EU funded *Human Brain Project*10 and the US *Brain Initiative*.11 She noted the scientific rhetoric of the brain ‘being positioned as “one of the greatest challenges of 21st century science” and “advancing the frontiers of brain-inspired technology”’ (Prophet, 2016, p. 484). Neuroscientific imaging practices, within this more transversal view, becomes a critically charged practice actively developing a new cartography that resists the universally applied principles of large-scale US-centric or EU-centric science projects, bringing to bear a situated, located, embedded practice.

The popularity of the concept of neural plasticity, is itself an area of feminist research (see Malabou, 2008; Pitts-Taylor, 2016b; Wilson, 2004). The concept of neural plasticity ‘refers to the brain’s ability to biologically change and be changed […] It means that the brain is not hardwired, but rather constantly developing and changing in response to experience’ (Pitts-Taylor, 2016b, p. 2). As a feminist theoretical area of research, this acknowledgement of the unique adaptability and relationality of the brain to social and environmental conditions means that notions of universality and fixity are countered. The experiential relational significance has led to a nuanced dynamic model that supports the notions of embodied and embedded as acknowledged by feminist new materialist theorists.12 The brain is therefore always in relation to body and environment, with potential for such attributes as kinship and relationships, intercorporeality and intersubjectivity. Pitts-Taylor advocates in particular for the interpreting of neuroscientific literature and research alongside critical, queer and feminist studies. (ibid, p.15)

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9 Zoran Josipovic co-directs and helped establish the Nondualist Institute. Nonduality is understood to mean here the unity of subject and object, self and other. ‘Nondualist research aims to explore the nature of nonduality through a multifaceted approach that looks both at the nature of nondual awareness, and at the ways in which it can influence cognitive, affective and somatic dimensions of our experience.’ Retrieved 13 February, 2017 from: http://www.nondualityinstitute.org/ To see the examples of the kinds of meditation practices see Prophet’s blog post dated November 11, 2014 at http://www.neuro-memento-mori.com.

10 Broadly the Human Brain Project has been established to accelerate research and development within the fields of ‘neuroscience, computing and brain-related sciences.’ It includes targeting multi-scale modelling and simulation encompassed within a large research infrastructure. See the Human Brain Project website for further information: Retrieved 3 July, 2017 from https://www.humanbrainproject.eu/en/.

11 The stated mission for the Brain Initiative is that it: ‘seeks to deepen understanding of the inner workings of the human mind and to improve how we treat, prevent, and cure disorders of the brain’. Since 2013 a number of advances in neurotechnology have been made through collaborative alliances between US-based scientists partnering with global research initiatives. See the Brain Initiative website for further information. Retrieved 3 July, 2017 from http://www.braininitiative.org.

12 See Pitts-Taylor for an overview of this especially the introductory chapter on the social brain and corporeal politics (2016b, pp. 1-15).
Returning to the specificity of Prophet’s artistic practice, she has written about a previous project working with stem cell researchers, computer scientists, curators and mathematicians and observed: ‘The research is situated in sometimes conflicting cultures ranging from the hypothesis driven ethos of the medical research lab, to the reflexive practice of the art studio [...] Simultaneously, the extra-contextual framework of art counters that there is no truth, only subjective interpretations and constant slippage of meaning (and that the goal is to ask questions rather than find answers.’ (Prophet & Inverno, 2004, p. 3) Here Prophet reflects similar sentiments embedded in labile-technics, acknowledging what I describe as the laboratory as a space for bringing the performative, the diffractive and the speculative into experimentation.

Prophet acknowledges Barad’s influence in the way that she views her practice. As Prophet states:

‘As part of my art practice I endeavor to view neuroimaging apparatus as part of the practice of producing neuroscientific phenomena. [...] Agential realism shows us that neuroimages are not separate from the human brain they supposedly represent, even though they might momentarily appear so when we make an observational cut to create them. [...] Furthermore, neuroimages only emerge when humans intra-act with non-humans as part of neuroscientific apparatus (Prophet, 2016, p. 486).

In this statement, we can see the artist is intertwining the notion of the laboratory containing specific apparatus and knowledge systems, resisting their fixed positions and introducing tactics that recognise responsibility, accountability and flexibility.

3.1.2 Neuro Memento Mori (2015)

Prophet’s artwork, Neuro Memento Mori, is specifically a 3D printed life-sized sculptural bust, forming the surface on which is projection mapped the associated imaging sourced from variously the fMRI imaging sessions, wire mapping for the 3D model and other artefacts in the data mapping processes [Figs. 11, 12, 13, 14, 15]. In the case of Neuro Memento Mori imaging projects a set of entanglements evidencing transversal practices with imaging and concepts sourced from a variety of actions including: medical procedures related to the tasks of ‘mapping’ the brain, analysing data, medical imaging, scientific, artistic, technological and philosophical research and development. These considerations and actions undergo change as they traverse the differences in team, disciplines and the practices of modeling that span artistic, museum, scientific practices and traditions.

This artwork plays with the relationships between these ‘disciplines’, through embedded iconography, artefacts, imagings and the use of scale. These scales can be seen in the projection mapping visual imagery as spanning the micro internal spaces of the brain, moving through to the surface perceptions of her face, the wire mapping of the computational structures and on to the macro conceptual scales relating to overall brain systems and knowledge constructions, along with philosophies such as Buddhism and the contemplation of life and death. Prophet has enlarged on this type of modelling practice involving working with scale by stating: ‘Modelling a system at a range of different scales and disciplines that can be easily switched between, enables more comprehensive understandings
of the system and how the whole is a function of the behavior and interaction of the component parts’ (Prophet & Inverno, 2004, p. 11). Performing computational assemblages of differing scales and temporalities shifts the sediment of intra-action as discussed in Chapter Two. We are in intra-action with differing and overlapping human and non-human temporalities.

When I first encountered Prophet’s work\(^\text{13}\), I remember feeling a sensation that mixed both vulnerability and a kind of discomfort around the level of ‘personal’ exposure that was engaged in her practice with the triggering of more confused anxieties and fears. These were of the ilk that arise when you are ‘investigated’ by medical apparatus for ‘disease’ and in those moments, contemplate the possibility of something being wrong and of the potential thresholds of uncertainty, of mortality and varying understandings of pain. Mixing into this affective congeries was curiosity about process and wonderment over the intricacy of the relationships, apparatus and research trajectories and a desire to know more and to dig deeper. There was an intrigue in the multiplicity of imagings used and the shifting of both frozen stilled moments with the active body moving in and out of relation to technological apparatus.

By focusing on memento mori, Prophet is inviting us in co-presence, to share the vulnerability of peeling back the layers of the shifting thresholds between the living and the dead. The shared and necessary experience of mortality is relevant for both human and non-human. Captured within the term *labile-technics*, is the notion of breaking down, failing, transforming or disappearing that are associated with both the contemplation of memento mori and the material-discursive processes inherent within the work.

### 3.1.3 Forming connections

*Neuro Memento Mori* then enters into an intra-active encounter with the space of exhibition through the curatorial platform *Alter* where it was displayed in Gallery One of the Gus Fisher Gallery at the University of Auckland. The life-size sculptural plaster head that was created from the merging of the fMRI brain recordings and 3D scans of the face, head and neck is placed on a custom-built plinth painted black and placed against a black gallery wall. Projected on to the still ivory surface of the bust is a flickering staccato moving image sequence of looped visual mappings precisely aligned to the contours of the sculpture [Fig 15, 16]. These live video and computer animations mix together both imagings from living and dead sources, namely from Prophet’s fMRI data including animations of brain activity gathered during the viewing of memento mori through to skull models in a combinatory practice. The only light generated emanated from the three mini projectors projection mapping the head ensuring that the participant’s attention is focused on this sculptural bust. All support brackets, cabling and mirrors took a secondary position through their immersion in the painted darkness and shadows. Other aspects of the work such as the monitors and hard drives were hidden from view locked into the black plinth. Mounted on the neighbouring wall, beside the plinth, was a small monitor with headphones that played a short documentary produced by Prophet that shows the research, development and production of *Neuro Memento Mori*. The documentary shows art historical sources and neuropsychophysiological content and concepts, revealing the acts of modeling, mapping, simulating and exposing the collaborative relations in

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\(^\text{13}\) I first encountered *Neuro memento Mori* as a work in progress at a Transmediale workshop in Hong Kong. I was already aware of her practice as a result of a gallery project I curated, in the mid-nineties, that staged Prophet’s Techno-Sphere for Moving Image Centre’s programme. As part of this project, I arranged for Prophet to come to New Zealand for both installation and public programme activities.
Figure 15: Jane Prophet, *Neuro Memento Mori*. Installation shot in *Alter*. Photo: © Sait Akkirman
Figure 16: Jane Prophet, *Neuro Memento Mori*. Installation shot in *Alter*. Photo: © Sait Akkiran
the laboratorium. It also reveals the apparatus, experimentation and different disciplinary knowledges at work in artistic and scientific traditions.

The decapitated bust, mounted on the plinth, calls forth a multitude of art historical encounters in museums around the world. Juxtaposed to this bust is the moving, flickering, scanning and moving images of technical and organic materials connecting the bust to the documentary. The documentary shows the full body in medical research process and is a shifting referent in and out of the video documents. A corporeality emerges of relationships with imaging apparatus and activated shifting sensorial activated positioning-stilled, captured, seated, frozen, surveilled, lying, processed. The placement of the processes of capturing (both imaging, artistic and research-based) means the completed contemporary memento mori is reinforced in its diffractive experimentation through the doing and makings of the work. A blend of the living and the dying is layered, transitory and intra-acting. Through the acknowledgement of process there is a dialogue at work within her material-discursive practice.

Through encountering the posthumanist premise of the exhibition, the human and non-human relations enmesh in *Neuro Memento Mori* as posthuman entanglement. These linking relations span the immediate core human group of the scientists, medical technologists and Prophet through to the non-human agents of the computational devices, medical imaging machines, 3D prototyping machines, editing software and communication technologies. *Neuro Memento Mori* itself is a technoscientific assemblage constituted of intersecting and intra-acting technical systems, knowledge systems and artistic processes. These could be listed variously (and not conclusively) as: neurobiology, art history, Wellcome Trust collection, Buddhism, meditation, neurophysiology, 3D Rapid prototyping, Prophet’s mind/body, documentary filmmaking, neuropsychology, bespoke software architecture, projection mapping, fMRI, bilingual translation, video production, bespoke cabinetry design and research design. This is a densely populated assemblage showing a breadth of actors, materials and forces at work and posits a mingling of disciplines that perform in the production, documentation and presentation of the art work as a material-discursive practice. The complexity of the zigzagging movements across these disciplines, technologies and the respective concerns contributes to the multiplicities and alternative transversal mappings at work.

### 3.2.0 Nina Sellars

#### 3.2.1 Sellars’ practice

Nina Sellars’14 art practice interrogates human anatomy and its historicised and symbiotic relations with science, art and technology. She works with a variety of media while practicing within science laboratories specialising in wet anatomy, physics and medical imaging. Sellars’ practice is interested in imaging technologies that are able to ‘re-imagine’ the body. Working in the laboratorium moving from studio to science laboratory to classroom, online and exhibition spaces, her practice is emblematic of the agile flexibility across sites. I specifically chose her work because of the trans-mediating qualities that exemplify the porous and febrile nature of *labile technics*.

As Sellars comments in a recent interview: ‘As pervasive media technologies, i.e. radio, television, the press, smartphones, and the internet,
collectively enable science and scientific notions to appear ubiquitous and somewhat uncontested. What is of interest to me is being aware of this (technoscientific) environment and its system of metrics and to engage with it meaningfully through critical thinking. In this way, art can be a call to think otherwise’ (cited in Criado: 2016, n.p.). Sellars’ practice takes scientific imaging and the apparatus of the cellphone and its mediating processes, along with the material and force of light embedded in anatomical imaging processes, and redeploys these practices in her artwork. By doing so, her practice surfaces, and interrogates, the activation of all of these aspects in the distribution and instigation of knowledge. She is interested in the anatomical body and how it can be reconfigured, altered and reactivated. She explores, as she reveals: ‘the internal architecture and perceptual awareness and abilities of the acculturated body as embedded in the world and mediated by technology.’

3.2.2 Scan (2012)

Scan is a mixed reality interactive art work that initially appears to be a graphic wall image. This black adhesive-backed vinyl film outline of the skull and eyes, is taken from an MRI scan of the artist’s brain. Sellars graphically removes a section of the MRI image relating to brain matter


16 Retrieved 5 February 2017 from artist’s statement online on artist’s website: http://ninaseellers.com/?catID=4

17 Magnetic resonance imaging (MRI) is ‘a non-invasive technology with high resolution that is primarily used to image brain structure and function’. It traces the changes to blood flow and/or metabolism and is coupled with the principle that changes in blood flow and metabolism are due to changes in regional neural activity. See (Asbury, C. 2011, p. 41).

and instead implants in its place a red vinyl film QR (Quick Response) code [Fig 17]. The QR code acts similarly to a two-dimensional bar code. This then requires QR scanning software to be downloaded and operational on the individual participant’s smart phone. Once scanned using the QR scanning software, a continuous hyperlinked auto-play online animation

18 QR codes were originally developed in Japan by DENS to track automobile manufacturing parts by Toyota. See Valmestad, L (2011, p. 70). QR codes can be generated through sites such as www.beetag.com where all the necessary applications are available.

19 QR software is required on the specific smartphone. Common programmes include QR Reader and QuickMark. Through the camera function of the smartphone an image is taken of the QR code and the user is then hyperlinked to the relevant website providing connected further information.
Figure 18: Nina Sellars, *Scan*. Installation shot showing mobile phone scanning outcome. Photo: courtesy of Sam Hartnett

Figure 19: Nina Sellars, *Scan*, screenshot from MRI animation. Photo: courtesy of the artist
The animation once accessed on the participant’s smart phone shows a transverse cross-section of Sellar’s brain animated into a sequence that begins with the view of the middle of the brain panning to the top and then down to the base of the spine and then back up to eye-level in a continuous loop [Fig. 18]. These scans are the post-surgical imaging taken after the artist was treated for a pineal gland brain tumour that, after surgery, caused an eighteen-month period of blindness. Sellars’ biological data and lived experience become active participants in the assemblage of Scan flowing across corporeal porous boundaries in performative activation.

Scan plays with the interface between real and virtual with the necessary requirement of the active performative participation by the human and non-human actors such as audience member, internet, QR code software and mobile phone devices. Regarding this work, Sellars further elaborates that in Scan the brain is not only: ‘dematerialised, but also mobilised, i.e. transported from the physical space of the body to its liminal position in the art gallery. […] The act of scanning the image enables viewers to leave the exhibition with effectively a little brain playing in the palm of their hand.’20 She further perceives that one of the critical outcomes of Scan for her is “enactment of knowledge, as it unfolds as a process, through the imaging of the anatomy.21 It is a remapping and revisioning of the anatomical imaging. Her practice allows a space for imaginative, diffractive and differing tactics for adjusting to the varied ways that new apparatus are able to paradoxically ensnare and mobilise, change and revision.

will appear on your phone’s screen showing MRI scans of the artist’s brain [Figs. 18, 19, 20].

20 Retrieved 5 February 2017 from http://photomediationsmachine.net/2013/04/30/scan/

Figure 21: Nina Sellars, *Scan* (Performance), 2013. Laboratorio Arte Alameda, Mexico city. Photo: courtesy of the artist.
A second iteration of Scan exists as a durational performance work designed for enacting in a gallery setting [Fig. 21]. In this version Scan (performance) sees the artist seated in the gallery with her eyes closed, still, seemingly inanimate. On the skin of her forehead is adhered the QR code and when gallery participants scan the code they receive the same MRI version as the gallery installation described above. Although artist and participant will directly meet, the artist does not engage and remains unaware of who has a copy of the MRI imaging of her brain. Through her corporeal presence she has become an additional element in the artworks assemblage. Her lack of engagement recalls a similar pattern of stillness required when the MRI images were first captured by an unseen observer. Sellars herself speaks of this in her writings of the unseen observer at the moment of capture in many medical and scientific imaging practices of the interior of the body.

Sellars’ work pushes the symbiosis of technicities and the organic creating a performative mobile re-imagining of the brain, that is portable, re-playable, re-sitable, virtually accessible at any time through the website or QR code. By dislocating the imaging from a medicalized personal context into the incessantly mobile public zone, she sets in movement unstable and transitory settings for the imaging that are not located with a specific body. The anatomical imaging develops ongoing shifting affective bonds with its repositionings and relations with differing participants’ engagements. An episodic reimagining and recapturing.

Sellars’ work surfaces a paradoxical conundrum. Scan contains two imaginaries of the one set of imaging. On the one hand the MRI scans are a representation of the medicalized post-diseased, post-surgical brain that purports to have a transparent visual openness which is anatomically precisely mapped. Aspects of the body have become, in this sense, decontextualized and the brain is isolated in order to image for traces of disease. On the other hand, the artist performatively repurposes the imaging in which it could be said to be treated in a diffractive experimental practice. Here the diffractive reading implies that ‘bodies are never fully readable or visible, never fully explicated, and in which different possibilities of displacement and interference emerge. […] Here, life and death are not contained in single bodies, but disseminated in an open circuit potentially accessible to multiple actors’ (Timeto, 2015, p. 134).

3.2.3 Mobilising

Scan was displayed in the gallery foyer. [Fig. 20] The specific intent of the installation is for the ‘scan’ to meld into the architecture of the gallery achieved through both a satin matt finish to the walls and to the finish of the vinyl artwork itself. As Sellars states: ‘in this way the surface of the building acts as an interface into the internal architecture of the body.’

22 This conundrum has some similarity to Salvatore Iaconesi, an artist and hacker, who became ill with a brain tumour. He repurposed his diagnostic CT (Computerised Tomography) and MRI imaging converting the files to other formats in order to redistribute them outside of the medical community. He uploaded them, along with a video, to a website entitled La cura. The cure (AOS, 2012). He then invited anyone to proffer potential cures for cancer. This project then went viral including Facebook, YouTube, the TED community and even to CNN coverage. This case study is discussed and analysed as diffractive practice in detail in Timeto (2015, pp. 134-139). Timeto also addresses in the same chapter the different case of Beatriz da Costa who died in 2012 of a metastatic breast cancer that spread to the brain. Her art work made after brain surgery ‘Dying for the Other’ is analysed in depth. See (ibid, pp. 139 -148).

23 As per installation instructions emailed to curator: 2nd October 2015
Both iterations of Scan provocatively translate and enact the movement of medical and scientific imaging out of their prior disciplinary context into a minimally controlled decontextualised distribution in the hands of the general public. Any form of ownership is dispensed with. A personal diagnostic imaging is given through mobile technology a new form of public circulation dislocated from its originary corporeal vessel. This work has connections to her earlier works Spin and Speed for which Sellars noted, in her journal article The Anatomy of Optics and Light:

‘The space is always available to the viewer to be entered, downloaded, transferred, sent, relocated, expanded, flattened and repositioned at will. It has been disconnected from its real-world position and the volition of its maker. […] the aim of the installation is to explore not so much the structures and technical processes involved in bodily imaging, but rather the network of relations and discourses around the anatomical body, both in culture and science, that have been initiated by these technologies’ (2010, p. 59).

Returning to Sellars’ Scan, we can see that she utilises her personal medical diagnostic MRI images, sending them through a series of generative and iterative digital processes. Firstly, she takes the original encoded MRI images and graphically repositions, enlarges and outlines the scan removing the original reason for being; the diagnostic imaging of the grey matter of the artist’s brain. The MRI scans are then moved to an encoded but initially not visible position embedded in the QR code, becoming then further encoded as a hyperlinked animation. Access then only becomes viable if a participant accesses the imagery through the QR code and their smartphone. As such the MRI image, has gone through a series of steps of coding, decoding and recoding. With each step, a different manipulated view of the anatomical imaging is seen. The culmination of this processual unfolding leaves the future distribution of the MRI images with multiple unknown members of the general gallery audience. Sellars is deliberately provoking a labile-speculative encounter. As she outlines: ‘Scan functions as a poetic questioning of the possible interactions that may occur when radiological visualizations of the body escape the confines of their scientific context.’

Ensuring a diffractive intervention, Sellars reprocesses and reanimates the MRI scans to a degree that makes it no longer possible for the imaging to be used for scientific and medical diagnostic purposes.

Sellars’ diffractive experimental practices remind us of the need to re-enliven our practices of imaging the body and to repurpose those that have taken an objectifying apparatus-aided gaze. She stages a turn towards acknowledging partial, situated openly distributed practices that engage human and non-human alike as equal participants in the reimagining and relocation of medicalized imaging. This includes connecting and networking the physical laboratorium of the architecture of the gallery walls, the technological information coded structures of the mobile phone and internet, the medicalized apparatus driven imodings of the brain and the underlying organic and synthetic structures of being and doing in co-present action.

24 Retrieved 5 February 2017 from http://photomediationsmachine.net/2013/04/30/scan/
3.3.0 Agatha Haines
3.3.1 Haines’ practice

Agatha Haines is a speculative designer who works in collaboration with scientists working on future scenarios implicating the biomimetic and alternative modelling of the human body. This has resulted in art projects such as creating new and improved organs for the body, exploring bacteria for antibiotics sourced from decomposing corpses, surgical modification of babies and thinking through living prosthetics. Integral to her practice is the raising of questions about the ethics implicated in these proposed practices with an interest in ideas around why we might want and need to change our bodies in the future. Haines asks: ‘How might people respond to the possibilities of our body as another everyday material and how far can we push our malleable bodies while still being accepted by society?’

As with Prophet, Drones with Desires (2015) [Fig. 23] is an artwork that is a result of a collaborative research, development and production process involving the neurosciences. Haines worked with neuroscientists to produce a set of Diffusion Tensor MRI (DTI) scans of her brain [Fig. 22, 27]. Marcel de Jeu and Jos van der Geest at Erasmus University Medical Centre produced the DTI scans to create a data resource from which the scientists were able to abstract information regarding the number, placement and thickness of neurological connections in Haines’ brain. The methods for extracting the neural measurements were collaboratively designed by neuroscientist Vaibhav Tyagi and computational neuroscientist Jack McKay Fletcher specifically for Haines’ work. The extracted biological and mathematical information is recoded into the neural network programme driving the motion and decision-making of the drone. The interpretation of the data for the neural network was designed by Christos Melidis, a roboticist. An artificial neural network programme is modelled on a human brain through mapping sets of virtual neurons and then programming them with weights or measurements such as those supplied by Haines’ abstracted information. The decisions made by the programme are those the programmers have supplied, parameters developed to train its machine attention to homeostatic functions such as balance, comfort and curiosity and environmental conditions such as sound, movement and

25 She is currently a Research Fellow in Transtechnology Research at the University of Plymouth developing new and experimental works as part of a doctoral programme. This research sits within a transdisciplinary department called Cognovo - a large scale Marie Curie funded ITN exploring cognitive innovation.

26 Haines describes herself as a speculative designer – see: https://cognovo.eu/people/research-fellows/agatha-haines.php

27 Biomimetic is related to synthetic methods which mimic biochemical processes. Drawn from: https://en.oxforddictionaries.com/definition/biomimetic


29 Diffusion Tensor MRI scans are imaging that is taken sensitised to water dynamics rather than blood flow. The imaging measures the integrity and the ‘pipeline’ of white matter and contributes towards building a ‘roadmap’ of the brain. This type of medical scanning is usually shortened to either DTI or DSI. In this instance from now on in the text it will be referred to as DTI – Diffusion Tensor Imaging.

30 Jack McKay Fletcher, Christos Melidis and Vaibhav Tyagi are all based at CogNovo at Plymouth University. For information regarding the research initiative CogNovo see: http://cognovo.eu/

Figure 22: Agatha Haines: Diffusion Tensor MRI image. Photo: courtesy of the artist
Figure 23: Agatha Haines: *Drones with Desires*, Gus Fisher Gallery. Photo: © Sait Akkirman
Figure 24: Agatha Haines. Network schematic: courtesy of the artist as part of *Drones with Desires* preliminary development documentation.
Figure 25: Agatha Haines, image of artificial neural network. Photo: courtesy of the artist

Figure 26: Agatha Haines, installation of the three video works as part of the Alter installation. Photo: courtesy of Sam Hartnett

Figure 27: Agatha Haines. Diffusion Tensor MRI imaging. Photo: courtesy of the artist

Figure 28: Agatha Haines, magnetic resonance imaging. Photo: courtesy of the artist
air quality. Evolutionary algorithms to manifest an artificial central nervous system were formulated through the artist’s neural connection data.

The neural network programme, or connectome, residing in *Drones with Desires* was developed in collaboration with neuroscientists, computational neuroscientists, and roboticists largely based at Erasmus Medical Centre in Rotterdam. As a research team they were experimenting with the machine learning actions of the drone and how it may, in turn, provide information concerning human decision-making. It also provides information as to how the ‘brain’ is modifying within a new body and technology. The drone learns from the sensor network updates that inform the research team about how the neural plasticity of the brain might change if it was housed in a completely different anatomical structure. As Haines explains: ‘The drone makes decisions based on comfort and curiosity, moving its wings to navigate. As it does so connections in the network alter their strength to replicate learning behavior as it develops in the human brain.’

