

Inreach: *A Choreographic Process of Transversality*

PhD. Dissertation

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Jessica Foley

CTVR/the telecommunications research centre

Dunlop Oriel House,

Cnr. Fenian St. and Westland Row,

Trinity College Dublin

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Thesis Advisor: Linda Doyle

Declaration

I declare that the work described in this thesis is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.

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SUMMARY of research

This dissertation was developed over a five year period through artistic research and participant observation with the Centre for Telecommunications Value-Chain Research (CTVR). CTVR is the national telecommunications research centre in Ireland and is headquartered in Dublin. This research was motivated in response to CTVR's pragmatic and lyrical question: *How do we Communicate Communications?* The thesis composes a narrative based upon processes of artistic research and participant observation that sought to understand and address CTVR's expressed problem of communicating communications. By combining thinking, visualising and writing skills developed in dialogue between the occupations of art and engineering research within CTVR, the thesis offers partial, and at times critical, insights on the tools and techniques developed and meanings produced through engaging this problem.

This artistic and qualitative research was carried out in a context habituated to and expert in empirical research practices. A major challenge for the author was thus learning how to address the authority of empirical research through artistic research. An inventive and critical practice of naming was developed to this end.

Inreach was the name given to the particular choreographic process that developed in dialogue between the occupations of art and engineering in the context of CTVR. Inreach was a way of learning with CTVR's workers how to collectively address the challenge of communicating communications. Inreach imagines communication as a cultural process of dialogic and dialectic practices that emerge out of the singularities of collectivity, community and context. In the context of CTVR, dialectic practices were found to be privileged over dialogic practices of communication. Inreach was developed in order to better understand and intervene in this perceived asymmetry.

As a choreographic process, inreach works with the potential for communicating techno-scientific research and knowledge with and alongside the research community of CTVR. Inreach recognises that the multi-layered community and collectivity of CTVR affords the possibility for generating counter-public space. Inreach taps this possibility by structuring and facilitating dialogic situations within the techno-scientific research context of CTVR.

This thesis shows that inreach is both catalytic and supportive of transversality; a process of communication within groups and organisations. Transversality is a process of communication that resists rigid or dominating cultures of

communication, for example, academic models of competitive and argumentative dialectic. Equally, transversality is a process of communication that enlivens disempowered modes of dialogic communication, for example, those operating passive-aggressively within agonistic dominator cultures.

The concept of inreach became a useful multi-tooled and qualitative strategy for accessing and interrupting the hidden curriculum of CTVR. Thus, inreach sought to attenuate or soften dominant competitive cultures of authoritative discourse within CTVR while enabling and supporting dialogic cultures of communication in order to enliven the research culture to develop its own ways of communicating communications.

This thesis develops a narrative of the choreographic process of inreach through the composition of a 'theoretical distillery'. The distillery is structured by theories that emerged as most relevant to and supportive of an analysis of the research process. The composition of the 'theoretical distillery' highlights both the qualitative design of the research process and the context-based demands on the writing process and representation of research. The theoretical distillery emerges only towards the ending (and/or postponing) of the inreach experiments within CTVR, as the author switches emphasis from qualitative to exegetical processes. The distillery must be understood as a metaphor for the reflexivity of the author at work in both the research and writing process as the inreach experiments are brought through the heat and pressure of analysis.

The principle readership for this research, from the beginning, was CTVR. This research offers a partial perspective, a multi-vocal story, on a dialogue catalysed in between artistic and engineering research at CTVR. The purpose of the thesis has been to articulate the material, intellectual and affective processes at work responding to the research question and to offer insights on how artistic and engineering research practices can work together productively to generate knowledges through communication. At a more abstract level, the thesis speaks to a broader readership of artistic and qualitative research, offering occupational difference as a useful concept for thinking and working through inter and multi disciplinary research in the context of empirical research traditions.

The thesis narrates the choreographic process of inreach through the theoretical distillery, thus generating a partial perspective on the ways that CTVR began internally recreating its research culture by cultivating occupational difference.

Through an analysis of the inreach experiments, CTVR's technological politics becomes articulable. The political imaginary of CTVR manifests through the theoretical distillery by moods of parody and/or lyric legible in the materials generated and collected through the inreach experiments. A sense of CTVR's pragmatic yet aspirational philosophy of technology becomes distilled as an ambivalent politics of freedom within constraint.

The artistic and qualitative research process adapts to the traditional framework of an empirical thesis in order to articulate and respond to CTVR's question of communicating communications. The implications of this are discussed in Chapter One, and efforts are made to prepare the reader to read the thesis in a flexible manner. In Chapters Two and Three the author works to recover the initial conditions of the research context through the composition of a theoretical distillery. In these chapters a critical sense of CTVR's motivations for engaging with the occupations of art is developed, only to be extended throughout the thesis. Theories and concepts drawn from the practice of participant observation are brought to bear here and combined with the educational theory of the Hidden Curriculum; Félix Guattari's concept of transversality; as well as histories and politics of the occupation of engineering and the philosophy of technology.

In Chapters 4, 5 and 6 the provenance of the concept of inreach is recovered. The theoretical distillery permits a critical reflection extending from participant observation materials and primary source documents (the *Green Booklet* and the *Design for Change* proposal). These documents were found to be both constitutive and reflective of the initial conditions of research. This process of recovery involves retracing the influences and early steps of inreach, and thinking forwards through the process. Inreach is shown to emerge out of a discontinuity in-between CTVR management's vision for 'Education and Outreach' and its practice of smuggling occupational difference within the research centre. Inreach is intuited playfully as a way of addressing this discontinuity, figured as the 'neglected twin' to Outreach.

Over time, inreach develops as a choreographic process that sets up inreach experiments with CTVR that become theorised as 'dialogic situations'. Their implicit purpose is to generate different modes of internal communication with CTVR, and to gradually begin convecting communication collectively in a meaningful way. Chapter 4 introduces the inreach experiments *Room 3.17* and *Engineering Fictions*, while Chapters 5 and 6 trace the choreographic process which led to them, and provide

sample encounters of each. Thus, the narrative is presented as a kind of report on the experiments followed by an exegesis of them.

Chapter 7 brings the theoretical distillery to bear upon the inreach experiments in order to refine language and meaning around CTVR's aspiration to Communicate Communications by thinking through the materiality of the dialogic situations. Finally, Chapter 8 draws together findings and observations, and proposes three pathways for future work.

The thesis works together a language of practice and a language of theory in order to structure and narrate learning. The narrative offers a specific insight on how artistic and engineering research worked together within CTVR in response to the hidden curriculum of communicating communications. More broadly, the thesis makes a case for catalysing, structuring, facilitating and supporting experimental dialogic communication within research contexts that tend to privilege dialectic communication.

Overall, the thesis demonstrates that inreach is an experimental choreographic process of transversality, formed experimentally in-between research occupations of art and engineering. Inreach tells a story of the challenge of communicating communications within CTVR, a research centre intuitively encouraging of researching under conditions of occupational difference.

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I dedicate this research to my sister, Joanna (1978-2003).

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List of Characters

in order of appearance

L.D.	Linda Doyle, <i>Director of CTVR</i> .
J.F.	Jessica Foley, <i>PhD Candidate with CTVR</i> , lead author of thesis.
P.S.	Penny Storey, <i>former Executive Director of CTVR</i> (on career break).
R.B.	Ralph Borland, visual artist and activist, (PhD. guided by L.D.)
B.C.	Brian Corbett, <i>CTVR/Tyndall, Cork</i> .
D.oM.	Dónal O'Mahony, <i>former Director CTVR (2004-09)</i> , TCD.
L.dS.	Luiz da Silva, <i>Stokes Professor in Telecommunications</i> , CTVR.
G.W.	Gail Weadick, <i>former Executive Officer with CTVR</i> .
C.G.	Carlo Galiotto, <i>PhD. Candidate with CTVR</i> .
J.K.	Jacek Kibilda, <i>PhD. Candidate with CTVR</i> .
J.T.	Justin Tallon, <i>PhD Candidate with CTVR</i> .
L.W.	Louise Ward, <i>visual artist</i> .
S.mG.	Séamas McGettrick, <i>Senior Researcher with CTVR</i> .
N.M.	Nicola Marchetti, <i>Ussher Lectureship in Wireless Communications</i> , CTVR/TCD.
G.R.	Giuseppe Ruvio, <i>Research Fellow Antenna & High Frequency Research Centre</i> , DIT/CTVR/TCD
E.dP.	Emanuele Di Pascale, <i>PhD. Candidate</i> (graduated 2014), CTVR.
M.R.	Marco Ruffini, <i>Optical Network Architectures</i> , CTVR/TCD.
M.B.	Maureen Burke, <i>Artist and Art Educator</i> .
A.L.	Abraham Loutridis, <i>PhD. Candidate, Antenna & High Frequency Research Centre</i> , DIT/CTVR.
R.oD.	Rachel O'Dwyer, <i>PhD. Candidate</i> , CTVR.
T.F.	Tim Forde, <i>Senior Researcher</i> , CTVR.
M.C.	Mark Cooney, <i>Technology Transfer Liaison</i> , CTVR.
D.P.	Dave Payne, <i>Optical Networks</i> , CTVR.
M.J.	Matthias John, <i>Research Fellow, Antenna & High Frequency Research Centre</i> , DIT/CTVR.
D.mN.	Dennis McNulty, <i>Artist</i> , CTVR.
N.F.	Nuala Flood, <i>PhD. Candidate</i> , co-supervised by L.D.
A.mK.	Allen B. MacKenzie, <i>E.T.S. Walton Visitor Award Scholar, CTVR / Virginia Tech</i> .

I Introducing inreach: a choreographic process of transversality

1.1 Introduction

The thesis gives an account of the experimental development of a choreographic process of communication called inreach. While the research process has served to enact inreach as a process of transversality, the process of writing of the thesis enacts a translation of the choreographic process. This choreographic process gradually structured and facilitated dialogic situations within the techno-scientific context of CTVR. Throughout the thesis, the dialogic situations generated are referred to as inreach experiments. The experiments were devised through a careful combination artistic research processes and participant observation that responded to the particularity of the context and its affordances (Gibson 1986)¹. The purpose of the inreach experiments was to explore and develop ways to communicate communications through the context of CTVR. This introductory chapter aims to initiate the reader into the logic of how the thesis was produced.

During the research process and the writing of the thesis, words and expressions were coined as conceptual tools to aid both in the research process itself and in the process of translation into thesis form. In many cases, these words have been used for their abstract and metaphorical qualities. For example, a ‘choreographic process’ was understood as a good way of naming the process of thinking and working with material-semiotic agencies. This is what Donna Haraway understands as a “*more than metaphorical*” process. Haraway sees it as a “*deep way of seeing how the natural-cultural world is constituted*” (Goodeve 2000). For the author, a choreographic process is a way of initiating a thoughtful dance with others (human and non-human) within a particular context or environment. The entire thesis is an effort to translate embodied criticality into the typical logic of an academic thesis. While the intention is to render the process meaningful to the reader, the attempt may come across at times as more or less successful. The clue of this intentionality is in the somewhat tautological title declaring: *inreach is a choreographic process of transversality*. The thesis strives to spell out the communicative processes embedded in the title which were a

¹ The concept of *affordances* is drawn from James Gibson’s ‘Theory of Affordances’. Gibson coins the term *affordance* to indicate the relationship between animal and environment: “The medium, substances, surfaces, objects, places, and other animals have affordances for a given animal. They offer benefit or injury, life or death. This is why they need to be perceived. The possibilities of the environment and the way of life of the animal go together inseparably.” Fricker, M. (2007). *Epistemic Injustice: Power and Ethics of Knowing*. New York, Oxford University Press.

result of artistic research practices working in relation with engineering research practices within CTVR.

The focus in this preliminary section is on spelling out the roles the author enacted experimentally and reflexively during the process of artistic research and participant observation with CTVR, including during the 'writing-up' phase prior to submission of the thesis for examination.

A brief caveat in advance: It is important for the reader to keep in mind that the concept of experiment is not to be confused with 'experiment' as in the late positivistic sense of scientific experiment: a method of falsification that "*insures that the judgement [of some problem/subject] is correct and that it is objective, because anyone else can follow the same method and come to the same judgement*" (Dobrin 1985). Experiment in this thesis refers to a dialogic process of trial and error that adapted out of the author's unfolding engagement with CTVR as an artistic researcher. This process toggled between a dialogic communication with self and with the disparate and dynamic community of CTVR. However, the artistic and dialogic understanding of experiment was always in both productive tension and conflict with an underlying contextual assumption of the positivistic model of experiment. This tension and conflict is echoed in the way the thesis is written, as will be discussed shortly.

The author enacted two major roles in the development of this thesis. The first emphasised hands-on and practical work with CTVR while the second emphasised exegetical and critical translation in response to experimental work produced with CTVR. These of course are not mutually exclusive roles. In the first role, the author was expected to perform as an artist researching within the context of CTVR. There were mixed underlying assumptions at work throughout CTVR, as a research centre, of what the 'role of the artist' might be. For many, the expectation was that the artist would represent and beautify telecommunications engineering research, hence *communicate communications*. The question of the artist's role as a researcher within CTVR thus became an important focus of the dialogic process. In the second and later role, the author was expected to perform as a *technical writer* of artistic research within the context of CTVR. She was encouraged to 'write up' her artistic experiments, in much the same way as an engineering researcher might write up their scientific experiments. In other words, the author was expected to frame her research in the tone and style of a typical engineering thesis, a scientific report with discussion.

1.1.1 The Hope of a Hybrid

As will be discussed in chapters 4 and 6, the artistic research sought to open up a correspondence with engineering discourse within CTVR. The author recognised the possibility to experiment with writing and conversation styles within CTVR, and thus formed the second inreach experiment, *Engineering Fictions*. Here, as will be shown, the author extended her own practice of art writing within the domain of CTVR, offering it as a model for communicating communications that could be adapted over time with CTVR through the process of inreach². The author permitted the adaptation of her own artistic practice in the hope that a hybrid writing practice might emerge that was particular to the research community of CTVR of which she was becoming a part. The difficulty was that this process of adaptation was largely one way and there was more at stake for the author. In other words, the onus was on the author to adapt, and there was no reason or ethical imperative for CTVR researchers to reciprocate adaptation. Nonetheless, a kind of gradual and asymmetric reciprocity began to emerge both through the commitment of the author's relational process with CTVR, and a commitment from other researchers within CTVR to the intuitive and playful process of inreach.

Inreach developed out of a desire to make responses to a problem (communicating communications) with the people for whom that problem supposedly mattered most. The problem was making ways for/of communicating that could be meaningful to the myriad researchers and researches of CTVR. The research context offered the possibility of rethinking broader issues of communication (beyond the immediate territory of telecommunications). Such rethinking happened through a mingling of artistic and engineering discourse, and took shape through the inreach experiments. This process unfolded not through making a comparison of 'art writing' with 'engineering writing' but through an improvisational attention towards the nuance occupational difference, "*attention to differentiated expertise and differentiated literacies – whether 'lay' or 'professional'*" (Haraway 2004:316). Inreach enacted a materially semiotically engaged hope for hybrid processes of communication to develop through the techno-scientific context of CTVR.

² Art writing means writing that develops within a context of creative arts practices and establishes a creative discourse with that context. Sometimes art writing can mean generating a critique on a particular work of art, an exhibition, or a contemporary or historical theme. The kind of art writing the author espouses works in critical dialogue with the context of contemporary creative arts practices. Thus, it is a hybrid mode of writing, combining essay, poetry, prose, fiction, etc. The author's art writing is informed by conceptual art and experimental mediums such as dance and installation.

This hope was challenged significantly during the 'writing up' phase of the research. This was largely because of a conflict between the hybrid process of inreach and the expectations and requirements of PhD examination in the context of CTVR. The author was forced to adapt the process of inreach (a) to an educational system that did not recognise artistic research as valid, and (b) to the constraints of technical writing. In the first place, CTVR was officially a research centre that carried out and validated engineering (not artistic) research. Secondly, CTVR produced research theses that adhered to a rubric of technical writing.

Technical Writing, according to Carolyn R. Miller, is unsystematic in its definitions and unclear about its subject matter. After all, many subjects, including art, involve technical aspects. Technical writing, therefore, would seem to be about spelling out the technique or craft of a particular practice. The assumption of technical writing is that precise techniques are discoverable and knowable, and can be spelled out systematically. Technical writing thus appeals to absolute clarity and to what Miller calls the "*windowpane theory of language*". Technical writing understood in this way is part of a "*complex and varied tradition, extending in some forms back to the ancient Greek philosophers, but reaching its most extreme expression in the logical positivism of the early twentieth century*" (Miller 1979). The mode of technical writing sustained within CTVR reflected this tradition, and the author was impelled to "*devise a pure 'observation language,' free of the emotion and metaphysics which pollute ordinary language*" (Miller 1979: 613). Thus, the thesis is written more or less in such a way that adopts the style and organisation of engineering theses advocated by CTVR, which happen to un-consciously implement a positivist epistemology and which ironically works against the subject and purpose of the thesis. While the author was intuitively aware of this contradiction at the time of writing, she did not have the capacity to spell it out, or make a good proposal for how this irony might be turned to some creative advantage (e.g. through parody). The imperative was to get the thesis written and submitted on time. Thus, "*under the sway of positivism*", the author adopted third person constructions, passive voice and personifications in a feigned effort at "*staying out of the way of the subject matter*" (Miller 1979: 614)³.

³ This kind of advice might be familiar to fiction writers. While the relationship between technical writing and fiction is not elaborated in this thesis, it bubbles beneath the conscious surface of the text. That fiction is a mode of truth-telling is often stated in the field of Science Fiction, most eloquently perhaps by Ursula K. Le Guin: "*The only truth I can understand or express is, logically defined, a lie. Psychologically defined, a symbol. Aesthetically define, a metaphor.*" Le Guin also goes on to put her finger on one of the major problems encountered in this research: "*The artist deals with what cannot be said in words. The artist whose medium is fiction does this in words. The novelist says in words what cannot be said in words.*" It is indeed a paradox. Le Guin, U. K. (1969). *The Left Hand of Darkness*. New York, ACE Books.

Artistic research (often referred to as practice-led research or practice-as-research within the international academic system) and art writing is relatively new to the academy and, as with Engineering research and technical writing, there are underlying assumptions of positivism disrupting its potential. Andrew McNamara, an experienced supervisor of practice led research doctorates, has attempted to advocate six rules for artistic and practice-led research within the academy that can mitigate double-bind problems before they occur. The first of these rules, interestingly/ironically, is the elimination (or at the very least limitation) of the first person pronoun.

The reason given is as follows: *“The challenge for the creative fields is... this shift from the quasi-confessional mode of the artist statement to a research model that requires a critical reflection involving the communication of the contribution to knowledge and its findings... A good rule of thumb therefore is that over-reliance on the use of ‘I’ correlates with a drift away from research clarity and from providing any research context at all. This is usually because the researchers is conflating their own subjectivity, or individual experience, with the research project”* (McNamara 2012).

The view of the author is that the first person pronoun itself is not the problem but rather the assumptions about what constitutes knowledge underlying its use. If these can be explicated from the outset then the writer should be enabled to articulate the research and findings in whatever way best accommodates a material-semiotic communication of the research contribution. Provided, of course, that the research context accommodates practice-led research, which CTVR officially could not. Hence, this thesis is written under the constraint of a double-bind.

While the conditions of this research were always those of a double-bind, it was not clear from the beginning of the research process that this was the case. Throughout the thesis, an effort is made to suggest the implications of this situation. These suggestions typically feature in the footnotes as a subtle visual critique.⁴ Miller makes the case that it does not make sense to place such a double bind on students *“by urging them to be impersonal on the one hand, but denying them, in the name of stylistic grace, these obvious syntactic tools [first person pronoun, active voice] on the other”* (Miller 1979). For the author, learning to speak without ‘I’ was challenging, at times helpful

⁴ Many of the author’s personal struggles, contradictions and irreconcilable affects are located in the footnotes. The footnotes thus act as a (subtle) visual metaphor for the way technical writing prioritizes a tone that is impersonal, unemotional, and objective. It would be fun and critically informative to play with the footnote form to develop a more entertaining sense of this curious bias of techno-scientific discourse. But this kind of play was beyond the scope of this research, unfortunately.

and at times inhibiting of making a critical translation of inreach from process to theory. But as Donna Haraway has argued, “*Identity, including self-identity, does not produce science; critical positioning does, that is, objectivity*” (Haraway 1988: 586) The critical positioning of inreach was always a hopeful one of enacting hybrid communications in the context of CTVR under conditions of occupational difference. The hope was to enact hybrid communications that could be responsible and accountable to the question ‘*how do we communicate communications?*’

A feature of technical writing is personification (Miller 1979). Two important personifications emerged during the research process: the interrupter and the distillery. In practice, the author was identified and personified by the research community of CTVR as a catalyst and interrupter. The affect of the interrupter and the process of inreach within CTVR was measured through a second personification, the theoretical distillery. Here, the author playfully takes on the work distilling the inreach experiments, thus partially adapting the constraints of technical writing through the ‘ingenious invention’ of the interrupter. Both of these personifications will be outlined below as a partial primer for reading the main body of the thesis.

1.1.2 Enacting the Interrupter

This thesis is shaped by the struggle to develop an account of the situated knowledges that emerged through the agentic process of inreach. As Haraway reminds us, “*Situated knowledges require that the object of knowledge be pictured as an actor and agent, not as a screen or a ground or a resource, never finally as slave to the master that closes off the dialectic in his unique agency and his authorship of ‘objective’ knowledge*” (Haraway 2004). Haraway often speaks of the importance of ‘staying with the trouble’ in the process of research. In this research, the ‘trouble’ was sustaining a resistance to “*the master that closes off the dialectic in his unique agency and his authorship of ‘objective’ knowledge.*” For the author, that ‘master’ was both external/structural and internal/psychic. The question of whether this thesis accounts well enough for inreach as an apparatus of situated knowledges remains an open one. The goal has been at least to provide an account of the effort made to produce situated knowledges with CTVR.

During the practice-based development of the inreach experiments, the author was personified by CTVR’s management team as a ‘catalyst’ for CTVR’s learning how to communicate communications. The author (with some discomfort at the personification) came to more or less understand and accept her role as inreach catalyst, which she experienced in a material-semiotic way. Over time, the artistic research process became more or less partially informed, recognised and guided in

relation with the research community, CTVR. Later, the author would be re-named as an ‘interrupter’ by a collaborator within CTVR (J.K.). The metaphor of the interrupter offered a way to conceptualise the material-semiotic way in which the author’s artistic research process began to intervene in the cultural life of techno-scientific research at CTVR.

In electrical engineering, an interrupter is a device used to interrupt the flow of a steady direct current for the purpose of converting a steady electric field into a changing one. A common application of an interrupter is the ground fault interrupter that helps to prevent electrocution when using domestic appliances. In domestic kitchen circuitry, for example, the interrupter “*will ‘sense’ the difference in the amount of electricity flowing into the circuit to that flowing out, even in amounts of current as small as 4 or 5 milliamps. The GFCI reacts quickly (less than one-tenth of a second) to trip or shut off the circuit*” (Energy Education Council 2011). This electrical device is a useful metaphor to describe the author’s perceived role within CTVR as inreach catalyst. The motivation of inreach was to encourage dialogic (alternating current) forms of communication within an environment conditioned by competitive dialectic (direct current). The author was seen as a figure that could interrupt unthinking modes of communication within CTVR, thereby constellating other processes of communication, however tentatively. The concept of the interrupter, acting as a metaphor for the author’s practice, further implies electricity as a metaphor for the powerful relational capacity of occupational difference.⁵ J.K.’s naming of the author’s practice as a kind of interruption resonates with the affordances of CTVR as a context that (more or less) supports both occupational difference and the production of situated knowledges.

1.1.3 Enacting the Distillery

To ‘write up’ the inreach experiments in the style of scientific research offered the author an interesting challenge and opportunity to adapt a textual form. The practice of adaptation was one that appealed to the author’s artistic and ethical values. As Linda Hutcheon has theorised “*adaptations disrupt elements like priority and authority*” serving to “*destabilise both formal and cultural identity and thereby shift power relations*” (Hutcheon 2006: 174). But adaptation is not for its own sake, it usually has to do with survival or well-being under changing conditions. In this case, the adaptation involves artistic research practices becoming accepted, recognised, and valued in the context of CTVR.

⁵ This rich metaphor deserves to be unpacked and developed further. However, such a translation is at present beyond the scope of this thesis. However, exploring what this metaphor can do will be a task for future research and the continuing practice of inreach.