As her self-proclaimed descriptor of speculative designer suggests, Haines is asking questions, and developing collectively experimental figurations, that begin to conjecture about where some of the emergent technologies in the merger between biosciences, computational engineering, artificial intelligence and neuroscience may lead to in future manifestations. Haines asks: ‘With an increased efficiency of modelling the brain for artificial intelligence or the introduction of mechanics within biomedical sciences, where are the boundaries of humanness in a world full of integrated and invasive technologies?’ By asking such questions, Haines is using her role within the team as a designer, to question and to create a space for reflection about the future potentials of such scientific research.

### 3.3.2 *Drones with Desires (2015)*

*Drones with Desires* consists of a floating balloon-like pvc-fabric sculpture [Fig. 29] that is driven by a drone navigating through signals for movement stemming from the anatomical information of the artist’s brain that feeds an artificial neural network [Fig. 25]. Haines’ work actively sets up a speculative practice that is shifting the boundaries of science practiced as a ‘rationalist’ pursuit. The play of the imagination is engaged as we as participant are confronted with a new unfamiliar organism in the form of the floating sculpture that newly embodies aspects of the artist’s corporeal data while being remapped into a new emergent machinic cartography. Here Haines is answering the call for new constructions of body, developing a denser interconnected and networked responsive ‘artificial’ creature in the form of a mutated disembodied brain complete with wings and novel aerial movement. This responsive machine, driven by decisions

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32 A connectome is a computational map of the neural connections in the brain. See: [http://www.brainpreservation.org/content-2/connectome/](http://www.brainpreservation.org/content-2/connectome/)

33 Haines describes machine learning in relation to her work as ‘the art of linking learning processes effectively to feedback loops that influence future behaviour.’ From working documents supplied in personal email sent to curator on 19th January 2016


35 Images sent to the curator by artist 19th January 2016

36 Drawn from a grant application sent from the artist to the curator by email 19th January 2016.

Figure 29: Agatha Haines, *Drones with Desires*, installation shot showing inflated sculpture sensors and fins, at Gus Fisher Gallery. Photo: © Sait Akkirman
Figure 30: Agatha Haines, tissue imaging. Photo: courtesy of the artist.
made through machine learning with parameters set by the artist’s brain mapping data drawn from the stilled DTI procedures, is given new movement outside of the scientific objectifying apparatus capturing gaze.

The artist’s DTI data has been recycled, regenerated and given new agency and liveliness in a novel unexpected and unfamiliar form. Not only are measurements from the DTI being used as algorithmic parameters within a new machinic body, but the texture of epidermus drawn from her imaging scans have been used to visibly reskin and resurface the inflatable sculpture. Images of the tissue texture can be seen in [Fig. 30, 28].

Retaining a fleshy tone this new synthetic form merges as posthuman. A visual tension over the surface is formed through the disjunction between the synthetic yet vaguely familiar biological surfacing and the noticeable artificial manufacturing of the seaming of the balloon’s construction.

Crude new vessels of machinic ‘liveliness’ network the surface joining sensors through cables to the Arduino board housing the ‘intelligent’ learning programme.

These sensors, that are distributed in a networking across the surface of the inflatable, are registering space and movement and are feeding these coordinates back, to the arduino-housed ‘intelligence’, deciding movement. Movement generated through the flapping of the tiny fins or wings cause it to change direction. It is using its sensual assemblage to discover,

learn and make decisions about the situated environment it finds itself in. Its synthetic behaviour is, therefore, influenced by the environment coupled with its sensing and computational systems including a machine learning intelligence. This could be seen as a sensual machinic situated sensibility.

3.3.3 A speculative encounter

_Drones with Desires_ was displayed in the foyer of the Gus Fisher Gallery [Fig. 31]. The floating drone sculpture was suspended by cables beneath the historical glass ceiling. This placement was designed to reflect and sit aesthetically within the historical architectural features that are present in the gallery foyer while benefiting from the constant flows of bodies, forces and changes in environmental factors that fed the navigational systems of the work. The sculpture was inflated with hydrogen gas and floated largely above peoples’ heads moving without obvious logic in the free void space.

To one side of the sculpture in the side alcove was exhibited the three video works on equal sized screens placed equidistant from each other [Fig. 26]. Sound was sourced from one of the videos and sent through a sound system to give ambient sound to the foyer area that replicated the movements of information flow in the neural network system.

Haines has embraced the capricious in her speculative assemblage. As their research questions convey, Haines’ collaborative team were exploring machine learning using the artist’s brain measurements in the programme and placing this within a newly formed unique anatomical sculptural structure. When placed into unpredictable settings, such as the gallery foyer, the environment is constantly changing and therefore the programme is adjusting to the unexpected.

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38 Images sent to the curator by artist 19th January 2016

39 Arduino was originally designed at Ivrea Interaction Design Institute as an electronics open-source system. Prioritising ease of use hardware and software, the platform is able to read inputs such as light, pressure, text messaging and in turn outputting to another signal such as sound, tweet etc. See: [https://www.arduino.cc/en/Guide/Introduction](https://www.arduino.cc/en/Guide/Introduction)
Figure 31: Agatha Haines, Gus Fisher foyer installation. Photo: courtesy of Sam Hartnett
Drones with Desires opens itself up to the mercurial forces and elements both of its immediate environment and the data it is fed: wind gusts, brain measurements, drone movement, artificial intelligence, audience movements, doors opening and spatial attributes of the physical architecture, all inform its movement. As such, this emergent system is always in intra-action with all of these elements. The result is a symbiotic fusion of the artist’s biological and anatomical data fusing machine learning, drone capabilities and sculptural aesthetics.

The work calls on us to consider the very nature of drones themselves. The installation, with its strange floating corporeality has coupled its ability – or rather its absolute need – to survey its surrounds. Operating in syncronicity with its environment can only work if the system is able to accurately track what is happening at any given moment. It is a reminder that drones are now a pervasive part of both domestic and militarized spaces. Yet in the case of Drones with Desires, rather than a human subject controlling its actions via a hypermediated interface at varying distances, here we have human measurements and programming within the drone itself.

This tech-sci-art work reveals a form of synthetic liveliness and intelligence expressed through its autonomous movement. As such this work, raises many questions regarding technologies of machine learning, mapping, navigation and deployment at work in the greater social and political contemporary global contexts. It enacts the transversal movement across perspectival and intensity flows shifting and revealing layers of speculative actions. Drones with Desires is an intra-active posthuman form that operates with affective and relational desires to connect to human and non-human that move in the architectural spaces in which it inhabits.

The result is a speculative symbiotic fusion of the artist’s biological and anatomical data fusing with connectomes, machine learning, drone capabilities and sculptural aesthetics.

3.4.0 Elena Knox
3.4.1 Knox’s practice
Knox is a dramaturgist, performance and media artist who her works range across genres largely exploring female enaction through performance. Elena Knox’s art practice challenges and plays with embodiments of gender, the android, and the hostess activated by choreographing performances across human and non-human agency through a dramaturgical and puppeteering practice featuring Actroid-F designed by ATR Hiroshi Ishiguru Laboratories. These gynoid performances are recorded and placed as screen-based works within installation contexts for contemporary art environs. In 2013, she had access to the gynoid through her creative doctoral practice associated with the Creative Robotics Laboratory. The laboratories constructing these androids are based in Osaka and

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Figure 32: Elena Knox, *Comfortable and Alive* (2014). Photo: courtesy of the artist
Tokyo and are using the actroids\textsuperscript{45} to investigate presence and personality. Concurrently they are extending the science behind android robotics, developing social robots for use in homes and hospitals as entertaining and caring agents. An underlying drive in the research and development industries surrounding advanced robotics and artificial intelligence is the notion of creating service agents to help with labour requirements in multiple commercial and domestic contexts.

The resultant series of six art-works, Knox created using Actroid-F, variously highlighted feminist concerns with gender stereotypes relating to femininity, the hostess, service and care roles being reinstated and reinforced within the advanced robotics industry\textsuperscript{46}. She states that she is disturbing ‘the intransigence, or the non-negotiability, of these aesthetics and behaviours’ (Knox, 2017, p.1).

As dramaturgist, Knox becomes a diffractive experimenter of the prototype robots, diverging from those generated by the laboratories’ roboticists for scientific research and potential commercial manufacturing with the accompanying agendas of expertise, utility and service. She challenges these conventions, through her dramaturgy, querying gendered aesthetics through unraveling gender stereotypes, revealing limitations and prejudices and exposing the shallow publicly accessible knowledge depositories of intelligence including Google. In a recent interview, she stated: ‘Gender stereotype is not just imposed by heteronormativity, we’re also complicit in it. We’re enmeshed. So some of the discomfort is taking responsibility for our own involvement’ (cited in McKinnon, 2016, p. 85). Her work takes the gynoids modelled on beautiful young Japanese women, and places them into a feminist video art practice, where the actroid performs as radicalized hostess.

\subsection*{3.4.2 Canny (2013), Comfortable and Alive (2014)}

Comfortable and Alive [Fig. 32] shows the Actroid Geminoid-F delivering a monologue consisting of a trance-inducing track set to an ambient soundtrack. This script vocalised by the actroid is sourced from “open source” hypnosis scripts downloaded from the internet. The actroid hypnotically induces the participant into entering a “peaceful” trance. During the hypnotism, the gynoid will ask for the participant to get comfortable, readying themselves for a deep and peaceful trance. Throughout there is a tension that is set between the power relations of the actroid, who has control over the progression of the hypnotism, and the ‘human’, who is in the passive role of being ‘controlled’. Knox describes the actroids acts as follows:

‘usurpation of agentic power: the Actroid knows, through informatically absorbing science fiction, that robot will-to-power is something many humans imagine and, crucially, fear. The takeover is bracketed by the prompt or hypnotic suggestion that the trance will be “as automatic as dreaming” and that its events will be forgotten upon awakening. Human becomes automaton’ (Knox, 2014, p. 92).

Here, Knox is also acting as speculator asking; who is in control? The actroid provides the navigation through the experience. The artwork merges the artist’s dramaturgy, the human fed internet, the Actroid’s enactment and the human’s experiential journeying.

\textsuperscript{45} An actroid is a humanoid robot developed by Osaka University.

\textsuperscript{46} Service roles in advanced robotics industry include amongst others foyer hosts, companion services, hotel welcoming staff and housekeeper.
Figure 33: Elena Knox, *Canny* (2013). Photo: courtesy of the artist
Figure 34: Elena Knox, *Canny* (2013). Photo: courtesy of the artist
Knox’s other work in *Alter, Canny*, continues the depiction of the gynoid hostess, this time placing her seated within the Google data storage matrix [Fig. 33, 34]. She represents an embodied agent that voices ongoing Google and YouTube searches on well-known gameshow hostesses, who are highly intelligent experts in their fields. These internet searches are revealed to continue an endemic objectifying and sexist commentary forged from the most recent results found from trawling the internet. The gynoid hostess patiently searches the popular online suppliers of information today for knowledge as to her identity and finds a litany of repetitive assertions regarding her physical attributes. She endlessly loops never getting beyond these assertions commonly available on the network.

In *Canny*, the full body of the gynoid is seated, enforcing the limited range of movement that the gynoid currently has set by the laboratories developing her. By being seated the scientists can run experiments relating to face to face interactions and monitor affect and empathy. Additionally, she is clothed in the red dress so often referred to in the online searches through YouTube and Google. Concerning *Canny*, she also speaks about her surprise at the strength of the sexualized responses, that came through in the Google and Youtube searches regarding female gameshow hosts, and these subsequently influenced the dialogue and the style of dressing of the actroid.

Knox’s *Comfortable and Alive* and *Canny* proffer a new ‘fabulation’, a new storytelling of the actroid as hostess. Through using the gynoids in a new ‘science-fiction’, Knox works at uncovering and destabilizing stereotypical categorization of female gender in contemporary robotics research, development and manufacture. Through the telling of different stories, she is addressing Actroid-F as a subject-object under a form of speculative interrogation and repositioning. As Suchman alerts us:

> ‘If objects, as Haraway reminds us, are ‘boundary projects’ (1991, p. 201), the figure of the humanoid robot sits provocatively on the boundary of subjects and objects, threatening its breakdown at the same time that it reiterates its founding identities and differences. Whether as a promise to subjectify the world of The Object, or a threat to objectify the sanctity of The Subject, the robot’s potential is perpetually mobilized within both technical and popular imaginaries.

At the same time, the material assemblage of the robot is in complex intra-action with its accompanying stories, never quite realizing its promise but always exceeding the narratives that animate it’ (2011, p. 133).

### 3.4.3 An actroid’s dramaturgy

*Comfortable and Alive* was displayed, in Gallery One and, in such a configuration with seats beneath the screens that it encouraged viewers to sit with the work. Considering the self-hypnotic theme of the work, getting comfortable in either a seated or lying down position was an important factor. It worked, for people were often seen either sitting or lying listening to the full length of the track, staring sometimes at the floor, sometimes at the screen and sometimes with eyes closed [Fig. 36, 37]. Each of the screens played a different language and so each was mounted with individually hung headphones. The actroid in the two pieces exhibited

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47 Elena Knox and Lindsay Webb also developed a new version of the frame for *Comfortable and Alive* onsite during the installation week. The artists and I shared costs for this trip, and the construction costs for the onsite installation, to enable the artists to develop a new version of the frame that would be able to be packed up and distributed internationally for exhibition. Access to laser cutting facilities at the Architecture school were organized to facilitate this and a new series of tablets were purchased for the work [Fig. 35].
in *Alter*, are the ‘first made-for-video scenes of an Actroid being verbal. Re-programmed, performed, and recorded by the artist, the actoid is respectfully obliged to performatively encounter its own ideological construction’ (Knox, 2014, p. 9).

I speculate that the intra-action, when listening to the soundtrack through head phones, is more of an experience of concurrently ‘being-with’, and *troubling*, notions of ‘intelligent’ exchange. In this work does vision have superiority over audio? If you accept the invitation proffered by the vinyl couch, placed for lying upon below the monitors, and you lie down, then it is likely you are no longer looking at the screen [Fig. 37]. In this altered embodied event there is an immersive experience concentrating on sound and directions relating to body and affect that induce a tangled relational interlude between human and non-human far more complex than simply a resistance to stereotype or fetishistic encounter. In this playful space, there is a movement between ‘profoundly embodied, and as profoundly dis-embodied, dispersed through the texture of the cyberworld’ (ibid., p. 93).

If watching the screen then the actoid simulates with appropriate hostess-like efficiency with correct length of pauses and emotive facial gesture to reinforce the various passages of the self-hypnotism script. This is a labyrinthine work, of multiple layers of storytelling, with changing power dynamics exchanged in shared space.

*Canny* is a single channel video work. For the exhibition, it was on a continuous loop, with the screen wall mounted at (standard) eye level, with headphones for the audio [Fig. 38]. Both *Comfortable and Alive* and *Canny* required headphone usage and as such provided a particular reception technology. Here sounds of the gallery and other visitors are shut out and a new context for listening is supplied. The rhythm, speed and tone of the hypnotic and synthetic sounding vocal tracks reinforce the cyber hostess and in both works you are guided into very specific digital spaces. Unlike the work of Haines and Stelarc (whose work will be discussed in the following section), Knox’s work is driven by the script supplied and programmed for the gynoid. There is not a generative functionality to the ‘storytelling’, it is a fixed, controlled and looping script. There are conceptual slippages in the intra-action with the listening and watching of the videos but the content is pre-determined by the artist, adding another layer regarding control within the power relations in-process.

These works when viewed as transversal epistemologies reveal the underlying concerns of the politics of labour through the potential for these mechanized domestic gynoids to become the new slave class for the monied, and the implied potential threat to the current human domestic workforce. Servile, replicable, programmable, customizable and therefore a class of labour arguably without the need for ethical care. Knox’s works produce a complex contribution to the current debates surrounding the future of labour markets, in the light of the increasingly sophisticated robotic and artificial intelligence advancements, and the size of investment in their development and deployment (Knox, 2014, Suchman, 2007).

Knox is initiating a diffractive resistance to the generation of female gender stereotypes within the advanced robotics industry. Discrete movements of the actoid came about as a result of the limited parameters that had been programmed by the roboticists and these became an experimental aspect of both *Canny* and *Uncomfortable and Alive*. Accepting the Google translation faults and slippages in *Comfortable and Alive* further sees Knox accommodating the accidental and unexpected. She states: ‘Agentially and (re)creatively, I rudely re-fix this trope, experimentally
Figure 35: Construction of frame for *Comfortable and Alive*.

Figure 36: Elena Knox, *Comfortable and Alive* (2014). Photo: © Sait Akkirman

Figure 37: Elena Knox, *Comfortable and Alive* (2014). Photo: courtesy of Sam Hartnett
Figure 38: Elena Knox: *Canny* (2013) in installation with viewer in *Alter*. Photo: courtesy of Sam Hartnett
Figure 39: Prosthetic Head as installed in Alter. Photo: courtesy of Sam Hartnett
Stelarc is intrigued by types of artistic and philosophical discussions that occur in connection with artificial intelligence and artificial life research. As he proffers: ‘Artistic practice can be said to be amplified, producing unexpected insights, by the new kinds of imagery that scientific instruments and medical procedures are now able to generate’ (Stelarc in Gere, 2010, p. 112). He has on a number of occasions spoken about his interest in the diffractive experimental processes that occur in the acts of practice between intentions and final results and ‘the slippage between the idea and the actuality’. Stelarc is conscious that an artwork is not designed for utilitarian purposes, evidential or goal-projected results. Rather: ‘Art is about play and surprising and unpredictable occurrences, and not about methodical research with particular aims and hoped for outcomes’ (ibid. p. 114).

I propose Stelarc is better positioned as a posthumanist and not as transhumanist49 where he is more commonly located. Transhumanists see that the human body and mind as something that can be improved and enhanced by technology. This includes the expansion of human intelligence and body functions including the oft spoken aim of uploading a complete replica of human intelligence to a computational system. Transhumanists have a view of there being a human nature and is connected to a secular humanism. I am in agreement with Joanna Zylinska50 who emphasizes post-humanism, identity, embodiment and the evoking of agency in machine systems. Thus, it creatively incorporates biomechanics and biomimicry in exploring aliveness with robots.” Retrieved 20 March, 2017 from http://www.alternate-anatomies.org/

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48 The Alternate Anatomies Lab is based at Curtin University in Perth and is led by Professor Stelarc. It’s declared mission is to be: ‘an interdisciplinary lab that interrogates the aesthetics, the ethics and the engineering of prosthetics, robotics and virtual systems. Its interest encompasses the post-modern condition, Stelarc is intrigued by types of artistic and philosophical discussions that occur in connection with artificial intelligence and artificial life research. As he proffers: ‘Artistic practice can be said to be amplified, producing unexpected insights, by the new kinds of imagery that scientific instruments and medical procedures are now able to generate’ (Stelarc in Gere, 2010, p. 112). He has on a number of occasions spoken about his interest in the diffractive experimental processes that occur in the acts of practice between intentions and final results and ‘the slippage between the idea and the actuality’. Stelarc is conscious that an artwork is not designed for utilitarian purposes, evidential or goal-projected results. Rather: ‘Art is about play and surprising and unpredictable occurrences, and not about methodical research with particular aims and hoped for outcomes’ (ibid. p. 114).

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49 Transhumanism is advocated by thinkers such as Nick Bostrom at Oxford University. See: http://www.nickbostrom.com/ethics/values.html

50 Joanna Zylinska is variously a writer, lecturer, artist and curator, spe-
the aspects of relationality in Stelarc’s work that is both unstable, fluid and allows for the creative and accidental to emerge. She states: ‘Since in Stelarc’s universe of multilateral and synthetic fusion “everything is interwoven with everything else”, the claim to human superiority is undermined on the material level by the multiplicity of crisscrossing connections within the organic-mechanic system, in which “human” is only one possible, and unstable, nodal point’ (2009, p. 171). Zylinska goes on to say that: ‘However, listening to Stelarc will allow us to envisage a more effective politics and ethics. This will be a technopolitics of distributed agency and suspended command, informed by the ethics of infinite – and at times crazy, shocking, and excessive – hospitality toward the alterity of technology (that is already part of us)’ (ibid., p. 173). Stelarc is not seeking to establish an essential human nature and therefore the enhancement of the human through technology. Rather he is interested in co-performing with technology as part of a changing ecology that accepts our co-evolution with the non-human. Stelarc often refers to the analogy of the chimera which he observes as:

‘The chimera is the body that performs with mixed realities: a biological body, augmented with technology and telematically performing with virtual systems. The chimera is an alternate embodiment. The body acts with indifference: indifference as opposed to expectation. An indifference that allows something other to occur, that allows an unfolding – in its own time and with its own rhythm’ (Gardiner & Gere, 2010, p. 93).

3.5.2 Prosthetic Head (2003)

Prosthetic Head is an embodied conversational agent51 that simulates Stelarc in virtual form and is capable of speaking to the person questioning it [Fig. 39]. It is a 3D computer-generated automated, animated and arguably artificially intelligent avatar activated by the participant typing queries via a computer keyboard. The avatar’s operational system is a bespoke designed version of the Alice chat-bot52 that is designed to generate natural language dialogue between human and machine participants. Working with a team of computer scientists the programme was customised to include ‘real-time lip synching, speech synthesis and facial expressions. Head nods, head tilts and head turns as well as changing eye gaze’ (Stelarc, 2010, p. 97). To create the artwork Prosthetic Head, Stelarc worked with a team of five principal collaborators including Karen

51 An embodied conversational agent is a virtual human-like agent that is designed to converse with humans both verbally and non-verbally. They are often found in roles of virtual assistants. For further information see: https://www.chatbots.org/embodied_conversational_agent/

52 The Alice chat-bot programme is an artificial language computer programme that is designed by Dr Richard Wallace to mimic natural conversations with human participants. A.L.I.C.E stands for Artificial Linguistic Internet Computer Entity and the platform is based on open-source free software. The first edition of the programme was formulated in 1995 and was inspired by Professor Joseph Weisenbaum’s ELIZA programme developed at MIT Artificial Intelligence Laboratory in 1966. ELIZA is a natural language processing programme that attempted to mimic a conversation with a psychotherapist. It was renowned for its history of interactions with users, some of whom believed that Eliza comprehended their personal problems. More information can be found about the A.L.I.C.E project here: http://www.alicebot.org/about.html For more information on the ELIZA programme and a series of chatbot projects that came out of the ELIZA project see: http://elizagen.org/index.html. There are other more recent chatbot programmes. For contemporary examples see: cleverbot.com and wolframalpha.com
Figure 40: Stelarc, *Prosthetic head*. 3D Model: Barret Fox. Photo: courtesy of the artist
from which the agent is operating. For Stelarc, this work ‘exposes the problems associated with notions of awareness, intelligence, agency and embodiment’ (Smith & Clarke, 2005, p. 231). ‘Being alive is now superseded by an artificial operational aliveness. What it means to be human is perhaps not to remain human at all.’

In *Prosthetic Head*, some of its capacities were developed by Stelarc through experimenting with the computational system. This is seen in attributes such as its capacity to perform poetry, to sing and to become an improvisational performance partner where the accidental and unexpected is an intra-active partner in a live networked environment.

3.5.3 Conversing

*Prosthetic Head* is a digital interactive installation where the head is projected in monumental size at least 5 m in stud height to enhance its sculptural embodiment. It is required to be in a darkened space with minimal reflections on architectural surfaces to direct attention and assist with immersion. *Prosthetic Head* was displayed in Gallery One [Fig. 41]. The head was projected at maximum height which was just under the minimum 5 m stud height usually required for this work. A minimal black plinth was installed central to the projection. Housed inside the plinth was the IBM laptop running the programme and on top of the plinth was the keyboard required for interaction. Speakers were placed at 45 degrees to the plinth to maximize the sound levels for the participant.

In *Prosthetic Head* the conversational agent requires active participation with a gallery audience member to activate the interaction through the typing of audience-driven questions. Through the ensuing mutual question response framework of the interaction between the avatar and the audience member, a changing dynamic occurs, moving the emphasis from

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53 Karen Marcelo worked with the team as on project co-ordination, al-ice-bot customisation and for system configuration. Generally she programmes for artistic projects, robotics and as part of Survival Research Labs. Survival Research Labs was founded in 1978 and is a renowned for its live mechanised performance works involving special effects, robots and machines. More information about her work can be found at: [http://k0re.wordpress.com/](http://k0re.wordpress.com/) and with Survival Research Labs: [srl.org](http://srl.org)

54 Sam Trychin customised the 3D animation and programmed the text to speech software for Prosthetic Head.

55 Barrett Fox worked on the 3D animation and modelling.

56 John Waters helped construct the system configuration and gave technical advice.

57 Dr Richard Wallace originated the Alice chatbot programme and advised on its use and AIML customisation.

58 AIML is the XML-compliant language that A.L.I.C.E is based on. Working with the AIML site for A.L.I.C.E. means that the Alicebot programme can be customised. See for further information: [http://www.alicebot.org/aiml.html](http://www.alicebot.org/aiml.html)
Figure 41: Installation view of Gallery One showing size of projection of *Prosthetic Head*. Photo: © Sait Akkirman
individual visual and virtual presence, to an intersubjective negotiation across machinic and human, virtual and real, text, visual, kinaesthetic and vocal enunciations. In addition, it is likely the interrogator controlling the framing of the questions is themselves either witnessed by, or in interaction with, other gallery participants. Collectively, they become complicit in a complex interwoven, participatory and intersubjective relational dialogue. The frequently unconventional questions and answers that ensue cause more breaks than cohesion.