Attempting to narrate the involutions of artistic research through technical writing required emphasising a style and organisation that in many ways was at odds with the more idiomatic possibilities afforded by art writing. The author understood that to engage with both art writing and technical writing was a process of translation that was necessarily “*always interpretive, critical and partial*” and particularly experimental (Haraway 1988). To engage in a process of ‘both/and’ demanded an organizing apparatus that could allow the author to transition from the practice of practice (enacting the interrupter) to the practice of translating practice (the critical and thinking act of writing). The theoretical distillery was composed to enable an organisation and distillation of experience through theory and reflection.

Though the author made several proposals during the research process to structure the thesis in a way that might stylistically articulate both the tools and findings of the inreach process, none were recognised or, more specifically, trusted as viable in the context of CTVR. And while artistic research certainly became more valued by CTVR it nonetheless could not be articulated through the academy’s examination system on its own terms. It had to be expressed through the style of technical writing that was expected of engineering researchers⁶.

As was discussed in an earlier section, the author was required to adopt the assumed conventions of technical writing in the context of engineering research: that is writing with an “*emphasis on form and style at the expense of invention*” and “*the insistence on certain characteristics of tone: be objective, be unemotional, be impersonal*” (Miller 1979). The author learned through CTVR that breaking ideas down by assigning numbers and bullet points was valued as technical writing and recognised as a sign of knowledge and facticity. Hence, the author adopted a style that embraced the ‘hyper-rational numbering of points’. This was done less in parody than as a matter of academic survival.

⁶ The double bind implicit in the opportunity to develop artistic research through CTVR was not detectable at the outset, only becoming increasingly apparent and troublesome, as the examination deadline grew nearer. The author experienced psychological and emotional stress, panic and anxiety in particular during the writing up phase of the research. This was because the author perceived a certain fear and reticence on the part of her supervisor at producing a thesis that would enact through writing what the research had developed through artistic practice (inreach experiments). The process of writing, an integral aspect of the authors artistic and scientific research process, was being reduced to a technical exercise for the very good reason of getting passed by the examinations board of the university as valid. Nonetheless, the author accepted the intractability of her situation and strove to find a way to creatively intervene in the process of technical writing in such a way that could satisfy both her own integrity and the examination process. Thus, the author, by a method of ‘ingenious invention’, ironically engineered a way to articulate the choreographic process of inreach. Initially, through the dialogic situations of the inreach experiments, and later through the dialectic process of writing through and with inreach experiments.

Trying on this system of conventions in order to articulate the processes of inreach was at times a struggle. This austere and unfamiliar style seemed to demand too much precision and systematically disregard doubt. Donna Haraway has observed how “*the dreams of the perfectly known in high-technology*” and “*that dream science/technology of perfect language, perfect communication, final order*” have served as “*the hostile other*” to feminist objectivity (Haraway 1988). Such dreams were certainly operating as material-semiotic agents within the context of CTVR, acting as foil to the choreographic process of inreach. The challenge for the author was how to negotiate with these deadly dreams through the writing of the thesis. How could the “*webs of differential positioning*” (Ibid) generated through inreach be translated through the latently positivistic injunction of technical writing?

The author made a simple intervention in the structure of the thesis, subtly challenging the notion implicit in technical writing that “*use of a method insures that the judgement is correct and that it is objective, because anyone else can follow the same method and come to the same judgement*” (Miller 1979). Instead of writing the thesis under the implicit conceit that research had begun with a distinct theoretical framework, based upon a literature review and a research question which inevitably led to the inreach experiments being devised on the basis of that framework, the author invented the theoretical distillery as a concept to help her to write honestly.⁷

The theoretical distillery can be understood as a personification of the author’s inreach process. The theoretical distillery enabled the author to continue to position herself reflectively and reflexively within the inreach process as she translated and wrote-up the salient aspects of inreach as an agentic mode of “*power-sensitive conversation*” with CTVR (Haraway 1988). The distillery offered a way to enrich the language and meaning of inreach as a choreographic process. It both critically extends and folds back into the webs and lines of inquiry and observation generated through the process of inreach. Because this will be discussed at length in Chapter 2, no more need be said at this point.

The rest of this introductory chapter works to provide the reader with a working sense of the context, motivations, and audience for the thesis, as well as sketching out a map of the subsequent chapters that distil an account of inreach.

⁷ Conversations with both the author’s supervisor and other PhD students in CTVR had suggested that engineering researchers were aware of the positivistic conceit embedded in habits of technical writing. In many cases, students were advised to reverse engineer their research so that it appeared as though a step-by-step and straightforward research process had occurred, built solidly upon ‘the shoulders of giants’.

1.2 *Claims and Propositions*

This thesis begins at the end of an intensive process of artistic research and participant observation with CTVR. Over a period of five years an endogenous cooperative and collaborative process of communication in between occupations of art and engineering research was developed to address CTVR's aspiration to communicate communications. It takes as its point of departure a claim made by CTVR in 2010. Over the course of roughly five years collectively pushing and pulling and turning over this claim, the research process arrived at a partial proposition. The earlier claim, made in the high stakes context of a funding review, was that CTVR could communicate communications. This claim gradually became a proposition, formed through this research, that CTVR continue to develop its nascent practice of inreach, a process whereby the inner life of the research centre develops through conditions occupational difference and hybrid communications of dialogic and dialectic.

The purpose of the thesis is to articulate the provenance of the experimental choreographic process of inreach, showing how this process was responding to CTVR's question '*How do we communicate communications?*' The thesis critically reflects upon; (a) the initial context and conditions that supported the emergence of the inreach experiments in correspondence with CTVR; and; (b) translates the choreographic process leading to the enactment of the first two inreach experiments. The theoretical distillery enables the author to reflect upon the initial conditions of her engagement with CTVR, enabling the distillation of inreach while developing a partial proxy and portrait of CTVR's research philosophy.

1.3 *Context and Research Process*

The Centre for Telecommunications Value-Chain Research (CTVR) was the national telecommunications research centre in Ireland⁸. Its research focus was on the design and testing of future wireless, mobile and optical networks. The centre was headquartered in Trinity College Dublin and involved six other academic institutions spread across Ireland (NUIM, UCC, DIT, DCU, UL and Tyndall). Additionally, the research centre collaborated with over 60 companies and had a strong focus on technology transfer and commercialisation. CTVR were also involved in European-wide projects as well as international collaborations.

⁸ At the time of writing, CTVR was evolving and transitioning into a larger research centre called CONNECT. This immanent process of transition was one of the reason's why this thesis focuses mainly on the early inreach experiments.

As mentioned, the research centre underwent a major funding review that would determine the future of the centre in 2010. The continuation of the research centre depended upon a successful review. CTVR sought to consolidate its research profile in every direction, working hard to gain commitments from industry and academic partners to demonstrate the reach of the centres research. CTVR needed to communicate its vitality and viability as a centre for developing future network research and to highlight its value to Ireland as an international telecommunications research facility. This was a highly pressurised and, at times, stressful time for CTVR with everyone in the research centre pulling together to compile the most compelling and effective proposal possible. It was under these circumstances that the author began working with CTVR. This potted history belies the ad hoc, uncertain, exciting and turbulent quality of the initial conditions of research.

The first work package assigned to the author was creating information-graphics of CTVR's research activities for circulation amongst judges during the centre's review process. The author was also invited to make a presentation to the review panel on the value of Education and Outreach and to outline CTVR's approach in this regard⁹. After a successful review, the author was invited to remain with CTVR and to help contribute to the programme for communicating communications with CTVR's Director, L.D.. The programme for communicating communications was sketched out in the *Design for Change* (2010) proposal, and will be introduced further in Chapter 3. Suffice to say that it was this initial sketch that the author began to work with and adapt in correspondence with L.D.. It was in this way that a conversation in between artistic and engineering research began within CTVR.

This thesis aims to give an account of the improvisational and ad hoc research processes that developed out of these conversations. Both J.F. and L.D. were keen to learn from each other and to find ways to articulate their own research and share it with others. This relationship was a way of asking '*what is it we can give each other?*'¹⁰ Between J.F. and L.D. there was a desire to stretch occupational imaginaries and develop ethico-political relations in-between the epistemic worlds of art and engineering research. This field of relations later became provisionally named by the author as 'occupational difference'.

The main questions and concerns of this research, began with CTVR's question 'How do we communicate communications?' As the thesis will seek to show, this 'how'

⁹ See Appendices, pages 18 and 19 for images of the initial engagement with CTVR developing information-graphics (Figs. 3-6).

¹⁰ This question is influenced by the work of bell hooks.

became diffracted into 'what': *What does CTVR mean by communicating communications? What matters to CTVR's researchers in relation to communicating research? Is there a shared ambition within CTVR to communicate communications differently?* As these questions were being teased out and considered, a central problem came to the surface: *How can we learn to learn from each other and with each other without negatively exploiting each other for our occupational skills?*¹¹ Formulating and addressing constellations of questions, such as those outlined above, gave rise to the inreach experiments. They were shaped in dialogue and correspondence with CTVR in an effort to establish conditions for relation and communication in between the many research occupations within the research centre. For example, amongst the various kinds of engineering research at CTVR (optical, wireless, antenna, etc.), there were occupational differences at work that were largely overlooked or unthoughtfully taken-for-granted. Additionally, there were artistic researchers working in proximity with CTVR, mainly through L.D., but whose influence upon the research centre was not perceived or acknowledged.

Finding ways to raise and address questions of occupational difference with CTVR meant coming to terms with habits of communication under changing conditions. In the context of CTVR, a techno-scientific research centre, there was an everyday privileging of argumentative dialectic communication, based around assumptions that 'either/or' judgements were more valid than 'both/and' judgements. This was a challenging yet fruitful context for developing artistic research. Inreach sought to find ways to structure, enact and facilitate communication that might interrupt unthoughtful processes of communication and begin to convect dialogic processes in counterpoint with traditional modes of communication within CTVR.

The words 'dialectic' and 'dialogic' are meant and used in a particular way throughout this thesis. The intention of the author is to give a sense of the habits of communication that were at work within CTVR and to evoke the reorientation or hybridising of communicative possibility that was catalysed within the research centre when artistic research began constellating there.

In dialectic communication achieving a common understanding is the aim. Such communication is typical of the competitive 'authoritative discourse' of bureaucratic and industrial ways of thinking and valuing, resonating strongly with technical writing,

¹¹ This question became articulable through the author's engagement with a round-table group at the Centre for Transcultural Media Practices (CTMP) at the Dublin Institute of Technology (DIT). This group, led by visual artist Dr. Anthony Haughey and ethnographer Dr. Alan Grossman, offered valuable friendship, support and feedback to the author during her research.

marketing and policy. Dialogic communication, however, involves a process of exchange through which “*people may become more aware of their own views and expand their understanding of one another*” (Sennett 2013). As such, dialogic communication manifests and mediates its ethico-political dimension more readily than dialectic communication. It does not necessarily aim at achieving a common understanding yet it productively mediates relations and communication.

Inreach is a choreographic process which attempts to catalyse dialogic processes in such a way that can support and enrich dialectic communications, and vice versa. Inreach is not the enactment of a dichotomy, but rather an enactment of communications in between difference and sameness in the context of CTVR. The intention in this thesis is neither to produce or underscore a dichotomy. Using the words ‘dialogic’ and ‘dialectic’ were found to be useful in describing the nuances of a process of clearing ground and making space for communicating communications in the context of CTVR.

It is difficult to represent a choreographic process, least of all within the constraints of an academic dissertation, and not least again within the academic context of an engineering research department that does not recognise artistic research. Therefore, this research has embraced (not without great struggle and by way of an intense learning curve) the constraints and affordances of CTVR as a context for developing academic writing in between art and engineering research. For this reason, the possibility of effectively scoring the inreach experiments has been postponed for future work, as Chapter 8 will discuss.¹²

This research is led according to dialogic principles of call and response, of improvisation and experiment. The research process has been informed by myriad methodologies, theories, practitioners and researchers as this thesis will work to show. In particular, the context of engineering has informed this research so deeply that it has become difficult to know where the occupational thinking of art and engineering practices meet or part ways. As a result, it has been learned that an imperative of working under conditions of occupational difference is to find ways to protect and nurture difference; particularly while working to augment

¹² This somewhat defensive statement is made in response to one of the expectations of an engineering dissertation. The author was expected to produce a clear yet brief step-by-step account of inreach, such that anyone else could enact its processes, more or less. For various complex structural and psychological reasons, the expectation for clear scores, diagrams, tables or visuals representing the inreach process and experiments acted upon the writing process as a kind of violence. This statement is evidence of a sense of inferiority (at the time of writing) at work within the artistic research, one compounded by the double-bind of the research conditions.

communication and resonances in between epistemic occupations. Difference can enable communication.

1.4 Whom is this research for?

This research is for anyone who wishes to learn more about the challenge of collaboration and cooperation under conditions of occupational difference in research and learning contexts. Such conditions exist where various occupations uphold different traditions and commitments to ways making and sharing information, experience and knowledge come into relation with each other socially, psychically, politically, productively, creatively, etc. as part of a research and learning process.

As has been outlined, this thesis gives an account of the experimental development and formation of a choreographic process called inreach. Thus, the thesis will be of interest to researchers who are seeking alternative ways of accessing, narrativising and developing knowledges in between artistic and engineering research in particular, or in transdisciplinary contexts more generally.

This research speaks to concerns raised through the field of science and technology studies, particularly the cultural studies of science, and this includes the criticism of ethnographic writing. As Patricia Ticineto Clough has outlined, *“the criticism of ethnographic writing in anthropology also led to extended self-reflection on the production of authorized knowledge in the social sciences generally, and therefore to various experimental writings in which a self-conscious self-reflection on the part of the writer was performed in the text”* (Clough 2000). Rather than engaging a *“naïve production of autobiographical authority, as if writing what one knows about oneself can be so much fuller or more accurate or even more ethical than writing what one knows about others,”* the writings developed throughout this research, both through the thesis or the Field-Journals and Field-Notebooks, remain as traces of the attempt to, as Haraway proposes, develop *“critical direct action on semiotic-material objects”* within the specific context of CTVR (Ibid: 16). Thus, this research will broadly be of interest to those at work in the field of cultural studies of science and technology who are critical of *“the authority of western anthropology in the context of colonization”* through to the *“transformation of world cultures in the context of the globalization of teletechnology”* (Clough 2000: 15), and who wish to experiment with modes of translation, authority and narrative within this field.

This research will also be of value to artist researchers who work collaboratively, particularly with people whose experience and expertise appears to be of a different register or tradition to themselves. This research will speak to artists whose work seeks to constellate communications and relations in between material-semiotic

agencies of difference and sameness. Such research practices can be situated in between fields and discourses of community and knowledge production, from art history to anthropology, from sociology to natural sciences, from mathematics to poetry; from painting to medicine, from teaching to engineering, from architecture to cooking. Burgeoning fields such as Practice-as-Research (PaR) and practice-led research, and practitioners of non-representational research methodologies will recognise the process and insights of this thesis as a valid contribution, in that it struggles with the challenge “*to find a different way of writing*” (Ingold 2015).

This research buoys itself in relationship with diverse movements and moments of making situated knowledges, “*with roots in the fine and performing arts, solid foundations in human geography, and expansions across cultural studies, the humanities, and the social sciences*” (Vannini 2015) as well as feminist science and technology studies (Haraway 1988).

This thesis seeks to show how the practice and processes of inreach opened up pathways for communicating communications through generating a resonance in between art and engineering research. It does so by drawing upon knowledges, insights and practical approaches to situated and embodied research and learning from many fields, including anthropology, contemporary art, ecosophy, dance and education. Additionally, the approaches, techniques and ways of thinking particular to art and engineering research come to bear in many ways through the writing of this thesis. A theoretical and practical conversation is thus opened up relating the epistemic, material-semiotic and haptic worlds of dance, electrical and telecommunications engineering, anthropology, education and artistic research more broadly. There is much more to be sounded out here, much more dancing to be done, in-between the epistemic, psychic and material matter of these occupations in order to re-orient and re-write the problems and possibilities of communicating communications.

1.5 Map of the Thesis

There are no images or visual materials included in the body of the thesis. This was both a critical and aesthetic decision, as well as a minor strategy of academic survival in the context of CTVR. In the simplest terms, more and different work would be required to develop an appropriate relationship and narrative correspondence between the image and text. This will be discussed further in Chapter 8.¹³

¹³ The author wishes to acknowledge the terse anti-explanatory tone of this paragraph. As alluded to in a previous footnote, the author was struggling against an expectation/demand for diagrammatic explanation – to deliver her research thesis in the manner of engineering. The

The Appendices are thus kept separate from the body of the thesis, but include materials that should be kept to hand for reference as the thesis is read. This requires the reader to enact an active and critical position of correspondence between image and text. A simple visual essay is made for each chapter, with the images and materials laid out in order of appearance in each. The Appendices also include a glossary of terms that were developed through the choreographic process. The meanings of these terms are provisional and continue to develop beyond the thesis. The glossary attempts to make provisional and useful translations of terms that helped to orient the process of inreach as it developed. The appendices also include links to the Field-Journal (available only for examination purposes) and video essays, and includes excerpts from the Field-Notebooks that are not directly addressed within the main body of the thesis, but which may serve to illuminate aspects of it. The thesis is organised as follows:

Chapter 2 introduces the theoretical distillery with a brief preamble to explain how it came to be composed. The theoretical distillery enables the provenance of the choreographic process to re-emerge through critical reflection. The purpose of this chapter is to provide the reader with a working knowledge of the main theories and concepts of the distillery: The Hidden Curriculum, Transversality and a brief history and philosophy of the occupation of engineering, framed under the provisional concept of occupying politics (see glossary). This chapter works to make clear how these theories emerged through participant observation with CTVR, and develops a cursory narrative of the initial conditions of this research. This enables a deeper analysis of initial conditions of the research to be developed in Chapter 3.

In Chapter 3, two primary source documents, the *Green Booklet* (circa 2007) and the *Design for Change* proposal (2010) are read through the theoretical distillery. The purpose here is to recover a better sense of the initial conditions of research and to trace the provenance of the choreographic process. Through the theoretical distillery aspects of the choreographic process begin to re-emerge that had become compacted through the intensity of participant observation and artistic research with CTVR. Thus, a theoretical language begins to develop through writing that is complementary to the language of the research practice. In summary, Chapters 2 and 3 serve to distil the initial conditions of CTVR, and to critically reflect upon the

author was continually faced with the challenge developing a thesis within a context that did not officially recognise artistic research as valid. The tone here, and the swiftness with which the text moves on, reflects the author's need to not become 'stuck' by this negative identification, by the double-bind. Arguably, learning how to 'unstick' oneself when working within a double-bind is a necessary skill of transdisciplinary research.

provenance of the choreographic process of inreach. What these Chapters serve to show is that inreach is a mimetic and adaptive process of call and response in critical relation with its environment.

The subsequent three chapters serve to introduce the inreach experiments as they emerged in practice. These chapters focus upon telling the story of the experimental process by moving forwards through the phases of development. Again, the linear step-by-step structure typical of an engineering thesis serves at times to work against the reality of the research process. In other words, the thesis structure itself sometimes belies the quality of the research process. It is hoped that the reader will bear this in mind throughout.¹⁴

Chapter 4 contextualises how the name inreach emerged and gradually became developed as a conceptual heuristic for the author in relating with CTVR as an artistic researcher and for establishing conditions of relation in between engineering occupations by way of artistic research practices. This process is referred to as foiling and is shown to become a central conceptual tool of inreach. Chapter 4 goes on to provisionally introduce the two inreach experiments by recalling their scores and the experiments themselves.

Chapter 5 traces the choreographic process of the first inreach experiment and contextualises the influences and phases of its formation. *Room 3.17* structures a way of sharing knowledge and materials in between the various occupations at work within CTVR, from wireless to optical engineering, from PhD researchers (the author included) to administrators and managers. The experiment, and the relations it generated, emerged through the material-semiotic choreographic object of the antenna. This chapter presents both the choreographic process leading to the experiment and provides insight into the experience of the experiment, by providing a sample encounter within *Room 3.17* via an annotated transcript of an audio recording made during the experiment.

Chapter 6 is structured in the same way with a purpose to trace the choreographic process leading to the second inreach experiment, *Engineering Fictions*. This experiment aimed to structure and sustain dialogic communications within CTVR over time. It became a forum for speaking and writing, listening and reading, that brought a word-of-mouth network of people from within and beyond CTVR

¹⁴ This appeal is to readers, particularly from CTVR, who may be unfamiliar with developments in the field of cultural studies of science and technology around “self-conscious awareness of inscription devices, its own doing and practices of representation and methodology.” (Clough 2000: 15)

together to explore experimental writing, thinking, imagining and conversation within the context of techno scientific research. The chapter traces the four-fold phases of the choreographic process and presents two samples from the ten sessions of the *Engineering Fictions* experiment in 2013.

Chapters 4, 5, and 6 thus serve to give a detailed analysis of the choreographic process which draws upon the language of practice and also upon the language of the theoretical distillery. Up until this point the experiments have been discussed largely in relation to the choreographic process. In Chapter 7, a theoretical analysis is extended and developed.

Chapter 7 makes a reading of the experiments through the theoretical distillery. This analysis combines prehensions of practice with critical reflection. This chapter is less concerned with determining or fixing what the experiments were or what they mean and more concerned with learning how the problem and possibility of communicating communications manifested itself within CTVR through inreach processes. This Chapter helps to draw out hidden curricula within CTVR that can tell us something about the research organisations learning disposition and research philosophy in a nuanced yet robust and systematic way.

Following this analysis, Chapter 8 serves to develop the provisional findings of the experimental choreographic process of inreach. As the concluding chapter of the thesis this is not a site of generalisation or of predication. The aim of this chapter is to further open out critical observations made during the research process, and of the research process, developed under conditions of occupational difference within CTVR. There are myriad lines for future artistic research and scholarship emerging out of the inreach process. Three of these are developed briefly in Chapter 8 as propositions and speculations for near future work.

2 A theoretical distillery intuited through inreach

2.1 Preamble

After an intensive four year period of artistic research and participant observation it became necessary to look back to the beginnings of the research to recuperate a critical understanding of the initial conditions of the research context. This meant looking back at the context of CTVR, prior to the author's engagement with it. On the 23rd of February 2015 the last entry was written in the Field-Journal¹⁵, signalling a period of "*stillness on the way to movement*" (Manning 2009: 43). It was necessary at this time that the author dis-engage as much as possible from her experimental work with CTVR in order to compose the theoretical distillery. This distillery was based upon the prehensions and situated knowledges garnered through artistic research practice. Thus, the critical and reflective process involved in composing the theoretical distillery began at the end of a long period of participant observation.

At this time, Spring 2015, source materials, such as previous Education and Outreach initiatives and official publications produced by CTVR, were sought out and studied; forgotten or overlooked facts were recalled and reconsidered. A process of re-reading was underway. In particular, a public-information booklet from the early period of CTVR (circa 2007) and its *Design for Change* proposal (2010) acted as time capsules. They assisted in recalling the time and conditions of research that the author had entered into in the autumn of 2010. Through a careful study of these documents, in comparison with the materials, prehensions and experience developed through subsequent participant observation, it became possible to recognise and draw out a number of key theoretical concepts. These theories broadly related to education, communication and politics, reflecting the author's own education and experience, and were composed together to create a theoretical distillery adapted to both the context of CTVR and the research process. The theoretical distillery thus serves as an aid to partially retrieve the 'initial conditions' of the research context prior to the emergence of the inreach experiments.

The theoretical distillery should not be read as pre-determining of the choreographic process of inreach and the experiments described through this thesis. Because the distillery is a personification of the author's reflexive and reflective material-semiotic

¹⁵ The Field-Journal was a private online blog named as 'Private Pages I' and 'Private Pages II'. The blog had been set up transparently between the author and her supervisor/correspondent L.D. However, L.D. is not known to have ever read the blog, and thus the blog was a private journal of the author's experience, research and observations with CTVR.

agency, it must be understood as intuited through the research process and re-composed in this chapter. The theoretical distillery brings language to aspects of the research process and knowledge formation that were based upon prehension and intuition, but which did not have a language beyond the word *inreach*¹⁶.

The concept of distillation is used deliberately to evoke a sense of duration and process, movement and change, and also a kind of percolating non-linearity that characterised the research process¹⁷. The theoretical distillery is employed as an analytical tool principally in Chapter 3 and Chapter 7.

This artistic research was in many ways counter-normative to traditional research practices within CTVR. In this context, it was more typical for a (engineering) student to scour the literature, to present a state of the art on current practices, and to develop experiments based upon gaps and oversights perceived in the canon. To put it crudely, this research proceeded from the context 'up', not from the literature 'down'. It is more correct to say that it proceeded through a critical, thoughtful and listening engagement with CTVR, drawing upon theories and practices along the way that could help clarify problems and illuminate action.