Paying attention to the social exchanges both inherent in activations of the work, and the potential collective experiences occurring around the participatory engagement with Stelarc’s conversational agent, reveals social and communication acts not just in the technological system but in the gallery environment itself. This enlarged conception of a system of human and non-human exchanges and social engagement is an important feature of this platform of practice.

Not only is there an affectivity of entanglement between participants and the conversational agent, there is the layering of the enactive entanglement happening at the technological threshold. As Suchman explains: ‘Rather, effective encounters at the computer interface are those moments of moving complicity between persons and things achieved through particular, dynamic materialities and extended socialities’ (2007, p. 245). Suchman’s account of interacting with Prosthetic Head in 2003 when it was exhibited at the InterAccess Gallery in Toronto is fascinating as it entails the unexpected mediation occurring as she interacts with the installation while receiving advice and encouragement by Stelarc who was present in the gallery at the same time [Fig. 43]. At the time of the Alter installation, Stelarc often engaged with participants also encouraging, laughing, suggesting alternate questions in which the artist has also introduced his corporeal presence into the already rich entanglement. Suchman’s reflection on this complexity is revealed in her recorded passage relating the dialogue that ensued during her engagement as follows:

‘Stelarc: it also has a simple way of generating poetry on the fly, it has a simple database with keywords, you can say, “recite a poem” (pause)

LS: (types) “recite a poem, please”

Stelarc: It’ll, basically put together a bunch of words that-

Head: Your polite style is very nice.

Our breathing imploding breathing imploding,

City body electric system city excessive replicating,

And city city involuntary imploding. (Smiles)

LS: Oh, that was very nice! (laughs, glance to Stelarc, types)


Stelarc’s Prosthetic Head is a relational media ecology that comes alive and adapts in relation to its encounters, dislocating ‘identity’. Stelarc as trope invites interrogation. The trope exhibiting machinic liveness, as technological apparatus, mediated and assimilated within the hygienic gallery aesthetic. Pre-programmed, but randomized, enigmatic yet at times predictable, alien, particularly when stuttering into sing song, strangely comedic when pouring out tangential poetry with rich data streams of subjects of interest like sci-fi, star trek and other fictional wayfaring. Prosthetic Head is a posthumanist navigation that is faulty, has faults
Figure 42: Stelarc, *Spinning Screaming: Event for Amplified Head and Prosthetic Head, Brunel University.* Photo: © Sait Akkirman

Figure 43: Stelarc during opening of *Alter* explaining the work to the public. Photo: © Sait Akkirman
and embraces them ironically in a now aging 2002 graphically animated screen fabrication.

The Prosthetic Head has been customised to enable unpredictable behaviours through programming in the ability of the avatar to compose poetry, tell stories and jokes, give surprising answers and sing songs that are the repetitive enunciation of typed in consonants and vowels. This capacity means that the Prosthetic Head has been used as a companion/actor in live actions by and with Stelarc in both solo and collaborative stagings. As a performer, the Prosthetic Head, sings songs made up purely of vowel sounds and partial words. These are moments in which one can argue that this posthumanist subject-object, the Prosthetic Head, evokes liveliness. This singsong vocalizing, is improvisational, unpredictable and surprising. Two of these live enactments were recorded and edited into video documents that were also selected for display in Alter and displayed to one side of the Prosthetic Head installation.

In Spinning Screaming: Event for Amplified Head, Sydney, 2011 and Prosthetic Head, BEAM Festival, Brunel University, London, 2011, Prosthetic Head becomes an active partner [Fig.42]. The video documents of these performances were displayed to the right of the Prosthetic Head projection on monitors with headphones in Alter. Here the Prosthetic Head can be seen to speed up and slow down, to be manipulated in timing and choreographed involvement. Both presentations show different registers in which the Prosthetic Head can perform and be performed. Stelarc, when discussing his practice stated:

There is no “I” in the way we generally imagine. There is only a body that interacts with other bodies, situated in history. […] So this is not an essentialist model of the human but one that allows for a more flexible and fluid unfolding and definition of the human condition. It’s more in the realm of a Deleuzian becoming. And what constructs our identity is no longer our physical presence nor location but rather our connectivity (Cited in Donnaramma, 2012, para.13).

In BEAM Festival at Brunel University in London in 2010, the Prosthetic Head featured in an improvisational event that included Stelarc playing an iphone sound application, Lori Lixenberg who sang and Christos Michalakos as percussionist. Stelarc in this rendition played sounds using the application that both synchronized and opposed the Prosthetic Head’s intonations. The Prosthetic Head in this iteration was doubled in projection with two screens behind the performers. A live assemblage improvising and intra-acting in performative process. In Spinning Screaming: Event for Amplified Head, at the Powerhouse Museum in Sydney, 2011, Stelarc used a Kinect sensor interface that enabled him through gesture to control and animate the Prosthetic Head. As the title suggests, this was a choreographic event that featured the Prosthetic Head spinning and singing.

Prosthetic Head resists forms of mirroring that are, as Suchman reflects: ‘A form of relation that privileges vision, and looks to find in the Other a differently embodied reproduction of the Self’ (2011, p. 121). There is an awareness of this challenge and this work disrupts this trope and introduces further complex entanglements. In the intra-action with this screen-based installation, a complex relational mingling comes to the fore where identities are not fixed, difference and ruptures in dialogue are enabled and the readings and answers slip into the multiple.
Stelarc is the last of the international artists to be explored in this chapter. The next section of this chapter will specifically look at the curatorial actions at play in the development of various platforms in which Alter as an ecology of works has been activated.

3.6.0 The Curatorial
The curatorial in this thesis is centred around thinking through the acts of curating philosophically in addition to more functional acts of curating. Thinking of curating as ‘the curatorial’ is scrutinized in a recent book that has emerged out of the curatorial/knowledge programme at Goldsmiths College. In the preface it states: ‘We wish to talk about curating, because we thought we saw a possibility nesting within its protocols, a possibility for other ways of working, relating and knowing’ (Martinon, 2013, p. viii). I sympathise with this drive.

Curatorial practice for the project Alter has been centred on the curatorial, probing limits, flexibility, agility and expanded practices beyond the institutional domain. It has also involved seeing the exhibition as not necessarily the pinnacle of the project but rather a step in the experimental and iterative practice of labile-technics. The curatorial, here, is a way of thinking through acts of relating and intersecting with other disciplines, artists, encounters, audiences and predicaments. It inhabits the inside of a matrix of interconnections consisting of research and the interwoven art, science and technology practices. It celebrates this elaborate territory by being present with and in flow, paying attention to details and reconvening conversations and encounters occurring between the curator, exhibiting artists and the viewing public, in multiple acts.

The heart of the project has been the ongoing interweavings that exist between myself as ‘curator’ and my relationships with artists, their practices, their artworks, the physical and virtual sites of installation and the participants. This project has had a degree of freedom from being an independent project delivered in the context of a doctoral programme. It has meant that there haven’t been the usual institutional limits imposed by such strategic objectives as connecting to a collection, managing KPIs and major grant funding, dealing with extensive marketing and public programming teams and respective expectations or managing corporate and government sponsors. Having a space where these pressures are reduced, has enabled a certain freedom of experimental curatorial practice in Alter that I am aware could be difficult to activate within other institutional contexts. After having had a long curatorial career it has been refreshing to be paying attention to the practice of the curatorial rather than meeting organisationally set outputs.

Additionally, this project has provided an opportunity to more fully engage theory with making, and to practice with agility, thinking through what happens in shifting fields of limits and freedoms while being inherently entangled. Limits in this project include working with low levels of resourcing, requiring the need to self-fund many aspects of production and not having a staffing team to assist with the project (which does have inherent challenges). Finding supple ways of working, arising through the practice, has been one of the joys and challenges of this specific tech-sci-

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Figure 44: Early development sketches of virtual walkthrough
Figure 45: Alter VR installed at EResearch Science Visualisation Laboratory, University of Auckland, July 2017
arts framework. This has been my situated context for this project. A re-invention of my role as curator was enabled due to the specific nature of the kinds of practices, artists, artworks and encounters that constitute this project. Curatorial practice, here, stays with the present. It has not strived to establish historical precedent, to search for models to match itself against or to impose methods that would necessarily ‘fit’ within an institutional context as a museum industry-driven method. Focussing on the acts of relating and encountering, the curatorial stays within the specifics of this particular ecology of pursuit. It moves towards the laboratorium and the encouraging of acts of mapping, diffracting, speculating and intra-acting to initiate an inventive space. One that can accommodate the already convoluted sites of practice happening in tech-sci-art.

Alter, is more than the singular one-off exhibition bound project, staged in an institution, and defined as a display, that begins with its opening night, and ends on the closing night. Rather, this project has seen the development of a processual platform that began as idea, was collectively discussed by artists and myself within the digital space of a virtual walkthrough, staged as a gallery-based exhibition with an accompanying series of talks and moved through to its current iteration as a virtual reality environment.60

3.6.1 Virtual walk-through as laboratorium

Labile-technics is a stratagem utilised by the curator as tactitian. It constitutes the actions that are required for exploring and experimenting with different methods for staging an engagement with the artwork. Part of this is also the relations between the artists, the curator and the artwork and the different understandings and negotiations that occur in the developmental and research phases of the project. I am interested in projects from first idea generation through planning to realization and then further iteration. My process is therefore one of constantly adjusting to new ideas, artist input, prototype development, information, resourcing issues and physical materials, amongst many other potentials and constraints. By thinking through the concepts that have now formed the strategy of labile-technics, I was able to design ways to flex with the new and unpredictable technologies that presented themselves, to open up to new possibilities, new experiences, new knowledges and new processes that are situation specific. Labile-technics is designed to enquire into, and develop novel outcomes. It invites through the process of tactical movement a way of encouraging relations. Striving to not fix but experiment, to not repeat but iterate differently, and to stage a speculative laboratorium.

In curatorial process this is also about providing facility to make, to discuss, to ongoing problem-solve, to accept prototypes and work through challenges, to participate rather than observe, to provide spaces for coming together. I am interested in process over a long window of time rather than process driven by a particular deadline. The curatorial in this sense does not give all power to the final exhibition project the public sees but to all the steps before and after as having equal value. Labile-technics is interested in each work, its context, the artist, their context and the context in relation to all others in the exhibition as a group – a temporary assemblage, a temporary site, situation, collective action.

The virtual walkthrough became such a responsive temporary site where collectively artists and curator could experiment, map and discuss different concerns, virtually. During the exhibition development phase of Alter

60 Alter catalogue is enclosed as Appendix 7.2 and press as Appendix 7.4
once the limitations of email and Skype in addition to photographs and PDF plans of the gallery space became obvious, this virtual walkthrough emerged as a most useful prototyping tool for the exhibition itself. In the theatre, set design and architecture industries, virtual walkthroughs are used as a vehicle to enable creatives to navigate, concept design, demonstrate and test ideas before extensive expenditure, time and resources is spent on physical builds. Similarly, while Alter was evolving as an exhibition, the virtual walkthrough became an agile tactic, assisting with the challenge of discussing the exhibition space and the technical placement of the works in the physical space with a group of artists who were internationally based⁶¹ [Fig. 44 and Appendix 7.1].

Werner Ollewagen at LAT, who had built a virtual walkthrough for concept design for an exhibition proposed for a local museum, could collaborate on the build. This virtual walkthrough became a virtual place with which we discussed problems and explored alternative placements and technical issues. We developed short videos of animated walkthroughs so the artists could have a concept of how their works looked in the Gus Fisher Gallery. These were uploaded to a dropbox and went through a number of revisions as each work was resolved. This was particularly important for the works that were in prototype and were still being built or tested such as Prophet’s and Haines’ work. With individual works that were more problematic we worked with taking stills of the virtual walkthrough from different angles to ensure there were solid understandings regarding the installation. Through this process we were able to identify problems such as a misunderstanding about the importance of the wall behind Prophet’s plinth for the mounting of reflective mirrors for the projection on the bust.

The virtual walkthrough was also useful for understanding the placement of Knox’s Comfortable and Alive. The length and dimensions of this work were unusual. The hypnotism track also required thinking through height, the height of the monitors positioned to encourage participants to choose to sit, stand or lie depending on the level of immersion in the work they chose. Eventually the details of placement were decided during the installation process as the artist was able to come to Auckland. Placement was thus consolidated during the installation week and the changes retrospectively added to the virtual simulation in the walkthrough.

For Haines, her work was installed in the foyer that had a variety of challenges including architectural features. Challenges included the entrances into this transitional space from the street, galleries, working offices and stairs to other levels accessing teaching and performance spaces. In addition, her large, inflatable sculpture was to be suspended below the stained-glass dome and the historical protection restrictions on the building.

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⁶¹ The artists were at the time of the virtual walkthrough use residing variously in Perth, Sydney, Plymouth, UK, Netherlands and Hong Kong. My initial desire was to be able to raise external funds to be able to bring some of the artists and their artworks to Auckland for the installation. I did attempt to raise funding to bring the artists to New Zealand for the exhibition. I applied for cultural funding from the Netherlands for Agatha Haines and Asia Foundation for Jane Prophet but was unsuccessful in these two instances. I was able to raise funding to bring Stelarc to Auckland through the NICAI Creative Industries conference fund. I was also able to travel to see Stelarc and Nina Sellars in Perth as well as attend the Symbiotica conference at the same time for research. I saw Jane Prophet’s work in development while I attended the Transmediale PhD workshop at Run Run Shaw Creative Media Centre at City University Hong Kong. This was enabled by an AsiaNZ Foundation Grant that I was awarded to attend several biennales and conferences in South Korea in 2014. I was able to meet with Elena Knox in Sydney during a month-long residency at the UNSW art studio for developing both artistic and curatorial practice. On my return to Auckland, I was able to transport some of the components for Elena’s installation as excess luggage.
that he preferred the virtual walkthrough as a form of documentation and used these stills over and above the onsite photographs during the physical exhibition at the Gus Fisher Gallery.

It was important for me as a curator to accommodate the spatial requirements of the artists when possible, and be able to adjust installation and planning on the fly so to speak during installation. Due to the walkthrough, we had already developed alternative placements such as the back-up plan to switch my work with Stelarc’s placement if problems arose during installation.

For artists such as Stelarc the walkthrough also meant that we could develop alternative placements. Stelarc had two proposed placements for his work. Problem solving was particularly pertinent for his work as he required his work to be projected at a minimum height of 5 metres – a monumental style projection work. He also required free space to either side of the work and for the sound to be mounted in a way that was inclusive and immersive. The plinth was also designed to be minimalist and at a height that could both hold the keyboard but also secure the laptop. Concurrently it was designed to be at a scale that enabled the viewer to stand and converse with the chatbot/avatar/conversational agent with ease. Issues I faced as a curator included the stud height required by Stelarc was not the stud height of the Gus Fisher Gallery. Secondly, I could not source within budget the style of projector that could project floor-to-ceiling. So, we experimented with painting the space black and trialing different ratios of projection both through the virtual walkthrough and during the installation in the physical space. Initially, we mounted Stelarc’s work at his first chosen site in Gallery 2 but a few days before opening he decided that he would rather the work be in the group exhibition with the other artists in Gallery 1 and so his work was re-sited in response to this. This entailed moving Leah into Gallery 2 and Sellars’ work in to the foyer in order to give sufficient space around the work. When this work was documented Stelarc required photographic evidence for reporting purposes and found

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All of the artists commented via Skype or email how much they appreciated working in this kind of modelled virtual space and how they appreciated the care and attention that was given regarding the precision of installa-

Figure 46: Stained glass dome in Gus Fisher Gallery. Photo: courtesy of the curator.
tion. They found working in this environment particularly valuable as it helped them get a sense of scale and materials in the space, access through entrances and sight-lines, lighting, soft and hard flooring surfaces and stud height. It also enabled them to grasp some of the unusual features of the Gus Fisher Gallery including the colonial features such as the stained glass central dome and the wood and marble architectural features in the space [Fig. 46].

Throughout the research and development process for Alter the virtual walkthrough of the Gus Fisher Gallery operated as an alternative space, a model simulation of a real space in which we could afford to be more freely playful. As a group we were able to work through issues and have a clear and shared understanding of the exhibition’s dynamics and the gallery’s spatial challenges. The walkthrough was frequently changed and open to change, constantly being adapted and altered as works developed or new information emerged. It was a kind of conceptual virtual meeting place and an extremely valuable tool that I would definitely use again. Working on an international exhibition with minimal resources, the walkthrough created a place that gave the artists a sense of the exhibition and, importantly, a sense of involvement in a collaborative workspace - a kind of collective laboratorium. It was also a tool that could be shown to gallery staff and technicians if there were moments of confusion. The virtual walkthrough, along with technical spec sheets, were the tools the technicians installing the exhibition worked with, enabling them to sketch out issues as necessary.

The virtual walkthrough also mutated into a valuable documentation for the artists and myself. This process was especially useful as a working model for the way that it brought people, ideas, virtual objects and information together in one space prior to to the show achieving its final, physical form. Consequently, many of the problems and unexpected developments were worked through prior to the moment of going out in to the public eye and ensured that a better public experience was designed.

Additionally, building the virtual walkthrough with Unity software, meant we then had the basis of a Virtual Reality exhibition. This formed the kernel of the idea to develop a prototype for an evolving exhibition platform that started with the virtual walkthrough, was realized as a physical exhibition in the Gus Fisher Gallery and then moved to being a Virtual Reality experience as discussed in the next two sections of this chapter [64].

62 Comments made by the artists included the following selection: ‘I have looked through your fantastic virtual layout of the exhibition. Really impressive!’ Sellars in email to curator, 10th March, 2016. ‘The whole process has made me appreciate the care and attention that you gave to the ‘Alter’ exhibition.’ Sellars in email to curator, 3rd May, 2017. ‘This looks great, wow it really gives an idea of how the show will come together, I think the screens look a good size and that is a nice cove for them to sit in also. I think this will be a fascinating show.’ Haines in email to curator, 20th February 2016. ‘The virtual walkthroughs indicated more clearly what the spaces were like. Way to go.’ Stelarc in email to curator, 19th February 2016

63 I sourced historical documents on the gallery space so that if the artists wanted to know more I could give them an understanding of the space and its previous usages and design history. Gus Fisher was originally the IYA Radio Station built at the height of the Depression in 1935 and designed by Norman Wade and Alva Bartley in 1934. For further information see lecture by Linda Tyler delivered at Victoria University at the one day symposium “Pleasing homogeneity”, “Dull times,” and “animated cocktails”: New Zealand Architecture in the 1930s http://www.victoria.ac.nz/architecture/centres/cbpr/conferences. Paper was entitled: A Certain Stirring Thrills the Air: the design of IYA Radio Station, 1935, in context. Emailed to curator 30th May, 2014.

64 Lizzie Muller, Mari Velonaki and D. Turnbull Tillman have worked with new media prototype technologies and exhibition projects. Lizzie Muller has written about taking interactive new media projects from a university lab to a public museum environment (Beta_space at the Powerhouse Museum in Sydney) and testing audience engagement through HCI understandings. Tillman and Velonaki have written recently on disruptive projects and ways of disrupting the curatorial and exhibition project with an emphasis on involving the audiences’ responses in the ‘disruptive’ processes. It should be noted that
3.6.3 The curatorial as labile-technics

Alter, as discussed at the start of this chapter, was a project that shifted the frameworks of thinking through the acts of curatorial practice in encountering the posthuman. Each of the works framed an encounter and exposed an ecology of ideas and practices uncovered in this chapter by examining each work in turn. Alter profiled a selection of works that acknowledged a way of being in the world that is co-evolving with technology. These works point to ethical and speculative considerations in our relations with technology and non-human artificial lifeforms in emergence (as gynoid, as avatar, as drone). Through the artwork, as participants we have an encounter in which our acts of being and knowing are up for questioning (eg. the faltering, shallow and stereotypical information generated from Google searches as in Knox’s work, the chatbot engagement in Stelarc’s work, the machine learning and neural network processes of both Haine’s work and Leah).

Rather than assemble a linear narrative in terms of journeying through the exhibition space, the idea was to create intersecting practices expressed through the individual artworks. Different allegiances and counterpoints exist within the exhibition. One such grouping that contained both divergence and convergence were those artists that used magnetic resonance imaging devices as one of the apparatus in their process. This created a diffractive echoing through the works of Prophet, Sellars and Haines. Although each of these artists uses some form of magnetic resonance imaging, each work uses differing forms of magnetic resonance, and their inherent reuse, distribution and speculative repositioning are dissimilar from each other. However, in these three works we can see the placement of magnetic resonance imaging into an activated relationship. Magnetic resonance imaging is an imaging process that involves an apparatus in the form of a device that measures according to parameters decided upon by the scientists, medical experts and technicians. Thus: ‘An fMRI scan is not a ‘neutral’ product but the result of a series of specific, culturally shaped sociotechnical negotiations, which imply – like any technological fabrication – processes of formalization and transformation’ (Burri & Dumi, 2007, p. 301). Such images require expert interpretation and as representations are often in the service of either clinical or research assertions. The practice of imaging is an increasingly important and common tool in research and critical care. 65 Prophet, Haines and Sellars, as we have seen, have taken this magnetic resonance imagery through a series of diffractive speculative shifts using variant media and technology applications questioning ‘fixed’ and disciplinary-specific positions and mobilizing the data into a different use, context and form.

These artists have also connected in their transdisciplinary practices with neuropsychologists, neurocomputational experts and cognitive scientists to develop an alliance and a re-thinking of laboratory-based domains of practice. Fitzgerald and Callard discuss the practices of humanists and social scientists arguing for a ‘re-thinking [of] the laboratory-based experimental domains of the cognitive neurosciences as both spaces and moments for firing strange alliances between neuroscientists and social scientists’ (Fitzgerald & Callard, 2015, p. 6). I would contend that it is

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65 For an in-depth explanation of magnetic imaging processes and their usages for research and medical purposes see: (Asbury, C., undated).
also a space for intervention by artists who wish to employ their own situated, embodied and embedded selves into a re-imagined space, place and labor of experiment, opening up to the relations and connections between disciplines and human and non-human, that could be considered ‘firing strange alliances’. Within these artworks are denied dualist separations between mind and brain, brain and body that lead to ideas that the brain is a fixed biological organ essentially operating within a set of ‘normal’ parameters.

It is not possible, nor the goal, within the confines of this thesis, to examine changes in the field of neurosciences, but given the content of the examined practices a couple of important principles are required. The artists in this thesis, are bringing to the fore the mind/brain/body into play with complex ecologies in which the mind/brain/body is embedded in the environment and connected, mobilised and influenced by other systems both living and nonliving. This is in denial of ‘a disembodied Cartesian mind cut off from the world’ (Pitts-Taylor, 2016b, p. 4). It could be argued that in technoscientific art assemblages, new knowledge can potentially emerge through the extension of practices that participate in ongoing experimentation and critical questioning with scientific imaging processes. Prophet’s, Haines’ and Sellars’ creative practices all extend knowing, being and doing through these actions. Their works activate a mobilization and reuse of the magnetic resonance imagings that causes us to rethink their use outside of anatomical representations of the brain. Their works tease out the supposed binaries and relationship between the human and machine flowing between both. Prophet’s Neuro Memento Mori brings this to the fore through the combination of still and moving aspects inclusive of ‘instrumentalised’ visualisations of skeletal, muscular and neural anatomy alongside the scan lines and noisiness from the video sourced imagery. Additionally, by working with the sciences, such as cognitive neurosciences, these artists are critically engaging with, and intervening in, the notion of scientific experiment. These artists explore and interrogate scientific and medical apparatus, histories, cultures and processes in which ‘objective’ knowledge practices are generated in favour of a more speculative practice. This is in sympathy with the labile-technics action of speculating and diffracting as discussed in Chapter Two regarding speculating using models and simulations and diffracting through apparatus and imaging.

Another grouping of dissimilar practices in dialogue with each other is Stelarc, Knox, Haines and my work Leah which invite the audience to engage in intra-active systems. In the case of Knox this is in a dramaturgical sense and in the invitation to be hypnotised by a gynoid delivering a pre-defined script both derived and translated through internet sources. However, more machine-generated performative systems are at work in Leah, Sellars, Stelarc and Haines’ projects. These involve some form of machine learning. All perform in intra-action and the systems Stelarc’s, Haines’ and my collaborative work can be considered generative. Processes are generative when some of the variables are left unspecified by the programmer (Cavalhais, 2016, p. 52). The merging of time and space scales across the works lend an attentiveness to new materialist and posthumanist concerns that lead us to think through how we intra-act with these works. These artworks underscore the in-moment-in-between zone of the intra-active state as discussed in Chapter Two. They entail an active participant integral to the experience. These encounters are sympathetic to Hantelmann’s notion of the performative in the gallery, as discussed in the previous chapter as part of the analysis of unstable engagements.
A constellation of associated practices includes those artists participating in research projects in which their data is part of both the artwork and associated research ventures. This is the case with Prophet, Haines and my work *Leah*. In these works, the entanglement of observer, the utilised apparatus for observation and being the object of observation are part of the artwork and are visibly diffracting and transforming each of these in an intra-action. Prophet, Sellars and I acknowledge this intermeshing by embedding them/ourselves into the technoscientific assemblage and enacting the inseparability of artist as researcher/researched, artist as object/subject. This recalls the position of Barad’s agential realist approach when she advocates that ‘knowing is a direct material engagement’ (2007, p. 379). Our way of understanding is from within and as part of the encounter.

These technoscientific artworks reveal a new form of bio-ethics in which different relations are being sought with our techno-kin. Barad, Braidotti and Haraway all ask that we think about the effect of our actions on these media-nature-culture ecologies and in what ways are we thinking through materially and discursively our own contributions. As Braidotti states: ‘Both kinship and ethical accountability need to be redefined in such a way as to rethink links of affectivity and responsibility not only for non-anthropomorphic organic others, but also for those technologically mediated, newly patented creatures we are sharing our planet with’ (2013, p. 103). These technoscientific art works are variously exploring the kinds of intelligent machinic non-organic others that are coming into being within their relation to social, and in some cases political, contexts and creatively and strategically interjecting.

In *Contexts of/as Resistance*, Sally Jane Norman explores the ways in which art practices will often destabilize ecologies as they are not interested in classification or convention but rather in questioning, the unexpected, the accidental and the non-utilitarian. As she states: ‘Defiance of normative affordances and patterns of use, generating friction and resistance, is integral to creative endeavor’ (2013, p. 282). In order to track the questioning and resistant practices, Norman calls for a context sensitivity and an awareness that: ‘experimental art systems are creative machines designed to resist normative practices and concepts, and to provide an alternative context in which the future remains rich in conjecture, variations, and potential’ (ibid., p. 285).

Such resistances are arguably manifested in each of the artworks selected for inclusion in *Alter*. Knox is generating a resistance to the generation of female gender stereotypes within the advanced robotics industry including the sex-bot industry. Recently she elaborated by stating: ‘These femininity tropes, which are designed to make people feel comfortable, are very tied in to ideas of service. They’re replicated and, perhaps downstream, mass-produced. Hollywood loves the idea of sex-bots, though as technology develops, there are some real implications for real people that we don’t want to discuss. What happens to sex-workers, say when you get sex-bots that look like them, but have no pain threshold’ (cited in McKinnon, 2016, p.85). Resistances and questionings of these feminine tropes are part of both works featured in *Alter*. Concerning *Canny* she also speaks about her surprise at the strength of the sexualized responses that came through in the Google and Youtube searches regarding female gameshow hosts, and these subsequently influenced the dialogue and the style of dressing of the actroid. Specific movements of the actroid came about as a result of the limited movement parameters that had been programmed by the roboticists and these became an experimental parameter for performance.
Accepting the google translation faults and slippages in *Comfortable and Alive* further sees Knox accommodating the accidental and unexpected.

Haines has embraced the unexpected as her speculative assemblage invites the unknown. As their research questions convey, Haines’ collaborative team were exploring machine learning using the artist’s brain measurements in the programme and placing these within a newly formed unique anatomical sculptural structure. When placed into unpredictable settings, such as the Gus Fisher Gallery foyer, the environment is constantly changing and therefore the programme is adjusting to the unexpected and developing enriched decision and learning behaviours.

In *Prosthetic Head*, some of the agent’s capacities were developed by Stelarc through experimenting with the computational system. This is seen in attributes such as its capacity to perform poetry, to sing and to become an improvisational performance partner where the accidental and unexpected is an intra-active partner in a live networked environment. Stelarc perceives that this complex intra-activity is a way of experiencing how we don’t have control, as in a simplistic master-slave relationship with technology, but rather as part of a diverse causal system. He observes: ‘As artists I think we’re in the business of generating contestable futures - possibilities that can be experienced, examined, sometimes appropriated, and most often discarded’ (McKinnon, 2016, p. 84).

These artists have a degree of comfort with the slippages and inherent *troublings* of their experimental practices. Creative practices often foreground the experiences and processes of reconfiguring agency between human and non-human. As Vivienne Plumwood (2009) advocates: ‘In re-animating, we become open to hearing sounds as voice, seeing move-
their mutually enriching collaborations and conflicts. Interwoven with the exhibition was a series of talks that collectively expanded upon the dialogue occurring between different disciplinary backgrounds and research interests. Some of these talks were held in the foyer of the Gus Fisher Gallery [Fig. 47, 48]. Stelarc gave the keynote in the Kenneth Myer Centre presenting an overview of practice in relation to technological developments [Appendix 7.3].

### 3.6.4 Alter – VR

Within the acts and encounters of curating and re-siting of Alter as a gallery-based simulated exhibition and as Alter Virtual Reality experience, differences were introduced as a result of the different virtual engagement with the works [Fig. 45]. Donning a VR headset entails immersion. By choosing the HTC-Vive platform the participant has full body movement and can navigate the space using handheld remotes. The VR environment shifts the parameters for engaging the participant and changes their experience of the artworks. The artworks continue to entangle the viewer in complex relations. Curating contemporary artworks into virtual spaces, that require some form of engagement other than standing and viewing, is a relatively new curatorial challenge and has not been well theorized.  

The VR environment simulates the gallery by recreating similar dynamics and spatial orientation in terms of the basic architectural configuration of the space. To increase the sense of realism, some similarities to floor and wall surfaces have been added. The artworks are positioned in the same places as were devised in both the virtual walkthrough and the physical exhibition. However, the simulated experience of this Gus Fisher Gallery involves fresh ways of engaging and navigating the space. Walls, ceilings are not physically restraining. We can teleport, move quickly. We can fly upwards and see the model from afar. We can be at ground-level or float in co-presence with Haines’ desiring drone. The changes in material/force and affect creates a curatorial challenge with a fresh immersion in to the demands of the labile-technics space, requiring a further agile re-invention of all aspects of the indeterminate zone of the laboratorium-gallery-space.

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66. VR stands for virtual reality. Virtual reality is usually defined as ‘a computer simulation of a real or imaginary system that enables users to perform operations in virtual spaces and shows effects in real time.’ (Kuksa and Childs, 2014, p. 3)

67. The VR environment was built in the Unity game development platform by Werner Ollewagen and Nick Young for the HTC-Vive system. See [http://www.htcvive.com/](http://www.htcvive.com/)

68. This is a head mounted display (HMD) where two digital images are rendered at the same time using two cameras arranged at interpupillary distance creating the illusion of stereoscopic depth. For more in-depth description, see: (Miltiadis, 2016, p. 387).

69. This is in contrast to Oculus Rift which currently does not require the body to move and can be done within a seated configuration using a gamepad. See: [http://www.oculus.com/](http://www.oculus.com/)

70. The Virtual Museum Transnational network provides the heritage sector with tools and support for building museums in virtual spaces and was a research initiative that ran from 2011-2014. See [http://www.v-must.net/](http://www.v-must.net/). It included such projects as the Vatican collection online. Kuksa and Childs discuss heritage projects with institutions such as British Museum and Victoria and Albert Museum and augmented reality projects such as Green Mill’s VHE. (2014, pp. 37-50) For technical description of a project that built an architectural virtual museum space of exhibition see: (Miltiadis, 2014, pp. 386-397).

71. For an exploration of game design in relation to virtual reality art galleries see (Guynup, 2016, pp. 149-165).
Figure 47: Gallery talks as part of *Alter* 2016. Photo: courtesy of the curator.

Figure 48: Gallery talks as part of *Alter* 2016. Photo: courtesy of the curator.
Within the exhibition, it was decided to give the participant a re-invented avatar\textsuperscript{72} body in which it could be felt one was moving and navigating the space and able to engage with the more intra-active/interactive works. For instance, with Sellars \textit{Scan} you can pick up a mobile phone and virtually scan the QR code and receive the same autonomous animation of the MRI scans in the same sequencing as was available in the physical exhibition.

As Schultze and Orlikowski note: ‘In virtual worlds, users – who had been technically disembodied by such electronic media as online forums, email, and text messaging – now assume a virtual body […] to interact with others and the environment. Having a virtual body in a graphical 3-D space establishes presence and enables non-disscursive action’ (2010, p. 811). The artworks continue in \textit{Alter} in many respects to be dynamic assemblages that require an intra-action that involves shifting responsive decision-making and actions.

Acts of curating for this virtual space had its own inherent challenges. For some works it was possible to give a sense of the work activated in the environment while for others, technical limitations reduced their effectiveness. All of the screen-based works are able to play virtually in the space and are triggered by avatar proximity. Through picking up the headsets and placing them on the virtual avatar we are able to hear the soundtracks. With Knox’s work, it is possible to then choose when participating in \textit{Comfortable and Alive} to sit, stand or lie down on the couches below the screen as was the choice in the physical exhibition. The participant therefore has a set of options regarding how to view the work and experience the differences in their placement of the avatar body into these positions.

Stelarc’s \textit{Prosthetic Head} performance videos are able to play when you come in to proximity with the video screens. The interactive work has a video simulation of the work operating where the avatar has been scripted by Stelarc for showing in the VR environment. This version of the work sees the agent speak about its avatar presence and becomes in a way a new presentation of the \textit{Prosthetic Head}. The current programme that runs this artwork is not able to be translated into the virtual environment. However, it is possible to simulate the experience of the \textit{Prosthetic Head} by reanimating through a particular plugin a programme that reanimates the prosthetic head for playing in Unity. A keyboard is simulated for the plinth. The option was provided to connect through the VR experience to the original Alice chat-bot programme and have a similar dialogue-based engagement with a newly configured Embodied Conversational Agent.

The drawback of this particular presentation is that it is running on the general Alice chat-bot programme and not the customized programme that was built specifically for the \textit{Prosthetic Head}. The participant is able to select which version from the two aforementioned presentations of the virtual \textit{Prosthetic Head} to engage with.

With Haines and Prophet’s work there are reconfigurations for the virtual platform as well. With both of these artists’ works the screen-based works are able to still play the same content as was available in the May 2016 exhibition. However, Haines’ drone inflatable sculpture is only approximated in this environment and is not connected to any neural network or machine learning capabilities. The sculpture is however moving and floating, seemingly under its own accord, and the pre-recorded sound of the neural network performing is heard when the participant is present in avatar form in the foyer. Prophet’s work has a bust that is modeled on the same prototyping data that formed her sculptural bust. The moving

\textsuperscript{72} Avatar here means ‘a graphical representation of a user within the environment which is under his or her control’ (Allbeck & Badler, 2002, p. 313 cited in Kuksa & Childs, 2014, p. 9).
imagery over the bust is can be simulated but it is not known at the time of writing if this can be successfully fully resolved as surround projection mapped content. Alter VR is at the time of writing continuing to be developed.

Leah’s programme is not yet developed for running on Unity for HTC-Vive and is unable to be embedded as an intra-active installation. She has a pre-recorded sequence that is triggered when in avatar form you enter the darkened gallery space. This mimics the experience of entering the space but it is difficult without the full programme installed for the avatar to responsively track the participant-avatar presence with eye gaze and appropriate emotion. The soundtrack is drawn from the sound design of Witness and is changing according to the participant-avatar proximity to the ‘contact zone’ defined by the single light source.

As an exhibition in VR experience there are activated entangled experiences occurring. The works are still changing and have a fluidity that adapts to the decisions the participant decides while engaging in the immersive experience. There is the additional entanglement of the participant-avatar as a virtual presence that is triggering the behavior of the various artworks through proximity. Each viewer’s experience of the Alter VR experience will be different according to navigation of the space, time spent with the works and ability to effectively engage with the specific virtual choices for intra-action. In addition is the layering of the understanding of performance as a shifting amalgamation of both programmable and spontaneous actions in the moment of the experience in real-time. The emphasis is not therefore on the technology per se, but the active fluid experience in the moment of intra-action with each simulated artwork.

3.6.5 Bio-virtual movement

‘The bio-virtual is structured so that the ontological categories of the biological and the virtual are linked and superimposed upon each other to exist as part of a lived, embodied experience’ (Causey, Meehan & O’Dwyer, 2015, p. 3).

The Alter laboratorium accepts the bio-virtual. Holding the multiple layers, the biological and the virtual, and intersecting interpretations is part of the labile-technics space. It constitutes an active passing back and forth between the computational systems, participants, the artworks and their entanglements. This transmuting platform of Alter has shifted between spaces and ways of relating working with the accompanying notions of care as each engagement takes place. The curatorial at work in Alter has accepted that our contemporary experience is a movement between real and virtual sites and taken this movement into the practice of building, negotiating and designing exhibitions. This flexible style of the curatorial in action is able to adjust and adapt works and conversations across the bio-virtual. The artistic and curatorial at work in the creation of Leah equally asserts this current condition of developing myriad bio-virtual relations and is the subject for exploration in the next two chapters.
Chapter 4: Navigating an avatar ecology

4.0 Leah’s Laboratorium

Created over the last three years, Leah [Fig. 49], is conceived of as an ‘alter’, developed through a methodology of diffractive experimentation in the Laboratory for Animate Technologies [LAT]. The laboratorium and its connected ecologies, both human and non-human, began to reveal the constellations of becoming curatorial with and in the space of a labile-technics practice. Leah bought to the fore many troubling conditions present in her entangled ‘contact’ zone. As an emergent prototype, she surfaces new posthuman predicaments that hold within disquieting philosophical and ethical concerns.

This autonomous character animation, modelled partially on my personal facial and emotional characteristics, has been collaboratively developed with Sagar at LAT. Leah was developed as part of the Auckland Face Simulator [AFS] project where, for scientific research purposes, adult faces are realistically and precisely modelled to simulate emotional expression. These simulated adult faces can be used for neurophysiological and neuropsychological research into emotion, agency and empathy. Leah is the product of an ecology of practice, involving artists, engineers, computer scientists and neuroscientists working across a spectrum of spaces of labour, and knowledge generating practices, inclusive of LAT, the neurophysiological laboratory in the University of Auckland School of Psychology, as well as test install spaces, studios and galleries.

I propose that it is critical to spend time thoroughly understanding the culture, methods, and knowledge practices at work in this ecology. The avatar framework lies at the heart of the resistances and peculiarities that emerge in the creation and exhibition of Leah.
Figure 49: Leah, Gus Fisher Gallery, 2016. Photo: courtesy of Sam Hartnett
To fully understand the ways that this is happening, a critical analysis of *Leah* will spread over the next two chapters. I will plot the challenging and emergent process of both the creation, evolution and engagement of *Leah* across the transdisciplinary ecology of practice in which she operates. This is a complex journey, made up of many interconnected relations and events and requires multiple strategies for its mapping. Consequently, these two chapters are written as an emergent posthuman cartography (according to the *labile-technic* of mapping), as an alternative figuration (according to the *labile-technic* of speculation), from a researcher perspective that acknowledges the embedded and situated experiences of the artist/researcher.

Chapter Four uncovers the issues and practices at work. It will first examine the specific technoscientific modelling and simulation processes that Sagar and his team at LAT, and Corballis and his team at the Psychophysiology Lab, are engaged in. I will examine this laboratorium and investigate some of the key principles on which the research practices are founded.

Chapter Five addresses the development of *Leah*, and the subsequent exhibition projects, to fully reveal concerns that hold a different diffractive perspective to the rest of the team. This chapter creates a basis for understanding the difference that the avatar *Leah* is ‘performing’ as a part of this larger technoscientific ecology using Sagar’s neurocomputational autonomous avatar framework. The practices of the laboratories, researchers, apparatus and technical systems at work in LAT are embodied and embedded in *Leah* and require a detailed overview.

### 4.1 LAT’s avatars

*I ask what kinds of bodies, liveliness and emotions are configured in the autonomous animated avatars that LAT produces? What kinds of knowledge and techniques are being embodied, constructed and investigated in this LAT system?*

*Leah* is the product of an ongoing bioengineering project driven by Sagar, who leads the technological development of computational models of the face and brain at LAT. He is a transdisciplinary practitioner engaging fluidly across the fields of bioengineering, computer science, design, art, neurobiology, neuropsychology and education. Having come from the animation film and entertainment industries\(^1\) and a bioengineering background\(^2\), Sagar’s research interests include developing a universal system for mapping faces including morphology\(^3\), anatomy and bio-mechanical\(^4\) modelling that would advance the animation modelling processes for diverse uses for film, animation, gaming, online services, virtual reality, security along with university neuropsychological research streams.

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1. Sagar is a previous Academy Award winner for his digital character animation work for the film industry (2010 and 2011) and was the Special Projects Supervisor at Weta Digital. He has been involved with the creation of technology for the digital characters in blockbusters such as *Avatar*, *King Kong*, and *Spiderman 2*.


3. Biological form and structure and their relationships.

4. The application of mechanical principles to the movement and structures
LAT’s aim is to develop a realistic human face for virtual usages (human computer interaction) in which the facial behaviours help support the creation of intuitive, affective conversational agents. LAT’s sophisticated computational system is a combinatory framework primarily designed to represent human faces in avatar form that express realistic emotion and are able to respond appropriately when interfaced with human users. By recognizing other human faces and reading their expressions, these autonomous avatars are then able to emotionally and intelligently respond. Within the gaming and film industries there is an increasing need for realistic appearing and moving animated characters in order to drive more fully immersive experiences. The face is the site where the most realism is being sought. The challenge for the team is to find ways in which the embodied agent’s behavior is believable, consistent, appropriate and in context in unscripted life-like interactions. (see Sagar, Seymour & Henderson, 2016, p. 83) The desire is to increase levels of immersive interaction and emotional interconnection whilst not triggering the uncanny valley effect.

LAT’s framework is a form of affective computing that strives to activate machines to read human emotion and accordingly adapt, react and learn. Accordingly, he and his team, have analyzed the muscular facial control system and have investigated the emotions and neuro-behaviours driving character expression. These behaviours are informed by cognitive, emotional and physiological factors and are connected to a lower-level biologically based system that acknowledges a ‘brain-body state’ (ibid, p. 83). This then led, in turn and as part of the research foundations of the project, to the aim to create a neuro-behavioural computational model with emergent behaviours. Sagar’s work is informed by certain current theories from cognitive science and neuroscience and developed by computer scientists and designers in association with neuropsychologists at the University of Auckland. This is, consequently, a collaboration between laboratories and across disciplines. The initiative experiments and tests notions impacting on relations with simulated neuropsychobiological models. This is a complex technology development ecology. It involves many team members,

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5 The uncanny valley is the moment where we lose belief in the character and a participant will experience alarm or emotional discomfort. See: (Mori, MacDorman & Norri, 2012).

6 Affective computing is an area of computation that is focused on the theory and formation of systems that can read, interpret, simulate and appropriately respond to human emotional states.

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8 The core team of computer designers and developers is David Bullivant, Khurram Jawed, Ratheesh Kalarot, Paul Robertson, Werner Ollewagen and Tim Wu. This has been the subject of research for postgraduate computational modelling researchers within LAT including the recent PhD thesis project: Wu, T. A. (2014). Computational Framework for Modelling the Biomechanics of Human Facial Expressions, The University of Auckland.

9 Key members of the neuropsychology team are Associate Professors Paul Corballis and Annette Henderson from the School of Psychology, University of Auckland.
research projects, technologies and knowledge disciplines collectively informing the development.

This neurocomputational project is currently utilised in specific commercial and scientific research contexts where the parameters of software and hardware can be constrained and enabled fit-to-purpose. As Sagar states: ‘We are building a collaborative modular model of the face and brain, a brain and face Lego with swappable and reshapeable parts.’ This notion of modularity and customizability is a core principle of engineering and lends an overall fluidity, disposability and renewability to the assembly. These emergent prototypes developed at LAT are a set of computational models that can be reconfigured and recycled as requested. Together, they represent a quest for both autonomous animation systems and artificial emotional intelligence. Unique to this model is the integration of facial animation generated and responsive to modelling neural control over the facial framework. As Sagar et al explains: ‘Because the behavior of the face is affected by so many factors – cognitive, emotional, and physiological – we explore a more-detailed and lower-level biologically based approach than has previously been attempted in facial animation’ (2016, p. 83).

This is realized through a variety of interconnected programmes including an autonomous character animation system, a sensing and visual simulation framework and a biomimetic brain modelling system entitled BL – brain language [Fig. 50, 54, 55]. Through this BL brain modeling framework, microdynamic and compound facial expressions are being sought in real-time interactive settings. The aim is to bring together this human character animation with a biomimetic brain modeling system that displays autonomous and freely expressing emotions and responses to engagement by human users. BL delivers a virtual nervous system that drives the psychobiological facial framework.

Particular critical theories and models that have informed the development include those relating to embodied cognition, social learning, affective computing and neuroscience, developmental and social robotics and face to face interaction. This model is founded on the understanding that our cognitive actions preside in relation to the body, environment, perception, motion and stimuli as an integrated circuit. This is informed by a convergence of theories and techniques and is not isolated in one particular branch of neuropsychology or neurocomputational science. It is interested in mixing various theories together in order that a rich ‘dynamic behavior

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11 Input is through such devices as cameras, microphones, keyboard, and can be linked to other types of sensors through an API – an application that will connect it to the operating system. Leah uses only vision through a camera in the exhibition installation versions at the Gus Fisher Gallery. The first version of Leah did not operate with BL, the second version of Leah does operate with BL connected, largely to drive simulated breathing.

12 Research on facial expression often is focussed on the six basic commonly used and recognised emotions of neutral, happy, sad, fearful, angry, surprised, disgusted. Compound facial expressions of emotion include combinations such as sadly fearful or happily disgusted. For further information see Du, S., Tao, Y., & Martinez, A. M. (2014). Compound facial expressions of emotion. Proceedings of the National Academy of Sciences of the United States of America, 111(15), E1454–E1462. http://doi.org/10.1073/pnas.1322355111

13 To get a quick introduction to Sagar, LAT, and the logic behind the computational programming view the YouTube video (December 2016) https://www.youtube.com/watch?v=UhO8quSgA9Q
Figure 50: BL programme still image. Photo: courtesy of the Laboratory for Animate Technologies
of the face emerges from many systems interacting on multiple levels, from high-level social interaction to low-level biology’ (ibid, p. 85).

These models share similar aspects found in interactive robots and intelligent virtual agents including, as ‘computer vision based object tracking, speech recognition, memory and cognition, reactive behavior, reasoning, planning, action scheduling, and articulation enabling them to participate autonomously in real-time in dynamic environments’ (Sagar, 2015, p. 2).

LAT’s neurocomputational modelling and animation system development belongs with a history of autonomous artificial intelligence animated projects. This drive to give human-like qualities that engender liveliness to ‘animated’ models leads to underlying requirements of the system to have responsive behaviours. The challenges thrown up by practices of modeling in the laboratorium (as discussed in Chapter Two), and their corresponding problems associated with notions of objectivity and representation.

These models therefore are part of a history of AI development inspired by biology and psychology to produce a computational path through which emerges intelligent agents. Suchman notes: ‘The concept of ‘emergence’ is the trope through which proponents of the “New AI” secure a form of digital naturalism in the face of the evident constructivism of “artificial” life’ (2014, 318 citing Kember, 2003, p. 56). Common within this developmental trajectory is the influence of development and social robotics which has influenced Sagar as well. Sagar’s avatars are largely depicted from the neck up, excepting the more recent full body development of the leading avatar BabyX. This social intelligence embodied by the avatars includes the ability to emote, to have vision and capacity to respond, speech capability and recognition, eye contact and a form of artificial emotional intelligence that builds with experience adapting to new situations and stimuli.

In viewing this assemblage of human and non-human actors and agents as a transversal posthuman ecology, certain tensions and challenges start to surface. These automating systems are measuring, mapping and technically engineering affect in the ‘human’ face, thus arguably reducing a complex diversity of human expression into a ‘limited’ language that can be universally applied. As we have seen in the previous discussions of posthumanism this thesis is advocating for a diverse transversal approach where a more layered and multiplicitous approach is applied. This is a part of the task of responding with the artwork Leah.

4.2 Troubling the liveliness

With respect to automata, the approach is, first, to slow down the rhetorics of life-like machines and to attend closely to the material practices of their realization; and, second, to ask what conception of life and liveliness is in play in these projects. This requires, in turn, attention to the particular circuits of production and exchange in which automata research and development is embedded and to which

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15 See (Sagar, Seymour & Henderson, 2016, p. 82).
In this Chapter, I apply different theoretical perspectives that enable a rich basis for approaching the technical, social and knowledge histories embedded in the system that Leah, the avatar, is an outcome of, along with the various artefacts produced during her development. This is a labile-technics tactic to introduce further conceptual complexity, to provide multiple readings, of this technoscientific ecology that enact the non-unitary cartography methodology advocated by new materialist thinkers such as Braidotti, Haraway and Van der Tuin.