Tim Ingold makes the case that "*It is of the essence of life that it does not begin here or end there, or connect a point of origin with a final destination, but rather that it keeps on going, finding a way through the myriad of things that form, persist and break up in its currents*" (Ingold 2011: 4). The same could be said of the movements of artistic research practices and in particular of how the choreographic process of *inreach* developed through this research. Perhaps the greatest challenge in this has been to learn to bring stillness to such movements from time to time, enough to permit reflection and share understanding. With this in mind, Chapter 2 introduces the theories and concepts that make up the theoretical distillery, indicating how these theories emerged through participant observation with CTVR, while Chapter 3 makes a reflexive account of the initial conditions of this research with CTVR by thinking through the theoretical distillery.

¹⁶ For example, the language and concept of *transversality* helps to articulate certain intuitions and prehensions that could previously only be described generally as *experimental communicative practices*.

¹⁷ The etymology of the verb *distil* means to "*trickle down in minute drops, as rain or tears*", while a *distillery* is "*the act or art of distilling*". Only by about 1759 was distillery recorded as a place for distilling. Arendt, H. (2000). *The Portable Hannah Arendt*. England, Penguin Books.

2.2 Introduction

The purpose of this Chapter is to introduce the key theories and concepts of the theoretical distillery: the educational theory of the Hidden Curriculum, the Guattarian concept of Transversality, and some theories on and histories of the micro-politics of engineering. These theories and concepts are shown to have been intuited through the artistic research practice and participant observation with CTVR and drawn out over a period of critical reflection towards the end of the research process¹⁸. The theoretical distillery is a personification of the author's process of learning to develop a material-semiotic agency with(in) CTVR. An understanding of the initial conditions of this research is developed by retrospectively composing a partial theoretical understanding of the research organisation CTVR.

Two primary documents are drawn upon frequently in this chapter and the next as part of a critical reflection on the initial conditions of this research. The first is small information booklet on CTVR's research produced circa 2007 for the purposes of informing academia and industry of its research agenda. The second document is the *Design for Change* proposal produced in 2010 by CTVR as part of a major funding review of the research centre. These will be discussed sporadically here and throughout Chapter 3. This re-reading is not to suggest that two primary source documents are being used to produce a fixed representation of CTVR. That is not what is being sought out here. Rather, these documents enabled the author to partially re-trace her initial encounter with CTVR, after a long process of ad hoc learning through artistic research and participant observation. This re-reading is a practice of enacting embodied criticality through memory and material-semiotic agents provided by CTVR's institutional memory and archive. This process of making sense of experience is called distillation, and echoes New Materialist practices of diffraction.¹⁹

¹⁸ In a sense, the composition of the theoretical distillery is a finding of this research process. This observation will be discussed further in Chapter 8.

¹⁹ Karen Barad has worked with Donna Haraway's re-writing of diffraction, and she cites Haraway in an interview with Dolphijn and van der Tuin: "*diffraction patterns record the history of interaction, interference, reinforcement, difference. Diffraction is about heterogeneous history, not about originals. Unlike reflections, diffractions do not displace the same elsewhere, in more or less distorted form, thereby giving rise to industries of [story-making about origins and truths]. Rather, diffraction can be a metaphor for another kind of critical consciousness.*" (Dolphijn and van der Tuin 2012: 51) The metaphor of distillation is a complex one, and it seems to reflect most of all the double-bind encountered (and exacerbated) by the author in completing this research. Unpacking this metaphor, particularly in companionship with diffraction, will be pursued in future work.

This chapter therefore provides a provisional distillation of CTVR, focusing mainly on introducing the key theories and concepts. For example, a hidden curriculum oriented towards learning with and from contemporary and historical art and design research practices becomes legible through a reflective reading of the *Design for Change* proposal. The focus in this chapter, however, is upon introducing the theoretical distillery.

In section 2.3 the concept of the Hidden Curriculum is teased out, firstly by way of Kathleen Lynch's analysis (2.3.1.) and secondly by way of Jane R. Martin's conception of 'learning states' (2.3.2.). In section 2.3.3 the concept of the Hidden Curriculum is traced within the context of CTVR, particularly in relation to its engagement with artistic and design research practices.

Throughout section 2.4 the work of Félix Guattari introduced and the concept of transversality is elaborated in relation to the context of CTVR and its hidden curriculum. In section 2.5 an occupying politics of engineering as co-efficient of technology is elaborated historically and in relation to the context of CTVR. A more thorough distillation of CTVR will be made in Chapter 3, building on the provisional reading developed through this chapter. This movement backwards and forwards again echoes the process of inreach, as a diffractive process of re-reading and re-writing through material-semiotic agencies. The writing in this thesis is somewhat tidal in this regard.

The following sections will introduce each theory, contextualising it in relation to CTVR where possible. Once again, it is important to clarify that these theories emerged after a process of participant observation with CTVR. These are theories reflect the embodied criticality of the author's material-semiotic agency within CTVR.

2.3 *The Hidden Curriculum*

To think with the etymology of the word *curriculum* is to think in terms of currents and channels: being born upon them, navigating them, countering them, directing them, damming them. To think of the Hidden Curriculum is to think in terms of the non-disclosing curricula of relational life amongst a community or organisation of people, contextualised by some society in time. The concept of the hidden curriculum as "*the relational life of the school*" (Lynch 1989) offers a way of thinking through the invitation to develop artistic research practice with and alongside CTVR. The purpose of this section is mainly to introduce the theory and concept of the hidden curriculum. An effort is also made to show how it was intuited through the research context and subsequently articulated after a period of critical reflection.

Theories of the Hidden Curriculum are typically focused upon the role schools and educational institutions play in reproducing inequality²⁰. Education and social justice theorist Kathleen Lynch develops an understanding of schooling which takes into account its universalistic and particularistic aspects. So, for example, her research illustrates “*the universality of competitive individualism and hierarchical control*” within schooling, while taking into account the possibilities for “*counter-resistance*” through “*certain particularistic aspects of schooling, using evidence on extracurricular activities to illustrate the case*” (Lynch 1989). However, the relevance and presence of the hidden curriculum extends beyond the school. As Jane R. Martin has acknowledged, the hidden curriculum can be generalised as “*...always and everywhere tied to learning,*” stressing that it is the *learning* that happens through particular settings and systems that constitutes the hidden curriculum (Martin 1976:136).

2.3.1 Thinking The Hidden Curriculum through Kathleen Lynch (1989)

Kathleen Lynch makes an extensive survey of the literature in relation to the Hidden Curriculum, and it is this work which is mainly drawn upon in this section. By Lynch’s account, the Hidden Curriculum has been understood broadly from two points of view: *Functionalist perspectives* and *Marxist or neo-Marxist perspectives* (Lynch 1989, Margolis 2001).

The *functionalist perspective* posits a consensual relation between society and the educational setting (i.e. schools), such that “*The social life into which people are initiated via school is assumed to be a consensual, socially undifferentiated whole where achievement, independence, universalism and specificity are the required norms of conduct*” (Lynch 1989: 1). From this perspective social class, gender, racial or religious interests are flattened out under assumptions of universality²¹. Lynch cites Phillip Jackson who

²⁰ Such theories develop an understanding of the role formal education plays in maintaining and perpetuating middle-class privilege, and recognise education as “*a live political issue for all classes*” De Keersmaeker, A. and B. Cvejic (2012). *A Choreographer's Score: Fase, Rosas danst Rosas, Elena's Aria, Bartok*. Brussels, Mercatorfonds/Rosas.

Lynch’s research on the operation of The Hidden Curriculum is pertinent to this research because it is focused upon the Irish system of schooling, and takes into account the broader social, historical and political context of education in Ireland. However, in this research the hidden curriculum is developed as a conceptual tool that can help to distil the participant observation developed through the inreach experiments.

²¹ The functionalist perspective broadly reflects the author’s own experience within the Irish Education system, and arguably remains the dominant educational paradigm today. The consensual nature of this perspective affords a non-critical learning disposition. Within the author’s experience of post-primary formal education, the hidden curriculum of consensual functionality and instrumentality was countered by a particularistic hidden curriculum which valued and privileged learning through and engagement with the arts. It was by way of a particularistic schooling that the author learned to learn through dance, for example. Neglecting to acknowledge the myriad ways of knowing and learning, however, means the relegation of the arts to particularistic schooling will continue. Art increasingly becomes the

coined the term *hidden curriculum* and articulates this perspective in his 1968 work *Life in Classrooms*. In this text, the hidden curriculum is understood as an aspect of schooling that students must come to terms with if they are to pass through the institution in a satisfactory manner. Firstly, they must cope with the crowded nature of the school-room, “*with delays, denial of their desires and social distractions*” (Ibid). Secondly, they must negotiate the contradictory demands of allegiance to both teachers and peers. And thirdly, they must reconcile to the unequal power relations that grant the teacher authority to command the pupils attention (Lynch 1989). From this perspective through the school, both the curriculum proper and the hidden curriculum are in the service of and subject to the imperatives of society. There is a sense that both student and teacher have limited agency and can perform only in relation to the parameters of their prescribed role within the social situation.

The *neo-Marxist perspective* troubles arrangements of functionalist and consensus education. From this perspective the school maintains “*the existing social relations of capitalist society by reproducing the consciousness necessary for such relations*”²². The conflict theory approach implicitly tackles addressing the hidden curriculum, though rarely uses the term (Lynch 1989). A neo-Marxist perspective seeks to critically expose the interdependent relationship of the inner social life of schools with broader social, political and economic context. In their book, *Schooling in Capitalist America* (1976), economists Samuel Bowles and Herbert Gintis argued that there was a strong symbiotic relationship between “*the norms of schooling and the maintenance of the capitalist system*”. As Eric Margolis et al. summarise “*They argued that through formal and hidden curricula schools reproduce the social relations necessary to maintain capitalism: competition and evaluation, hierarchical divisions of labour, bureaucratic authority, compliance, and the fragmented and alienated nature of work. They argued that the reproduction of these skills and attitudes through the educational system corresponds to and prepares students for future stratified work roles. Embedded in the form, content, organisation of the classroom, and the evaluation of students is a message system that conditions students to adopt the traits of punctuality, docility, cleanliness, and conformity.*” (Margolis 2001: 7)

hidden curriculum of a society that privileges economic productivity over cultural reproductivity. This resonates with theories of Immaterial Labour and the living labour of art making and reproduction.

²² This analysis is taken from Kathleen Lynch’s seminal work. Citing Bowles and Gintis, Lynch outlines the capitalist social relations that are reproduced through schools: “*the hierarchical division of labour between teachers and pupils; the alienated character of pupils’ school work itself; and the ‘fragmentation in work.. reflected in the institutionalized and often destructive competition among students through continual and ostensibly meritocratic ranking and evaluation’* (Lynch 1989:3).

Focusing on formal state schooling in Ireland, Kathleen Lynch's work develops a more complex overview and understanding of the hidden curriculum, describing it as at once *universalistic* and *particularistic*: *"Social inequalities are reproduced through schools because schools are universalistic in their provision relations, and particularistic in their consumption relations."* (Lynch 1989: 29) Lynch draws attention to the fact that neo-Marxist theories tend to underestimate the significance of schools universalizing features in the reproduction of inequality. The universalistic aspects of education include *"the realm of the formal curriculum where knowledge is selected, organized, evaluated and distributed in a particular way"* (Ibid.). This is considered a standardized and identical productive system, which in turn operates a *"a system of maintenance and procedural activities... which create the conditions of learning"* (Lynch 1989: 29) This universalistic system produces hierarchical relations: *"Batch processing, banking and hierarchical relations are all... universalistic features of the school's maintenance subsystem"* which lead to other universalistic practices: *"the routinization of everyday life, the fragmented mode of presenting knowledge, and a future-oriented reward system"* (Ibid.). While Lynch's research describes the secondary-level education system in Ireland, the universalistic character of the system extends into third and fourth level domains of academic-industrial education and research in Ireland.

Particularistic practices, then, are those developed by mediators; people working within the universalistic system. Lynch points out that *"the simple mechanistic relationships, which both functionalists...and neo-Marxists... claim exists between schools and the economic system do not obtain: school administrators, teachers, and pupils mediate the application of state educational policies to themselves. Consequently, schools cannot be regarded as solely and successfully imposing a middle-class patriarchal system of education on all...; neither can they be regarded as being devoid of class and gender interests in their hidden curriculum as the functionalists suppose"* (Lynch 1989: 30). What Lynch proposes is that systems of education be classified on a universalistic-particularistic continuum, *"some aspects of it being classified as highly particularistic, while others as principally universalistic"*. This concept supports the recognition that *mediators* within any system of education have agency and can act with self-interest under competitive conditions: *"Gaining control in the credential market is no different... to gaining control in other markets in a capitalist world"* (Lynch 1989). Thus, *mediators* within systems of educational service provision *"play a key role in determining the particularistic-universalistic balance in a given area"* (Ibid.). In many ways, such mediators act as gate-

keepers of the levels of social justice reproduced [or not] through the hidden curriculum²³.

2.3.2 *The Hidden Curriculum as learning disposition*

For Jane R. Martin hidden curricula are constituted by learning-states, which “...can be states which we think of as character traits – for example, docility or conformity. They can also be cognitive states such as believing or knowing, states of readiness or of skill, emotional states, attitudinal states, or some combination of those and other sorts of states” (Martin 1976: 138). In this research Martin’s learning-states are imagined as dispositions or orientations, so as not to exacerbate an impression of learning as fixed or unable to change, which Martin does not intend. Feminist theorist bell hooks critical reflections on her own life story offer an example of the effect of a hidden curriculum when she discusses her own learning disposition of ‘seriousness’ and lack of ‘humour’ in relation to her work and experience of formal education. For hooks, the particularistic-universalistic tension between home and school was a difficult negotiation. The curriculum of her home life was one of ‘*patriarchal-tyrannical caring*’ which produced in her a ‘*split mind*’, making it hard for her “*to let go and experience pleasure at home or school*”. As hooks explains: “*More than anyone realises, the students seen as nerds or geeks, students who are often gifted at book learning, carry the residue of pain and trauma. Many of us are simply emotionally numb, shut down, disassociated.*” (hooks 2010:70) hooks came to see her own disassociatedness and seriousness as an unconscious defence against the gendered/sexist curriculum of academia and home-life within which she strove for equal success. hooks seriousness was a kind of hyper-reaction which she gradually learned to recognise and redress through a relational process of teaching and learning with her students²⁴.

The learning-state or disposition of seriousness was a hidden curriculum for bell hooks personal and academic life, interdependent of each other, until it became undone in the crucible of the classroom and the heat of dialogic encountering. Ana Parvulescu contextualises this disposition historically; “*Seriousness, in its official tone and respectable dress, has intimidated, demanded, prohibited, oppressed. It has established*

²³ Lynch’s ‘mediators’ resonate with the managers who ‘adjust the blinkers’ within an organisation or group. See section 2.4.3 and 2.4.4 in this Chapter.

²⁴ With this in mind, the concept of unlearning developed by Gayatri Chakravorty Spivak is valuable in coming to terms with Martin’s concept of ‘learning-states’. Unlearning is a self-directed process of “working critically back through one’s history, prejudices, and learned, but now seemingly instinctual, responses” such that enables the apprehensions of personal bias, and supports communication with others “in such a way that they might take us seriously and, most important of all, be able to answer back” (Spivak 1996). Unlearning could be a way to address calcifying particularistic-universalistic tendencies of the hidden curriculum that perpetrate some injustice in the life of a person. *Unlearning* is a process of learning to move and listen in movement to calcifying tendencies – learning to dance with them.

values and rules of appropriate behaviour” (Parvulescu 2010). The hidden curriculum of hooks academic and home life effected a learning disposition “*to be docile and obedient, to value competition over cooperation, to stifle...[her] creative impulses*” (Martin 1976: 136). But as Martin points out, the hidden curriculum is not the same for everyone, therefore there is no definitive hidden curriculum: “*A hidden curriculum, like a curriculum proper, is of some setting, at some time, and for some learner.*” (Ibid: 138) Moreover, the ‘hiddenness’ of a hidden curriculum is a relation: “*Being hidden, like being North of, is a relation: just as Boston is north of Miami but not North of Montreal, so something can be hidden from one person or group but not from another*” (Martin 1976: 141).

Jane R. Martin proposes that “*it is always possible that we will want to embrace rather than abolish the hidden curriculum we find,*” either by (a) openly acknowledging the learning dispositions undercurrent in the setting, and thereby diverting them from hidden to curriculum proper, or (b) continuing to intend a range of learning dispositions, but not openly, in which case they remain part of the hidden curriculum (Martin 1976: 145)²⁵. The hidden curriculum, from the perspective of the literature at least, typically registers as an undercurrent valuing of “*learning states of neatness and competitiveness, docility and obedience to authority*” (Ibid.) While this may be generally the case for primary, secondary and even third-level education, in the case of highly specialized fourth-level research that is the context of this research, an inversion appears to take place²⁶. The curriculum proper of fourth level research involves pragmatic interpellation between priorities of academic and industrial research.

The curriculum proper of CTVR, informed by an academic-industrial agenda, has been oriented by principles of competition, predictability, certainty, innovation, and efficiency, etc. In education, these are all words typically associated with the hidden curriculum because of the learning dispositions they reproduce: *obedience, indifference, competitiveness, etc*²⁷. The hidden curriculum for CTVR relates to the learning dispositions fostered through art and new-media practices: *spontaneity, humour, risk, criticality, imagination, etc*. This was a hidden curriculum intended for CTVR by its Director, L.D., and written into the *Design for Change* research program.

²⁵ This idea can be read with Chapter 4.2.2. In this chapter CTVR’s hidden curriculum is shown to have been embraced by CTVR’s management, openly acknowledged through screenings of the Eames’s films and talks in relation to its aspiration of communicating communications. The implications of this are discussed further in Chapter 8.

²⁶ Industry and Education have become coefficient of each other. Under such open conditions it becomes more necessary to foster situated self-knowledges and non-prescriptive communication, in order to attenuate the destructive effects of competitive dialectic.

²⁷ The *curriculum proper* of CTVR is retrieved in Chapter 3.2 through informational material produced during the first phase of CTVR.

However, because it was not “*openly acknowledged*” by the learners in the setting - that is to say, the broad majority of CTVR’s researchers were not aware of the learning dispositions intended for them - the hidden curriculum remained *hidden-in-plain-sight* (Martin 1976)²⁸. In the following sub-section, the alliance of CTVR with artistic research practices to this effect will be contextualised briefly. This will show how the theory of the hidden curriculum was developed by the author’s prehension of the material-semiotic agency of ‘smuggling’ at work in the actions of CTVR’s Director.

2.3.3 Sensing a hidden curriculum: ‘Smuggling’ as embodied criticality

Smuggling means the “*unlawful dealing against law or proclamation*” (Barnhart 2008)²⁹. It is an action most often rendered visible or perceptible by the movements of contraband. A ‘curriculum proper’ acts as the ‘law’ against which contraband moves. Such contraband (smuggled goods) catalyse a hidden curriculum, the ink in the system so-to-speak. In this section, the movement of artistic research practices within and through CTVR is theorised as a kind of contraband, circulating along the currents of a hidden curriculum.

In recent times, ‘Smuggling’ has been collaboratively theorised through art education, theory and practice as a general action of criticality and resistance (Rogoff 2013 [2006]). Taken as a literal-metaphor for contemporary curatorial and artistic action and theory the use of the term ‘smuggling’ “*reflects the search for a practice that goes beyond copulative conjunctions such as those that bring together ‘art and politics’, ‘theory and practice,’ or ‘analysis and action’*” and which instead aspires to “*experience relations between the two as a form of embodiment, which cannot be separated into their independent components*” (Rogoff 2013 [2006]: 186). Rogoff calls this revised

²⁸ CTVR’s Hidden Curriculum will sometimes be referred to as its *Hidden-in-plain-sight curriculum*. Jane R. Martin acknowledges that in order to address the learning dispositions fostered through the hidden curriculum both the source and the hidden curriculum must be ‘found’. However, “*finding is one thing and telling is another,*” as Martin says. In order for a decision to be made with respect to the hidden curriculum of a setting, they must be acknowledged, and ‘the learners’ must become aware of them. To this end, *self-knowledge is prerequisite for change*.

²⁹ Artistic, Design, and New-Media research practices have been passed through PhD examination via CTVR since its inception, but always in an ‘under-the-radar’ manner. This reflects a challenge of inter- and trans-disciplinary research within the academy and a reticence around examining inter-disciplinary or multi-disciplinary research officially within the domain of engineering. This has to do with strained educational and human resources (time, space, comprehension, etc.) and inflexible funding systems. There is a sense in which it is more efficient to remain somewhat outside of the formal system in order to develop experimental research in this regard. While this provides substantial freedoms to researchers, the status of being ‘under-the-radar’ can be disconcerting and isolating, and over time can undermine the identity and agency of the researcher. As a result, the research can assume a kind of ventriloquised identity, becoming instead a part of an ambiguous hidden curriculum, with a clandestine agency that elides the ‘love labour’ involved (Lynch 1989), particularly in relation to socially engaged artistic research practices.

orientation “*embodied criticality*”. This approach operates by asking “*how to produce criticality through inhabiting a problem rather than analysing it?*” *Embodied Criticality* is a mode of inquiry that acknowledges how meaning develops by way of “*intricate webs of connectedness*” spun out through social relations. This approach demonstrates a “*reflective shift*” within art discourse from “*an analytical to a performative function of observation and participation*”. In this regard, it resonates with the anthropological practice of *participant observation* and the feminist practice of *situated knowledges* (Haraway 1988, Ingold 2014). Curator and academic Irit Rogoff tracks this change as follows: “*...we have moved from criticism, a form of finding fault and exercising judgement according to a consensus of values, to critique, which examines the underlying assumptions that might allow something to appear as a convincing logic, to criticality, which operates from an uncertain ground of actual embeddedness*” (Rogoff 2013 [2006]:187).

In the Autumn/Winter period of 2010, the author was serendipitously invited to engage with the education and outreach strand of CTVR’s research agenda, through a sub-strand named *Communicating Communications*³⁰. The parameters of the research remained open-ended, with few constraints imposed, bar an endogenous ethical one inherent to the nature of the artistic research practice: to correspond by way of embodied criticality to the call of an other³¹. This situation reflects Rogoff’s meaning of “*contraband*” as a “*form of surreptitious transfer...from one realm into another*” that “*does not have visible and available protocols to follow*” (Rogoff 2013 [2006]:191). The gesture of invitation and welcome by CTVR towards the occupations of art and new-media can be understood as “*a highly performative instance... that perform[s] certain aspirations and inaugurate[s] the subjects behind them into worlds they would like to inhabit*” (Ibid). Considered through the material-semiotic agency of ‘smuggling’ such a gesture on the part of CTVR could be understood as a mode of *occupational* curation, inviting the occupational possibilities of art to bear within and through an academic-industrial context of engineering research (O’Neill and Wilson 2010)³². The ‘smuggling’ of artistic research practices into the research

³⁰ This invitation was not unprecedented. Other artists and new-media practitioners had engaged with the research centre before through PhD research, with a handful undertaking research degrees concurrently with this research. L.D. acted as supervisor to the following artist-researchers during the course of this research: Rachel O’Dwyer (artist, new-media theorist); Nuala Flood (architect, design theorist); Neil O’Dwyer (artist, new-media practitioner), Sven Anderson (sonic artist, cultural geographer), and Ralph Borland (artist, activist, design theorist), amongst others.

³¹ Details of the early phase of this research are given in Chapter 4, in the description of the design process for the first inreach experiment, *Room 3.17*.

³² In recent years, curating has been understood, in relation to Education, to emphasise “*the framing and mediation of art and the circulation of ideas around art, rather than on its production and display...Curating, in this sense, is ‘processual’ rather than ‘procedural’ or instrumental. Rather than deploying a means-ends rationality, the processual mode entails both means and ends, however they may emerge in the flow of activity. The processual mode is not linear, nor are its ends foreclosed;*

centre brought the author into circulation with and alongside CTVR's hidden curriculum, rendering it sensible.

In the case of CTVR, the hidden curriculum was a prehension of the education and outreach strand of the centre's research agenda for 2010-2016, as outlined in its *Design for Change* proposal (Doyle 2010)³³. In relation to particularistic practices within educational organisations, Kathleen Lynch argues that "*Because of the career structure of their own occupation, the only variable rewards open to teachers are the psychic ones*" (Lynch 1989: 39). This observation resonates with the fact that the nascent Communicating Communications strand of CTVR's Education and Outreach programme was written into the *Design for Change* proposal by L.D., one of the principal mediators of both universalistic and particularistic practices within the research organisation.

The intention for the proposed communicating communications research strand was to develop an imaginative and experimental engagement with art, new-media, and design under the auspices of education and outreach³⁴. This was CTVR's hidden curriculum. While the source of this intention was L.D., the hidden curriculum trickling through the *Design for Change* proposal was intended for CTVR's researchers as well as engineering research and education more generally. Jane R. Martin proposes that "*When we find a hidden curriculum, we can show it to those destined to be its recipients. Consciousness raising, if you will... But whatever form it takes, it will consist in transforming the learning states of the hidden curriculum of a setting into the subject matter of a person's curriculum proper*" (Martin 1976: 149).

As the following Chapters will show, the aspirations inscribed through the communicating communications strand in the *Design for Change* proposal became a heuristic for the development of inreach experiments within CTVR. This kind of education and outreach activity had not happened before within CTVR. Thus, the main tools for developing a process for communicating communications were listening and dialogue.

there is no imperative to achieve an exhaustive disclosure of final meaning, value or purpose. It is in this sense that a processual activity may be radically undermined by a bureaucratic instrumentalism or a narrow accountancy of 'quality'" (O'Neil and Wilson: 19).

³³ See Appendices, Chapter 2, page 20/21 (Figs. 7 and 8)

³⁴ This was an intention vocalised in conversation with L.D. many times. In the *Design for Change* proposal, however, the *Communicating Communications* strand is stated as a matter of fact, rather than an aspiration that will have to be struggled for. This is because the *Design for Change* proposal is a rhetorical device to secure funding for the next phase of CTVR. All aspirations are stated as if they are already factual.

A tacit commitment was made in this approach to attend to the particularistic agency and habits of CTVR's gate-keepers – and this meant attending to the learning dispositions of CTVR's workers, including those of the author herself. CTVR's aspiration towards communicating communications, when thought through theories of the hidden curriculum and the embodied criticality of smuggling, can be seen to have been catalysed by the act of inviting an artist researcher work and learn with and alongside telecommunications engineering researchers. This invitation might be understood to have been extended as *a phenomenon of advice* whereby “Both the person asking for advice and the person giving it assume that they are bound together in friendship” (Gadamer 2013:584). This action becomes legible in the following section as indicative of a *dimension of transversality*, a concept developed by Felix Guattari as an aid to inhabiting the problem of communication within organisations and groups.

2.4 Transversality, and its coefficients...

2.4.1 Context

There was a peculiar hidden curriculum at work within CTVR. It was boldly sketched out through the education and outreach strand of the *Design for Change* proposal, produced by CTVR in 2010³⁵. The author's engagement with the communicating communications strand of the *Design for Change* proposal began in earnest from November 2010³⁶. During this period of working closely with L.D. it became apparent that while there was a strong desire to communicate communications the question of what this might entail and of how it might be done remained more or less open³⁷.

The work of Charles and Ray Eames was leveraged by CTVR as a example of excellent practice in communicating ideas of technology and society by way of a

³⁵ This proposal was a collective one, co-authored by many people within CTVR, though principally authored and edited by L.D. Nonetheless, there was a collective responsibility for the details of the proposal and the workpackages it outlined. The final proposal was more or less produced by consensus.

³⁶ The *Design for Change* proposal aimed to secure funding for a second phase of CTVR (CTVR 2). The proposal was successful, and the research organisation was funded by Science Foundation Ireland until 2016. By a turn of serendipitous events, the author was invited to work with CTVR in order to catalyse the *Communicating Communications* strand of the *Design for Change* proposal. Beginning with a series of short-term contracts with CTVR, in the summer of 2011 the opportunity to undertake PhD research was extended by CTVR and taken up by the author. The research was to build upon the work initiated through the earlier engagements with the Communicating Communications strand of Education and Outreach. The turn of the research towards *inreach* experiments will be discussed in Chapter 4.

³⁷ The phrase communicating communications is suggestive of a *poetry of naming*. This is a practice which has been emulated, learned and developed throughout this research, by way of an intimate participant observation with the people and texts of CTVR. This subtle and powerful use of language has been defined as a *poetry of naming* in the sense that Audre Lorde ascribes to poetry: “the way we give name to the nameless so it can be thought”(Lorde 1993).

multi-media approach. The Eameses acted as a touchstone through which the author and L.D. could imagine and share ways of approaching the problem and possibilities of communicating communications. The Eameses offered J.F. and L.D. a common ground for deliberation and conversation.

The intention to host public screenings of the film *A Communications Primer* (1953) was inscribed in the research proposal *Design for Change*, and this operated as a sketch-map for generating a discourse around information theory and communication practices (Shannon 1949, Demetrios 2001)³⁸. There was a further implication in the *Design for Change* proposal: to be able to communicate research like the Eameses – with the Eameses film work in particular acting as a model³⁹. The idea of the Eameses' practice as a model was spoken and written about somewhat casually but not explicitly outlined as such. For example, *Communicating Communications* proposes to “create a series of what we are terming ‘YouTube Vignettes’ that focus on different topics in communications. The YouTube Vignettes will be created through collaborations between artists and various CTVR researchers” (Doyle 2010: 40). Tellingly, the resources and time required for such a collaboration are not mentioned or considered in the proposal, reinforcing the impression that a claim was being made by CTVR that such work was within their research and practical capabilities.

The Eames film *A Communications Primer* was screened twice as part of CTVR's Education and Outreach programme, firstly at the Science Gallery in Dublin, and secondly at the Glucksman Gallery in Cork. On both occasions strong interest was shown and audience capacity was met. These screenings, however, glossed a more fundamental problem of communication within the research organisation itself, particularly in relation to a consciousness of the relevance and value of artistic research practices to engineering research practices, and vice versa.

In an effort to come to terms with this deeper problem, the author undertook a hermeneutic and poetic study of the Eameses' filmmaking through the film *Blacktop*⁴⁰. The author came to understand, as will be shown in Chapter 5.2.2.2, that the Eameses' creative approach seemed to evolve out of a mode of material-semiotic agency in between *techne* (craft/art/skill) and *episteme* (theoretical knowledge),

³⁸ See Appendices: Chapter 2, page 22, Figs. 9 & 10.

³⁹ This will be discussed in more detail in Chapter 6.

⁴⁰ This will be discussed in detail in Chapter 5 in relation to the choreographic process of the *Room 3.17* experiment.

called phronesis. This approach appeared to be overlooked by CTVR's understanding of both artistic and engineering research.

The Eameses often spoke about the idea of design as that which is appropriate or suitable under the circumstances and constraints of a problem. While design for the Eameses was always situated, depending upon particular and concrete problems, wants or needs, it worked in productive relation with more universal principles or ideas that became manifest through the constraints of any given problem⁴¹.

The author's imaginative and critical reading of the Eameses' film *Blacktop* (1952) as a model of their creative design process suggested their skill with phronesis. By re-reading the history of *Blacktop* and studying the film itself, the author came to understand that the Eameses' approach to design depended upon phronesis as a mode of embodied criticality, an attunement towards making and mediating situated knowledges and thereby developing appropriate designs. Phronesis has been theorised as a particular quality of action and agency by philosophers from Aristotle to Gadamer⁴².

For Aristotle, phronesis is less about applying the rules than seeing a situation correctly, and where 'seeing' is not exclusively related to the 'ocular' organs but also to the material reality of an embodied mind and intellect in action⁴³. In this regard, the Eameses' design process involved a dynamic relationship with knowledge and material formation that operated in between *techné*, *epistémē* and phronesis. While the Eameses' craft and knowledge of design seemed to be quite clear to CTVR already, the author chose to pursue the lesser known concept of phronesis as a way of drawing out possibilities for communicating communications, inspired by the Eameses. Hence, the task of communicating communications tuned out of the channel issuing the expectation that artefacts should be produced, e.g.: the YouTube Vignettes, and tuned in to the quieter channel, the hidden curriculum of CTVR, that opened up a possibility of catalysing and choreographing hybrid communications

⁴¹ The Eames design was always a kind of educational design. Their designs held in tension the universal and the particular, and recognised constraints as the means by which any problem might be addressed. It would be worth elaborating a story of the connection between Kathleen Lynch's diagnosis of a universalistic-particularistic continuum and the treatment of the universal and the particular in the work of the Eameses. While this is an 'opening' onto further research, it is beyond the scope of this thesis to explore at this point.

⁴² This in turn has been translated as 'practical wisdom', 'practical knowledge' or 'moral knowledge' and 'moral consciousness', where 'moral' means knowing how to act within a concrete situation.

⁴³ There is an interesting relationship to be made between the concept of phronesis and the concept of diffraction as a means of producing feminist objectivity as developed through New Materialist discourse. This is a path for future work.

through the concrete situation of artistic and engineering researchers in material-semiotic agentic relation with each other⁴⁴.

This involved reflecting more deeply upon the request for advice and help extended by CTVR. Thinking in this way, away from the *Design for Change* proposal, led to renewed observation and the insight that L.D.'s research and management practice demonstrated not only a quality of *phronesis*, but a dimension of transversality. This led to a further insight that artistic research practices seemed to be intuited by L.D. as co-efficient of transversality. While the development of these insights will be elaborated in Chapter 3, the following sub-sections seek to offer a situated understanding of Félix Guattari's concept of transversality⁴⁵.

2.4.2 Félix Guattari

The following account of events and actions in the life of Félix Guattari (b. 1930 d. 1992) is adapted from the Bloomsbury edition of *The Three Ecologies*, translated by Ian Pindar and Paul Sutton (2014). Félix Guattari was a philosopher, social theorist, and a radical political activist. He studied pharmacy and philosophy during the 1940's, and worked with the *Parti Communiste Français (PCF)*. In 1953, Guattari established an experimental psychiatric clinic at the Chateau de la Borde, south of Paris, with Dr. Jean Oury, a Lacanian psychoanalyst. The aim of this clinic was "to abolish doctor-patient stereotypes in favour of an interactive group dynamic". According to Guattari, La Borde was organised as a *privileged site for social and mental ecology*: "Everything there is set up so that psychotic patients live in a climate of activity and assume responsibility, not only with the goal of developing an *ambiance of communication*, but also in order to create local centres for collective subjectification'. Guattari is most well-known, perhaps, for his work with philosopher Gilles Deleuze. In their writing together,

⁴⁴ The implication/claim of the *Communicating Communications* proposal was that multi-media texts would be produced collaboratively between artists and engineers within CTVR. The proposal was clear about the ends but not about the range of means required to produce such material. The implication was that, as collaborative work, this would be developed in-house. While CTVR has worked with animators before, it had been in an off-site capacity and followed a typical client-producer relationship. The *Communicating Communications* proposal was striving for something different. The author was invited to engage with this proposal, but she herself was the principle resource. There was no precedence for such inter-occupational collaborations. This was unfamiliar and uncharted space. By analysing the Eameses film *Blacktop*, the author began to distinguish a way that she could engage collaboratively with the *Communicating Communications* strand by focusing on the relational action of *phronesis*, and experimentally exploring this with CTVR's researchers. This was a quality which would be useful for her to understand and develop in her own practice, and it was felt to resonate strongly with CTVR's design ethos.

⁴⁵ Félix Guattari's work is both wide-ranging and intricate. No attempt is made to summarise his oeuvre in this thesis. In accordance with the artistic research practice, Guattari's work is brought into play as a heuristic for action, a way of thinking through the complexity of situated knowledges. The focus in this thesis, therefore, is *specifically* upon the concept of transversality in Guattari's thought and practice.

Deleuze noted “*what was important for us was less our working together than this strange fact of working between the two of us. We stopped being ‘author’*” (Deleuze and Guattari 2003 (1987)).

Guattari was passionate about free-speech, and can be considered a parrhesiastes⁴⁶ in this regard (Foucault 2001). In 1973 he was tried and fined 600 franc for publishing an issue of *Recherches* (no. 12) entitled: “*Three Billion Perverts: The Great Encyclopaedia of Homosexuality’s*”. All copies of the publication were ordered to be destroyed, as an “outrage to public decency”, to which Guattari responded: “*Is it really dangerous to let people speak of things as they feel them, and with their language, their passion, their excesses?*” In 1975 he became president of the *Collectif de Soutien aux Radios Libres*, which he ran from his apartment, and he worked with *Radio Alice* in Bologna, a ‘popular free radio’ campaign that aimed to show “*the immense field of new possibilities that is opened up*” through radio communications (Guattari 2014: xii - xiv).

Later in his career, Guattari developed an ethico-political theory he called ecosophy, which sought to set up a dynamic between “*the three ecological registers... the environment, social relations and human subjectivity*”. This work evolved from Guattari’s concept of transversality. The stakes underpinning his life’s-work, therefore, remain largely consistent: “*Wherever we turn, there is the same nagging paradox; on the one hand, the continuous development of new techno-scientific means to potentially resolve the dominant ecological issues and reinstate socially useful activities on the surface of the planet, and, on the other hand, the inability of organized social forces and constituted subjective formations to take hold of these resources in order to make them work*” (Guattari 2014: 20).

Guattari’s practical work studied processes of “*resingularization*,” the methods by which distance could be instated between the “*normalized subjectivity*” produced through mass-media and procedures of capitalism. What Guattari hoped and worked for was to catalyse the collective production of ‘dissident subjectivities’ and encouraging “*Work on oneself, in as much as one is a collective singularity; construct and in a permanent way re-construct this collectivity in a multivalent liberation project*” (Guattari

⁴⁶ For the ancient Greeks, the question of parrhesia was focused upon recognising whether a particular person was a ‘truth-teller’ or not. In modern times, this question became focused upon whether a ‘truth-teller’ could be certain that what she believes in is, in fact, the truth. A parrhesiastes is a person who speaks truth in a situation where she stands to risk something. The idea of truth is troubled in participant observation with CTVR – in Chapter 6.2.3 truth and falsehood are claimed as mathematical concepts from within the occupation of engineering. Notions of truth are complicated under conditions of occupational difference however. A violence can be levelled when such differences are not prehensible, recognised or acknowledged.

2014: 20 - 21). This proposal to 'work on oneself' means to reclaim respect for one's own "*times – time for comprehending or refusing to comprehend, time to be unified or to be autonomous, time of identification or of the most exacerbated differences*" (Ibid. :11). It is in this respect, the making of a self-collective subjectivity, that the concept of phronesis resonated with Guattari's concept of transversality⁴⁷.

2.4.3 Transversality in context – becoming porcupine

The concept of transversality was developed when Guattari's was working at La Borde clinic. It is a concept that emerges out of the demands of relational practice through the production of situated knowledges. In 1964 Guattari wrote his essay '*Transversalité*'. This essay provides the most concentrated account of the concept of transversality, but it was at that time quite unfamiliar, even to Guattari.

In the essay he stresses that it is a hypothetical concept, subject to change, and he offers it as a tool to be used and developed. The idea persists throughout his work and writings, and varies over time. The concept of transversality was considered to have "*practical tasks to perform in specific institutional settings,*" and was understood as inherently political. Guattari's intention for the concept of transversality was "*to use it imaginatively in order to change... institutions as we know them, beginning with analytic method*" (Genosko 2014: 51)⁴⁸.

Transversality is related to qualities of communication within a real situation (*institutional life*) of a group in context (*mediating object*). When considered through the context of this research, transversality seeks to generate convective power relations (power-conscious conversations) where ordinarily there are 'stuck' vertical

⁴⁷ The point here is not to make an exhaustive comparison between Guattari's concept of transversality and the philosophical ideas of phronesis, although there is rich and tempting grounds for such elaborations. The point is that they were imagined to infuse each other, to foil each other. Phronesis was detected first by studying the Eameses design process in relation to CTVR's expressed desire to communicate communications. It was during these cursory investigations into the meaning and scope of phronesis that the resonance with Guattari's concept emerged. Guattari's concept was considered more tractable than the philosophical idea of phronesis, in the way that it resonated with educational practices and possibilities of unconscious reasoning. Thus, a field of resonance was set in motion between the Hidden Curriculum for CTVR, the curatorial actions of smuggling and phronesis demonstrated by CTVR and through the Eameses work. Transversality became a conceptual tool by which this field might be listened to and conceived.

⁴⁸ It is an idea that Guattari develops from the occupations of psychiatry and psychoanalysis, though he becomes less committed to these fields over time. Traditionally an analytic situation is constituted by a couple, the analyst and the analysand, and this arrangement establishes a transference relation between them. Understood at its most simple level, the transference is the channel of the relationship between people, it is non-linear, and open. Unfortunately, the transference had (ironically) become stereotyped through psychoanalysis, and made rigid. For Guattari the transference relation had become "*a kind of internalization of bourgeois repression by the repetitive, archaic and artificial reappearance of caste phenomena with their procession of fascinating and reactionary group phantasms*". In other words, it entrenched a kind of master-slave dialectic between analyst and analysand. Guattari sought to disrupt this tendency, and he did this by re-thinking transference as transversality.

or horizontal power relations. The means of achieving such convections are by what Guattari refers to as coefficients of transversality⁴⁹. Guattari explains what he means by transversality through the bestiary fables of (a) horses and (b) porcupines, as outlined below.

2.4.3.1 Blinkered Horses – allegory for coefficients of transversality

“Think of a field with a fence around it in which there are horses with adjustable blinkers: the adjustment of their blinkers is the ‘coefficient of transversality’. If they are so adjusted as to make the horses totally blind, then presumably a certain traumatic form of encounter will take place. Gradually, as the flaps are opened, one can envisage them moving about more easily.” (Guattari 1984)

Gary Genosko elaborates this fable in the following way:

“Blinkers prevent transversal relations; they focus by severely circumscribing a visual field. The adjustment of them releases the existing, but blinkered, quantity of transversality. While horse blinkers are supposedly preventative – that is, they prevent the horse from being frightened or distracted – they may also cause a fright by their very restrictiveness. Indeed, the opening of them may initially produce less than harmonious relations; and, as for the harmony of group relations, they are certainly not guaranteed by the opening of blinkers. Transversality is the tool used to open hitherto closed logics and hierarchies.” (Genosko 2014: 58)

2.4.3.2 Freezing Porcupines – allegory for coefficients of transversality

“One freezing winter day, a herd of porcupines huddled together to protect themselves against the cold by their combined warmth. But their spines pricked each other so painfully that they soon drew apart again. Since the cold continued, however, they had to draw together once more, and once more they found the pricking painful. This alternate moving together and apart went on until they discovered just the right distance to preserve them from both evils.” (Guattari 1984: 18)

⁴⁹ Guattari’s catalytic hypothesis of transversality, based upon the organisational situation of the clinic (which is not unlike the academe) is as follows: “it is possible to change the various coefficients of unconscious transversality at the various levels of an institution. For example, the overt communication that takes place within the circle consisting of the medical superintendent and the house-doctors may remain on an extremely formal level, and it may appear that its coefficient of transversality is very low. On the other hand the latent and repressed coefficient existing at department level may be found to be much higher: the nurses have more genuine relationships among themselves, in virtue of which the patients can make transferences that have a therapeutic effect. Now, and remember this is still hypothetical, the multiple coefficients of transversality, though of differing intensity, remain homogenous. In fact, the level of transversality existing in the group that has the real power unconsciously determines how the extensive possibilities of other level of transversality are regulated” (Guattari 1984).

The porcupines serve to illuminate the affective and libidinal relations within a group attempting to live together in harmony under particular conditions beyond their control. The porcupines are self organizing, and it is the weather, their own spikes and their ability to forget injury and communicate need which imposes the constraints upon their subjective desire to be together for warmth. In the case of the horses, there is an architectural device at work upon their ability to see, the adjustment of which is at the mercy of some authority. The point here is that the transversality of groups under institutional conditions can be “*destroyed by the rigid imperatives of management*”; by blinkers that either too open or too closed under the circumstances and in relation to the subjectivity of the group (Genosko 2014: 59). In the libidinal realm, the transversality of the group will depend upon the self-knowledge of the self-organising porcupines, so-to-speak, whether they are more or less aware of their own and each others discomfort and willing to make adjustments accordingly.

To introduce another example, from the world of telecommunications, the co-efficient of transversality might be that of a radio, and the ability of an actor (person or software) to more or less tune in to a desired signal under particular circumstances. The inreach experiment *Room 3.17*, presented in Chapter 5, is a kind of allegory for this process of adjusting and tuning into the subjectivity of the group. In a later discussion of the second inreach experiment, *Engineering Fictions*, the radio will be shown to take on a ‘bestiary’ aspect reflective of Guattari’s animal allegories of the coefficients of transversality.

A co-efficient of transversality is that which strives to enable “*maximum communication among different levels and , above all, in different meanings*” (Ibid). It is a dimension which can only be seen clearly, according to Guattari, “*in certain groups which intentionally or otherwise, try to accept the meaning of their praxis and establish themselves as subject groups*” by enacting their own methods of resingularisation (Guattari 1984: 22). With Guattari’s bestiary of horses and porcupines in mind, and with due respect, good will and humour, the following is an allegory by the author of the ‘becoming porcupine’ of this research⁵⁰:

Once upon a time there was a Porcupine who struggled to practice a particular mode of material-semiotic agency called *phronesis*. A Horse from a nearby field

⁵⁰ In fact, in writing this allegory the author is demonstrating her own resingularisation through the group of CTVR – the examples of a minor literature that emerge through *Engineering Fictions* in the *This Week @ CTVR...* e-newsletter are reflective of a humorous group subjectivity that oscillates between parody and lyric. See Table 4, pg: 251.

nonetheless admired her practice, seeing something of this tendency in herself and wanting to develop it. She sought the Porcupines advice and in no time invited the Porcupine into her field with the other Horses. The Porcupine was very excited by this, as she was feeling the cold a little bit, and was getting a bit tired of negotiating with all the other Porcupines.

After a little while (as will be shown in Chapter 4.2.2.2) the Porcupine came to realise that she was going to get trampled on if she couldn't find a way to make the Horses more aware of her presence.

If she couldn't make the Horses more aware of her presence she would either get hurt or hurt one of the Horses (whether by defence or accident with her spikes), or both. She had to find a way to adjust the Horses blinkers without hurting them (too much).

Thus the Porcupine gradually realised that this might have been the unconscious reason her presence was sought in the first place; to catalyse a different kind of communication in the field. Thus, the Porcupine became a coefficient of transversality *with the Horse*, by virtue of their shared *phronesis*⁵¹.

This playful allegory attempts to articulate the aspiration towards transversality at work throughout this research. It is important to keep in mind that transversality is not a state, it is a process. In this case, transversality is not so much connected to its psychoanalytical origins, as it is aware of them. It is not a practice confined to one institutional 'field', but involves mixing of sameness and difference, e.g.: both porcupines and horses, so-to-speak. (This mixing is what the author later comes to name 'occupational difference,' and can be understood as a necessary condition for transversality).

Through its evolution in the life-work of Félix Guattari, the concept of transversality, as Genosko explains, "*is radically opened to hitherto unimagined mutations and complexifications across all sorts of domains. In other words, transversality still signifies militant, social, undisciplined creativity*" (Genosko 2014: 81)⁵².

⁵¹ Genosko notes that Guattari "*emphasised that transversality was not a given, an 'already there', but always to be conquered through a pragmatics of existence*" (Genosko 2014: 81). The 'pragmatics of existence' resonates with the situated actions of *phronesis*.

⁵² This description of transversality resonates with a comment made by the author in preparation of the second *inreach* experiment. She is proposing it to CTVR's management team, and describes it spontaneously as "*a friendly kind of unpredictable mutiny*" (see Chapter 6.2.2). This expression uncannily resonates with Genosko's description of transversality.

2.4.4 The Unconscious Life of Transversality [within CTVR]

Transversality is “an unconscious source of action in the group, going beyond the objective laws on which it is based, carrying the group’s desire” (Guattari 1984: 22). Within CTVR, a sign of the ‘local coefficient of transversality’ was to be found in the education and outreach strand of the *Design for Change* proposal. Communicating communications was a modification of CTVR’s education and outreach program, inscribed CTVR’s Director who maintained “oversight of the Education and Outreach activities in CTVR” (Doyle 2010: 50).

According to Félix Guattari, such a modification “implies the existence of an erotic focal point, a group eros, and a takeover – even if partial – of local politics by a group-subject. A social formation can modify the erotic ‘causality’ which sets off the activity of the superego⁵³. This modification of the ways it accommodates the superego leads to a radical transformation of the whole of the topography” (Guattari 2009 (a)).