The aim here is to enrich and expose thorny considerations regarding such frameworks and understandings that LAT’s system is based on. One of the sources of unease is that of affect classification, based upon a set of humanist traditions that a posthumanist reading is trying to disrupt. This responds to Haraway’s call to situate knowledge. Haraway is asserting: ‘Location is the always partial, always finite, always fraught play of foreground and background, text and context, that constitutes critical inquiry’ (1997, p. 37). A new materialist method would be to approach this laboratory and the LAT computational system as a transversal project that has embedded within it certain genealogies, relations, practices, rhetorics that are coming into intra-action within this framework. I will next consider some of the aspects of this ecology, inclusive of the other avatars BabyX, Xyza and Tim, and their construction and deployment. All of the avatars are intra-acting with the knowledge systems, their developmental genealogies, computational histories and the disciplinary entangled tales that comprise LAT.

It should be noted that this ecology is traversed from the partial perspective of an arts collaborator which, as a role, contains certain limitations regarding access, knowledge and resourcing that determines the depths...
means that this is a negotiated design and collaborative process, as to any of the models and projects that I work on in collaboration with the labs, and that there is a working, functional, respectful, understanding regarding boundaries.

My education training period of being a postgraduate attached to a lab entails a particular located situation in which it is shaped by the minutiae of details that all amount to criss-crossing tracks across fields of power, knowledge, economies and resourcing. Access while in training is a fraught site of resistance, the resources are with-limits available for you for the time that you are in training but potentially no longer once completed. The tenuousness of the slightly-to-one-side nature of the involvement carries with it risks and particular problems that frequently emerge regarding constraints as to what can be done with the framework and the investment of resources such as computers, to be able to take the programmes outside of the lab once they have been secured. There are an odd mix of freedoms and impediments and it is in this contact zone that the project of Leah’s intricacy of relations is negotiated. When considering the non-human others, including the resultant avatars, then it can be argued there this a kind of variant ecology similar to a cross-species ecology. In Haraway states that training between ‘Man and Animal in the abstract – is a historically located multi-species, subject-shaping encounter in a contact zone fraught with power, knowledge and technique, moral questions – and the chance for joint, cross-species invention that is simultaneously work and play’ (2010, p. 445). Although Haraway is speaking to the task of dog training, her comments are applicable to other multi-species ecologies.

of what can be negotiated, particularly in regard to laboratories that have commercialized operations. A labile-technics framework enables me to traverse this situation with a set of agile tactics. The detailed knowledge and programming structures of LAT’s framework are only able to be partially exposed. This is due to several factors, including the complexity of the system and the breadth of the knowledge that has been invested into it. The current staffing of the commercialized lab is sitting around forty practitioners. The framework has been commercialized and therefore there are legal restrictions regarding intellectual property; this is a proprietary framework that has been patented and trademarked, and additionally, there are the legalities of international trade contracts that are highly confidential. Although I have worked with the lab, it has not been in a programming context and my exposure to the nuts and bolts is limited to publicly available released documents. My negotiated access was as a postgraduate arts student. As an arts practitioner, I see my role as working in collaboration with partners, facilities and colleagues who have depths of knowledge, resource and technical skill that is not possible for me to personally accumulate. The nature of this LAT-driven technological development ecology has recognized this in the ways it is networking knowledge, skills and resources across departments and disciplines. It is a necessary part of the troubling that I am writing about, that these ecologies are teeming with conceptual and ethical problems as well as legal, restrictive and resourcing issues. I have respected the clearly understood boundaries that I have been able to work within which involves understanding that the proprietary system is, in many ways, a ‘black box’ technology for me. This

16 ‘Black Box’ refers to technology where the inputs and outputs are known but the inner ‘nuts and bolts’ of the programme and its internal workings are not. The LAT framework as a whole is not something that I know in detail for the various reasons identified. Rather with Leah I worked on what characteris-
Figure 51: BabyX 4, proposed marketing image. Photo: courtesy of the Laboratory for Animate Technologies

Figure 52: BabyX 4, proposed marketing image. Photo: courtesy of the Laboratory for Animate Technologies

Figure 53: BabyX 2016. Screen capture, courtesy of the Laboratory for Animate Technologies
One of the tactics that Haraway speaks of ‘learning to pay attention to one another in a way that changes who and what they become together’ (ibid., p.445). This concept of learning to pay attention to one another is applicable across the human and non-human and its variant ecologies for technoscientific art practices.

In many respects, this thesis is about paying attention to changes, to each other, to thinking through what changes when human and non-human come together and pay attention to each other. Paying attention may be through technological apparati, a galvanic skin sensor, or the tension filled moments of a clock that ticks when you only have half an hour with someone with a full diary for the next three months. It could also be a system that is set for a particular use, and you need to find a way to shift the technician and the system in the direction of a new or unexpected unplanned-for use. There are moments in the rhizomatic nature of this chapter and the next where this will emerge as an agitation with no easy answers but rather speaking to being ‘in the trouble’, in the ‘contact zone’ and in the act of becoming-with, of being co-present. Haraway explains the ‘contact zone’ by citing Mary-Louise Pratt, a colonial and post-colonial theorist, who stated: ‘“A contact” perspective emphasizes how subjects are constituted in and by their relations to each other […] It treats the relations … in terms of co-presence, interaction, interlocking understandings and practices, often within radically asymmetrical relations of power’ (ibid., p. 449). Asymmetrical relations of power are a feature of my particular contact zone in more ways than the obvious. It is certainly a contact zone where ‘the mind/body is not a giant computational exercise, but a risk in play’ (ibid., p. 462).

4.3 BabyX

Over the time of the development of Leah, a family of avatars have been developed by LAT. Predating the production of Leah was the realization of the first avatar BabyX [Fig. 51, 52, 53], who is currently still the most artificially intelligent and emotionally responsive of the avatars and is the leading prototype. Following BabyX was the development of other avatars such as Xyza [Fig. 56] and Tim whom cross both commercial and research based applications.

BabyX is an interactive animated virtual infant prototype. BabyX is a computer generated, psychobiological simulation under development in LAT and is an experimental vehicle incorporating computational models of basic neural systems involved in interactive behavior and learning. BabyX embodies many of the technologies prototyped in LAT and is under continuous development, in its neural models, sensing systems and the realism of its real-time computer graphics and simulation.

In the case of the leading prototype of BabyX, the model is based upon Sagar’s child. This dovetails with other computational models based on early learning and language acquisition in young children as a neurobiological model worth studying and replicating in the search for AI emergent intelligence. Sagar is working with child development psychologist Dr Annette Henderson to ensure current neuroscientific understandings of early child learning have informed the BabyX model. This research collaboration is part of the research generated out of the Early Learning Laboratory for which she is the Director. Henderson is a Psychosocial and Cognitive Development specialist in early childhood (0-4 years). With BabyX she consults on neuropsychological learning including language acquisition and cognition aspects of BabyX’s development. With BabyX
Figure 54: Auckland Face Simulator project. Screen capture: courtesy of the Laboratory for Animate Technologies

Figure 55: Auckland Face Simulator project. Screen capture: courtesy of the Laboratory for Animate Technologies
she is wanting to explore the language of learning and to compare the differences between interaction with BabyX and interaction with a real baby. She specifically intends to examine interactions focused on mothers and their real babies opposed to mothers and their interactions with the virtual infant BabyX. A secondary research interest is examining a series of language experiments designed to reveal how parents teach their infants language and again compare these to parents teaching BabyX language. The system can analyse video and audio inputs in real time during the period of reaction to the caregiver’s or peer’s behavior using behavioural models. This is being accomplished with doctoral and postdoctoral researchers as part of the associated research programme being carried out at the School of Psychology at University of Auckland.

Consequently, this technoscientific ecology is an entangled and complex one. On one hand, there are deeply challenging research projects regarding specific disciplines and on the other, the same research can be used to develop a more effective, commercially viable, intelligent agent capable of learning and responding appropriately. As Casteneda and Suchman (2002, 2014) have observed, looking to child learning is a key trend historically within computer science research and development that is striving to manifest artificial intelligence. This research often calls on contemporary neuroscience research to model a child-brain that develops in response to interaction with the world. However, in the computational simulation the modelling and flexibility is fashioned on a universal child intelligence, with a capacity to respond to a fixed set of environmental stimulation, usually confined to audio and vision.

This influence of the notion of child learning on the modeling of BabyX can be seen in several videos currently available on YouTube that show Sagar demonstrating the prototype of BabyX. BabyX first words features a short documentary showing Sagar working with BabyX. BabyX here is described as an experimental computer animation of a ‘psychobiological simulation of an infant which learns and interacts in real time. BabyX integrates realistic facial simulation with computational neuroscience models of neural systems involved in interactive behavior and learning.’ BabyX is seen learning from paper-based physical books that Sagar has designed to teach the avatar BabyX to recognize language as text and as oral prompts along with recognition of shape, colour and form in the symbolic representation of the object matching the word. These learning demonstrations represent the same procedures that a ‘human’ child would participate in Western early child learning and development. The avatar BabyX is therefore being actively taught to be ‘humanlike’ arguably according to Western humanist principles. It is garnering artificial embodied cognition under controlled environmental conditions with specific types of information being designed to be supplied to the model. This constructed set of learning procedures is shaping BabyX to have a particular trained artificial intelligence which generates problematic ramifications when looked at from a posthumanist perspective.

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17 See TedX 2013 video at the start of the development: https://www.youtube.com/watch?v=eXrRdX8kVWw

18 See BabyX video of being taught words and images: https://www.youtube.com/watch?v=ahDOBhKuuEM
Figure 56: Xyza, 2015. Screen capture: courtesy of the Laboratory for Animate Technologies
the controllable stimuli for use in both social psychology and neuropsychology. Currently face perception as a research field, broadly speaking, is hampered by a lack of stimulus control. Face perception models are used for researching how we process faces such as recognizing self, friends, microexpressions, and types of emotion. Largely, still photos, cartoons or computer simulations of variable quality that are recognisably simulated are used. These draw upon the FACS based set of images. In the area of emotional expression, the FACS set of images has been considered a good stimulus, although current renditions are required in order to obtain reliable results. Current challenges for the research into this area, include still photos being the most widely used stimuli, rather than action-based animated models. If the photos are manipulated, it is done through morphing and lack a sense of dynamism. They are perceived as being too mathematical, linear and sequential. The avatars from the AFS programme are dynamic, realistic and highly controllable which make them very useful for research purposes. The AFS models are considered realistic across a range of expressions. This is due to the amount of control that the researcher has over individual muscle elements. The Ekman FACS set of images are dated as they were created in the seventies and so the research usability is compromised. To be currently applicable, there needs to be a set of images generated based on the FACS set, to introduce an element of time and contemporary dynamic expression. AFS can generate the required updated set of test images.

4.4 Auckland Face Simulator

What technoscientific histories does the Auckland Face Simulator Project [AFS] participate in and what concepts are being further demonstrated? What kinds of bodies and minds does AFS’s research and knowledge practices reveal?

Xyza [Fig. 56] and Tim, as with Leah, belong to the AFS programme that studies neurophysiological and neuropsychological behaviours. The AFS programme was developed in consultation with Associate Professor Paul Corballis who is a cognitive neuroscientist with research interests concerning visual perception, attention, neuropsychology and cognition. Based in the School of Psychology at the University of Auckland, he has recently set up a neurophysiology lab for research incorporating psychophysical, electrophysiological, neuroimaging and neuropsychology. In the AFS project, Corballis leads the research connected to adult emotion and consults on the neurobiological and neurophysiological aspects. He is particularly interested in developing a set of avatars that model Ekman and Friesen’s FACS system for neuropsychological research and to explore digital agency, empathy and affect. Corballis is interested in developing the AFS project for face perception research in a variety of psychology research pathways.

Central to this applied research is exploring how much agency and animacy is contained within subjects’ interaction with the avatar models and to establish if emotional engagement with simulated models replicates ‘real’ emotional engagement. This data can also be used to fine tune the computational modelling of human subjects. All of the avatar models have been used in a variety of neuropsychophysiological research projects since their construction, including Leah. In particular Corballis is interested in

The experimental testing procedures for the avatar family are based on affective psychophysiology research. Within this research framework, emotions are viewed as ‘action dispositions’ (Lang, 1995, p. 372) in which affects are tracked by assessing data that examines ‘functional behaviours, evaluative and expressive language, and physiological events’ (ibid., p. 372).
Corballis is staging a series of experiments, including comparing the physiological response in relation to still photos captured from avatar and morphed photos of real models. They have a collection of models in addition to the current three AFS models. Test subjects are exposed to a 1/2 second recording of avatar or real model generated images of various expressions and degrees of intensity. Concurrently the test subjects are monitored through recording EEG response linked to emotion. Each picture over a period of time will be presented 100 times in random sequences. To ensure attention, there will be slipped in an occasional random upside-down face that requires a button press response. They then assess the average responses from EEG readings. So far there have been fifty subjects tested. The responses have been divided in that some thought the avatar as being the real model and vice versa. As a group, the avatar in neutral expression, revealed an emotional response that may be indicative of an uncanny valley response.

Corballis is aware that all experimental images are problematic and that, in particular, the depiction of blended emotions such as shame or contentment are difficult to test as these are not uniform across cultures. Only the basic emotions appear to get reasonably similar responses across cultural groups. Blended emotions are harder to simulate and the results are highly variable. For the avatars, the 20-40% range of intensity regarding emotion appears to gain detection. Corballis is also interested in microexpression and the flickers of small expression. On this area, the research and literature is poor. 19

In Corballis’ research these emotions are being recognised as mind and body working together as a whole system with no clear boundary of separation. This he refers to as embodied psychology. As Pitts-Taylor describes, emotions are: ‘felt throughout the body - the gut, the hands, the heartbeat - and in the neopragnatic view that they are not the effects of thoughts but perceptions of bodily states that shape the content of cognition’ (2016, p. 47).

The AFS programme, as designed by LAT and the neurocomputational avatar framework, is modelled on Paul Ekman’s FACS system and includes algorithms that observe and analyse participant responses through facial mapping systems. The LAT developed system for this usage can...
include interfaces such as a slider in which emotional registers can be ‘dialled up’ in percentile intensity for use in neurophysiological research [Figs: 54, 55]. LAT have designed interfaces that allow researchers and other users to adjust the values of model parameters using a set of widgets which link to different variables in the system. Variables may directly control the behaviour of the model’ (Sagar, 2015, p. 5).

In particular, the camera connected system offers two-way discursive practices both reading and responding to the participant’s expressions and categorising and archiving results into an ever-increasing database of previous user recorded features and reactions. It is designed to focus on participant’s emotional registers conveyed through a mapping of the key features of emotion displayed on the viewer’s face and recognised by Sagar’s programme. As such it resonates more generally with various forms of social classification, mapping, capturing, tracking and categorising human behaviour and emotion.

Part of the LAT computational system, is a facial recognition system which can map individual observer’s expressions and analyse and categorise according to emotional register. In this way, other building blocks can be connected that enable the avatars to respond and act in real-time according to customisable objectives. This computer vision capability of the LAT system is connected to the research behind the AFS project that gives it the capacity to categorise emotion and track response. This computer vision capability is not a neutral site of programming and is increasingly utilised in intelligent and human computer interface environments. By extension, this system could be used to monitor the cognitive and emotional attributes in a wide array of social contexts such as sites of work, border control, public gathering sites as well as for gathering affective data for market research.

To contain this kind of building block within the computational system conveys that LAT is in the business of engineering physiology. This emotional register that forms the basis of the LAT system is based upon the psychophysiological system namely Paul Ekman’s FACS system. This system is an enormously influential methodology originally developed in the 1970s and still in wide use today, particularly in psychological research. Ekman and his collaborator Wallace Frieson developed a system that provided a ‘comprehensive classification system that could be applied to every human face, and that could be used to make discoveries about facial affect that could be generalized universally – in other words, a method for making discoveries about facial expressions and their relationship to felt emotions that would apply to all human beings’ (Gates, 2011, p. 161). Consisting of forty facial action units, the FACS system [Fig. 57] was demonstrated by employing actors to perform the facial action units and these were filmed as a visual resource for analysis. Stills were taken from the films, namely 358 frames, and these were widely circulated. They contained primary emotional states such as anger, jealousy, fear, grief and happiness. The expressions in the system are posed and stilled for recording and analysis.

Specific ‘emotional’ registers, based on Ekman and Friesen’s FACS system, are constructed in the AFS project and they therefore become the objects of a ‘knowledge-making gaze’ (Castaneda & Suchman, 2014, p. 318). Entangled within these models are a culture of knowledge making in which there is a universalized and standardised system of knowledge-body-intelligence making, that is drawn from the neurobiological
and neuropsychological sciences, and that can be applied widely. As Suchman observes: ‘As a foundational move of scientific method, the transposition of assertions constructed in a particular place and with reference to a specific animal (individual) to others (within or across species) remains a central challenge and an always contingent accomplishment’ (2014, p. 322). These animated avatars could be described as model organisms in which models that embody constructions of knowledge are used as model systems for testing, and knowledge generated from this is then applied to other cases and settings. This then entails as Suchman observes that: ‘The model organism is haunted, in this respect, by what Keller (2007, p. 341) describes as “circular trajectory”, as models become apparently test beds for assessing the very theories that they materialize in the first place’ (2014, p. 322).

One could observe that the AFS project is a set of models based upon Ekman and Friesen’s FACS system and therefore the testing that is possible for these models are in some senses circular, as the acceptance of the validity of the base scientific theory encapsulated is embedded in all outcomes that will result from such modelling. It also recognizes the capacity to take learnings from the models for use within social situations. It holds within it a specific laboratory history and practice that makes this dissertation’s theoretical framing of the laboratorium especially relevant.

Arguably, Ekman’s system and this contemporary revisititation could sit within a history of anthropological, psychological and ethnographic histories of skull, emotion and facial measurement and visualisation. This history is fraught with misuse. Photographic technologies, in particular, hold a starring role in the recording and classifying of human emotion and physiology for research, with specific prevalence in the nineteenth centu-
around the dynamic expression of emotion are not visible in this system. The human form is fundamentally seen as a programmable resource where the computer has expert capacity for recognition of its ‘nature’. As Gates notes:

[...] neural networks – or “networks of simple interconnected processing units that operate in parallel” – are seen as offering a promising possibility for addressing the challenges of automating facial expression analysis. [...] If a designer of a system ‘restricts the [neural] network to a predefined class of appropriate responses, the network will be exhibiting the intelligence built into it by the designer for that context but will not have the common sense that would enable it to adapt to other contexts (2011, p. 167).

This is a material discursive practice where the apparatus of the LAT system effects and affects the possibilities of the outcomes. This concept of perception as an act of doing is the basis of many contemporary theorists’ approaches and involves the intra-action of dynamic and relational activity in responsive action with human, non-human and the situational environment. Alva Noë and J. Kevin O’Regan propose:

Seeing […] is comparable to dancing with a partner. Just as dancing consists in a delicate interaction between two partners, so seeing we argue depends on patterns of interaction between the perceiver and the environment. There is no doubt that neural activity is necessary to enable one’s skillful participation in a dance, but it is unlikely that this neural activity is sufficient to give rise to the dancing. After all, the dance, with its weight changes, moments of disequilibrium, and

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20 Gates is an Associate Professor in Communication and Science Studies at UC San Diego. Gates’ research focuses on the critical analysis of digital media technologies and the politics and social implications of computerization, especially the automation of surveillance, in America from the mid-twentieth century. Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance, examines the methods under which computers are taught to see human faces. For further information see: http://communication.ucsd.edu/people/faculty/kelly-gates.html
rebounds, depends on the actions and reactions of the partner (not to mention the nonbrain body) (2002, p. 567).  

The structures of knowledge-making, the apparatus and the kind of objectifying ‘gaze’ that grounds the founding principles, of the computational system that drives the avatars developed by LAT, is problematic when conceptually viewed from cultural studies, new materialist or posthumanist perspectives, as it can be seen to constitute a universalising system. As should be apparent from this wide-ranging discussion across the LAT culture of the generation of autonomous animated avatars, the system is a form of technological apparatus that reveals histories of thinking and practice, current discipline-specific research, as well as an ongoing process of developing new prototypes that entail within the laboratorium, processes of construction, demonstration and performance. This is an ongoing production process. A process that is running not only across university research and development and their respective scientific research fields, but also as part of a commercial enterprise that has patented the computational system to form in-parallel actuations within a series of commercial outcomes.

4.5 Soul Machine: Avatars in service

LAT’s programme development is a sophisticated coding system marketed to be ‘next generation’. In 2016 Sagar launched a new commercial company named Soul Machines to further develop this system and its extended applications across numerous possible commercial applications. Soul Machines is ‘developing human-like avatars that enrich the user experience for customers and markets adopting artificial intelligence-based platforms.’ This is an extension of LAT’s work enabling the technological application of the knowledge gained through the development of BabyX and the other avatars for ‘humanizing the interface between man and machines’. The full family of avatars were implicated in the marketing and promotion that surrounds the establishment and current systems generated by Soul Machines. However, in Soul Machines, the avatars find a new life, and are required to act as emotionally intelligent avatars operating at the human computer interface for a variety of repurposing and application. Primarily they are marketed as fulfilling the purpose that Sagar describes: ‘It’s a bit like a science fiction scenario, you’re talking to your intelligent machine and it’s just like talking to a person. People learn through interaction with each other but that’s completely ignored by current artificial intelligence’ (Rotherman, 2016, n.p.).

Applications for the technology will include avatars as call centre and security system agents, characters within virtual and augmented reality games, theatrical film actors and as avatars potentially embedded within specific medical and service applications. It has been financed initially by venture capital firm Horizon Ventures that has ‘funded some of the more well-known technology innovations of the last decade including Facebook, Skype, DeepMind, Siri, Spotify and more’ (Rotherman, 2016, n.p.). Soul Machines’ aim is to provide ‘a 21st century user interface in the era of Artificial Intelligence, robots and AR/VR using what has been the most important human-to-human interface – the human face – as a platform. The application of the technology is vast but the essence is that it augments, rather than eliminates the need for, face-to-face services,’
The ongoing development of these avatars is now accountable to a large community of commercial and industrial concerns and ultimately influences the directions of further development. The new in this culture is developing product that has not been seen before and can therefore be marketed as ‘cutting-edge’ technological development. As such, this process of the development of intelligent autonomous animated avatars is a ‘case of a performative artefact that works to align multiple, discontinuous social worlds. Like any technology, the prototype does not work on its own, but as a part of a dynamic assemblage of interests, fantasies and practical actions, out of which new socio-material arrangements arise’ (Suchman, 2002, p. 175). In effect, the avatars shift their technical nature in hybrid fashion, according to permitted need, given the new regulatory, patented, intellectual-property protected and non-transparent systems now in operation as befits a leading edge new technology start-up venture.

This transversal ecology therefore mutates across a variety of operations that are connected to non-human - human relations, discipline specific university housed research, general media technological and societal relations as well as economic and political drives. This complex rhizomatic technoscience mapping has required a rich and multilayered response, that is carefully situated within this specific transversal ecology, that also reflects the agility, speed and volatility essential within its drives to remain at the leading edge of technology development.

This kind of ‘digital economy’ would fit within Parikka’s discussions of cognitive capitalism in which he observes in response to Yann Moulier Boutang: ‘The allusion to the powers of the brain as communicative, organizational and a coordinating factor in production of value needs to be investigated in relation to its technological conditions as well’ (2014, p.)

The first commercial project utilizing the autonomous avatar system is Nadia, who was created as the empathetic 24-hour human interface for the service organization, National Disability Insurance Scheme, in Australia. The now Soul Machines system was clipped to the IBM Watson’s artificial intelligence technology along with FaceMe, a locally developed real-time video communication technology recalling the original lego system analogy discussed by Sagar. Nadia has the capacity to assist disability users by providing an interface consisting of a young female avatar, voiced by actress Cate Blanchett, to provide assistance by voice, text or live chat. She was interestingly developed in close collaboration with a group of disability users over a year-long period. Nadia retains the neurophysiological modelling and is, therefore, regardless of the need for accountability to external stimuli, still largely a mind-in-brain system. This was further reinforced when Cross stated ‘The core theory behind our technology is our faces are the mirror image of our brain. You can’t create a realistic face without creating models of the human brain as well’ (Strang, 2017, n.p.).

Greg Cross is the Chief Business Officer at Soul Machines.

For a short recent video on the commercial application of Soul Machines technology with IBM Watson artificial intelligence technology. See: https://www.youtube.com/watch?v=khr-eWGHbSI

For a short explanation of the making of Nadia see YouTube video: https://www.youtube.com/watch?v=3jMQuTXTj6c or a Newshub report giving an overview of the project: https://www.youtube.com/watch?v=0-BSrFQv2ls

According to Sagar. Put more simply by Greg Cross, the human face is being utilized as ‘a next generation leisure experience between humans and machines’ (Strang, 2017, n.p.).
The kinds of technological cognitive economies emerging out of the university research systems that LAT and the new Soul Machines epitomize is an ecology based on innovation that is not often analysed from a transversal perspective. More often than not it is greeted with utopian, universalizing and celebratory language, often positioning the system as cutting edge, fun, new, smart, adaptable and next generation as referenced earlier in this chapter. Inherent within the system is the value creation in knowledge production embedded within university research pathways. Boutang in his recent book *Cognitive Capitalism* maps the changes in labour practices at work in what he calls an era of cognitive capitalism that has at its heart a combination of forces moving between collectively produced knowledge practices and their embeddedness in information technology systems and practices. This combination he argues has led to a transformation of labour practices and social economic values at work in late capitalism. Noted within this is the role of the academy and the generation of innovation and knowledge. Paying attention to who is making the coded system and why, and what kinds of labour have gone into the development of the system, has been part of the intention of the excavation that has occurred in this chapter. However, an in-depth analysis of the coding practices is not possible in this case due to the registered technology patent, legal and contractual regulatory restrictions in existence protecting the emotionally intelligent avatars’ computational system. This is indicative of the matrix that Boutang unravels. It is worth quoting his summary of software practices within this matrix. He states: ‘software can be seen as the concentrated essence of the new information technologies. [...] Software is therefore a symbolic and strategic knowledge-good of the immaterial economy and of the new capitalism based on innovation and the production of value’ (2011, p. 80). Haraway makes a point of discussing the need to acknowledge the role that copyrighting, trademarking and patenting have in technoscience (1997, pp. 87-94).