When questioned, the reasons given by L.D. for including the Eameses in the education and outreach program, effectively bringing them to the centre of this activity, was described as one of frustration. The education and outreach remit was adopted by L.D. largely because there was no one else in the organisation who would willingly assume responsibility for it⁵⁴. If it was to be her responsibility, then L.D. assumed the right to make it relevant and interesting to her, less instrumental and more imaginative. Such a pragmatic approach hardly comes across as unconscious, but while the pragmatism of this rationale is quite conscious and overt, there is a superficiality to it. The desire at work underneath this decision remains unconscious, yet the it opens the research centre up to the field of its own unconscious.

Guattari describes the dynamic of this move as follows: “The field of the unconscious is the site of every possibility, in every domain, of connections and not separations, of

⁵³ The Superego is that part of a person’s mind that acts as a self-critical conscience, reflecting social standards learned from parents and teachers. For Guattari, “The despotism which exists in conjugal or family relationships arises from the same kind of libidinal disposition that exists in the broadest social field... it is no longer a simple question of describing pre-existing social objects, but one of engaging in a political struggle against all machines of the dominant power, whether it be the power of the bourgeois State, the power of any kind of bureaucracy, the power of academia, familial power, phallogratic power in male/female relationships, or even the repressive power of the superego over the individual.” (Guattari 2009: 156) In the case of the *inreach* experiments, it is difficult to exclude any of these struggles, but it is more difficult again to call them into plain sight.

⁵⁴ This offers an insight into L.D.’s approach to organisation and management. Her focus was enabling people to do what they were good at, to allow each person to do what they were good at doing and to trust that all the slack within the organisation would be pulled taught by virtue of this principle. This was acknowledged to be the case by CTVR’s former Executive Director, Penny Storey (Foley 2015).

stratifications and segmentarities. If there is no fusion between analytical practices concerning the formation of the unconscious, and the political practices of social formations, then the same attitudes, the same dogmatic gregariness, the same hierarchies, the same conditions of exclusion and domination will endlessly recur” (Guattari 2009:32). What becomes enacted through the Communicating Communications strand of CTVR’s education and outreach program, as will be shown in subsequent chapters, is the possibility to engage ethico-political habits of communication within CTVR by way of “*analytical practices concerning the formation of the unconscious*”, i.e. CTVR’s hidden curriculum.

2.4.5 A note on language as action...

Félix Guattari worked imaginatively with language to develop more cogent conceptual tools to aid in his political and analytic practice. He explains this approach in the following way: “*In the best cases, instrumental word tools are capable of opening up a new set of questions, of carrying them along and articulating various fields. I do not believe in universal literature or philosophy but rather in the virtues of minor languages.*” (Guattari 2009: 21)

Words like transversality thus worked “*as tools, as machines, with reference neither to an ideology nor to the communication of a particular form of subjectivity*” (Guattari 2009: 22). The concept of transversality is therefore a tool “*used to open hitherto closed logics and hierarchies... maximizing communication between different levels of organisation in an institution*” (Guattari 2014: 60).

Guattari is careful to uphold an understanding of the “machinic arrangement” of concepts as they intra-act with “collective arrangements of enunciation” specifically as tools, for the following reason: “*To call them universals would be saying two things: either one expects them to apply to a very large field, or one wants to make them ‘universals’, that is to say foundations, basic principles of a scientific or moral order*”. For Guattari, such concepts are pragmatic and heuristic, they are ways of negotiating the political and subjective fields of social life and its organisation and arrangements.

Guattari’s use of language resonates with Audre Lorde’s theory of Poetry as “*the way we give name to the nameless so it can thought*” (Lorde 1993). For Guattari, conceptual tools such as transversality were the way he gave name to the nameless in order to act.

2.4.6 Summary

Félix Guattari's concept of transversality lends itself to educational efforts to come to terms with the ever-changing hidden curricula of institutional and group life. Attention to the *particularistic-universalistic* continuum of the curriculum proper and the hidden curriculum, proposed by Kathleen Lynch (1989), could be well served by Guattari's concept of co-efficients of transversality in its appeals to "two different dimensions of communication: manifest and latent" (Genosko 2014: 60).

The attention afforded the unconscious through Guattari's political thought is relevant to the educational situation, as a way of approaching the learning dispositions of the hidden curriculum for some individual or group. Drawing the theories of the hidden curriculum together with the ethico-political purpose of transversality enables a dynamic between thought and action that resonates with the creative and improvisational skill of phronesis.

Thus, the second theory of the distillery begins to conduct a blended approach to an analysis and translation of the problems and context of this research, which led to the formation of the choreographic process of inreach and catalysed processes of transversality within CTVR.

2.5 Occupying Politics of Engineering

In the previous sections theories of the hidden curriculum were introduced and related with the curatorial concept of smuggling. Also, the practice of phronesis was considered in relation with a latent dimension of transversality at work within CTVR. These theoretical concepts resonate and are contiguous with each other in various ways. They begin to act as stills through which the process of inreach can be considered. In another sense, these theories begin to act as foils to the inreach, enabling the author to see the choreographic process in a deeper way⁵⁵.

The third theory of the distillery is really a set of theories conceptualised as opening onto an occupying politics of engineering. This set of theories seek to develop an historical sense of the subjectivity of the occupation engineering (in practice and research) as a coefficient of technology, beyond the local context of CTVR. While during participant observation with CTVR prehensions of its occupying politics were

⁵⁵ The sense of foil that is meant here is always a push and pull between resistance and flow. This word acts as a conceptual tool developed through participant observation with CTVR. It is an agonism that is buoyed by a commitment to ethico-political relations, and bolstered by a politics of friendship (Condoirelli 2014).

sensed, but the author had little knowledge or experience of the history and philosophy of engineering. It was conscious choice of the artistic research not to delve too deeply into historical or sociological readings of engineering as an occupation. The reason being that the author wished to respond to the specificity of CTVR's research community and to the particularity of the problem and possibility of communicating communications.

The aim in the following sections, however, is to story a backdrop against which an occupying politics for CTVR might become legible. The aim here is to develop a better understanding of how the occupation of engineering is a coefficient of technology. The intention here is to develop a particular kind of foil that will aid the author in re-reading CTVR for its occupying politics. This aspect of the theoretical distillery serves to open up a sense of scale between the author and the broader occupation of engineering after a long and intensive period of participant observation.

2.5.1 *An occupation in our bones...*

Professor of civil engineering, Henry Petroski argues that *"the ideas of engineering are in fact in our bones and part of our human nature and experience"*. The *"principal object"* of engineering is *"not the given world but the world that engineers themselves create"* (Petroski 1992: 3). The world that engineers invent and build is inconstant, always changing, the opposite to the timeless constancy of the honeybee's comb, writes Petroski. While all this change makes for an occupation that is *"more exciting and less routine than that of an insect... constant change means that there are many more ways in which something can go wrong"* (Petroski 1992: 2). Petroski's story of engineering, a representation and embodiment of his own occupation, is suggestive of technology's narcissistic tendencies. It is partially motivated by its own reflection.

As a composite occupation, engineering came together in the 17th century under the name of 'Engine Science': a *"forced integration"* of philosophy, mathematics and engineering. At this time, the word 'engine' was used to mean something like 'instruments'. A vernacular word, it connoted 'artifice' and aligned with the 'cognitive culture of ingenuity' developed by natural philosophers. According to Patrick Carroll-Burke, *"The idiom of the engine expresses a broad but surprisingly coherent array of cultural meaning and significance: intervention and manipulation; design, contrivance and art; ingenuity and engineering; body and mind united in praxis; the deployment of force and realization of power"* (Carroll-Burke 2001: 599). While the idiom of the engine persists, working its way through many occupations and forms of work in today's technologized world, it is the occupation of engineering that explicitly carries *"the universe of reference that frames a pragmatic field"* (Guattari 2009 (a): 192).

For its load-bearing abilities engineering became relegated as “*handmaiden of science*” in the 17th century. Carroll-Burkes ‘*analytic of engines*’ develops a story of engineering as “*one of the most successful and powerful forms of modern science*” and a valuable coefficient of State formation⁵⁶ (Carroll-Burke 2001: 601). As a broad occupation, engineering has developed since the 17th century as a powerful “*handmaiden*” to state formation and “*a method of ‘ingenious’ inquiry*” (Carroll-Burke 2002: 105). Since becoming a ‘mass occupation’ in the 20th century it has developed a curious bi-polarity, oscillating in stereotype between handmaiden and hero⁵⁷.

2.5.2 *Handmaidens and Heroes*

Matthew Wisnioski recounts a history of engineering workers struggling to face head-on precarious working conditions of temporary contracts and project work, and to assert social responsibility, ecological justice and peace as fundamental principles of engineering as a ‘mass occupation’ in post-war America. As coefficient with *competing* visions of technology, Wisnioski asks “*how engineers imagine themselves in service to humanity, and how their service ideals impact the defining and solving of problems with multiple ends and various consequences*” (Wisnioski 2012: 10).

In 1971, for example, there were unprecedented protests at the IEEE⁵⁸ International Convention in New York. The *Committee for Social Responsibility in Engineering*

⁵⁶ Modern states are “*as much engineering feats as political ones*” For Carroll-Burke “states are complex, much more so than the individuals who serve as the model of an actor. States are ideas and discourses that are contested and historically shifting. They are designs, abstractions, imaginings, fantasies, and institutions. But states are also practices that are creative, skilful, augmentative, repressive, disciplinary, regulatory, and on-going. They are socio-technical systems, ingenious contrivances of things human and non-human. The system subsists in the buildings, roads, maps, canals, schools, police, and so on. Ideas and discourses are embedded in the material system and its associated practices, but not always to the same extent or to the same level of systematicity. Modern states, finally, *are* countries, crucially constituted of land and people incorporated as territory and population.” Carroll-Burke suggest that “Ireland provides fertile ground for empirical studies of such cultures and their states, because it was a crucial site of experimental statecraft” under British colonial rule. He points to the difficulties for the Irish ‘Free-State’ in living with and depending upon a material infrastructure laid down by its oppressors. (Carroll-Burke 2002:105)

⁵⁷ This curious bi-polarity was witnessed during the IEEE EDUCON (Engineering Education) conference in Istanbul, 2014. A University from Australia were discussing student numbers and how they were finding ways to attract engineering students to enrol in undergraduate degrees. The image projected onto the auditorium screen was a stereotype of a ‘Super-Hero’, with copy suggesting ‘Become an Engineering Hero’. While there was a slight sense of awkward self-consciousness about this gimmick, it indicated a recognition that there was something troubled and superficial about using such imagery, but there were no critical or hermeneutical resources to draw upon that might emancipate other forms of imagining. This critical and hermeneutic paucity is one of the gravest problems facing the techno-scientific paradigm, rendering it enthralled to capitalist production.

⁵⁸ IEEE stands for the *Institute of Electrical and Electronic Engineers*, and it is the considered the hallmark of best practice in contemporary electronic engineering, across all its disciplines, including telecommunications. Such organisations are part of an academic knowledge economy that renders research inaccessible to anyone who cannot pay the subscription fee,

(CSRE) activated the protests and were denied access to the convention. These engineers were referred to by the Convention organisers as “*dissident*”. The CSRE’s aim was to direct “*productive and creative people*” to find ways to turn “*necrophilic*” technologies into “*humane*” ones, by raising awareness of the “*individual freedom and responsibility*” of their profession as engineers to a wider society. The express purpose of the CSRE was to “*challenge the present orientation of engineering and to explore ways in which engineering skills can be used to solve the obvious and growing ills of our society*” (Wisnioski 2012: 130). The CSRE was broadly pro-civil rights, antiwar, and anticorporate, while the research conducted by the group’s members was explicitly community oriented and inter-disciplinary.

For example, a formative member of CSRE, electronic engineer Stephen Unger, and sociologist Amitai Etzioni, were developing research at this time that focused upon designing electronic networks for community interaction. Their goal was “*the design of electronic networks to re-create participatory democracy akin to the ancient Greek polis and the Israeli Kibbutzim*”⁵⁹ (Wisnioski 2012: 112) (Powell 2010). Unger helped to articulate the CSRE’s antiwar position, declaring that an engineers primary responsibility fell in “*using his knowledge and skill for the advancement, never the detriment, of human welfare*” (Wisnioski 2012:112).

Wisnioski’s account of the history of engineering in America describes the engineer as quiet hero, a frontier man, who had rendered the Western world “*compliant for settlement and commerce. Clad in a leather jacket and engineer boots, he (always a he) commanded lesser men, raised dams and factories. Later he donned a laboratory coat to invent new wonders and defend the nation against its enemies*” (Wisnioski 2012: 112). The values of strength and dominant masculinity combined with “*superior intellect, initiative and moral respectability*” laid the foundations for engineering’s professional image and understanding of itself. Analogous to doctors and lawyers, the engineering profession valued autonomy, self-regulation and social responsibility.

From an American perspective, the establishment of polytechnical schools, driven by industrial capitalism, established dynamic identities of engineering criss-crossing

or who is outside of the academy. IEEE are gatekeepers to knowledge and to a reputation economy. Subscriptions to publications by organisations such as IEEE are extremely high, though researchers are unpaid for their work. It is an exploitative system. In counter to such organisations, there are open peer-reviewed journals.

⁵⁹ Such work maps onto contemporary practices of establishing, managing and maintaining Community Wireless Networks(Powell 2010).

science, management and labour practices⁶⁰. An ethic of individual scientific mastery and business management was encouraged in the new schools, within the corporate sector and member societies (like IEEE).

The occupation of engineering was inevitably “*contradictory at its core... crafted in exchanges between one set of elites seeking corporate leadership and another trying to make engineering an autonomous profession*” (Wisnioski 2012:21). On the one hand, engineering as a profession imagined itself attending directly to its social responsibilities; to reform and curb disorder and waste in an increasingly industrialised world. On the other, the corporatisation of social reform meant that the engineer could continue to identify as “*an agent of social change*”, while “*responsibility and service were mobilized in a vision of the corporation as an inherently reformist enterprise that generated maximum efficiencies by unlocking engineers’ collective potential*” (Wisnioski 2012: 40).

Meanwhile, *Technology* became the age-defining term of the late modern period, indexing a revolution in industrialized societies of increasing automation and systematisation of life and work. Social and political theorists of technology and society, such as Hannah Arendt, read these changes as a ‘*threatening event*’ for the human condition. For Arendt, the rapid development of technology expressed and enacted a human desire to be “*liberated from labour’s ‘toil and trouble’*” elaborating that “*The fulfilment of the wish... like the fulfilment of wishes in fairy tales, comes at a moment when it can only be self-defeating. It is a society of labourers which is about to be liberated from the fetters of labour, and this society does no longer know of those other higher and more meaningful activities for the sake of which this freedom would deserve to be won.*” (Arendt 1998: 4) In a time of increasing acceleration and deepening desires to be liberated from daily labours, Arendt asserted the importance of asking the simple question, “*What are we Doing?*”.

By the mid-1960’s this is precisely what foundations and think-thanks concerned with engineering and technological research and practice began to do, by initiating and drawing upon the social study of technology, hosting seminars, and funding academic projects. In America, scholarly debates opened up across university campuses and within research institutions and factories alike about “*how to analyse engineers as political actors*”, to begin to dissolve stereotypes of handmaidens and heroes (Wisnioski 2012: 5).

⁶⁰ From a European perspective, the role of the Engineer in Society was more strongly linked to natural philosophy and the gentleman scientist.

2.5.2.1 *The ideology of technological change...*

Wisnioski points to an asymmetry in technological discourse amongst engineers in America in the 1960's. At that time engineering was an occupation with a million members, however: "...only a small minority were visible participants in debates about out-of-control technology. Engineering's reformers and radicals as well as its corporate and academic leaders were significantly more literate than the rank and filers" (Wisnioski 2012: 11). Nonetheless, Wisnioski elaborates, 'rank-and-file' engineers were exposed to dominant images of technology and its discontents informally, through mass-media, annual meetings, pedagogical training, TV, 'lunchroom jokes' and so on. Building upon the work of Langdon Winner and Rosalind Williams, Wisnioski argues that by the late 1960's there was a consensus view of technology as an ideology of technological change: "This way of seeing society posited that rapidly accelerating technological advances had produced an array of negative, unintended consequences that stressed existing institutions and patterns of life ill-equipped to handle them. These problems had only recently emerged, and were the result of technology's nature. Consequently engineers could not be blamed for the country's technological dilemmas" (Wisnioski 2012: 11).

This line of thinking propounded the belief that the engineering role was to "adapt society to technology" by "maximising its positive opportunities and minimizing its negative effects" (Ibid)⁶¹. In this regard, Langdon Winner's scholarship aims to address "why so much of modern social and political thought contains necessary statements of what can be called a theory of technological politics, an odd mongrel of notions often crossbred with orthodox liberal, conservative and socialist philosophies" (Winner 1980). In a hypothetical response he suggests two possible answers: "One side affirms the freedom and the reality of 'choice', while the other sees mankind as a pawn in the indelible hands of history" (Ibid). There has been, according to Winner's account, throughout the development of technology in all its variation and ingenuity, two languages, two mind-sets, inextricably bound up in each other. "One is the language of a dynamic global process that moves ineluctably forward, transforming everything in its path. The other is the language of free agency, individual will, deliberation, and choice in which the path of technological advance is consciously directed" (Winner 1977:54). Winner's contextualisation of technology troubles the absence of a "middle ground of rational discourse" on the ideology underpinning so-called technological advancement⁶².

⁶¹ There is a curious resonance here with the design process of the Eameses – In an Oral Interview, 1980, Ray describes how Charles believed in "putting in what was good and taking out what was bad. Over the years, having a form develop" (Bowman 1980).

⁶² Guattari's proposal for "Molecular Revolution" addresses this grey space: "Only a profound transformation of social relationships at every level, an immense movement by machines of desire 'to get their hands on' technical machines, a 'molecular revolution' correlative to analytical practices and

In the 1960's *"an ideology of technological change provided a solution to the crisis of technology while undercutting the identity of the engineer"* (Wisnioski 2012:197). Rosalind Williams argues that the problem for engineers today lies in their ability to define a set of problems that are suited to their skills. She argues that engineering is disappearing as *"a coherent and independent profession that is defined by well-understood relationships with industrial and other social organizations, with the material world, and with guiding principles such as functionality"* (Williams 2002: 31). There is a subtle kind of nostalgia at work in Williams account at times, it is arguable whether engineering was ever all that coherent as an occupation.

The etymological history, so-to-speak, of engineering as a hybrid method of 'ingenious' inquiry demonstrates how the occupation has throughout history been inscribed as handmaiden or hero; as ever and either way a willing servant to the intrigue of the problem. Through these accounts, the occupation of engineering becomes legible as an 'engine' of change and trade across worlds of provision and consumption, knowing and making; as well as their less apparent role as resisters, agitants and tricksters that are *'doing something else'* in the ever-current flow of technological change. Perhaps it is an intense desire for solution that runs as an undercurrent, cohering in some sense the subjectivity of this broad occupation?

2.5.2.2 A Theory of Technological Politics...

The 'second domain' of Langdon Winner's Theory of Technological Politics is difficult to define due to its "widely scattered views" and voices (Winner 1977) . Wisnioski's account of this theory is somewhat difficult to distinguish from his account of 'an ideology of technological change' and so it is worth returning to Winner more completely here. This second domain, holds at its centre, according to Winner, a belief that; *"...technology is problematic not so much because it is the origin of certain undesirable side effects but rather because it enters into and becomes part of the fabric of human life and activity"* (Winner 1977:320). In this view, technology is recognised as a force with a tendency to *"structure and incorporate that which it touches,"* therefore it can at times prompt a certain ontologic or existential anxiety.

Thinking with the allegorical fiction of Mary Wollstonecraft Shelly's *Frankenstein*, Winner claims that what is at stake here is *"the plight of things that have been created but not in a context of sufficient care... At the outset, the development of all technologies*

new micropolitics, will enable such a readjustment... An analytic and micropolitical approach towards collective formations of desire should constantly renew its methods, diversify and enrich itself through contact with every domain of creation, so that it can become 'everybody's business'" (Guattari 2009 (a): 203).

reflects the highest attributes of human intelligence, inventiveness, and concern. But beyond a certain point, the point at which the efficacy of the technology becomes evident, these qualities begin to have less and less influence on the final outcome; intelligence, inventiveness, and concern effectively cease to have any real impact on the ways in which technology shapes the world (Winner 1977:314).

Winner highlights the ways in which technology enables a particular kind of forgetting, whereby humans *forget* their own labour, their own works, and moreover provides us with a “*license to forget*”⁶³. The central hypothesis of Winner’s technological politics, according to Wisnioski, is that once technologies became sufficiently advanced, they would continue to reconstruct and reconfigure autonomously. The anxiety underpinning this advancement was the fear that technological systems would become essentially ‘out of control’ at a human scale, yet at the same time would be impossible to abandon. Winner’s theory of technological politics, therefore, views technologies as the material embodiment of political philosophies. Therefore, in order to substantiate any sense of reform over such systems they would need to be considered as part of a complex socio-technical structure of globalised society.

Theorists of technological politics have been of the view that ‘changing the system’ would come through ‘dialectical analysis of society’s *is* and *ought*’. Here, Wisnioski is taking Winner’s assessment “*That one employs something at all far outweighs (and often obliterates) the matter of how one employs it,*” and giving it a future oriented, pragmatic tilt via social theorists such as Jacques Ellul, Lewis Mumford and Herbert Marcuse. The first step in this process was to “*become aware of one’s place in the system*” (Wisnioski 2012: 46).⁶⁴ Wisnioski’s history of engineering in the 1960’s offers a way of thinking a grey space into what might appear to be oppositional and discrete (dichotomous) ways of thinking about and being with technology.

2.5.3 Contemporary Oscillations

Wisnioski’s work demonstrates how engineers in 1960’s America, typically academics or defence industry employees, harboured and fostered critical thinking through an engagement with social theory. Technological critics (Ellul, Mumford, Marcuse) operating in the ‘nameless’ vein described by Langdon Winner, troubled some Engineer’s sense of their own occupations and their role in constructing and maintaining technological advancement. These critics pointed to “*the need for technical*

⁶³ A similar observation on amnesia is made by L.D. in Chapter 6.2.3.

⁶⁴ In Chapter 4, it will be shown how this research shifts from a concern with ‘how’ to a concern with ‘what’, suggestive of this effort.

experts to develop philosophical introspection” (Wisnioski 2012: 46)⁶⁵. Educational reorientation was called for that would “enable us to make use of technology, control it and give it direction, cause it to serve values with which we have chosen”⁶⁶ (Ibid).

Wisnioski draws attention to actions of engineers within education that incorporated themes of technological politics into the everyday of their learning and design processes⁶⁷. The ‘circle of action’ analytical process developed by James D. Horgan, for example, sought to challenge notions of technological neutrality, to foster pragmatic reorientation within design processes, and to “convince engineers that the ‘pessimists’ were compatible with engineers’ inherently ‘optimistic view of man’”, arguing that “technology and culture shaped each other reciprocally and that human values were an essential consideration in any technical problem” (Wisnioski 2012: 48). Ultimately, Horgan was aiming to foster a self-interrogation of personal assumptions amongst his engineering colleagues and students. The process fostered by Horgan was a linear cycle/circle of steps from *Being – to – Comparing – to – Modifying Values – to – Setting – Goals – to – Doing (Technology)* with ‘desire lines’ of non-linear movement possible between each of these steps. Once brought to light, the goals fostered through personal attitudes could be rationally compared to existing conditions and steps could be taken to “bring technology closer to human needs” (Ibid). Horgan imagined that engineers could serve human needs by means; “...partly political, partly technological, and partly [by] a return to a life style that recognises man’s passion to create, to love, to play” (Winner 2012: 49).⁶⁸

Today, tensions between the slippery categories of ‘an ideology of technological change’ and ‘a theory of technological politics’, as outlined by Wisnioski continue to prompt re-evaluations of technology. These debates and contradictory ways of thinking and embodying technology are in tension (or in hyper-oscillation) within engineering education. Rosalind Williams develops an understanding of the contemporary situation in her book *Retooling*, when she writes: “What engineers are being asked to learn keeps expanding along with the scope and complexity of the hybrid world. Engineering has evolved into an open-ended Profession of Everything in a world where technology shades

⁶⁵ The Eames can be included in this list; they practiced an embodied criticality that would have had a deep effect on the likes of IBM and others whom they worked closely with over the years. This is a hypothesis, and opens up a pathway for future research.

⁶⁶ Wisnioski cites law professor Charles Reich here.

⁶⁷ The work of James D. Horgan, a biomedical engineer at Marquette University, developed an ‘analytical technique called the ‘circle of action’ that was based on the *is* of present technology and the *ought* of what a society wants it to be’. This practice resonates with that of the *inreach* experiments, particularly *Engineering Fictions* and *Postcards from the Near Future*.