At the centre of this change in the labour market has been the capturing and use of creativity to drive innovation in the new forms of knowledge-economies. It is somewhat inevitable that this is an almost indisputable aspect of current technoscientific activities and are often a feature of collaborative transdisciplinary technoscientific art assemblages. In the case study of Knox’s *Comfortable and Alive* and *Canny*, in the previous chapter, lies the addressing of the underlying manufacturing, labour, research and development that arose as part of the ecology that her work is staging resistance to. Prophet, Sellars and Haines’ work is also developed as part of a university research knowledge system. Additionally, Stelarc, since making *Prosthetic Head*, has set up the Alternative Anatomies Laboratory at Curtin University in Perth specifically to further innovative technology practices largely connected to engineering and robotics within a university research agenda. All of the artists referenced as case studies in this thesis participate, and critique, the knowledge-economy of current technoscientific practice that involves the circulation of cognitive capital.

Braidotti (2011, 2013) addresses this within her philosophical discussions concerning posthumanism and nomadic subjectivity that concurrently address the political economies in action and suggests ways through this complexity. These labyrinthine ecologies acknowledge the fusion of the neural and the nervous system with electronic networks affecting the corporeal behaviours of both human and non-human and their interrelations. By reiterating Deleuze’s concept of becoming-machine, she advocates that, in the face of such fast transformations manifesting in late capitalist societies, characterized in part by their knowledge economies and techno-
logical innovations, to affirmatively explore ‘alternative forms of reembodiment’ is important. ‘Nomadic radical immanence, reworked with feminist politics, allows us to respect the bond of mutual dependence between bodies and technological others, while avoiding the contempt for flesh and the subsequent fantasy of escape from the finite materiality of the enfleshed self’ (2011, p. 61). She importantly notes that Deleuze’s concept is in denial of the humanistic desires in regards to technology that would see the assembled parts working together as a harmonious and well-functioning whole. Rather, the emphasis is on the transformations, the becomings, the non-unitary without the requirement for an end result, while being coextensive with our technological habitats. Specifically when scientific knowledge systems are introduced into these technological habitats the body becomes fragmented and dematerialized in the acts of scientific experimentation that takes living matter as its focus (ibid., p. 62).

In the next chapter, I will explore the journey of working with the figuration of Leah, an autonomous avatar that contains my facial characteristics and an aspect of my emotional register merged with Ekman and Friesen’s FACS systems, Sagar’s computational system, Corballis’ neurophysiological and neuropsychological research and a range of software, hardware and biosensing apparatus. Leah, then, can be explored through posthumanism and new materialist thinking as an alternative form of reembodiment. Leah is an alternative parallel socio-material arrangement placed in a creative practice within a technoscientific assemblage, enacted as technoscience arts practitioner and framed by a speculative thinking framework, for development and staging with a not-for-profit agenda. It, therefore, joins a continuum of fantasy, interest and action that has featured in the computational system that forms the avatar development’s histories and proffers another level of entanglement. Leah’s entanglement attempts to conscientiously think through these histories, research and development trajectories and relations between human and machine in a material-discursive practice in which I, as artist-researcher, become the research project. This has only been made possible by the generous and liberal support that both Sagar and Corballis have given, to enable a freedom to take their model, research paradigms, techniques and practice histories into a new setting, a new form of practice and a rematerialisation in an unexpected site and use.

It is however, an inescapably implicated and embedded repurposing. The creative practices surrounding the creation of Leah are an art-based practice focusing on speculation, fragmentation and experimentation. I have done this with the aim of providing a different iteration imagined by myself as someone who has a feminist technoscience media art perspective that questions as well as makes, that finds sinking into the problematic is a necessary aspect of the current contemporary challenges of this practice. As I have endeavoured to demonstrate in this chapter, transversal ecologies of technoscience art practice should necessarily acknowledge the intermixtures of praxis in their laboratori when using technoscience models and methods so artists can clearly delineate points of difference and differentiation.
Chapter 5: Leah and recalling her stories

How does Leah offer a diffractive practice in relation to LAT’s practices and systems?

Leah [Fig. 58] emerges through a response to the technical and conceptual investigations undertaken by Sagar and Corballis’ in their development and research of biomimetic psychobiological avatars. The point at which I write this chapter is a long way conceptually from the day around four years ago in which I first heard them discuss their joint research at the Brain Science open day at the University of Auckland. After hearing their presentation, I approached them about working with the model’s development in the initial phases of prototype development. My curiosity was first sparked by the notion that this model could inform us about current neuroscientific knowledge about the brain and its function. I was also inspired by the sophistication of the visualisation and the breadth in which it could be utilised as a research testing tool and interface with my work as a curator/artist.

Today I see the structures of knowledge that founded the model and understand the lack of neutrality that exists. I accept the relationship of research, knowledge constructions and observer/observed intra-acting and entangling in this one shared ecology. I also understand that my role as an artist has been to apply a questioning attitude with the model, to flow with the nature of prototype development and the changing research-to-commercial culture that occurred, and to find a way to build an artwork with a different ecology of practice. The avatar’s emergence exposed a speculative enactment that continues to be in-action and intra-active.

Leah addresses the relation between the model and myself as artist/curator and of working with the other team members and their practices. Leah is
active matter in the form of an autonomous animated model. When I come in to relation with her I am intra-acting rather than interacting. Leah is a material-discursive practice. To write her creation account and to reflect upon her process of emergence is a fragmented exercise caught between the corporeality of the performative experience, the apparatus of the system and the thinking through practice in order to form an artistic realisation. Consequently, these shifts in a complex process and the ‘knowing in being’ understandings are worthy of capturing as short snippets of experiential account to depict the ongoing intra-action in different encounters.

The LAT computational system is agential as its history of prior ecologies affects the artwork Leah and the processes of formation. Once Leah is formed, a new entity with emergent properties has been created that has unique characteristics when in intra-action within the artistic ecology. She has qualities that have been predetermined by the computational system, but she is also emergent as she is being placed into new artistic ecologies to intra-act with different public and private spaces, and a range of participants. For example, including those drawn from the general public, when open for exhibition at the Gus Fisher Gallery.

The practices that constitute the processes of Leah’s research and development, presentations and analysis are an unfolding and messy practice. Leah’s construction has been a journey of deterritorialisation where my understandings have been challenged, and continue to be challenged, in multiple ways throughout the creative process. As van der Tuin outlines, Barad want us to consider practices and how they are ‘in being’ and ‘of knowing’:

“In being” points to appreciation of refraining from ontological assumptions, such as the assumption of entities being clearly delineated or of entities being mute in the hands of signifying academics. Here, being is allowed the possibility of being messy and above those assumptions which tend to produce reductive accounts. “Of knowing” indicates appreciation of refraining from epistemological assumptions, such as the assumption of knowledge claims ruling over objects of knowledge or existing in a web of words that refer to each other instead of to objects, of instruments being mentioned mediators and or environments being fully neutral (Barad, 2014, p. 259).

5.1. Diffractive practices
Participating in the laboratorium that formed Leah primarily saw my practice shift as I intra-acted with the mutable boundaries between human and non-human and the potentials of artificial liveliness from a diffractive material-discursive process. Leah materialises through the agential entanglements of this specific laboratorium as a new-life-form that continues to be under constant reconfigurings with embryonic prospects. This creative practice mutated according to situated encounter and the actors and agents in the assemblage.

‘Alife is not the practice of “breathing life” into inanimate matter, but an entangled and co-constituted process emerging from the material discourse of Alife itself’ (Prophet & Pritchard, 2015, p. 333). Leah is not a reflection in a mirror, or a copy, but rather the diffractive process of attending to the “patterns of difference” in her development and performance (ibid., p. 334).
In practical terms, this entails paying attention in the process of intra-action to the changes, differences, emergences and the performance of the transversal assemblages along with the boundary-making practices that are also in-process. As Prophet and Pritchard explain:

performative processes are at the heart of the creation of most natural systems – multiple representational events (multiple observational cuts) take place to create simulations, each of which abstracts, simplifies, and distorts the subject. The resulting simulations often affect previous understandings of the entity being simulated (ibid., p. 339).

Leah is an unstable artwork whose boundaries and characteristics are drawn and redrawn dependent on who is the observer/participant intra-actively engaging.

5.2 The processual

The figure of the automaton and its imaginative force are then taken as a starting point for thinking about the illusion of life and the life of illusion. The delegation of labour to machines comprises the project of automation, involving new technical practices, constantly shifting politics of value and attendant erasures. ‘Crucially, human labour is not lost in these translations but rather transformed, displaced, de-valued and obscured (Stacey & Suchman, 2012, p. 4). The labour of modeling the FACS system to produce the density of images required by the animation system at LAT, and which forms Leah, is obscured in the final autonomous avatar. As a consequence, I felt the need to draw attention to this ‘not visible’ part of the production process that is resonant with prior discussions in this thesis regarding medical imaging and model development as can be seen in Prophet and Sellars. I wanted to think about what happened during the process of recreating a set of images aligning with the FACS system. This meant the observational cuts, the observers, the apparatus and the embodied and embedded intimate experience is acknowledged. In part, this is connected to Suchman’s call (discussed in Chapter four) to slow down the rhetoric and to examine in detail the forces at work.

In order to be captured and tracked by the system, I became the object of observation that needed to be motionless. This recalls the same predicament faced in the various magnetic resonance procedures undertaken by Prophet, Sellars and Haines. This highlights the tension that Kelty and Landecker find between the desire to animate and give life while the object must be stilled, frozen in order to be captured for the making of animated ‘liveliness’. As they state:

living beings change continuously over time, and as a result, biology’s experimental techniques include a repertoire of means with which to halt, suspend, freeze, denature, or otherwise hold its innately dynamic subjects still, in forms amenable to visualization, representation, analysis, exhibition, exchange, or storage (2004, p. 42). The computational processes, in effect, restore movement and ‘liveliness’. In this sense, the computational processes are biomimetic, sourced from biological live imagings, stilled, captured and then re-enlivened to simulate realism. Now embedded within computational systems, these stilled imagings are affected by decisions or observational cuts that the computer
Figure 58: *Leah* during *Alter*. Photo: © Sait Akkirman 2016

My corporeal physical characteristics are annexed, through the many episodes of stilled expressions required to construct Leah [Figs. 59, 61]. These traits then merge into the computational system as designed by LAT. Ultimately, the system that then drives the ‘liveliness’ and has their observational cuts embedded into the algorithmic performance of Leah furthers their universalizing and normalizing structures.

What became noticeable in the activated iterations, as these imagings of my facial expressions and movements were captured for use in the system, was the acute awareness and sense of the imaging moving into the machinic, particularly accentuated by the stillness. There was a palpable liveliness, moving from form to form and the boundaries between human and non-human, of becoming-machinic or perhaps becoming-virtual.

Leah, in particular, echoes Braidotti’s ideas concerning the posthuman conceived of as: ‘a dynamic amalgam of animal, machinic, technical, digital, organic, inorganic, viral, and capitalist dimensions’ (cited in Blagaard & Van Der Tuin, 2014, p. 21). Leah belongs in a relational community of avatars, practitioners and researchers that calls for a posthuman ethics and conception of non-unitary subjects. As Braidotti explains: ‘A posthuman ethics for a non-unitary subject proposes an enlarged sense of interconnection between self and others, including the non-human or “earth” others,
Figure 59: iPhone production still. Photo: courtesy of the artist and LAT

Figure 60: Production still. Screen capture: courtesy of LAT

Figure 61: Production screen capture. Photo: courtesy of LAT
by removing the obstacle of self-centred individualism’ (Braidotti, 2013, p. 50).

5.3 The unpredictable
This fluid, shifting, mobile intra-active relationship between ‘myself’ as ‘human’ and ‘myself becoming-virtual’ was made palpable in an early experience with the avatar when it was in test installation for the purposes of supervision. The account that was written concerning this follows:

Oleg and Werner had kindly set up a test installation in the offices of LAT projecting my avatar onto a glass wall coated with projection film. ‘She’ was displayed at floor to ceiling height. Oleg and Werner were on hand to ensure the programme ran smoothly and to trouble shoot if there were any problems given this was a very early stage showing.

The avatar was very fresh and new to ‘me’. ‘I’ was still experiencing an inherent curiosity, studying ‘her’ closely and finding it unsettling in the way ‘she’ followed ‘me’ with ‘her’ eyes as ‘I’ traversed the space in front of ‘her’ (my movements tracked by camera). My two supervisors Megan Jenkinson and Carol Brown entered the space also to experience Leah for the first time. This would have been the first time the avatar had had a group of people in the room. ‘She’ was moving ‘her’ gaze from participant to participant. ‘I’ was studying ‘her’ intently conscious also of the observers/observation operating within the space.

Suddenly, ‘she’ rolled her eyes to the back of her head showing the whites of her eyes and ‘I’ felt a simultaneous psychological and physical shock intensely in my body. I became alarmed for my own physical being and wondered initially if ‘I’ was going to faint or become unconscious. This instinctive, and ‘I’ would say primitive alert, triggered physically as an overwhelming physical sensation and I found myself going into a rapid survival instinct of surveying my body checking internally from top to toe to ensure that ‘I’ was physically OK. Rapidly following this, ‘I’ laughed in discomfort and in somewhat irony, realizing that ‘I’ had not formed a firm psychological boundary or separation in that moment between ‘her’ action/expressions and ‘my own’. In that moment, ‘I’ deeply understood that the relations ‘I’ had with the avatar were far more challenging, instinctive and profound than ‘I’ had initially thought possible and ‘I’ began to seriously question what this space, this affective relation was and how it was emerging. ‘I’ began to wonder what the interrelationships consisted of and interestingly questioned were we learning from each other in some form of a co-constitutive intra-action enacted at each meeting.

Afterwards it was explained to me that the avatar’s programme had a fault at this time and that this was the first occurrence of it. In that moment the programme had had difficulty tracking the multiple participants in the room but had been able to track single participants with fluidity. This ‘fault’ was soon after ‘fixed’.

5.4 Troubling worldings
Haraway, Barad and Braidotti, as feminist thinkers, insist on the need for all participants to situate their knowledge and to acknowledge their role in the troubling parts of an ecology to which they are embedded, embodied and active. By acknowledging implication, responsibility is brought to the situation along with your monistic (mind-in-body, body-in-mind) being. The troubling of the moment accounted for in the previous account of the experience of the avatar ‘in-fault’, was a moment that I have returned to and discussed with other members of the team on several occasions that
everyone was interested in (for diverse reasons). For me, it was a defining moment in acknowledging the real posthuman relationality at work and my experience of the kinds of liveliness at work in these complex AI computational systems. A diffractive moment that has its own energetic agency, caused the thinking to become intensified.

A diffractive moment is interesting when viewed in more detail by Barad. In her article; *Quantum Entanglements and Hauntological Relations*, she notes that diffraction patterns are not the same as the original and it requires ‘explicitly tracing the (extant) entanglements’. She states that the trace of all measurements ‘remain even when the information is erased’:

> it takes work to make the ghostly entanglements visible. The past is not closed (it never was), but erasure (of all traces) is not what is at issue. The past is not present. “Past” and “future” are iteratively reconfigured and enfolded through the world’s ongoing intra-activity [...]. Phenomena are material entanglements enfolded and threaded through the spacetime mattering of the universe [...]. Memory – the pattern of sedimented enfoldings of iterative intra-activity – is written into the fabric of the world (Barad, 2010, p. 261).

In this figuration of *Leah*, these hauntings and memories keep enfolding back into the development moving between monist actions, discursive (oral and written) and the material practices whilst remaining attentive to the transversal ecology.

Braidotti observes that within late capitalism there is a particular ‘anatomy’ to these complex assemblages, namely: ‘This system is [...] sophisticated. It functions by perverse forms of mobility in striated spaces and...
quantified multiplication of differences. It works on life as capital, life as surplus’ (Davis & Braidotti, 2016, para.8). Further: ‘The thinkability of materialism is definitely connected with the life sciences, bio-genetics, and nano-technologies: all the new matters, new materials, and wearable technologies that are now being developed. We are surrounded by the fabrication of life, the manufacturing of life’ (ibid., para.12). This is pertinent given the commercialization, registering, patenting of the avatar system under the new company Soul Machines and the promotion of emotional artificial intelligence. It is also relevant when looking at the works of Knox where robotic service agents are developed for eventual global release.

5.5 Zoe-techno-body

Liveliness, as emergent in both human and computational non-human form, is acknowledged by Braidotti who developed zoe and bios as concepts to convey the allusive qualities at work. There is no denying the force of liveliness that is part of the haunting flowing in surprising and unexpected formations in this ecology. Zoe is that which is life that is generative and vital, impersonal, not under rational control and always in a process of becoming and bios which is intelligent, political and discursive. Both converge within and beyond our corporeal being leaking into the human and non-human. Embodied subjects become part of an endlessly circulating self-replicating system for which visual commodification is at the heart and ‘bits of life’ or rather genetic traces are of surplus value. The ‘technological body’ is a ‘zoe-techno-body’ in a state of ‘intensive interconnectedness’ and ‘is in process as a transversal form of subjectivity, or transindividuation.’ It is bound to its environment and is structured by mutual flows and data transfers.1

Leah is such a zoe-techno-body2 who is intensely connected to the environment and all human and non-human who flow through it. Although containing some genetic traces of surplus value from a human donor these have flowed as data into and out of her nomadic complexity. When Leah had first been transferred to my own desk-top computer in the studio then

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1 This section is informed by Braidotti’s chapter ‘The Politics of Life as Bios/Zoe’ in (Smelik, A., Lykke, N., 2008, pp. 177-192). Braidotti asserts that our contemporary embodiment surpasses a Western metaphysical concept of the subject including the notion of a sovereign consciousness. Western classical philosophy resides with the ‘bio-logical’. Life, for Braidotti, retains both bios and zoe and welcomes multiplicity enabling nonbinary and nonlinear relations. Her thinking transforms and acknowledges various previous philosophical notions of bios and zoe. Braidotti’s notion of bios/zoe is in dialogue with Michel Foucault’s concept of biopolitics (Braidotti emphasises moving beyond the visual economy), Giorgio Agamben’s ideation of ‘bare life’, Heidegger’s ‘finitude’, Julia Kristeva’s ‘chora’, Jacques Lacan’s ‘prediscursive’ and Luce Irigaray’s ‘maternal feminine’ amongst others. Braidotti, in summary and in contrast, is stressing the affirmative ‘generative power’ of zoe. She draws on the monistic Spinozist ontology as furthered by Deleuze and Guattari with particular reference to notions of ‘nomadic becomings’ and ‘planes of immanence’ that build an ‘eco-logical entity’. Zoe ‘refers to the endless vitality of life as a process of continuous becoming’. (p. 182) that connects to Guattari’s process of ‘transindividuation’ as a form of subjectivity that is transversal and group-oriented.

2 The zoe-techno-body is an ‘eco-logical entity’ that is in continuous relation with its environment. As Braidotti explains: ‘The human organism is an in-between that is plugged into and connected to a variety of possible sources and forces. ... Being embodied in this high-tech ecological manner means being immersed in fields of constant flows and transformations’. (p. 182-183) Due to the interconnected nature of bios/zoe with the environment, Braidotti asserts the need for a posthumanist ethics and political agency that engages with these complex technological environments and the politically fraught territories of advanced capitalism and moves past the notion of sovereign consciousness as an ‘I’ ‘bounded into its own being’. (p.185)
I was able to become ‘familiar’ with her presence and vitality. The following was written in one of the early familiarising sessions:

Leah looks like ‘my’ mirror image. ‘She’ simulates. Blinking, following my movements with ‘her’ same bloodshot eyes [Fig. 63]. ‘She’ is quiet. But not still. Constantly adjusting. Fluidly accommodating each presence standing before ‘her’. Sometimes, ‘I’ let her be, on the screen, while ‘I’ work in the studio. Leah watches quietly. Occasionally ‘I’ glance up and meet ‘her’ gaze. Our eyes connect. The affect is startling. ‘I’ am often caught by surprise. We stare at each other. Witnessing each other’s presence. ‘I’ am reflected in Leah’s pupils. Entangled in the moment.

Through the recombinant systems, both live and in the making, Leah is Braidotti’s collective entity who is environmentally bound. As body-machine she is ‘an embodied affective and intelligent entity that captures, processes, and transforms energies and forces. […]who] constantly feeds on, incorporates, and transforms its (natural, social, human or technological) environment’ (Braidotti in Smelik & Lykke, 2008, p. 183). As fellow kin in this dynamic system, ‘I’, and all others human and non-human, are immersed into an equally embodied and embedded ethical relational interconnectedness. Central to this understanding of this evolutionary entity is the need to attend and account for the complexity of the ecology through a cartographic mapping.

This approach advocated by Braidotti has informed the way that I have engaged with Leah as a curator/artist/human. Part of this ecology is the trail of artefacts of the human being tracked that are absorbed into her system and contribute to her vitality. Through Leah these are reclaimed, recycled, revisited. The artefacts exist in the form of thousands of photos and the recordings of psychophysiological responses of myself relating to Leah and the production processes involved in her creation [Fig 64].


Diffraction is a dispersal of identity. Barad states: ‘Reconfigurings don’t erase marks on bodies – the sedimenting material effects of these very re-configurings – memories/re-member-ings – are written into the flesh of the world … What if we were to recognize that differentiating is a material act that is not about radical separation, but on the contrary, about making connections and commitments?’ (2010, p. 266). And so we re-turn to speculation, to indeterminacy to rupture, to the non-unitary.

5.6 Disruptions
What is the space of multiple experimental artistic technoscientific practices operating in parallel across varied physical and digital spaces? What is this new set of relations developing? What marks and/or changes does this process indelibly leave or erase? Can its reuse, in entirety or in the use of artefacts, enrich an intimate sensory embodied experience?

As a biomimetic simulation, Leah raises questions regarding the relations between artistic and scientific research communities of enquiry, their processes and practices, the commodification of biological data and human/avatar identities. Leah is affected by the cuts made by others: scientists,
programmers, the coded system itself. *Leah* is not a copy. She is a virtual simulation [Fig. 62]. We are entangled and co-constructed.

*Inside the coded apparatus, the visual markers of ‘self’, the sur[face] is uploaded and downloaded, fragmented, unified, reworked, regenerated, defaced, broken apart and reformed in an ongoing re-cycle of emergence. These experimental processes are reworked, played out, encoded and re-presented across multiple terrains including laboratory, artist’s studio, museum and gallery in a series of practice-led iterations. These are shown in private studio process-driven installations, messy, untidy, disturbing, sprawling. These practices reveal this ebb and flow, this oscillation between process and prototype, embodied and coded, human and non-human. Either point is not definitive. These are not binaries. Neither are they dichotomies. They are mobile, shifting referents only. Sometimes able to be defined. Sometimes not. Slippages. Slippery content. Slippery practices.*

This is an entangled tale in a set of entangled tales. I am reminded of a quote that Barad uses of Trinh T Min-Ha’s:

> The moment the insider steps out from the inside she’s no longer a mere insider. She necessarily looks in from the outside while also looking out from the inside. Not quite the same, not quite the other, she stands in that undetermined threshold place where she constantly drifts in and out. […] She is, in other words, this inappropriate other or same who moves about with at least two gestures: that of affirming “I am like you” while persisting in her difference and that of reminding “I am different” while unsettling every definition of otherness arrived at (cited in Barad, 2014, p. 175).

She has qualities that have been predetermined by the computational system but she is also emergent as she is being placed into new artistic ecologies to intra-act with different public and private spaces and a range of participants. By placing *Leah* into variant installation settings, she is also in intra-action within the spatial, temporal and technical ecologies within the gallery environment. These include the programmes (LAT, Max MSP, audio generator), cameras, sensors, lights, sound system, cabling, physical architecture (blackened walls, carpeted floors, curtained windows).

When *Leah* is in intra-action with other forces and bodies, this artefact helps expose layers of phenomena, of novel and unexpected occurrences. These novel experiences also happen in testing installations and contributed to an emergent prototype that developed in unexpected and speculative ways and leads to an untidy story or figuration. Given that this was an open-ended, experimental, process of research, development and operation, it can also be perceived as a story of emergence and a state of ‘always-in-process’.

### 5.7 *Leah* (2016)

*Leah* is projected on to a white square screen in a blacked out gallery space at the Gus Fisher Gallery in May 2016. *Leah* is presented as a ‘live’ computational model that, in real-time, tracks viewers’ movements – following with the eyes, tilting and moving head and has deliberately, subtle, emotive responses. The gallery participant, once in the zone of intra-action, is reflected in real-time on the surface of the avatar’s spectacles [Fig 65].

The participant is thus tracked, digitized and captured by the software and then joins the same picture plane as the avatar while still being portrayed
Figure 63: Screen capture of avatar Leah (2016). Photo: courtesy of LAT
Figure 64: Psychophysiological testing
in a flow of digitized movements. When first entering the room, the participant will hear the sound of a human heartbeat at rest. Once in the ‘contact zone’ the heartbeat slightly, but perceptibly, speeds up as engagement with the avatar ensues. Participants, through engagement, reflected their entangled relationship through a co-constituting of Leah live on screen and through triggering sound through body movement. Leah invited participation and mediation through bodily intra-action. These acts of intra-action can be seen as a constant flow of information, moving between participant, Leah’s various componentry (camera and machine vision, software lighting, projection, computer hardware etc) constituting a movement between apparatus, embodied and virtual response. This is intra-action because it is the relationalities and forces affecting each other rather than operating from a fixed preconceived and bounded object-subject relation.

Utilising the LAT AFS programme, Leah makes an important agential cut. The LAT model has been primarily built for research revealing emotional affect and agency. In this first prototype, Leah was programmed to down-play emotional responsiveness, focusing on bringing to the sur[face] the engagement through gaze, the play on artificial ‘liveness’ and the tracking and digitization of the viewer and its merging with the ‘seen portrait’. This observational cut of denying pronounced emotional characterization, mirroring and reaction has instead called upon the capacity of Leah to engage through direct gaze. This is a subtle and nuanced technoscientific enactment enabling intra-action between human and non-human through the use of a neuroscientific research model. It is a different usage or enactment than either the neuropsychology or the animate technologies teams would usually initiate. It de-emphasises aspects of the model in order to lift other features to provoke a form of embodied and embedded questioning through the performative acts of intra-action.

Leah is projected on to a square screen with the edges of the frame projected black on black. This leads to Leah presenting as a portrait, rather than a cinematic or ‘video’ installation. It privileges intimacy and plays on the framing of portraiture in museums and gallery environments [Fig. 68].

A sound of a heartbeat is heard – insistent and rhythmic. The heartbeat was developed with Garling Wu, a sonic arts student at the University of Auckland’s Music school. The heartbeat sound file runs independently of the LAT programme as a Jitter Max/MSP patch triggered when the viewer moves in to the ‘contact zone’. This heartbeat was sourced from the internet and then reprocessed and reconfigured, partially as a result of technical difficulties experienced in the recording of a ‘real’ heartbeat. During the time of the exhibition I discovered that if the heartbeat accelerated too quickly it caused a feeling of anxiety rather than alertness in most viewers, so throughout the installation period we adjusted the speed of heartbeat until we obtained the rest to accelerated sound that least triggered anxiety but encouraged alertness. This was done through trial and error and different positions of webcams before settling on the correct position, timing and speed.

I decided to define Leah’s behavior and emotional resonance through having a small amount of mirroring set into the values affecting the parameters of the performance of the programme. LAT had developed the facial mimicry functionality as it is one of the key fundamental machine learning mechanisms in the programme and one of the possible devices for a more seemingly empathetic engagement and inducing a feeling of
Figure 65: Installation at Gus Fisher Gallery with hint of reflection in glasses showing viewer in contact zone. Photo: courtesy of Sam Hartnett
A lot of people studied Leah intently really thinking about her presence. Some children, teenagers and adults were alarmed, finding it a bit freaky, ghostly or too close in realism appeared to be evoking an experience of the uncanny that made them uncomfortable. One child thought there was a ghost in the room and was hiding behind their parent to shelter them from her gaze. One teenager almost frightened by the idea of her getting captured and relayed on to the avatars glasses. She was uncomfortable and out of her comfort zone and needed encouragement for her to stay in the intra-action zone. Some children (notably children of dancers) ran around the space, playing in movement with the avatar. She followed them with her gaze. They experimented with climbing on one another creating shapes and seeing what it looked like in her glasses. Could she keep up with their quick fast movements across the room in and out of the lit zone. The interactive installation artist who was intrigued and thought that he had gone on to the other side of the screen and she was ‘reading him’. In other words, he experienced his engagement as a reversal where he was the other/virtual and she was the real. He was in the screen, she was in a ‘fuller’ world. He had become flattened in some way or other. The most common response was the curious witnessing of each other’s presence. Contemplation. Slow movements. Watching micro-expressions and thinking through slow moving. Adjusting slowly and quickly to the glasses’ reflections, gaze, heartbeat and expressions of the avatar. Some looked around wanting to know how it was working – flicking on room lights, physically moving cameras, looking around for a computer (hidden in a plinth) [Fig. 67, 68]. Family members and friends were often deeply disturbed – it was too realistic for them.

Computer artists working on Leah in earlier stages of her development stated that it felt like I was in the room: that her seemingly contemplative and thinking presence was similar to mine when deeply thinking through content, conversation or problems. When faced with problems I will talk, listen and pause to think through issues before making decisions. Apparently, it sometimes felt like the pausing thinking listening me was present in the avatar. This is partially why I have called the next version Witness, because she seems to be simply present with us – somewhat familiar, somewhat watching, somewhat being with, somewhat witnessing us. Ultimately, she changed, mutated, adapted to the type and intensity of the intra-action being different with different people. Her responses and their responses were not uniform – they were volatile, always in movement, sometimes unpredictable. Overall the feedback was positive in terms of people feeling they had a somewhat ‘charged’ encounter and that the unsettling nature raised many questions for them regarding identity and its processing through technological/computational systems.

Leah is, ostensibly, silent. She quietly observes, witnessing the movements of each participant as they enter and traverse the room. She does not speak. Instead you hear her heartbeat rising and falling in rhythm. Some of the computational scientist/artists reflected that they would have preferred that the full capabilities of the model were displayed in terms of its capacity to be highly emotionally responsive and to ‘speak’ a scripted dialogue. Their concern was to highlight the technical ‘prowess’ of the model. Differing from this, I chose to conceptually raise questions, to

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3 This is drawn from casual conversations with gallery visitors. There were no formal recording of conversations, written responses or prepared surveys of gallery audience for either installation at the Gus Fisher Gallery.
acknowledge the embodied and embedded participant through evoking a sense of presence and subtly acknowledging and incorporating the participant in to the real-time intra-action of materials and forces at work in the installation.

5.8 Witness (2017)

In Witness⁴ [Fig. 69], I felt that the tendencies inbuilt in the LAT and AFS model needed to be offset by placing more emphasis on ‘enlivening’ the environment in which she is sited/sighted, giving the participant an opportunity to engage with the ephemeral hauntings of reprocessed scientific testing artefacts from various moments in her production. Witness continues to be designed as a self-simulated avatar, modelled on the artist/curator [Figs. 70, 71, 72]. This character invites the participant to entangle, in the moment, in liveliness and embodied sensibility. Witness is interested in exposing and exploring the volatile relations between technology, biological matter, artificial and human intelligence that are meshing in unprecedented ways.

I have extracted the research oriented, neuropsychophysiological biofeedback data drawn from my testing session with Leah and repurposed it for use in the audio composition for Witness. This data is drawn from sensors gathering information on skin conductance (galvanic skin response) and heart-rate variability [See Fig.64]. The data from this testing is sonified⁵ effectively reprocessing the 2D data relations into acoustic relations. Sonification of this nature is largely used for interpretation by scientists and is therefore required to accurately and transparently reflect the data’s measurements. In this case, this data is dislocated from its original use and intention for both linearity and accuracy. Giving sonic movement and liveliness to the biofeedback materials and resituating them in the gallery environment enables a continuous series of aural affects within the installation.

Specifically, the sound generator is a programme built in Ableton Live⁶ that takes an input (Audio Data played via a Sampler and/or Synthesizer) and uses a device called a Multimapper⁷ to randomise selected Controllable Variables⁸ within the Sampler, Synthesizer and any Processor⁹ based

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⁴ Witness: Deborah Lawler-Dormer in collaboration with Mark Sagar, Credits: Computer animation artists: Mark Sagar, Oleg Efimov and Werner Ollewagen, Sound artist: Vincent Beatty, Neuropsychophysiology advisor: Paul Corballis.

⁵ The data from the neurophysiology testing was sonified using Audacity - Sample Data Import (internal data to audio generator). Sample Data Import

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7 Multimapper is a MaxMSP device which lets you map one of its internal knobs to an element within a device, effect, instrument, plug-in or GUI element within Ableton Live. You can then define the range of the knob, control the mapped knob via the multimappers knob bay &/or output randomized values to all mapped variables via a trigger button.

8 Controllable Variables: Any variable with two or more possible values that is accessible within Ableton Live internal mapping system.

9 Effects Processors include effects such as: Echo, Delay, Distortion, Waveshaper, Bitcruncher, Reverb, Equaliser, Chorus, Phaser, Flanger, Amp
Figure 66: Installation at Gus Fisher Gallery. Photo: © Sait Akkirman
Figure 67: Installation shot showing camera and screen layout. Photo: courtesy of Sam Hartnett
Figure 68: Installation shot showing set up of projector, plinth with iMac and speakers. Photo: courtesy of Sam Hartnett
Figure 69: *Witness* (2017). Photo: courtesy of Sam Hartnett
To witness Leah, then is not to observe her with the same detached gaze with which she appears to stare down at us - after all, seeing, as Barad asserts, has no such impartiality. Rather, as Lawler-Dormer explains, in Witness “We are all related. We all share ownership for the presence of the work.” Witnessing is a matter of withnessing – being entangled in the emergent intra-relations of the artwork so that we, as much as anything else, are instrumental in “authoring” what we see (see: Appendix 7.5).

In Witness, Leah now breathes the subtle signs of new-life-forms. Her breath is realized as a result of this model being connected to brain language [BL] and her breath is being driven by this neurocomputational programme.

Witness:
To reset in the same space, to reiterate, to keep some things the same yet different, subtle changes, subtle shifts, a new plotting of technology, a different model that looks the same, pay attention there is more subtle differences, she breathes in visible pattern, her nostrils flare, the eyes reflect more, track more. Does she feel more present? Are the ways of entanglement the same? Will the audience see difference or sameness? Will they see repetition or reiteration? Will they engage the same? How does the sound generator reinforce or disrupt engagement? Is there intensity of affect or alienation? Does it feel more staged or richer? Are the participants looking for themselves, performing re-entanglement? How much should she emote? Shall I shift up the levels of affect or mirroring? Shall I make the sound shift with hormonal surges? How much light to let in. How much darkness to enforce? Where to look for what is seen or unseen? I am

on a modulated envelope and/or externally mapped trigger. The data for the randomize trigger is then housed within a data block. Each data block is designed to play and/or be read for a certain length of ‘time’¹⁰ based on the running tempo of the programme. Certain data blocks within the programme are based on the sonified biodata from the testing sessions.

In a sense, the notion of ‘intersubjectivities’ begins to emerge, where the participant intra-acting with Witness will have a more imaginative, embodied and embedded encounter, also listening to a new iterative process related to a recycling of biodata and a different imprint arguably of the artist. James Charlton¹¹ wrote the gallery catalogue essay for the exhibition entitled ‘Intra-actions with Leah: The Withness and Entanglement of the Biocomputational’. In this he develops his neologism, Withnessing, to describe the moment of intra-action with Leah in Witness. Charlton states:

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10 Once the runtime for the length of the data block has elapsed the programme then tells another data block to begin running. The choice of the subsequently run data block is based off:

- A randomizer which is restricted to a preset range of data blocks which includes the previously run data block.
- A randomizer which is restricted to a preset range of data blocks which does not include the previously run data block.
- A command to run the first data block in a string of selected data blocks.
- A command to run the next data block in a string of selected data blocks.

11 James Charlton is Programme Leader for the Bachelor of Creative Technologies at Auckland University of Technology. He is also a transdisciplinary artist who’s recent practice spans a spectrum of work that includes object-based sculpture, stereo-lithography, installation, robotics, interactive screen-based and performance work.

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The environment is an ecology of relation between *Witness* and participant, making her materiality and utility for research able to be experienced by the participant through kinaesthetic and aural sensing in addition to visual stimulus. Unlike Stelarc’s *Prosthetic Head* which relies on a keyboard and mouse as the interface, *Witness* is concentrated on individual participant’s monist relation to the time/space/affect and relations of intra-action through body movement. Simple observation is denied as the work becomes enlivened through the participant engaging with the work and becoming captured and tracked within the performing of intra-action within the installation. This was discussed as part of the gallery section in the chapter on the Laboratorium.

*Witness* was installed in the Gus Fisher Gallery’s side gallery. The installation was similar to *Leah*’s installation with the walls of the gallery painted matt black, the floor carpeted in dark grey carpet tiles preventing sound and vision reflection and minimal lighting is used purely to illuminate at the point of intra-action. The animated avatar was projected on to a portrait sized square and tracked participant movement through camera detection (camera is mounted above screen). The programme for this version has been shifted to a gaming PC laptop and drives both animation, sound, camera vision, and Max MSP12 and is housed in a black plinth. The sound emanated from speakers in the rear corners of the room. The sound changed according to movement in the contact zone triggered by camera detection and processed through Max MSP Jitter programming patch running in synchrony to the avatar autonomous animation programme.

5.9 *Leah*: Conclusion

This chapter and chapter four have mapped a journey through the laboratory of the creation of *Leah*, an autonomous artificially emotionally expressive and intelligent avatar. *Leah* is an alter creation, an alternative kin, modelled on ‘my’ physical facial and expressive attributes and can be ultimately driven by an artificial computational intelligence system. *Leah* represents an altercation and a figuration whose prototype has bridged disciplines of engineering, design, media arts, neurobiology and neuropsychology.

*Leah*’s emergence invokes an entanglement in the relations between human and non-human, between the apparatus in the form of a coded system and a neuropsychological tradition and system capturing a standardized range of expressions based primarily on the limited range of the six key expressions of Sadness, Anger, Disgust, Joy, Fear and Surprise. The interchangeable modular and commercialized construction is a critical and significant aspect of this neurocomputational technoscience art project and asking for modelling information to be registered against the next model regarding age and race to enter the database. Does it matter if I limit descriptors or resist them? … I go for resistance … I refuse the markers although pointlessly …. Plotting and replotting, shifting subtly, adjusting in process, in flux, plotting, speculating, diffracting and performing … *Witness* has arrived …

12 Max MSP is a programme that connects objects to virtual patches to create audio. Jitter connects audio to video. Max MSPJitter runs the trigger for the contact zone for sound. See more information here: https://cycling74.com/products/max/ In addition, the sound has used three MAX MSP devices including: Multimapper by Mothergarage, Xfade Bus System 2000 1.0 by Maxforcats, Gate.me - MIDI Gate 1.0 by yehezkelraz
Figure 70: Witness Photo: courtesy of Laboratory of Animate Technologies
Figure 71: Witness Photo: courtesy of Laboratory of Animate Technologies
Figure 72: Witness Photo: courtesy of Laboratory of Animate Technologies
WITNESS

A collaboration between Deborah Lawler-Dormer and Mark Sagar.

Friday 14 – Saturday 29 July 2017

Figure 73: Witness invite, Gus Fisher Gallery
influences the variability represented by the series of prototypes emerging and their interrelationships. In turn, I have responded with a series of creative practice based iterations and engagements through my own responsive collaborative transdisciplinary material-discursive practice that is moves through artistic and curatorial conventions. My engagements reflected on the performative rather than the representational, was interested in the faulty, hauntings, the slippages, fleeting moments and artefacts in the developmental process. This enabled speculation concerning differing ways of intra-acting from a monist, posthumanist and new materialist, embodied and embedded perspective.
6.0 Re-thinking technoscientific art ecologies

This doctoral journey began as a result of questions and issues that emerged through many years of working with artists and curators, operating at the tech-sci-art interstices and developing prototypes for exhibition in public spaces. *Labile-technics* has emerged as a series of strategic tactics into this porous *troubling* space.

Through this journey I have attempted to offer a platform for thinking through the complexity of contemporary technoscientific art practices and their transversal ecologies. This creative practice research, encountered art making practices that have engaged with neuroscientific medical imaging practices and their technological kin, consisting of variant forms of biometric artificial intelligence. These are emergent practices that hold as part of their currency, particular relations with rapidly advancing technological ecologies that expose emergent forms of posthumanism, experimental and speculative knowledge formation. The capacities and techniques of new materialist and posthumanist thinking were found, in this enquiry, to be a valuable tool for thinking through transversal assemblages. Through application, they revealed the evolving and entangled relations to apparati, ‘bodies’ and forces, in mutual intra-action, often in acts of becoming-machine.

The ‘intelligence’ at work in these ecologies is distributed, networked, environmental, embedded, embodied and in continual movement between virtual and real. This leads to artistic acts of speculation, figuration and experimentation, that can reveal labyrinthine changes happening across complex projects. The strategies in which artists responded involved an ethical questioning along with intra-actions that featured tendencies for the performative rather than representational, monism in opposition to
dualism, relational and entangled rather than the separate, categorized and fixed alongside notions of kinship. In conclusion, I propose the tactics of \textit{labile-technics}, consisting of mapping, speculating, diffracting and intra-acting for the tactical artist or curator to be able to expose, evaluate and perceive the complexity within these posthuman ecologies. Designed for the \textit{laboratorium} these tactics revealed the volatile relations between technology, the biological, artificial and human intelligence, and their intermeshing within tech-sci-art practices.

\textbf{6.1 Mapping the dissertation journey}

I began by briefly introducing the technoscientific art practices I would examine, situating them in both my prior industry practice and current creative practice frameworks. The targeted outcomes were the realization of the international exhibition entitled \textit{Alter: Between human and non-human}, and the creation of an autonomous animation avatar partially formed from my emotional and facial characteristics. The avatar, entitled \textit{Leah}, was developed in LAT with Sagar and Corballis. In both of these projects, I alerted the reader that I would be querying new and speculative discourses, emerging at the interface of science, art, technology and curating. I signaled that I would engage with feminist and new materialist ideations. A structural overview of how the argument would build was then given. Finally, I summarised the chapters and the case studies encompassed within \textit{Alter} inclusive of the artists, their research ecologies, practices and their respective artworks.

In \textbf{Chapter One}, I explored the term \textit{labile-technics} and how, as a strategy, it would be of assistance in navigating tech-sci art practices. I gave a brief description of posthumanism and new materialism as a contextual and theoretical grounding for the inquiry. I covered nomadic subjectivity, posthumanism, feminist new materialism, the notions of embodiment and embeddedness and a brief look at transversal relations, using Braidotti, Barad and Haraway. I then described the four principle actions of mapping, speculating, diffracting and intra-acting.

In \textbf{Chapter Two} I proposed and developed the notion of the \textit{laboratorium}, taking a commonly held scientific, technological and artistic site and recalled the older etymology that contained the acknowledgement of a broad spectrum of laboring. Acts of laboring in the laboratorium, preferred the speculative and the experimental while still oriented towards the sector of STEAM (science, technology, engineering, arts and mathematics). The acts of speculation, transdisciplinary collaborations and experimentation across the spectrum of involvement as actors, agents, affects and materiality were considered. I advocated that this new knowledge would arise through placing emphasis on experimentation and changing iterations in preference to results oriented, objective and repeatable laboring. In addition, it would be recognized through onto-epistemological practices while mapping new cartographies of what matterings were at work in these reconfiguring and reconstituting disciplinary zones of enquiry.

In this chapter, I developed a scaffold, that had the capacity to flex and accommodate both creative practice projects and the associated various case studies. I connected \textit{labile-technics} to the \textit{laboratorium} and conceived an evolving studio-lab-gallery-virtual-performative space. I explored in greater depth the four actions of \textit{labile-technics} including the performative intra-actions that occur within gallery environments. This provided some analytical and contextual tools to begin to think through the material-discursive practices in the outputs.
In Chapter Three I introduced the first creative practice output *Alter: between human and non-human*. The chapter opened with a series of speculative questions, that proposed ways in which rethinking the works could impact on the content discussed. Additionally, these questions operated as a writing device and playful strategy for speculating. They included asking the reader to think about how the artists were using their own corporeality, personal data and medical imaging as part of their tech-sci-art practices and to contemplate the levels and kinds of intra-action between human and non-human in each artwork.

I gave a brief overview of the exhibition, and then looked in detail, at the works in the exhibition as detailed case studies. These case studies of Prophet, Sellars, Haines, Knox and Stelarc, were looked at from a posthumanist perspective as activating, becoming-machine ecologies. Prophet’s *Neuro Memento Mori*, and Sellars’ *Scan*, were selected as examples that worked with the apparatus of magnetic resonance imaging, the role of the artists as research subject and object, and mediated processes. I examined each work in depth, looking at Prophet’s research collaboration, the research questions and the processes the team used to investigate them. I further looked into the ways that Prophet explored her art research, her specific thinking about her methods and her reprocessing of the scientific imaging. With Sellars’ *Scan*, I explored her thinking, her practice of working across facilities, including scientific labs, and her interest in both historical and contemporary imaginings of the human anatomy. I examined both the gallery-based installation of this work, and the live performance iteration of it, showing how artists are adapting their practices across boundaries of disciplinary practice. In Agatha Haines’ *Drones With Desires*, I looked at how the entangled connections between the artist’s biological neural data, and the artificial neural network, were interfaced with the inflatable drone sculpture. The tech-sci-art processes that had gone in to the making and research of this work, were examined and I explored some of the transversal connections that could be made regarding the combinations of technologies utilized. With Elena Knox’ *Comfortable and Alive* and *Canny*, I looked at her dramaturgical performance, and media installation work, interfacing with gynoids, gender, and service hospitality roles. I followed through her development trajectory, inclusive of the origin of the gynoid, and its integration into Knox’ practice. Finally, I explored Stelarc’s *Prosthetic Head*, as Embodied Conversational Agent, and the various performative repositionings as co-present partner.

Following the mapping of these works, I then discussed from a curatorial perspective, the development of the iterative platform of the exhibition project, *Alter*, moving from virtual walkthrough through physical gallery exhibition to virtual reality gallery exhibition.

In Chapter Four, I examined the general practices of research methods and disciplinary knowledge that underlie the modelling and simulation programming that *Leah*, the self-simulated avatar, is utilizing. To do this, I look in detail, at the entangled practices of the Laboratory for Animate Technologies, Soul Machines and the Auckland Face Simulator Project. In this chapter I draw on Science and Technology Studies thinkers such as Lucy Suchman who has analysed laboratory systems and cultures related to robotics, artificial intelligence and animation. I spend some time looking at the history of Ekman’s FACS system which formed the basis of the Auckland Face Simulator Project. These practices reveal *Leah’s* transversal ecology. *Leah* is also caught in relational and embedded co-constitutions with technological, university research and cognitive economies.
I utilise Parikka, Boutang and Braidotti to address this rich cognitive knowledge ecology.

**Chapter Five** investigates the process of developing *Leah* as a computational, artificially emotionally intelligent avatar, that has been modelled on my facial and emotional characteristics. Throughout this chapter, I interweave *labile-technics*’ accounts of the intra-active process inherent of emergence. A varied mapping of accounts of encounter emerge in processual order. Thinking with Barad brought a nuanced understanding to her development and presentation. I discussed how Prophet and Pritchard, in their ALife and AI practices, developed Baradian inspired diffractive creative practices, that attend to entanglement and co-constitution of each other. I look at aspects of *Leah*, from a posthumanist thinking, returning to Braidotti’s notion of the amalgam, of ethics and non-unitary subject states.

Continuing to interweave entangled tales with analysis and observations, I move on to a discussion around the *troubling* ethical relations that emerge in these intermeshed encounters and creative practices. I turn to Barad and her perspective of time, memory and hauntings, to think through the *troubling*, behind some of the practices involved in the labouring for *Leah*. Some of these *troublings* emerge from the speed of development of the overall avatar system and its increasing involvement in commercial outcomes. Other *troublings* emanated from the undeniable experience of the avatar’s liveliness and relations of kinship. To address the liveliness, I looked to Braidotti’s discussion of zoe as vitality, that is generative, impersonal and boundary transgressing. It was useful to see *Leah* as a zoe-techno-body, who is embodied and embedded, in certain transversal environmental conditions.

*Leah* is then examined in her two variations of installation for exhibition at the Gus Fisher Gallery. The first, as part of *Alter: Between Human and non-human*, and the second, *Witness*, installed for examination and public display. This analysis of the Gus Fisher Gallery installation, recalls some of the gallery site-specific understandings, first introduced in the laboratorium chapter, regarding participant’s intra-active potentials and embodied experiences as sites of new knowledge practices.

### 6.2 Findings and limitations

The key findings in this thesis, have been the relevance of thinking with posthumanist and new materialist concepts, while engaging with the complexity of technoscientific art practices, to reveal the depth of co-constitution and emergent forms of zoe or liveliness in both human and non-human.