⁶⁸ This example offered by Wisnioski resonates strongly with the author’s second *inreach* experiment, *Engineering Fictions*, and can be contextualised as part of this tradition of supporting critical thought in engineering.

into society, into science, into art, and into management, with no strong institutions to define an overarching mission. All the forces that are pulling engineering in different directions – toward science, toward the market, toward design, toward systems, toward socialization – add logs to the curricular jam. The most obvious symptom of the identity crisis of engineering is the crisis in engineering education” (Williams 2002: 70).

Williams proposes that what educators really need to care about, echoing the ‘nameless’ disposition of a technological politics outlined by Winner, is a “*general education for a world that is both technological and democratic*” (Ibid). Williams admits that “*In a hybrid world, engineering can thrive only as a hybrid*” (Ibid). The struggle expounded by Wisnioski of the 1960s engineers seeking to reconcile engineering as a professional and socially oriented occupation and as a hybrid method of ‘ingenious’ inquiry appears to have been abandoned by Williams: “*As the decades have passed, however, it has become increasingly evident that the establishment of an autonomous engineering profession oriented toward ideals of broad social responsibility (the professional ideal of the little-e engineering) has not happened and is not going to happen. The social contradictions are too great, the epistemological core is not there, the institutional supports are not there, and the educational program does not begin to meet the stated goals. After repeated failures to achieve professionalisation along these lines, it is time to admit that it is not going to happen, to let it slip, and to figure out another way of getting the job done.*” (Williams 2002: 80)

What Williams’ pragmatic account does, for better or worse, is open up a possibility for a general education that would support a convergence of ‘ideologies of technological change’ with ‘theories of technological politics’, a hybrid educational environment for a hybrid technologised world. Williams advocates for an engineering education that would “*rejoin higher education in an adventurous mix that brings together information technology, the sciences, the social sciences, the humanities, and the arts*”. What might be more useful, in the author’s view, is to recognise the pre-accelerating enmeshment of these disciplinary and occupational worlds, and begin thoughtful performative deliberations to ‘get the job done’ (Manning 2009). Echoing Carroll-Burke’s analytic of engineering’s role in the formulation of the modern state, Williams reminds us that “*the problems for engineering came from a mixture of the needs of the state and those of industrial capitalism, as filtered through the institutional needs of business enterprises*” (Ibid). In letting slip the disciplinary boundaries of engineering, in letting go of any absolute aspiration as a self-contained, autonomous profession, engineering can set about reimagining itself instead as a culture that can support “a

political life that deals with the ‘progressive composition of a common world’”⁶⁹ (Williams 2002: 87).

The origins of engineering as a method of ‘ingenious’ inquiry, its history as an occupation pulled between contradictory values of professionalism and service, its role in the debates around technology as described by Langdon Winner and Matthew Wisnioski, and its orientations towards politics and the construction of a ‘common world’ as espoused by Rosalind Williams, all indicate a complexification of the purpose of engineering and present a problem for the individual subjectivities who wish to play a part in its processes of problem solving and inquiry. What is at stake in all of this is the simultaneous expansion and disintegration of an occupation, as it continues to respond to the hybridising technological world it helps to rapidly co-construct. As Langdon Winner asserts, technologies “*legislate the conditions of human existence*”.

By recognising “technology’s intrinsic political aspect” engineering as a practice and a philosophical orientation can begin to “*redefine an authentic politics and reinvent conditions under which it might be practiced*” (Winner 1977: 324). Winner identifies such redefined technological politics throughout history in attempts such as “*the Paris Communes of 1793 and 1871, nineteenth century utopian experiences, twentieth century Spanish anarchism, the founding of work and community councils in a number of modern revolutions*”, all in an effort to create a shared, common and yet decentralist democratic politics⁷⁰. Such actions are visible in the radical upheavals described by Wisnioski in the 1960s amongst minority groups of engineering researchers and workers. So too, an effort at generating a practice of an ‘*authentic politics*’ can be identified in the work of Felix Guattari, which sought to “*reduce blindness and bureaucratic-mindedness in favour of openness, overcoming the impasses of both vertical and horizontal organisations, by means of creative organisational innovations*” (Genosko 2002: 200).

2.5.3.1 Ways of Being-With Technology

A brief note on Carl Mitchum’s analysis of *Three Ways of Being-With Technology*, that will be shown to be helpful in the reading of the inreach experiments in subsequent chapters. The ‘being-with’ relationship of humanity and technology is thought through Heidegger in Mitchum’s analysis. For Heidegger, the ‘world hood of the world’ is

⁶⁹ This resonates with CTVR’s actions of *smuggling* occupational difference into a territory of techno science.

⁷⁰ The philosophy of Jacques Rancière speaks to this history, as reflected upon by sociologist Avery F. Gordon in (Condorelli 2014). This is discussed briefly in Chapter 7 of this thesis, when developing a reading of the inreach experiments through the theoretical distillery.

disclosed through being-with technical engagements, and is primarily social: “it refers to the social character of the world that comes to light through technical practice. Such a world is composed not solely of tools and artefacts, but of tools used with others and artefacts belonging to others. Technical engagements are not just technical but have an immediately and intimately social dimension” (Mitchum 1994: 276). Because of this immediacy and intimacy, Mitchum stresses the importance of taking a step back, in order to be able to recognize this situation, and make statements about it. This is what philosophy enables, distancing and articulation, and this is crucial to thought and the life-world of the embodied mind. Mitchum’s philosophy of being-with technology outlines three forms of the human-technology relationship under the following categories: *Ancient Skepticism*; *Enlightenment Optimism*; and *Romantic Uneasiness*.

Ancient Skepticism posits that “technology is bad but necessary”. This idea is legible in such stories such as the Tower of Babel, and Daedalus and Icarus. Mitchum’s account of the ancients point of view of technology is “an uneasy being-alongside-of and working-to-keep-at-arms-length. This premodern attitude looks on technics as dangerous or guilty until proven innocent or necessary – and in any case, the burden of proof lies with those who favour technology, not those who would restraint it” (Mitchum 1994: 283). The pre-modern argument that technology is bad but necessary “effectively limited rapid technical expansion in the west for approximately two thousand years” (Mitchum 1994: 289).

Enlightenment Optimism offers a “radically different way of being-with technology”. In this case, the burden of proof (as to whether technology is good or bad or indifferent) shifts from those who favour technology to those who oppose it. Mitchum outlines four interrelated arguments for the distinctly *modern* way of being-with technology: “(1) the will to technology is ordained for humanity by God or by nature; (2) technological activity is morally beneficial because, while stimulating human action, it ministers to physical needs and increases sociability; (3) knowledge acquired by technical closure with the world is more true than abstract theory; and (4) nature is no more real than artifice – indeed, it operates by the same principles.” This way of being-with technology remain part of many intellectual discourses, from Marxism to Public Policy and Education, and has been “the foundation for a Promethean unleashing of technical power unprecedented in history” (Mitchum 1994: 289).

Romantic Uneasiness led to the development of “the first self-conscious questioning – of modern technology”. Paradox is the hallmark of romanticism. It can be characterized by “a pluralism of ideas that constitutes a critical uneasiness: (1) the will to technology is a

necessary self-creative act that nevertheless tends to overstep its rightful bounds; (2) technology makes possible a new material freedom but alienates from the decisive strength to exercise it and creates wealth while undermining social affection; (3) scientific knowledge and reason are criticized in the name of imagination; and (4) artefacts are characterized more by process than by structure and invested with a new ambivalence associated with the category of the sublime.”

Table I summarises Mitchum’s account of three ways of Being-With Technology. This table will be referred to in the reading and telling of the inreach experiments as the author narrates the kinds of being-with technology produced through them.

<i>Basic Attitudes</i>			
<i>Conceptual Elements</i>	<i>Ancient Skepticism (suspicious of technology)</i>	<i>Enlightenment Optimism (promotion of tech.)</i>	<i>Romantic Uneasiness (ambivalent about tech.)</i>
<i>Volition (transcendence)</i>	<i>Will to technology involves tendency to turn away from God or the gods.</i>	<i>Will to technology is ordained by God or by nature.</i>	<i>Will to technology is an aspect of creativity, which tends to crowd out other aspects.</i>
<i>Activity (ethics)</i>	<i>Personal: Technical affluence undermines individual virtue. Societal: Technical change weakens political stability</i>	<i>Personal: Technical activities socialize individuals. Societal: Technology creates public wealth.</i>	<i>Personal: Technology engenders freedom but alienates from affective strength to exercise it. Societal: Technology weakens social bonds of affection.</i>
<i>Knowledge (epistemology)</i>	<i>Technical information is not true wisdom.</i>	<i>Technical engagement with the world yields true knowledge (pragmatism)</i>	<i>Imagination and vision are more crucial than technical knowledge.</i>
<i>Objects (metaphysics)</i>	<i>Artefacts are less real than natural objects and thus require external guidance.</i>	<i>Nature and artifice operate by the same mechanical principles.</i>	<i>Artefacts expand the process of life and reveal the sublime.</i>

Table I Carl Mitchum's tabling of Three Ways of Being-with Technology

2.5.4 Summary

The concept of occupying politics emerged through the embodied criticality of inhabiting CTVR and working with and alongside researchers there. The purpose of this set of theories and histories was to develop insights on the historical subjectivity of the occupation of engineering as a coefficient of technology. Engineering emerged out of the pluralism of Engine Science in the 17th century. This idiom expresses an array of cultural meaning and significance, and demonstrates the enmeshment of practices and theories as embodied and intellectual goings on in the world. Engineering thus began as a ‘method of ingenious invention’, and by virtue of this capacity became crucial to the development of technological science, the State and industry.

The occupation of engineering has been shown to be contradictory, and at times paradoxical, becoming stereotyped through mass-media and other political and economic affiliations as at once handmaiden and hero of the techno-scientific paradigm. Such tensions led to various critical and resistant forms of self-organisation and intellectual emancipation, through activism and protest, and through peer-education. The bi-polarity of engineering is echoed at a macro level from ideologies of technological change to technological politics. Such dichotomizing remains troubling today, with calls for a more general education (Williams 2002, Williams 2008). The principles upon which such reforms might be based are unclear, as the seemingly distinct relations between State and Industry continue to diffuse. Thinking with Carl Mitchum’s ways of being-with technology offers insight on the ideology of technological change as being resonant with Enlightenment Optimism, while Technological Politics seems to oscillate between Ancient Skepticism and Romantic Uneasiness.

Historically, self-questioning has been catalysed within the occupation of engineering, through experimental frameworks fostering thoughtful conversation and reflective awareness. The ‘Circle of Action’ developed by James D. Horgan, for example, sought to catalyse a sense that human values were essential to engineering and technological problems. The idea that technical experts should be able to take a step back, in order to be able to recognize the situation, and to make statements about it, reflects Carl Mitchum’s understanding of the meaning of philosophizing.

There is a sense in which the intellectual emancipation and “*revolutionary openness*” initiated throughout the 1970’s shifted towards a “*position of totalitarian foreclosure*.” The kind of “*micro political struggle for the liberation of desire*” advocated for by Félix

Guattari resonates with these calls for intellectual emancipation (Guattari 2009 (a): 164).

In the following sub-section the theories discussed thus far are brought together in an effort to develop a sense of how the theoretical distillery might support a reading and analysis of both the initial conditions of this research. developing a process of inreach with CTVR, and of the inreach experiments.

2.6 Summary of the theoretical distillery

This chapter worked to show that the theoretical distillery was prehended through embodied criticality and participant observation with CTVR. Its theories became drawn out during the intensive process of enacting inreach and became re-composed during the writing-up phase of research. It was because of a need to recall the initial conditions of research, as a kind of ground upon which to steady the writing process, that the theoretical distillery emerged. This process of returning to the beginning and moving forwards through the research practice is recognised by Félix Guattari as important way of producing analysis. He argues that *“analysis is not something which takes place after the terms and relationships of force are established, or after the socius is crystallized into various closed instances which remain opaque to one another: it participates in this very crystallization”* (Guattari 2009 (a): 160). Likewise, anthropologists Hallam and Ingold argue against developing “backwards” analysis in terms of the results of a research process, and advocate for analyses that read “forwards, in terms of the movements that gave rise to them” (Hallam and Ingold 2007: 3).

In this chapter it was shown that CTVR inscribed a hidden curriculum into its *Design for Change* proposal through the Education and Outreach program. The work of Charles and Ray Eames was recognised as a touchstone for enacting an imagined practice of communicating communications. CTVR was shown to have intuitively sought advice as to how this hidden curriculum might be catalysed and enacted. It was by this intuition that the author became involved, serendipitously, with the occupation of telecommunications engineering. By way of L.D.’s intuitive practice of ‘smuggling’, (a strategy for curating and mediating occupational difference), the author was invited to work as education and outreach assistant with CTVR. She was invited to embrace the hidden curriculum of Education and Outreach, to experiment, to get involved with the research of CTVR.

Over time, an ethico-aesthetic analysis of the work of Charles and Ray Eames was made in relation to CTVR's desire to communicate communications⁷¹. Through this re-reading of the Eameses' work the action and disposition of phronesis becomes recognised and named. Phronesis was intuited as a practice which both J.F. and L.D. shared, hence the Eameses' work resonated so strongly in between them. Much later, phronesis became understood as a valuable heuristic for sourcing and channelling hidden curricula. Thus, the "procession unconscious" (phronesis) of the hidden curriculum was considered to orient towards the formation of a subjectivity "open to an ethico-aesthetic paradigm", and in this way could be seen as catalytic of ways towards communicating communications (Guattari 2009 (a): 192). In other words, L.D.'s inscription of a hidden curriculum within the *Design for Change* proposal became re-thought as an action guided by phronesis and in itself catalytic of communicating communications. The 'smuggling' of support into the research centre becomes understood as an intuitive effort to generate other such actions.

The prehension and later understanding of the disposition of phronesis as a kind of knowledge operating in between craft (techne) and theory (episteme), became abstracted further and recognised as a dimension of transversality struggling to overcome an impasse of communication between vertical and horizontal organisation, and between dialectic and dialogic processes within the academic-industrial institution, by way of the communicating communications strand of education and outreach.

The combination of these open-ended movements and struggles (L.D.'s inscription of a hidden curriculum and subsequent smuggling of support via the author) served to catalyse conditions of occupational difference within CTVR, by way of a "*micro politics of desire*" (Guattari 2009 (a)). Each of the theories drawn through the theoretical distillery emerged through the embodied criticality of participant observation, which developed by way of the choreographic process of the inreach experiments.

The inreach experiments were political actions. Operating as a kind of 'contraband' within the CTVR, over time inreach enacted a politics of occupational difference through CTVR. This politics unfolded through an initial somewhat common practice of phronesis and through the subsequent development of a situated ethico-aesthetic criticality in relation with the context of CTVR. The actions of inreach, as will be shown through the rest of the thesis, become legible as a way for the author to inhabit the freedoms afforded by CTVR, through intra-action with CTVR. The

⁷¹ This is discussed further in Chapter's 4 and 5.

occupying politics of CTVR, as will be discussed further in the thesis, is impressed upon by a tradition of ambivalence or contradiction within the occupation of engineering.

Engineering, characterised by clichés of the handmaiden and the hero, is an occupation simultaneously expanding and disintegrating in continual response to the hybridizing techno scientific world it helps to rapidly co-construct. By introducing a hidden curriculum informed by artistic processes and values, L.D. intuitively ruptures this tradition of ambivalence.

This chapter has introduced the theories and concepts of the hidden curriculum, transversality and occupying politics of engineering in relation to and as emergent from the research context of CTVR. In Chapter 3, the initial conditions of this research are partially recalled by distilling the context of CTVR through the theoretical distillery.

3 Distilling CTVR

3.1 Introduction

In the previous chapter the theoretical distillery was outlined and discussed. It was emphasised that the theoretical distillery emerged through participant observation with CTVR from 2011-2014. It was shown how CTVR sought advice by way of artistic research practices in order to enact the hypothetical education and outreach strand known as Communicating Communications. The advice was sought out by L.D. on an experimental basis at first, later becoming extended into PhD research. CTVR's desire to learn with and from artistic research practices became theorized through the contemporary curatorial concept of smuggling (Rogoff 2013 [2006]). The author was smuggled into CTVR under the auspices of education and outreach research. Thus, a working relationship in between artistic and engineering research practices was catalysed through CTVR⁷².

The action of smuggling other occupational knowledges and different approaches to theory and practice came to be understood as part of CTVR's hidden curriculum. The work of Charles and Ray Eames acted as an allegory and muse for CTVR's hidden curriculum. It was through a critical and close reading of their work, in conversation with CTVR's aspirations to communicate communications, that the practice of phronesis began to crystallize as valuable to this problem. The philosophy of phronesis offered a way for the author to enact her occupational difference within CTVR and to open up communication in between the various other occupations and hierarchies at work through CTVR. In this way, it became understood that CTVR was developing an ad hoc *micro politics of desire* (Guattari 2009 (a): 164). Through the critical reflection yielded by the 'writing-up' process, CTVR's hidden curriculum became recognisable as a coefficient of transversality. The hidden curriculum for CTVR, inscribed in the *Design for Change* proposal, emphasised a principle of sharing

⁷² This PhD research was funded through CTVR and Science Foundation Ireland. This research would not have been sustainable without having been 'smuggled' into CTVR under the auspices of PhD research. It could not have been funded otherwise. In ways, this research was undertaken in order to set an official precedence for valuing and recognising artistic research practices within the techno-scientific research domain of academia. It was also undertaken in order to leverage possibilities for future research and practical learning that encompassed not only technical and theoretical knowledge, but also the kind of reflective deliberation and moral knowledge such as phronesis. The PhD framework was seen to ambiguously legitimize the place of art within the techno-scientific domain, as a mode of knowledge production and criticality. The trouble here was that the value of artistic research practices was not taken as given, and had to be proven through the research itself. In many ways, this becomes a part of the research inquiry. The research therefore demonstrates a struggle with these all-or-nothing stakes of recognition and validation, of developing cooperative, reciprocal and non-exploitative learning in-between occupations of art and engineering.

ways of knowing and ways of sharing through a micro politics of occupational difference.

In this Chapter, the aim is to show that this orientation, this hidden curriculum, was already convecting within CTVR prior to this research getting underway. By making this clear, it will be possible to show how this research became catalytic of this latent transversality within CTVR. The smuggling of occupational difference into CTVR catalysed a kind of micro politics in between occupations of art and engineering research, eventually giving rise to a more or less mutual experimental choreographic process of communication named inreach.

The initial conditions of research are distilled in this chapter by imaginatively re-reading two primary documents produced by CTVR. These documents are understood as 'collective enunciations' by CTVR, written as more or less collective expressions of the organisations research and goals. These artefacts are not treated as conclusive representations of CTVR, rather they provide a flavour of the ways in which the research organisation had been communicating communications, so-to-speak. In other words, they allow for a contrast to develop between earlier approaches to communicating communications taken by CTVR and with the later approaches developed experimentally through conversation between artistic and engineering research. In other words, these artefacts act as foils to inreach. The theoretical distillery provides a way of making a translation of them, offering glimpses into the way CTVR conceptualised the purpose of communicating communications prior to the authors interventions.

In section 3.2.1 the *Green Booklet* is discussed and in section 3.2.2 the *Design for Change* proposal is discussed. The distillation of these documents leads to the insight that CTVR was cultivating an imaginary of itself as a creative institution of learning, guided by principles of social democracy through the historical institutional personae of (a) the Bauhaus and (b) the Eames Office (via the film *A Communications Primer*). These imaginaries suggest a collective desire to operate according to 'a different institutional score', as Guattari would say. In sections 3.3.1 and 3.3.2 these imaginaries become translated through the theoretical distillery.

Finally in section 3.4 the concept of occupational difference is elaborated upon as a condition of micro politic creative struggle. Occupational difference was a name given by the author for prehensions of the ethico-political conditions of research within CTVR. This poetic term gave a name to the complex, unpredictable and unfamiliar

experience of the paradigms of aesthetics and techno science coming into relation and conversation with each other.

3.2 *Collective Enunciations*

This research does not claim to represent the multifaceted research and management structures and processes of CTVR. The ‘god tricks’ of totalizing objectivity (the view from everywhere) and of relativistic impartiality (the view from nowhere) are struggled against within this research, in an effort to practice a feminist objectivity of situated knowledges. Donna Haraway elaborates these terms and concepts as useful heuristics for developing embodied and critical knowledge-making and thinking research practices: “*Feminism*,” argues Haraway, “*loves another science: the sciences and politics of interpretation, translation, stuttering, and the partly understood*” (Haraway 1988: 589).

As a telecommunications research centre, CTVR offers an appropriate context for such an approach to storying situated knowledges. Haraway acknowledges the richness of such teletechnological contexts in her work when she says: “*here we find highly particular machineries for processing regions of the electromagnetic spectrum into our pictures of the world. It is in the intricacies of these visualisation technologies in which we are embedded that we will find metaphors and means for understanding and intervening in the patterns of objectification in the world – that is, the patterns of reality for which we must be accountable. In these metaphors, we find means for appreciating simultaneously both the concrete, ‘real’ aspect and the aspect of semiosis and production in what we call scientific knowledge*” (Haraway 1988: 589). CTVR, in this regard, offers a crucible for an alchemical engagement with knowledge, not as “*that dream science/technology of perfect language, perfect communication, final order*” but as a structuring and arranging process altogether partial and vitally communicative. The possibility of developing situated knowledges within such contexts are what Haraway advocates as “*better accounts of the world*” (Ibid). The “account” of CTVR storied through this thesis is “*ruled by partial sight and limited voice*” (Ibid). It is not an account that is partial for its own sake, “*but, rather for the sake of the connections and unexpected openings situated knowledges make possible. Situated knowledges are about communities, not about isolated individuals. The only way to find a larger vision is to be somewhere in particular*” (Haraway 1988: 590).

With this in mind, the story of CTVR developed here involves a close reading of two artefacts made by CTVR that demonstrate the “*joining together of partial views and halting voices into a collective subject position*” (Haraway 1988: 590). The first artefact is

a promotional booklet written by CTVR during its first phase of research, from 2004-2010. Because the booklet is titled simply as *CTVR*, it will be referred to as the *Green Booklet*. It was written with prospective investors from industry and academia in mind, as well as with prospective students and researchers in mind. The second artefact is the research proposal *Design for Change*. This proposal was oriented towards investors, explicitly *Science Foundation Ireland*. The future of CTVR depended upon the success of this proposal. The aim in this chapter is to develop a partial insight into how CTVR was communicating communications prior to the intervention of artistic research practices by the author in collaboration with L.D. and others. Moreover, the aim here is to develop a sense of CTVR's self-identity and ethos by making an archaeological study, so-to-speak, of these publications.

3.2.1 *CTVR Phase One [2004-2010] – Green Booklet*

The *Green Booklet* was produced at some point during the first phase of CTVR (Phase One: 2004-2009). As a publicity and information tool it positions the research centre as a hub where “universities, government agencies, and industry come together to work as a team and solve complex R&D problems quickly, by leveraging the combined expertise of all involved” (*CTVR circa 2007*)⁷³. As an amalgam of educational institutions, state agencies, and industry partners, *CTVR Phase One* declares its commitment to supporting the creation of a knowledge economy for Ireland: “Ireland’s evolution towards a knowledge economy is critically dependent on the creation and replenishment of a cohort of highly skilled researchers capable of driving innovation in key technology areas” (*Ibid*).

The knowledge economy has been understood more generally as “a useful framework for speaking of changes related to the production and distribution of knowledge in modern societies” (*Kahin and Foray 2006*)⁷⁴. At this time, CTVR describes itself as “on track to become a major force in global telecommunications”, citing its education and outreach program as the engine of this development: “CTVR is committed to contributing to the development of this human capital through its schools outreach programme and by making a strong impact on undergraduate and postgraduate programmes in its partner institutions” (*CTVR circa 2007*). CTVR’s emphasis was upon articulating a universalistic

⁷³ See Appendices: Chapter 2, pages 23-25, Figs. 11-13.

⁷⁴ The knowledge economy “is an economy in which much greater strategic importance is given to the allocation of resources in (a) R& D and other formal modes of knowledge creation; [b] The formation of human capital through education and training; [c] The management of information, knowledge, expertise through investments in codification and the building of social networks; and [d] The organization of markets of rights in knowledge.” From a knowledge economy perspective, Telecommunications and Information and Communications Technologies (ICTs) are “geared to the production, processing, and dissemination of knowledge and information, and their effective deployment is central to the challenge of advancing the knowledge economy”(Kahin and Foray 2006: 9-10).

framework in line with the knowledge economy to show how it would structure the conditions for research and development. Arguably, this was a strategic move in order to leverage investment and support in the research organisation. CTVR reflects an understanding of itself as a ‘general-purpose’ occupational organisation productive of powerful infrastructures that would increase productivity (from a market value perspective) and offer “*new opportunities to any knowledge-driven activity*” (Kahin and Foray 2006: 9)⁷⁵.