I proposed the laboratorium as a working space for artists and curators, for its capacity to recognise the contemporary mobility, mutability and interweaving of tech-sci-art projects across the studio-lab-gallery-virtual zones of participation, development and presentation. I wanted to spotlight the aspects of the projects that are both complex and multiple in their outputs. The skills and the reconfigurations that arise, required an emphasis, and rethinking of the experimental shifts spanning the laboratorium’s working spaces. In addition, I advocated that the spaces were relational, and involved multifarious working transdisciplinary partnerships. Viewed as a whole, they constitute complex transversal ecologies and demand equally transversal methods to enable working processes that adequately address the complexity.
I developed *labile-technics*, for use in the *laboratorium* where I used these actions of mapping, speculating, diffracting and intra-acting to attend to the practices of the artists and their artworks that were selected for *Alter*. Mapping, as discussed, is a means of grappling with the complex and intricate networks, that comprise the research and development ecologies, surrounding these projects. Through activating speculation, the artist brought a questioning tactic into these projects. On occasion, this speculation may implicate modelling and simulation tools, used across the artistic and scientific communities of practice. Diffracting was advocated as a strategy for being attentive to difference and to acknowledge the inextricably bound matter and meaning. Intra-acting, was reinforced as an important touchstone, as it emphasised the lack of fixed position, objects or subjects. It recognized the porous interweaving of the human and non-human. The breadth of case studies explored in *Alter* was necessarily tight, given the resource limitations of the PhD research requirements, but further work in this area analyzing a wider spread of technoscientific artists could take place in the future. Conscientiously taking these techniques into the industry, into the *laboratorium* of the studio-lab-gallery-virtual-performative, would be of interest. I would like to tour *Alter* overseas, either as the VR component, or resetting both versions together, as a diffractive curatorial strategy.

### 6.3 Applications and implications

I perceive that a diffractive creative practice approach could be further applied in transdisciplinary technology innovation and entrepreneurial research and development environments. As a generator of new knowledge, creative speculative practices can give insight, ethical and response-able frameworks beyond the usual bound disciplinary ranges of knowledge. Currently in AI environments, there is an awareness that the technology...
and its applications are causing unexpected and therefore unplanned possible risk factors, in societal and environmental situations, such as driverless cars, medical diagnostic AI recommendations, amongst many other applications. Google has recently decided that there is a need to establish an ethics research taskforce to assess impact and risk factors, implicated alongside advanced technological systems development, inclusive of AI and machine learning. Activating more diverse research and development teams, that include the more speculative and experimental practitioners and content, facilitates more open-ended investigations that can help reveal ethical and social implications.

In regards to curatorial practices, the cartographic transversal mapping techniques developed in this research are useful for understanding complex techno-scientific art works, practices and overall ecologies. My understanding is that a richer encounter of reading and experiencing the work assists with recognising the ways in which it is both intercepting, and contributing, to its specific ecology. This then, can assist with opening the discourses around the works and practices in public forum and associated discursive materials, supporting artwork and overall exhibition.

For artistic practice, the technique of mapping and remapping as projects proceed, and other actors, agents and forces enter the assemblage, is pertinent, and I believe, necessary. Finding a voice, and a method, for being visible within such a system is a discussed challenge concerning practice in this field. Developing systems for researching materials at work, in discourse, and collaboration, with other team members, and acknowledging,

and respecting, where the disciplinary knowledge is deep and complex, whilst evolving ways that you can respectfully engage, without feeling the need to be ‘expert’ in other fields.

Barad’s concepts around intra-action and performative encounters are also excellent tools for understanding the embedded and embodied aspects for all participants involved in engaging with the work. Her discussion around understanding apparati, and the way that it affects the phenomena manifesting, is also critical in terms of addressing the entangled materials and forces at work in complex systems. For artists and curators this involves a diffractive practice, where watching for points of difference, slippage, messy and entwined states is an ongoing part of the creative practice. Within university arts practice-based teaching, these strategies are particularly applicable to technoscientific arts students work. In particular, Suchman’s long tradition of working in laboratories with robotics and artificial intelligence, and her concerns with slowing the process down, and looking out for endemic problems, relating to social, and ethical implications, are well placed for seeing the ways in which these reappear in unique, and unexpected, form in advanced technology systems. Combining these approaches, in my practice, has been beneficial to be able to speak across the complexity of what is transversality.

Finally, paying attention to the ‘liveliness’ across human and non-human networks, is of particular interest. As technological advances increase at rapid speed, the peculiar aspects of liveliness are emerging in unprecedented ways. Flexible thinking and frameworks for accounting and being with this aspect is critical in this posthumanist context. Increasingly, ‘intelligence’ is also accompanying ‘liveliness’, and it is in this area, that this thesis, has made some forays in thinking through the richness of relation-

ality, occurring in the assemblages. Braidotti’s thinking relating to zoe and bios remains useful in this environment, and particularly, the notion of the zoe-techno-body.

Direct results intimately connected to the content of this doctorate, are related to the entangled acts of curatorial, artistic, research and development. In regard to the artistic practices, relating to Leah, it would be advantageous to continue to modify the model, and investigate in more detail, with a neuropsychophysiological expert, such as Corballis, how my responses, and overall behavior of the avatar, relate to the wider research occurring with the AFS project. The AFS project is currently in its early phases of research development, and so there are wide implications for the research, beyond the parameters of this thesis. The same can be said for the Laboratory for Animate Technologies, to test different iterations of Leah, within the context of the family of avatars, in relation to a diverse set of applications, rather than the narrow focus of gallery installation.

The access to ongoing development of Leah, without technical development funding attached, has meant that commercial applications were prioritized over additional modifications. This provided both a potential to further explore the current model, but a limitation in regards to adding further features, that would have made Leah act more specifically for an arts installation museum/gallery audience. Technical aspects that would be fascinating to explore in application, would be to add sweat, flushing, hormonal triggers, and tears to the avatar, to see what the effect of subtler signs of liveliness would have been. This would be in preference to a wider language of defined emotion in accordance with the FACS systematised imaging. In addition, I would be intrigued to experiment with a richer multi-sensory environment involving haptic and olfactory experiences, triggered by the BL programme modulations. Further, I would like to test varied projection solutions seeking to bring the imagery off the flat wall surface and integrating it into the space more - perhaps on floating - two-way glass panels.

Continuing to build affects of liveliness, attaching Leah to more advanced forms of artificial intelligence, to engage and analyse the changing affects of increased liveliness and intelligence would be fascinating. This would dovetail with the critical analytical research interests in intelligence at work in technoscientific installations across the human and non-human in kinship relations. Furthermore, I would like to develop a version of Leah that is available for international touring.

6.4 In conclusion
In conclusion, this research has led me to recognise that technoscientific art practices require advanced and diverse transcontextual methods that, across time, develop as transversal ecologies. The laboratorium and labile-technics emerge as examples of how such ecologies can support and facilitate such technoscientific practices. I advocate that curation of technoscientific art and the tools proposed by purely media arts industry are inadequate for the task. Tech-sci-art practice, and STEAM in general, is a demanding sector to be involved in, and is littered with expectation for ‘advancement’, ‘speed’, innovation and entrepreneurial activity.

This thesis is a call for a posthuman recognition, of posthuman relational entanglement, within transversal ecologies. The zoe-techno-body is an ethical challenge to develop kinship and intimate relations, of embodied and embedded engagement, within advanced technological systems. Through using the strategem of labile-technics, in the laboratorium,
troublings and co-constitutive volatile relations are revealed, whilst providing tactics for moving with the rapid currents of change in tech-sci-art and staying in the trouble.
7.1 *Alter* virtual walkthrough
7.2 Alter exhibition catalogue

ALTER

LIST OF WORKS

ADAMAH HANES (UK)

ALISON HOGAN (NZ)

JANE PROPHET (UK)

LEONARD WICKSTEED (NZ)

NINA BEILAR (UK/US)


BETWEEN HUMAN AND NON-HUMAN

FRIDAY 22 APRIL – SATURDAY 21 MAY 2016

CURATED BY DEBORAH LAWLER DORMER

THE GUS FISHER GALLERY AT THE UNIVERSITY OF AUCKLAND PRESENTS
The exhibition includes works by international contemporary artists who critically address the posthuman. The posthuman is here understood as an engagement in deep questions of the self, being and our co-evolution with technology. Often referring to the biomorphic 'self', the works in the exhibition draw upon neurology, psychology, brain imaging, robotics, and computational modeling. Each artwork is a product of artistic collaboration between visual artists, engineers, computer scientists, neuroscientists and medical practitioners.

AGATHA HINES is a senior designer interested in manipulating the human body and the ethics behind why we might want to change our bodies in the future. She is a researcher at the University of Plymouth. She has been working onลาย

SNAPSHOTS WITH DEMENTIA is an interactive version of Dr. Barry, the memory impaired artist. He occasionally shares his memories and digital images of his paintings and everyday life. This project is an ongoing exploration of the relationship between the artist and his memories. The project has been embraced by Dr. Barry's family, friends and colleagues. The project aims to raise awareness of dementia and the importance of memory and life stories. The project has also been embraced by the Alzheimer's Society of Scotland. The project has been shown in various exhibitions and has received positive feedback from the public and the healthcare professionals.

Three women artists share their experiences using social media to share their artistic and personal journeys. This project explores the use of social media as a tool for sharing personal stories, emotions and experiences. The project aims to raise awareness of the impact of social media on mental health and personal relationships. The project has been embraced by the Mental Health Foundation and has received positive feedback from the public and the healthcare professionals.

NINA TIELER uses art to explore the human body and its role in society. She works with photography, video and installation to create a dialogue between the human body and its technological context. Her work explores themes such as the relationship between the body and technology, the impact of technology on human identity, and the ethical implications of technological advancements. The project has been embraced by the Tate Modern and has received positive feedback from the public and the healthcare professionals.

SCORPION is a piece of video art that explores the relationship between the human body and technology. The project uses animation and digital media to create a visual representation of the human body and its interaction with technology. The project aims to raise awareness of the impact of technology on human identity and the ethical implications of technological advancements. The project has been embraced by the Victoria and Albert Museum and has received positive feedback from the public and the healthcare professionals.

JANE PROPHET is an artist and writer in the School of Creative Media at City University. The project explores the relationship between human and technology. The project aims to raise awareness of the impact of technology on human identity and the ethical implications of technological advancements. The project has been embraced by the Science Museum and has received positive feedback from the public and the healthcare professionals.

KEIKO KOBAYASHI is a collaboration between Jane Prophet and the artist Keiko Kobayashi. The project explores the relationship between human and technology. The project aims to raise awareness of the impact of technology on human identity and the ethical implications of technological advancements. The project has been embraced by the National Museum of Singapore and has received positive feedback from the public and the healthcare professionals.

LEAH WATSON is a Stanford student who is working on a project to create a 3D animation of a virtual human body. The project aims to raise awareness of the impact of technology on human identity and the ethical implications of technological advancements. The project has been embraced by the Stanford University and has received positive feedback from the public and the healthcare professionals.

ELINA KNOX's art practice challenges and plays with our perceptions of gender, sexuality and identity. Her work explores themes such as the body as a site of resistance and the construction of gender and sexuality. The project has been embraced by the Tate Modern and has received positive feedback from the public and the healthcare professionals.

SHELLEY LAMB is a visual artist who explores the relationship between human and technology. Her work explores themes such as the impact of technology on human identity, the ethical implications of technological advancements and the role of the artist in society. The project has been embraced by the Tate Modern and has received positive feedback from the public and the healthcare professionals.

DEBORAH LAVERNER is a collaborator in the exhibition. She was involved in the conceptualization of the project and provided valuable insights and feedback. She is currently based at the University of Auckland, Australia, where she is completing her PhD in digital media. The project aims to raise awareness of the impact of technology on human identity and the ethical implications of technological advancements. The project has been embraced by the Tate Modern and has received positive feedback from the public and the healthcare professionals.
Liminal spaces are proliferating in technological terrains of turbo and hyper machinery, generating ambivalence and anxiety about what a body is and how a body operates. The body becomes a floating signifier, becoming whatever it wants to become, in a multiplicity of forms and functions. Electronically etched and augmented, the body performs beyond the boundaries of its skin and beyond the local space that it inhabits. It becomes an extended operational system, performing remotely, involuntarily and with profound indifference, absent to its own agency. It becomes physically split with an extruded sense of self. A radical emptiness permeates the human horizon, but with an emptiness generated not by a lack but rather through an excess of expectation. Technology is attached and is inserted inside the body as it becomes biocompatible in both substance and scale. And flesh is extracted and circulating. Body parts are exchanged. Hearts and hands are relocated and reanimated. A face on one body stitched to the skull of another, becomes a third face resembling neither. Your face, appropriated and animated by an alien nervous system becomes the face of the other. A body with implants is a body that can be hacked, re-wired and re-purposed. Prosthetic Flesh becomes Fractal Flesh and Phantom Flesh. It is a time of alternate anatomical architectures, of Zombies, Humanoids and Hybrids. Being alive is now superseded by an artificial operational aliveness. What it means to be human is perhaps not to remain human at all.
ALTER: BETWEEN HUMAN AND NON-HUMAN
Programme for Saturday gallery talks

SATURDAY 23rd APRIL - 1pm Kenneth Myers Centre
STELAR: CONTESTABLE BODIES: ZOMBIES, HUMANOIDs & HYBRIDS
Liminal spaces are proliferating in technological terrains of turbo and hyper machinery, generating ambivalence and anxiety about what a body is and how it operates. The body becomes a floating signifier in a multiplicity of forms and functions. Technology is attached and it is inserted inside the body as it becomes biocompatible in both substance and scale. Body parts are exchanged. Heads and hands are relocated and remanipulated. A face on one body stitched to the skull of another, becomes a third face resembling neither. Your face, appropriated and animated by an alien nervous system becomes the face of the other. A body with implants is a body that can be hacked, re-wired and re-purposed. Prosthetic. It is a time of alternate anatomical architectures, of Zombies, Humanoids and Hybrids. What it means to be human is perhaps not to remain human at all.

BIOGRAPHY:
Stelarc, a performance artist who has used medical technologies, prosthetics, robotics, virtual systems and body amplification in his artworks for over 20 years. In 1996 he was made Honorary Professor of Art and Robotics at Carnegie Mellon University, Pittsburgh, and in 2002 he was awarded an Honorary Doctorate of Laws, Monash University. He is currently a Distinguished Research Fellow at School of Design and Art in Curtin University, Perth.

SATURDAY 30th APRIL - 2pm Gus Fisher Gallery
AUCKLAND FACE SIMULATION RESEARCH
Associate Professor Mark Saggar from the Laboratory for Animate Technologies, University of Auckland, has worked with Associate Professor Paul Corballis to develop the Auckland Face Simulator project. Adult faces are realistically modelled to show accurate expression that is then used for neuropsychological and neuropsychological research into emotion, agency and empathy. Dr Paul Corballis and Dr Mark Saggar will discuss their research interests. LEAM in the Alter exhibition was constructed in association with the Auckland Face Simulator project.

BIOGRAPHIES:
Mark Saggar is based at the University of Auckland's Biomedical Engineering Institute. The laboratory creates interactive autonomously animated systems which will help define the next generation of human-computer interaction and facial animation. Saggar's pioneering work in computer-generated faces was recognized with two consecutive Oscars at the 2010 and 2011 Sci-Tech awards, a branch of the Academy Awards that recognizes movie science and technological achievements.

ASSOCIATE PROFESSOR PAUL MICHAEL CORBALLIS is a cognitive neuroscientist from The University of Auckland specializing in visual perception, attention, and cognition. He received his PhD from Columbia University in New York City in 1997, and spent the next several years at the Center for Cognitive Neuroscience at Dartmouth College in New Hampshire. In 2002 Corballis joined the School of Psychology at the Georgia Institute of Technology in Atlanta, where he remained until returning to the University of Auckland in June of 2011.

SATURDAY 7th MAY - 10am Gus Fisher Gallery
EXTENDED BODIES: CHOREOGRAPHIC RESEARCH AOTEAROA
CAROL BROWN: WHEN FLESH MEETS DATA: CURIOUS BODIES, EXTENDED BODIES.
REVOLVE was an art/science collaboration between choreographer/performer Carol Brown, media artist Anne Niemetz, sleep scientist Philippos Ganderi and sound artist Russell Scones. In this talk, Carol Brown discusses what kind of dancing emerged through this art/science collaboration and the kinds of artefacts that remain from this work.

BIOGRAPHY:
Carol Brown is a choreographer, performer, writer, researcher and an Associate Professor in Dance Studies at the University of Auckland. Her body of work has evolved through dialogue and experimentation in diverse settings including urban, architectural and theatrical environments in response to questions of space, embodiment and identity. Her current research with Gibson/Martelli considers the kinaesthetic potentials of virtual reality environments.

SUZANNE COWAN:
Suzanne Cowan speaks about her concept of the extended body where we exist relationally and always in context including the human and the non-human. She is interested in some of the ethical implications of the extended body and our response-ability to other.

BIOGRAPHY:
Suzanne Cowan is a PhD candidate in Dance Studies at the University of Auckland. She has worked as a professional dancer and choreographer for sixteen years both in New Zealand and in the UK.

SATURDAY 14th MAY - 1pm Gus Fisher Gallery
CURATOR’S GUIDED TOUR
ALTER: BETWEEN HUMAN AND NON-HUMAN is curated by Deborah Lawler-Dormer as part of her doctoral programme. Her PhD with Creative Practice specialising in Media Arts jointly supervised by NICLAS, University of Auckland and the School of Art and Design at the University of New South Wales through the Universities 21 Doctoral Scheme.

BIOGRAPHY:
She is a Research Associate at the Centre for Art Studies and Doctoral Candidate at the UNSW School of Art and Design and NICLAS University of Auckland. She has curated numerous media arts and multidisciplinary exhibitions in NZ, Europe, US, Australia, the Middle East, South Korea, Beijing and Hong Kong. Previously, Deborah held curatorial and consultant research positions at Auckland Art Gallery, City Gallery, Wellington and Te Papa Tongarewa Museum of New Zealand.

SATURDAY 21st MAY - 1pm Gus Fisher Gallery
POST-HUMANISM AND CONTEMPORARY ART
AN INTRODUCTION TO POST-HUMANISM AND ITS RELATION TO EXPERIMENTAL PRACTICES OF ARTMAKING
Sam Meiser from the Gus Fisher Gallery will present an overview of Posthumanism and Deborah Lawler-Dormer will give a response relating to the Alter exhibition.

BIOGRAPHY:
Sam Meiser holds Master's degree in Fine Art from the Université de Michel de Montaigne in Bordeaux, France. He spent 2 years at the EHESS Social Science University in Paris and is experienced as a cultural mediator and contemporary art curator in both France and New Zealand. He has worked for several international art festivals and important international artists such as Jeff Koons, Anselm Kiefer and Bjork.
7.4 Alter press
FOCUS ON THE FUTURE

Animated artistry narrows gap between art and science, writes Nick Atkinson

Deborah Lawler-Dormer's colleagues describe her as a very real and considerate person, yet this artist has a keen eye trained on the future as she explores our relationship with technology.

Her latest work, Leuk, is sure to haunt, amuse and disturb those who attend ALTER: Between Human and Non-Human, a group show curated by Lawler-Dormer. Leuk is an elaborate computer-generated avatar of the artist.

"Having it exhibited publicly for the first time will be quite confrontational," says Lawler-Dormer. "I'm a kind of ageing, odd female and I've got plenty of wrinkles in my skin and it's very unusual to see these features in computer animation."

Lawler-Dormer has worked closely with Oscar-winning animator Mark Sagar, formerly the Special Projects Supervisor at Meta Digital and now head of the Laboratory for Animate Technologies at the University of Auckland's Bioengineering Institute. Sagar has been called "the worlds of a digital portrait." Deborah's trying to explore what happens when technology and biology start becoming more intertwined in the future.

"The animators' working is one of the extra-ordinary works that make up the futuristic ALTER rope call. Sydney-based artist Elona Knox has two pieces in the show that form part of a dialogue about our paths going hand-in-hand with technology. The imagination can fly too far. This work is important because we're trying to collaborate with scientists. Science can be necessarily quite binary, whereas artists are slippery and tricky and they think very differently. From my recent work ALTER: Between Human and Non-Human, I'm involved in the development of a robot."

"Knox has another work in the show, Comfortable and Alive, where a multilingual avatar can hypnotise you into a state of feeling comfortable and alive" via one of its different languages.

While Lawler-Dormer and Knox's work is virtual, ALTER also features someone exploring physical modifications to his own body. Perth-based performance artist Stelarc has recently had a third ear surgically implanted on his arm that will soon be able to beam audio to the internet. It's part of the artist's mantra that in time we'll all be "more, metal and code."

"A professor at Curtin University, Stelarc exhibits his work Postemic Head.

"It's a 3D computational model that was built in 2002, but it's still as sophisticated in the way it's holding the conversation," says Stelarc who is giving a talk today.

"I'll be presenting my performances, my projects with images and videos and I'll also demonstrate the ear on my arm. I'm presently surgically constructing and stem cell growing ear. It's particularly interesting in how technology extends and enables the body to perform."
WITNESS
14 - 29 July 2017 Gus Fisher Gallery

Credits
Computer animation artists: Mark Sagar, Oleg Efimov and Werner Ollewaagen
Sound artist: Vincent Beatty
Neuropsychology advisor: Paul Corballis

WITNESS
A collaboration between Deborah Lawler-Dormer and Mark Sagar.
14 - 29 July 2017 Gus Fisher Gallery
In the detached gaze of Leah – the hyper-realistic virtual figure that features in Deborah Lawler-Dormer’s Witness – it is easy to overlook what we are looking at. After all, the uncanny seduction of such visceral and uncompromising images is often as repulsive as it is magnetic, the opportunity to stare at every skin blemish and wrinkle of the artist avatar as unnerving as it is irresistible. Yet it is a mistake to think that this almost unfathomable feat of computational realism is any more the aim here than it is in the research work of Mark Sagar – Lawler-Dormer’s principal collaborator.

As Director of Auckland University’s Laboratory for Animate Technologies, Sagar’s research on autonomous facial animation is focused on the interaction loops between the human and the non-human, more than aesthetic issues of representation per se. For both Sagar and Lawler-Dormer, then, in different ways perhaps, avatars such as Leah are more an interface to the relational agencies between the computational and the biological than they are an aesthetic subject. The aim here, then, is not to impress or entertain with techno-aesthetic virtuosity, but rather to invest the audience in the work so that the question of what we are looking at is foremost. Thus, to witness the work we should seek to look beyond the seductive surface of the image to the dynamic intra-actions of the work as the subject.

At the heart of Witness’ intra-active loop is a biologically inspired computational learning process that allows Leah to learn through her experiences with ‘other’ people. Leah’s ‘brain’ – which we could perhaps think of as an amalgam of Alan Turing’s computing machine and John Lilly’s bio computer – is a cybernetic dream come true. Much like a baby learning through imitation, Leah’s audio-visual sensory input system embodies principles of cognitive neuroscience and allows her to autonomously respond to her environment: flushes of virtual dopamine provide positive reinforcement for Leah’s equivalent of a neural network, stimulating facial expression and even subtly regulating her breathing. In this sense, Leah is as ‘alive’ to the moment of intra-action as you and I – neither of us being apart from the experience, both of us being witnesses in our entanglement with each other.

In such entanglements, feminist theorist Karen Barad reminds us, entities are not independent and detached as much as they are intra-related and emergent agents: iteratively coming into existence as they are reconfigured in each intra-action. Leah, then, is not so much the artwork as subject laid out for us to observe, as she is an emergent event that finds form through her intra-actions with the world. To this end, what we should be ‘looking’ at is not the hyper-realistic quality of the virtual image, but what Barad calls the “agential-realism” of our intra-action with the work.

The challenge of ‘looking’ at Leah is that as witnesses we are caught up in a dynamic feedback loop that renders us both subject and object of the work. In post-human encounters such as this, subject-object relations contest the privileged gaze of anthropocentrically situated knowledge and reconstitute onto-epistemic boundaries. Indebted in no small part to feminist theorists such as Barad, such non-dualistic propositions have themselves in recent years emerged as a subject of interest for artists and theorists like Lawler-Dormer. Indeed, the irresistible appeal of these theories – now formalised by New Materialist and Speculative Realist philosophies – is that they seem to promise an ultimate solution to the democratic agendas of avant-garde art practices by liberating the subject from the coefficient of artistic intent, such that everything has equivalent agency in the work. However, the dilemma of such onto-epistemic liberation is as undermining to the notion of art as it is empowering. In it, the questions of authorship that are historically entrenched in the notion of art are devolved to levels well beyond those of participatory and interactive art, to the constantly emerging entanglement of the work becoming itself. The intra-agency of works such as Witness confront us with these dilemmas, not simply by positioning the audience as an interactive participant in the work – as we have perhaps come to expect of such technologically mediated artworks – but by entangling us in the constantly emergent intra-relations such that we cannot truly separate ourselves from it.

To witness Leah, then, is not to observe her with the same detached gaze with which she appears to stare down at us – after all, seeing, as Barad asserts, has no such impartiality. Rather, As Lawler-Dormer explains, in Witness “we are all related. We all share ownership for the presence of the work.”

Witnessing is a matter of withnessing – being entangled in the emergent intra-relations of the artwork so that we, as much as anything else, are instrumental in ‘authoring’ what we see.

References:
References


Tuin, I van der (2011). *A Different Starting Point, a Different Metaphysics: Reading Bergson and Barad Diffractively*. *Hypatia* 26(1), 22-42