The knowledge economy, by and large, provides the framework for universalistic education, as well as research and development, in advanced capitalist societies. For example, in its *Agenda 2020* plan, the Science Foundation of Ireland, CTVR’s principal funding body, set out a vision of a “*preferred future, in which Ireland in 2020 is the best country in the world for scientific research excellence and impact*” (SFI 2013). The SFI imagines scientific research as an engine which “*powers an innovative and enterprising economy; creates high-value jobs; attracts, develops and nurtures businesses, scientists and talented people, and is connected and respected internationally*” (SFI *Agenda 2020*: 2). In line with SFI policy, *CTVR Phase One* strategically positions itself in relation to the universalistic curriculum proper of the knowledge economy. This is achieved largely through a use of key-words from the knowledge economy lexicon; ‘technology’ rather than specifically engineering; ‘human capital’ rather than students and researchers; ‘schools’ rather than education; ‘innovation’ rather than invention.

3.2.2 CTVR Two [2010-2016] – *Design for Change* [research proposal]

The *Green Booklet* is not comparable in scale to the *Design for Change* proposal. However, the purpose of re-reading the *Green Booklet* is to develop a sense of how *CTVR Phase One* was collectively articulating itself at that period, by and large through a kind of ‘branded’ language suitable to the knowledge economy lexicon. This *Green Booklet* is re-read as a foil for the *Design for Change* research proposal, just as both of these documents will be employed as a foil for understanding inreach. Whereas the *Green Booklet* articulated CTVR in terms of the knowledge economy,

⁷⁵ Needless to say, this is not a paradigm of knowledge that readily takes into account the situated knowledges of feminist objectivity articulated by Donna Haraway. It is therefore a paradigm which does not recognise, and is not perhaps even conscious, of different knowledges and the ways these might produce valuable and meaningful relations in the world. Everything under the knowledge economy paradigm takes on a tit-for-tat exchange relation – even the idea of ‘trust’, which is described as ‘social capital’. This research could easily be framed under the paradigm of social capital, but that it is committed to the paradigm of situated knowledges. The knowledge economy seeks to commodify relational practices and processes such as “emotional” or “cognitive trust”, by conceptualising these as disembodied abstract non-living relations that can be bought and sold in bottles, as if they really were “a form of glue that holds the constituent members of society together and permits them to function more productively in the economic sphere as well as in other interpersonal transactions where trust is beneficial”(Ibid). This is an entirely disembodied and profoundly alienating conceptualisation of life-force relations.

the *Design for Change* proposal, which outlined CTVR *Phase Two*, develops a language for the research organisation that is more idiosyncratic and particular to itself.

In the following sub-section, a closer reading of the *Design for Change* proposal is made in order to demonstrate how by 2010 CTVR was attempting to take hold of its own language, engaging, it could be said, with a poetry of naming so that the “*division of labour between the specialists of saying and the specialists of doing ceases*” (Guattari 2009 (a): 161). The *Design for Change* proposal is an example of “*When saying is doing*” (Ibid), and thus it becomes legible as a coefficient of transversality.

3.2.2.1 *When saying is doing...*

The *Design for Change* research proposal was made by CTVR to the Science Foundation of Ireland, in November 2010. In this proposal CTVR outlined its research focus: “*designing telecommunications networks for the future*”. In a neutral tone, proposal acknowledged that “*we live in a time of unprecedented change*” and that while “*we can extrapolate some trends and make educated guesses, we cannot predict exactly what lies ahead*” (Doyle 2010)⁷⁶. The key question underpinning CTVR’s research agenda at this time, therefore, was “*how do we design telecommunication networks to deal with the rapidly changing world in which we live?*” The *Design for Change* proposal implies, through a skilful use of repetition, that it already knows what the answer to this question will mean:

“*Answering this question will mean that networks of the future will be more robust to disruption caused by new applications, growing demands and changing user patterns. Answering this question will reduce the risks and increase the incentives associated with investment in future networks as our networks will be more durable and scalable. Answering this question will remove barriers to entry for new players and enable yet-unimagined applications and services*” (Doyle 2010).

Thus CTVR proposed that in order to *Design for Change* it must create “*optical and wireless networks with three distinctive properties... we must design networks that are evolvable, submissive and sustainable*” (Ibid). This language did not conventionally reflect the lexicon of the knowledge economy. While CTVR continued to speak to the knowledge economy, it did so more or less on its own terms. Reconsidered in this way, the *Design for Change* proposal becomes legible as a “*collective arrangement of enunciation*” (Guattari 2009(a)). It spoke of a desire without “*referring it to a subjective individuation, without centering it around a preestablished subject and previously codified*

⁷⁶ See Appendices: Chapter 2; page 21; Figure 8.

meanings” (Guattari 2009 (a): 161). Re-reading the *Design for Change* proposal demonstrates that CTVR had already at this time been undergoing an “*internal re-creation*” (Guattari 2009 (a): 182), a collective enunciation smoothed out by the rhetorical style of L.D.

The *Design for Change* proposal posited three heuristics for CTVR’s engineering research and design, properties that could act as an internal compass for the research centre. These heuristics were captured in the words ‘evolvable’, ‘submissive’ and ‘sustainable’. Networks designed with the evolvable property in mind “*will not quickly become the next legacy networks, as there will be smooth paths to future generations*” (Doyle 2010). Network design with the sustainable property in mind will “*have a persistent awareness of resource constraints such as manpower, energy, space, bandwidth, processing capabilities, storage, etc.*” (Doyle 2010). And Networks designed with the submissive property in mind, according to the *Design for Change* proposal will “*not be restricted by any one particular model of resource ownership and hence not limited by our current understanding of business models*” (Ibid). Re-reading the *Design for Change* proposal suggests that this meshwork of properties enunciated an implicit critique of and proto-alternative to of the knowledge economy lexicon. By taking responsibility for its own language, CTVR was beginning to draw power to itself⁷⁷. There are two terms which deserve a closer look, because they offer insight to CTVR’s latent dimension of transversality at work during this period. The first is the word ‘property’ and the second is the word ‘submissive’. These terms resonated with the artistic research practice, albeit on an unconscious level. A brief analysis suggests why.

3.2.2.1.1 Properties of Property

The word property can mean possession of some thing(s) or it can mean a quality or characteristic. In the context of the *Design for Change* proposal this word assumed a certain ambiguous authority. The word property referred both to the concrete infrastructure and to the quality of that infrastructure as it was imagined to perform: it was *evolvable, submissive, sustainable*. The idea that networks should “*perform*

⁷⁷ Of course, the *Design for Change* proposal was only one aspect of the assessment criteria for the SFI. A lengthy examination of the research organisations track-record as a research and educational centre was undertaken over a number of days in November 2010. This involved many researchers and administrators within CTVR making presentations on their work and its impact educationally, in terms of state-of-the-art, and in terms of industry and the economy. There is no intention to unwittingly privilege language here; but it was through language that the author began to engage with a new culture. Language offered a partial connection with the occupation of telecommunications engineering. The language appears somewhat mysterious and alchemical, evocative of a horoscope in many ways.

themselves into existence” was often mooted amongst CTVR’s researchers and management. The properties of these future networks (evolvable, submissive, sustainable) were very general, but also somewhat ambiguous. They were resonant properties that were suggestive of a feminist accountability at work (Haraway 1988: 588).

As metaphoric evocations of the communications networks of the future, these properties offered a *“means for appreciating simultaneously both the concrete, ‘real’ aspect and the aspect of semiosis and production in what we call scientific knowledge”* (Haraway 1988: 589). The language of the *Design for Change* proposal signalled an accommodation towards another kind of knowledge paradigm, quite other than that of a hegemonic transcendent objectivity *“in the service of hierarchical and positivist orderings of what can count as knowledge”* (Ibid: 580).

3.2.2.1.2 A principle of submission

In the *Design for Change* proposal, the word ‘submissive’ queered the idea of what network design could be. CTVR’s former Executive Director (P.S.) recalled that the choice of this word was *“very deliberately to be provocative, and to make people stop in their tracks and think... submissive? [It was] very deliberately chosen to make people stop and hopefully make them ask someone, what do you mean by that?”* (Foley 2015) As one of the centres key-words, it was printed on much of the publicity material, banners and notebooks, etc.

P.S. noted that the term was used performatively, as a kind of conceptual tool, by L.D. in direct interaction with researchers, business people, policy makers, industry partners, and so on: *“I think she was fully sure of the word... I think that she would have decided to use it, and the conversation would have been her contextualizing it and explaining it in such a way that it made sense... it comes out of her interactions with people in all sorts of different spheres. And so when she makes that connection it becomes firm, it’s fused, for the time that it’s in use...”* (Foley 2015).

This excerpt from a conversation between the author and P.S. suggests that both a particular use of words and CTVR’s network design properties were used deliberately as queer tools to open up thinking and dialogic with CTVR’s many and varied interlocutors. The *Design for Change* proposal is used to enact a material-semiotic agency that is undoubtedly queer. Taking up Shannon Winnubst’s theory that ‘queer’ means *“recuperating a more general sense of freedom”*, the oral performativity of the design properties underpinning CTVR’s research by CTVR’s

management can be interpreted as a dynamic instantiation of 'queer spaces', "*where meaning is not preordained as a useful or recognisable telos, and the possibilities of other sorts of meaning... are still viable*" (Winnubst 2006: 9).

CTVR's normative hierarchical management structure, regardless of the transversal communications at work within the organisation, means that L.D. represents and performs the authoritative discourse of the research organisation. P.S. noted that while she herself had never been questioned about the meaning of the word, L.D. was very deliberately engaging with this language to disrupt expectations and assumptions sedimented into a management structure of typically white, male, European, techno scientific privilege (Haraway 1997): "*I think particularly when a woman says something like 'submissive' it's so, it's so loaded and quite a potent word as well. I mean, it does have a very definite sexual connotation to it... and so, I think that it is very powerful when L.D. uses it*" (Foley 2015).

The word *submissive* was seen to have power primarily as a spoken and performed word, and this suggests that it functioned as an '*inspiring principle*' for CTVR. For political theorist Hannah Arendt, "*the inspiring principle becomes fully manifest only in the performing act itself*" (Arendt 2000: 445). For Arendt, the principle of an action is inexhaustible and universal, whereas the motive of an action is bound to the particular person or group. The three properties of CTVR's network design, therefore, might be understood as principles rather than motives. In comparison with CTVR *Phase One*; whose design agenda was largely articulated in terms of the knowledge economy, and seemed to be broadly motivated by the imperatives of this paradigm; the *Design for Change* proposal for CTVR *Phase Two* seemed to be, in Arendt's terms, "*inspired, as it were, from without*" by a *principle*⁷⁸.

CTVR's 'network properties', and in particular the word *submissive*, served as a hidden curriculum for the author as she developed processes of communication, via the concept of inreach, with CTVR. The ambiguity and complicated meanings of the word 'submissive' was embraced, and explanation for its precise technical application to the work of network design was not sought out. Instead its meanings became absorbed through the relational flow of communication in between the techno-scientific and aesthetic paradigms operating through CTVR. This word resonated with the author's experience as a researcher of the aesthetic paradigm, it struck a chord. The word *submissive*, therefore, unconsciously served as a partial, and not

⁷⁸ Arendt gives examples of principles such as *honour* and *love of equality*; but also *fear* and *distrust*. These principles resonate with Jane R. Martin's theory of the Hidden Curriculum as a 'learning-state', a disposition or orientation towards the world.

quite reliable, heuristic for the processual design of the inreach experiments. It became a choreographic object.⁷⁹ But where had this word come from? How was it that it came to stand for a property or principle of CTVR's research agenda?

The answer is through L.D.'s existing process of smuggling between her own epistemic domain of telecommunications engineering and the domains of artistic research. Early on in the research, it was disclosed to the author that the word 'submissive' had originated through a dialogic sharing of research material between artist, design theorist, and activist R.B. and CTVR's Director, L.D.⁸⁰ This sharing of materials and knowledges across the fields of techno scientific and aesthetic paradigms, through PhD research supervision, had catalysed a latent dimension of transversality within CTVR. L.D. acknowledged that this nascent practice had contributed directly to the formation of the *Design for Change* proposal and to CTVR's research agenda as a whole. This practice of smuggling was either not recognised or not fully valued/understood by her colleagues, and therefore not emulated, even though its positive effects were accepted (Foley, Doyle et al. 2010).

3.2.3 A Hidden Curriculum in formation...

Re-reading the publications from Phase One and Two of CTVR offers the insight that there was a latent process of transversality at work within CTVR prior to the development of inreach. The *Design for Change* proposal becomes legible as a nascent *collective arrangement of enunciation* informed by thinking developing out of artistic research (R.B.). This re-reading of the *Design for Change* proposal provides two insights into CTVR's nascent hidden curriculum, which will be discussed in more detail below.

Firstly, there was a desire to emulate paradigms of embodied criticality within CTVR that embraced concepts of the technologist or engineer as '*modest inventor*' (de Laet and Mol 2000) and '*modest witness*' (Haraway 1988). It is the queer property/principle of 'submission,' adapted by CTVR in the *Design for Change* proposal that indexes this desire. Secondly, there was an desire inscribed within the *Design for Change* proposal to augment communication within the research centre in two ways: (a) by proposing a practice of collective reflective awareness and enunciation amongst CTVR

⁷⁹ This idea will be discussed more fully in the experimental chapters 4 and 5.

⁸⁰ Ralph Borland is a South African artist who completed his PhD thesis through CTVR in 2010. L.D. was his supervisor. The disclosure that the word submissive had emerged through a research conversation between L.D. and R.B. was made in December 2010, at the beginning of this research, also through a research conversation, this time in relation to the development of the *communicating communications* strand of Education and Outreach.

researchers and interlocutors, through *Workpackage E⁸¹*; and (b) by working with and learning from artistic researchers and practitioners, starting with the Eameses, to develop ways to communicate communications.⁸² A brief summary of these two desire-lines are traced below:

3.2.3.1 A serviceable (or even submissive) inventor...

The concept of submissive networks was adapted from a paper written by de Laet and Mol in 2000 entitled *The Zimbabwe Bush-Pump: Mechanics of a fluid technology*. In their paper they attempt to parody figures of techno-scientific hero-narratives in an effort to propose different ways of thinking and imagining design and how design is produced. The figure of the ‘modest inventor’ discussed in their paper is given the position of a ‘non-classical hero’; a figure who renounces all claims to “heroic authorship”. An example of ‘heroic authorship’ might be a patent.

The ‘modest inventor’ described by de Laet and Mol was the inventor of the Zimbabwe Bush-Pump. This figure is described as “...fluid, dissolving into his surroundings. The one kind of activity which he firmly stands for is attending, being attuned, and adapting to what happens to the Bush-Pump in the world-out-there” (de Laet & Mol 2000: 226). There is a certain aspect of de Laet and Mol’s vision for techno-scientific design that resonated with CTVR’s aspiration, the idea that “the success of a technology does not necessarily depend on an engineer who masters the situation and subtly subdues everyone and everything involved” (de Laet and Mol 2000: 227). Here, de Laet and Mol are playfully refiguring the ‘modest witness’ of early scientific discourse outlined by Steven Shapin and Simon Schaffer as “a modest man” whose “narratives could be credited as mirrors of reality” and whose “reports ought to make that modesty visible” (cited in Haraway 2004: 221). Such acts of refiguration and queering appealed to L.D. and the refiguration of the gendered and power-laden term ‘submissive’ became a rhetorical tool in the composition of the *Design for Change* proposal. Thus, through conversation in-between artistic and engineering research, via PhD supervision, CTVR were engaging in what Haraway refers to as “the project of materialized refiguration” as agents in the “worldly projects of technoscience and feminism” (Haraway 2004: 221).

Refiguring language and figures, as modelled by de Laet and Mol, resonated with CTVR’s desire to refigure models of resource management, ownership and organisation within the political field of telecommunications. The figure of the ‘modest inventor’ harboured the potential to broker ways of organising networks

⁸¹ See Appendices: Chapter 3; page 29; Figure 17.

⁸² See Appendices: Chapter 3; page 30 and 31; Figs. 18 and 19.

that could be more flexible and adaptive to local conditions and needs. de Laet and Mol proposed that “A Serviceable (or even submissive) inventor may help spread technologies just as well – or even better” (Ibid).⁸³ Inspired by this idea, L.D. coined the concept of ‘Thinking Submissive’ and integrated it into the collective enunciation of the *Design for Change* proposal (Doyle 2010: 2).

CTVR’s intention to design submissive networks was meant to “ensure that they [networks] are not biased towards a particular resource ownership model and that they are capable of supporting multiple and changing models of ownership. The submissive property is as much about a mindset as it is about a set of technologies (though of course specific technology challenges must be overcome to support this mindset). We therefore strive to ensure that there are no unnecessary rule-setting or resource-labelling for specific purposes within the networks to decouple the business model from the network architecture” (CTVR 2010: 12).

The *Design for Change* proposal went on to give examples of how the “submissive mindset” could be enacted. For example, in the optical domain of telecommunications provision the proposal argued that “there should be no privileged position for connection to the optical network.”⁸⁴ This would mean that any one, whether a single person or a corporate entity, could connect to the network equally. The proposal noted that the idea of ‘equal access’ was “in complete contrast to the status quo” (Doyle 2010). Another example, this time in the wireless domain of telecommunications provision, argued that “Spectrum should not be dedicated in advance for use by particular services or technologies”⁸⁵. The proposal noted that the natural resource of electromagnetic spectrum, as it was managed and used at that time, was based on a “command and control approach that see international bodies or national regulators stipulate which bands are used for which services using which technologies” (Doyle 2010). In other words, spectrum was treated like land (or like water, increasingly), divided up according to its status as either a property or a commons.

The *Thinking Submissive* mindset called for two changes. Firstly, for critical reflection in the field of telecommunications industry and research about how resources were

⁸³ In relation to telecommunications, it is perhaps Tim Benners-Lee who might best tally with such an idea. He invented the World Wide Web, but did not patent his invention, thus allowing it to spread and proliferate different social, economic and political paradigms.

⁸⁴ The optical network refers to the telecommunications infrastructure that supports the encoding of signals onto light in order to transmit information, for example through fibre-optical cables, or in earlier evolutions through copper wires. Optical Networks depend upon lasers, LED’s, Fiber-Optic Cables, Legacy copper based infrastructures, etc.

⁸⁵ Currently, electromagnetic spectrum is strictly regulated, with certain bands assigned to particular incumbents such as the military or commercial entities such as mobile phone operators.

currently being conceptualised, shared and valued, how they became divided up and distributed under different models of ownership or via the commons. Secondly, the *thinking submissive* mindset proposed that these models of ownership could be re-imagined and distributed more equally and for the fair use of all interested parties and persons while offering the concept of ‘submissive invention’ as a way forward. But such an abstract tool would require the field to re-figure itself through individuating and self-educating processes. This was indeed quite a challenge.

Even though the *Design for Change* proposal put forward the radical concept of ‘*thinking submissive*’ as a way to design and implement networks, the tone and structure of the *Design for Change* proposal remained tethered to the cool authority of technical writing, a legacy of the 17th century modest witness. In the tradition of experimental scientific discourse, the modest witness was “self-invisible” in order to serve as the “*legitimate and authorized ventriloquist for the object world, adding nothing from his mere opinions, from his biasing embodiment*” (Haraway 2004: 224). As Haraway explains, “*This self-invisibility is the specifically modern, European, masculine, scientific form of the virtue of modesty*” (Haraway 2004: 224). The logic of self-invisibility acts as a kind of currency of epistemological and social power.

Haraway, however, refigures the modest witness so that its service is “*to make a difference in the world, to cast our lot for some ways of life and not others. To do that, one must be in the action, be finite and dirty, not transcendent and clean. Knowledge-making technologies, including crafting subject positions and ways of inhabiting such positions, must be made to be relentlessly visible and open to critical intervention*” (Haraway 2004: 236). Haraway refigures the 17th century modest witness as a material-semiotic agent of partial truths, implicitly invoking the telecommunications engineer as such a figure by claiming that “*The modest witness is the sender and receiver of messages in my email address... a figure in the narrative net... which works to refigure the subjects, objects and communicative commerce of technoscience into different kinds of knots*” (Haraway 2004: 221). Re-reading the *Design for Change* proposal, enriched by materials from participant observation with CTVR, reveals how the adaptation of the concept of submissive invention was made and employed as a rhetorical tool. But it also throws up a contradiction that plagues the occupation of engineering, a double-bind.

Just as the *Design for Change* proposal enacted a refiguration of the 17th century modest witness through its tender concept of ‘*Thinking Submissive*’, it continued to articulate its vision according to the conventions of technical writing, conditioned so thoroughly by the “self-invisibility” of “specifically modern, European, masculine,

scientific form". The radical content of the *Design for Change* proposal remained hidden in many respects by the dominance of the narrative structures of modernity. Thus, the *Design for Change* proposal can be read as an institutional artefact that embodies the split agency or double-bind of CTVR, but also indicates a struggle, in the Guattarian sense, for internal recreation and individuation. This aspect will be discussed briefly in the next section.

3.2.3.2 'What if...' we started communicating communications?

In the *Design for Change* proposal, Work package E was outlined as "the task in which the CTVR team sets all of its work in context" (CTVR 2010: 32). This workpackage was described as a forum for discussion and analysis. The aim of Workpackage E was to form a platform for CTVR researchers to "articulate the advances they make in terms everyone understands". This can be understood as a feminist injunction to spell out the material-semiotic agents at work in the research, and implies the refiguring of the historical 'modest witness' of scientific discourse.

Because of the multi-disciplinary nature of CTVR, the proposal stressed that "making communication between different research teams clear and understandable is an important part of our mission". This work package aimed to develop an analysis of CTVR's research by mapping the "complex relationships between the network architecture, the technologies deployed in the architecture and the ability of the network to withstand and embrace change" (Doyle 2010). In this regard, there was an openness to exploring "new metrics to capture how evolvable and submissive our networks are", suggestive of a ground up research process. The four key task of Workpackage E were: (a) To develop metrics that best suit the analysis; (b) To develop 'What If?' scenarios to think alternatively about research problems and solutions. e.g.: "What if all data is at the edges?" or "What if there is no privileged point of connection for any user [of the network]?"; (c) To develop "non-traditional visualisation techniques that communicate our findings"⁸⁶; and (d) To further identify "opportunities for cross-fertilization of techniques and ideas across the optical/wireless domains."

Workpackage E presented a set of principles according to which a set of guidelines or scores for 'continuous collective analysis' could potentially be enacted. By re-reading

⁸⁶ In relation to developing "non-traditional visualisation techniques", the workpackage states: "one of the Ph.D. students on this task will be focused on this aspect of the work. In fact this also feeds into our outreach initiatives..." (CTVR 2010: 32) This research effectively emerged out of the vision for Workpackage E, though this wasn't realised at the time. The present author was hired initially by CTVR to quickly develop visualisations of metrics, graphs, that would demonstrate facts about CTVR but in a non-typical way. The shared stakes of these visualisations was the success of the *Design for Change* proposal.

this workpackage through the theoretical distillery it becomes clearer that CTVR's management could see the importance of deeply re-figuring the traditional modes of research and discourse in the field of telecommunications. *Workpackage E* subtly inscribes a priority for an embodied feminist criticality of techno scientific research within CTVR, though it does not acknowledge the difficulty of preparing or enacting such practices.

The task at the heart of *Workpackage E* made implicit sense to the author, when she read it first in 2010. It was legible as a kind of open score for CTVR to follow, a heuristic open to creative possibilities. The constituent parts of its score were accessible to her and made sense: to discuss technology; to analyse relationships supported through the existing network architecture; both at a technical and social level, to diagram these discussions and analysis. The overall purpose and intention of the workpackage seemed to be to support communicative practices throughout the organisation. Or in other words, transversality.

The *Design for Change* proposal structured a set of “creative objectives” through Workpackage E and through the education and outreach strand called Communicating Communications. Both of these tasks implicitly proposed to reterritorialise artists as material-semiotic agents within CTVR. Félix Guattari argues that such reterritorialisations can be understood “in relation to the increasing uniformity of the life of individuals in the urban context” (Guattari 1995: 131). The widespread commodification of art attenuates and disguises the fact that “artistic cartographies have always been an essential element of the framework of every society”, and Guattari flatly asserts that for this reason “intellectuals and artists have got nothing to teach anyone... they produce toolkits composed of concepts, percepts and affects, which diverse publics will use at their convenience” (Ibid: 129).

Thinking with Guattari here, the inscription of the work of Charles and Ray Eames into the *Design for Change* proposal can be understood as the beginning of a process of modelling *communicating communications*. CTVR's expressed interest in their work was located in (a) “the processes they used to understand complex ideas in communications”, and (b) “the techniques they used to convey their ideas”. Thus, it is possible to say that for CTVR, and L.D. in particular, the ‘processes’ of the Eameses correlated to their subjectivity, their ongoing way of being-in-relation with the world around them, while the ‘techniques’ used by the Eameses correlated to the ‘toolkits’ they produced through the collective enunciation of their subjectivity in their work⁸⁷.

⁸⁷ In Chapter 4 it will be shown how one of their ‘toolkits’, the film *Blacktop*, was analysed and adapted as part of the first *inreach* experiment, *Room 3.17*.

The transversality emergent through the *Design for Change* proposal is legible in the where CTVR collectively enunciate the ambitious intention to re-figure organisation and communication in the field of telecommunications research. *Design for Change* partially disrupts the traditions of collective life within a techno scientific research paradigm that has typically been “conceived according to rigid schemas, to a ritualization of the quotidian, a regular and terminal hierarchization of responsibility” (Guattari 2009 (a): 181). What it attempts is a subtle yet radical re-figuration of research practice for CTVR, what Felix Guattari would call the composition of “a completely different institutional score” from conventions, traditions, habits and biases.

Thus, the *Design for Change* proposal can be understood as a catalyst for communicating communications as a process of internal recreation and refiguration for CTVR

3.3 A completely different institutional score...

The submissive property of CTVR’s network design emerged through conversation and research exchange between engineering and art. The action of incorporating the word into the *Design for Change* proposal was referred to as ‘reverse mapping’ L.D.. CTVR’s research was described to the author by L.D. as typically future oriented, but it was also said that in the process of solving a specified problem or completing a clearly delimited task it could become so intensely focused, as to be almost blinkered. Nonetheless, its day-to-day discourse tended to be pragmatic and diagrammatic. And while engineering involved action it was not necessarily conscious of the principles underpinning its actions. When a more general reflexive or conceptual analysis of CTVR’s research was sought out, for example, when distinguishing the properties of CTVR’s network design, it was seen to ‘reverse map’ these principles by the light of action elsewhere. An example of this ‘reverse mapping’ was provided in earlier sections on the theory of de Laet and Mol’s serviceable and submissive inventor⁸⁸.

A similar reverse mapping became legible when re-reading *the Green Booklet* from CTVR *Phase One*, specifically in relation to the formation of CTVR’s visual identity. The analysis of this ‘reverse mapping’ demonstrated, on the one hand, a similar

⁸⁸ Much the same can be said of artistic practice; rarely are the processes and principles of the action tracked and theorized, unless this is a self-conscious and deliberate focus of the work of art. Such practice led theorizing is not strongly recognised as part of the discipline of art or engineering occupations.

tendency for CTVR to enunciate research in terms of market and industry expectations and demands; and on the other, a more ingrained problem of non-recognition (or non-valuing) of the communicative propensity of engineering discourse, for example the everyday practice of diagramming.

In CTVR *Phase Two* it's been shown that there was a more pronounced orientation towards continual collective analysis (occupational self-awareness and criticality) and upon communicating communications, and this was suggestive of a latent transversality. The re-figuration of engineering research as a practice of modest invention found an outlet through CTVR's education and outreach program. Donna Haraway's assertion that "*Knowledge-making technologies, including crafting subject positions and ways of inhabiting such positions, must be made to be relentlessly visible and open to critical intervention*" (Haraway 1988) was being enacted through the Communicating Communications strand. The feminist objective of these reorienting processes can be understood as an effort to continually enact, as Guattari would say, "*a completely different institutional score...*" for CTVR, through the subtle inscription of a queer hidden curriculum.

3.3.1 CTVR Phase One – reverse mapping the Bauhaus

The formation of CTVR's logo demonstrates how 'reverse mapping' worked, and shows how it served to disguise the accident of its own emergence. The logo for CTVR was devised during a planning meeting between CTVR's lead researchers, as they tried to come to terms with the proposed research programme and how it could "*fit together*". During a conversation with the author L.D. recalls how the idea for the visual identify emerged through the discussion at this meeting: "*The idea came from a diagram that was drawn to capture the different areas in which CTVR was focused. There were four thematic areas in total. Three of them were represented by concentric circles and the fourth was represented by a triangle-like shape cutting across these three circles, to capture the fact that this fourth area was interdisciplinary in nature... It was drawn by a guy called B.C. from Tyndall, in Cork.*"⁸⁹ L.D. goes on to say that it was during this meeting that D.o.M.⁹⁰, "*recognised that a symbol from a specific Kandinsky painting looked like an abstract version of [B.C.'s] diagram and hence suggested that this symbol be the logo.*"⁹¹

The painting in question was a replica of Wassily Kandinsky's work *Jaune, Rouge, Blue* (1925) that hung in a lobby area of one of CTVR's office spaces at Dunlop Oriel

⁸⁹ Brian Corbett.

⁹⁰ Dónal O'Mahony was CTVR's Director from 2004-2009.

⁹¹ See Appendices: Chapter 3; page 32 and 33; Figs. 21 and 22.

House. The genealogy of the CTVR logo is valuable because it offers an insight on the contradictory handmaiden-hero subjectivity that has historically tended to be operative within the occupation of engineering. Instead of refining B.C.'s diagram and articulating the principle at work within it, so that an authentic logo for CTVR might be developed, the logo was claimed to have been directly adapted from the Kandinsky painting. A small plaque was subsequently made to narrate this story, which made a direct (rather than indirect) causal connection between the painting and CTVR's philosophy⁹². Such causality was in fact untrue to the reality of the creative process.

The first section of the plaque, which presents the title of the painting and its date, reads as follows: *"Kandinsky, painter and accomplished musician, is widely considered to be one of the earliest pioneers of modernism in art. He taught courses in analytical drawing and colour at the world famous Bauhaus Design School in 1922. The Bauhaus founder, Walter Gropius, called for greater cooperation between the industrialists and engineers on the one hand, and the artist or designer on the other."*

Quite evident in this potted history is a veneration for and valorisation of the 'pioneer' and the 'founder' figure – traditional hero's figures of modernity. The second half of the plaque goes on to set up an analogy between these heroic figures and CTVR: *"CTVR draws inspiration from this Bauhaus philosophy by applying the multidisciplinary skills of its research team to a range of important problems that are relevant to industry. The centre's logo represents the inter-communicating research strands within CTVR and is based on a figurative leitmotif that appears in a number of Kandinsky's works."* The authentic diagram generated through the actual discussion about the research centres priorities becomes written over by an idealization of the Bauhaus school (Bradley 2007)⁹³.

Moreover, the plaque suggests that CTVR's research is exclusively tailored to address industry problems. The opportunistic analogy with the Bauhaus only serves to distort CTVR's living research philosophy and its own authentic processes of research and communication produced through a particular kind of dialectic

⁹² This might be described as an *engineering fiction*.

⁹³ The Bauhaus was founded in Germany in 1919 *"as a school for a new art in a spirit of utopian optimism. As Oskar Schlemmer wrote in a flyer promoting the first Bauhaus exhibition in Weimar in 1923, 'The Staatliches Bauhaus, founded after the catastrophe of the war, in the chaos of the revolution, and in the era of the flowering of an emotion-laden, explosive art, becomes the rallying-point of all those who, with belief in the future and with sky-storming enthusiasm, wish to build the 'cathedral of socialism'"* (Bradley and Esche 2007: 467). The second director of the Bauhaus, Hannes Meyer was *"skeptical of the artistic direction of the Bauhaus, and in his first speech to the students as director he had asked 'Will our work be directed inwards or outwards? Shall we turn our attention to the needs of humanity, and collaborate in building a new way of life, or shall we become an island..."* (Ibid.)

discussion and diagram. What was overlooked in this scenario was CTVR's diagrammatic ability to self-articulate. It would have been possible for B.C.'s diagram to have been refined and abstracted into a logo, and for the actual discussion of the lead researchers to have been linked with it in some way. This recognition, however, reflects the author's awareness of and trust in the possibility of creative processes. It is easy for the author to recognise this possibility because of her familiarity with and valuing of such processes. Having said that, the question of self-recognition and reflective self-awareness is a patterned problem for occupations of both artistic and engineering research.

3.3.2 CTVR Phase Two – reverse mapping *A Communications Primer*

With the shift in language and conceptualisation of design properties developed through the *Design for Change* proposal, the problem of critical consciousness began to iterate through Workpackage E and Communicating Communications⁹⁴. The work of Charles and Ray Eames was made central to the Communicating Communications strand of CTVR's education and outreach program. Their film *A Communications Primer* (1953) was inscribed into the proposal as a model for CTVR to think with and learn through. The film-essay form was thus insinuated as a model for communicating communications, and was read as such by the author. The 'reverse mapping' of *A Communications Primer* through the research organisation was an important catalyst of the inreach experiments. The story of this catalysis becomes the purpose of this thesis, as it attempts to provide a language for an embodied experience of occupational difference within CTVR and the coming into relation of artistic and engineering research.

3.4 A micro politics of occupational difference

Occupational difference was a name given through practice for the coming into relation of paradigms of aesthetics and techno science, but also for the coming into relation of difference and sameness. The term was coined as a form of micro-poetry – occupational difference – a poem in and of itself, speaking to the situation of the research. This is Audre Lorde's poetry of naming, where "*poetry is the way we given name to the nameless so it can be thought*". Occupational difference was not a theory, it was a conceptual tool, a kind of walking stick for navigating a way of embodied

⁹⁴ The integral and idiosyncratic diagrammatic literacy of telecommunications engineering remains under-acknowledged in *Workpackage E*: "We will...use mind-mapping and advanced cognitive mapping techniques to capture the interplay between the elements of the network. We see great opportunities here for using non-traditional visualization techniques that communicate our findings..." The tendency was to turn outwards towards occupations deemed to be qualified to communicate in non-technical ways, so-to-speak (Doyle 2010:32).

criticality with CTVR. A micro politics of occupational difference, then, begins with “the immediate, daily, individual preoccupations, yet remains connected to what happens at the social level, and even, why not, at the cosmic level. An ecological sensitivity also means a preference for a vision that is at the same time molecular and worldwide in scope” (Guattari 2009: 138). Occupational difference named the territory in which inreach was being invented with CTVR. The process of inventing or articulating inreach can be understood as an improvised and collective enunciation, a micropolitical process that actually depends upon conditions of occupational difference.

The inreach experiments emerged out of the hidden curriculum for CTVR that was constituted by the confluence of the techno scientific and aesthetic research paradigms. Communicating communications was the engine of this relationship in the beginning, and the difficulties with this were not in short supply. The against-the-grain and queer actions operating through the *Design for Change* proposal meant that it was difficult to consciously communicate about what was desired, what was required, what was to be done, and what was already being done to enact communicating communications, and why?

For a stranger, as the author was, the desire-lines of *Design for Change* were such that could only be glimpsed at . Re-reading the proposal through the theoretical distillery demonstrates that there were two modest witnesses in force, the one teleological, traditional and modernist, and the other advocating a feminist techno science. It is only upon re-reading *Design for Change* that the reality of these struggling figures becomes articulable for the author. Initially these forces were merely felt as psychosomatic tensions within CTVR.

Inreach came out of a need to work with the invisibility of these tensions, and to develop a micro political struggle within CTVR. The concept of communicating communications became a useful channel for this effort, and gradually inreach became a catalyst for processes of transversality to strengthen within CTVR. Félix Guattari believed that “a concept is only worth the life one invests it with. Its function is less for the purpose of guiding representation and action than of catalysing the universe of reference that frames a pragmatic field” (Guattari 2009 (a): 192). Inreach emerged out of prehensions of CTVR as a conceptual tool for thinking and imagining micro political action. Gradually and through more or less collective actions inreach became a choreographic process that could navigate conditions of occupational difference in order to produce hybrid communications. The invention of inreach is recalled in

Chapter 4, while the choreographic process of the inreach experiments are recalled in Chapters 5 and 6.

3.5 Summary

This chapter has developed a partial and particular analysis of the initial conditions of this research by re-reading two of CTVR's institutional artefacts, the *Green Booklet* and the *Design for Change* proposal. The purpose was to develop an understanding of how a latent dimension of transversality was already informing the production of a hidden curriculum for CTVR, prior to the intervention of the author's artistic research. The need to articulate such a subtle point relates back to the habit of technical writing to produce causal relationships. The strong narrative of scientific discourse would be to argue that the author, by virtue of her artistic practice, caused CTVR to communicate communications. This chapter has outlined that such a change was already underway within CTVR, though it was unable to take responsibility for such a subtle yet radical re-orientation. In this case, artistic research practices can be understood as a decoy for an internal desire within CTVR for "*internal re-creation*" (Guattari 2009 (a)), a desire to articulate a more coherent and less contradictory basis for engineering research.

Through the collective enunciation of the *Design for Change* proposal, CTVR was shown to be asserting its own authority and authenticity through a queer use of language in an effort to enlarge its own freedoms within the techno scientific paradigm. The submissive thinking design approach and the catalysis of occupational difference through the *Design for Change* proposal contributed to the formation and enactment of a hidden curriculum for CTVR founded upon the open and poetic concept of communicating communications.

The 'reverse mapping' of historical design institutions; the Bauhaus, and less directly the Eames Office; while problematic, nonetheless catalysed a minor imaginary for CTVR as an organisation seeking re-creation while fostering and sustaining itself as a community of occupational difference.

In the following chapters it will be shown how the choreographic process called inreach emerged through CTVR's minor hidden curriculum. inreach echoed and amplified the queer instantiations and reverse mappings articulated through the *Design for Change* proposal through the experiments *Room 3.17* and *Engineering Fictions*. inreach gradually becomes translated, through the theoretical distillery, as a choreographic process which sets up and facilitates dialogic situations within CTVR.

Thus, in the next chapter the invention of inreach is recalled and the inreach experiments are introduced.

4 Introducing inreach: Two Experiments

4.1 Introduction

In Chapter 2 the theoretical distillery was introduced. It was emphasised that the theories had emerged from the artistic research practice following an extended period of participant observation with CTVR⁹⁵. The theoretical distillery was composed out of the experience of participant observation, which involved a choreographic process of inreach experiments, which are being introduced in this Chapter⁹⁶. The reflexive and reflective process of this research involved thinking through the experiments and drawing out patterns of concern, subsequently seeking out theories that resonated with these patterns. The purpose of assembling the theoretical distillery was to support (a) a re-reading of the initial conditions of the context of research, and (b) to support an analysis and translation of the choreographic process of inreach and the experiments. Hence the concepts and theories of transversality, the hidden curriculum and occupying politics were drawn together and assembled into a theoretical distillery.

In Chapter 3, the theoretical distillery was employed to re-vision the initial conditions of the context, i.e., to develop a reading of CTVR just prior to the beginning of this research. In the *Design for Change* proposal, CTVR (and in particular L.D.) was shown to have been advocating for processes of “*internal re-creation*” (Guattari 2009 (a): 181) suggestive of a latent transversality at work. By making a close reading of the *Design for Change* proposal it was possible to see how it was informed by a conceptual and poetic use of language. This language marked out the emergent and particular design philosophy of CTVR (e.g., *Thinking Submissive*), and yet was legible to a broader economy of funding bodies, industry partners, academic affiliations, etc. CTVR’s hidden curriculum of artistic processes and transversality became legible in the *Design for Change* proposal in two areas: (a) internal

⁹⁵ The Field-Journal officially begins in September 2012 and continues until early summer 2015. The Field-Notebooks date back to October 2010, when the author began working with CTVR on a temporary contract in support of the CTVR 2 Funding Review Process. (From October to November 2010 the author developed hand-drawn information graphics as part of information packs for the Funding Reviewers.)

⁹⁶ This critical reflective process was developed by re-searching the Field-Journal, through Field-Notebooks, and in conversation with critical friends outside and within CTVR. This process was a more solo process than the reflexivity involved in everyday participant observation.

communication shaping external research (e.g., *Workpackage E*), and (b) external communication shaping internal research (e.g., *Communicating Communications*)⁹⁷. Similar to Chapter 3, this chapter returns to the beginning of the authors engagement with CTVR in an effort to tell the story forwards in terms of the movements that gave rise to the artistic research practice and its findings or, more accurately, to the situated knowledges it generated (Hallam and Ingold 2007: 3).

The purpose of this chapter, then, is to introduce inreach as both a concept and as an improvisational choreographic process or open-ended methodology⁹⁸. The intuition of inreach as a concept catalysed a choreographic process that sought to generate movements of thoughts, imagination, ideas, knowledges and people through CTVR⁹⁹. This process gave rise to experiments, prompted through and hosted by the research organisation, that were facilitative of dialogic situations¹⁰⁰. In turn, these dialogic situations were catalytic of transversality within CTVR.

This chapter seeks first of all to outline the emergence of inreach within CTVR, by way of introducing the principles and motivations at work through its processes. This account is given in section 4.1. Secondly, the aim is to briefly introduce two of the experiments formulated through inreach: *Room 3.17* and *Engineering Fictions*. This account is given in section 4.2.

4.2 Principles and Motivations

In this section it will be shown that the choreographic process of inreach was catalysed by the ‘communicating science’ workshop, which took place during CTVR’s Plenary 2011. The principles of inreach were carried forward from the author’s previous experience working amongst the occupations of education and art research practice. Through these various fields of work the author developed a skillful

⁹⁷ It is important to keep in mind that the theory of transversality was sourced *by way of* the research practice. Prior to the development of the theoretical distillery, an esoteric language was invented describe this *hidden-in-plain-sight curriculum*. The author used the word *inreach* as a way of evoking the sense of convection and communication that was intuited as sought and desired by CTVR and by the author both.

⁹⁸ The word choreography is not used metaphorically here, it is meant quite literally and concretely. Much of this work has been initiated through movement, through bodily interaction, mimesis and orality. *inreach* is being posited here as a choreographic process of movement, change and improvisation which developed dialogically under conditions of occupational difference.

⁹⁹ This was intuited under increasing conditions of *occupational difference*; whereby occupational knowledges within telecommunications were bifurcating and becoming increasingly discrete, but also whereby knowledges *off/from* different occupational paradigms were coming into relation and co-existence, such as the aesthetic and techno scientific occupations. There are not mutually exclusive, but nonetheless, they are different.

¹⁰⁰ Richard Sennett understands that “*Experiment invites the dialogic conversation, the open-ended discussion with others about hypotheses, procedures and results.*” (Sennett 2013: 115)

pedagogic and improvisational practice through collective and collaborative artistic and educational work¹⁰¹. The author's experience and ethos resonated with the language of the *Design for Change* proposal and with the open and interdisciplinary attitude of CTVR's management team towards itself as a research centre and towards different research practices and ways of knowing beyond the worlds of engineering.

It is a difficult task to abstract principles because they manifest only through action and demand a continuity of attention and care. Thinking with Hannah Arendt, principles “are manifest in the world as long as the action lasts, but no longer” (Arendt 2000). The manifestation of a principle coincides with the performing act and it is through such acts that freedom appears. As Arendt argues, “to be free and to act are the same”. In the following sections, the principles and motivations underlying the experimental choreographic process of inreach are briefly discussed in preparation for a deeper reading later on.

4.2.1 Principles of this choreographic process

The focus in this section is to outline the principles at work in between the occupations of artistic and engineering research within CTVR in an effort to make a good enough translation of inreach¹⁰². The ‘evolvable, submissive, and sustainable’ properties of CTVR's network design agenda were discussed briefly in chapter 3. The theoretical distillery helps to identify the following principles as held more or less in common in between artistic and engineering research occupations within CTVR: love of equality; trust; risk; honesty; sharing. The latter, ‘sharing’, is understood as an integral aspect of the thinking submissive principle propounded by the *Design for Change* proposal¹⁰³. The principles inscribed in the *Design for Change* proposal helped

¹⁰¹ From a young age, the author practiced dance and contact improvisation, before training in art, graphic design and art education. Experience working as a *Teaching Practice Supervisor* at a third level Teacher Education Institution (M.I.C., University of Limerick, Ireland) led to a refinement of attentional and listening skills, observational record keeping and reporting. This experience lent itself to a practice of *participant observation* within CTVR, learning with and alongside researchers and staff. Improvisational and collaborative skills have developed through collective work with artists and people who were keen to practice art but did not necessarily identify as artists. Experience founding and developing *The Writing Workshop* (which will be discussed in Chapter 6), and working collaboratively with *Difference Engine* and with artist Aine Ivers as *reciprocate*, all served to hone principles of equality, trust, risk, honesty, good will and listening.

¹⁰² It should be kept in mind that the understanding of the word ‘principle’ in this thesis derives from Hannah Arendt's work on Freedom, and also on choreographic practices of improvisation and the new dance. A principle here is understood as the *cognitive and emotional load* that propels or compels action.

¹⁰³ As the *Design for Change* proposal becomes enacted post-2010, it changes and grows in contingency with the circumstances of research. Overtime, the submissive principle becomes subsumed by ideas of openness and sharing. Thus the language becomes more legible but in

to provide a map for its researchers as well as its funders. CTVR's research agenda was both intuitively self-directed and responsive to the contingencies and prerogatives of academic and industrial demands.

The performative property of thinking submissive was identifiable as a principle of CTVR's research philosophy and practice. The way in which the author came to work with CTVR is testament to the principles perceived to be at work within the research centre: *trust; risk; sharing; love of equality; honesty*¹⁰⁴. Conceptually, the principle of thinking submissive resonated for the author with principles of experimental choreographic and instructional aesthetic practices, such as those developed by the new dance, visual arts traditions such as FLUXUS, and more recently socially engaged and situation based art running a gamut of performance, visual art, activism, graphic design and social entrepreneurship, etc.¹⁰⁵ (Bourriaud 2002, Kester 2004, Bishop 2006, Burt 2006, Doherty 2009, Hope 2011, Bishop 2012, Jelinek 2013, Spampinato 2015).

Jonathan Burrows elaborates a variegated understanding of principles in relation to choreography: *"A principle is not a rule, it's just a way to take care of some decisions, leaving you free to do what you do best, which is to be intuitive,"* and *"A principle is a way to make a map where no map exists. The landscape is there already, but it might help you decide where to go"* (Burrows 2010). These precepts tally with Arendt's understanding of the manifestation of principles as inherent in the performing act (Arendt 2000).

many ways less transparent. This language is strongly legible as part of the lexicon of knowledge economy imperatives.

¹⁰⁴ This research journey began through a chance encounter with L.D. at a Network Cultures seminar in Dublin. While the author and L.D. had met before, and had enjoyed each others take on research and learning and art, they knew relatively little about each other beyond a first impression. The 'emotional load' of the encounter at the Network Cultures seminar, however, invoked a deep sense of trust and a willingness to take a risk by working together. The author was invited to work on a month long project developing illustrations of statistics and facts about CTVR as part of the *Design for Change* proposal review. By the end of the month the author was invited to speak to the review board in the capacity of Education and Outreach, and was hired on a short-term contract basis until being fully funded as a PhD candidate in September 2011.

¹⁰⁵ For example, Ramsay Burt's survey of the Judson Dance Theatre offers insight into the cross-over between the worlds of visual art and the new dance. The collaborations between John Cage and Merce Cunningham catalysed a terrific movement of change and experiment across the visual arts and dance worlds, from the 1940s and 50s onwards. Ann Halprin, Yvonne Rainer, and Simone Forti are amongst those who extended experimental forms and processes of dance through the visual arts scenes of the 1960s, weaving through Happenings and FLUXUS. Yvonne Rainer's work as a filmmaker has bridged the worlds of dance and visual arts, while the work of Simone Forti continues to elaborate through experimental contact improvisation, spoken word, and visual materials (Burt 2006). More recently, Francesco Spampinato provides a survey of the contemporary rise of cooperative art and design, that runs the gamut from D.I.Y. to entrepreneurial, claiming that *"Collective art and design has always peaked at times when the political, economic, and social structures of power have lost their balance."* (Spampinato 2015)

A further principle at work, particularly through the artistic research practice, has been *improvisation*. As a way of working, *“it brings freedom to follow impulse and the intelligence of the moment, the freedom to arrive at the right parameters for the structure of that moment without binding it with formality, the freedom to work at the speed of a thinking body and mind”* (Burrows 2010: 24). For anthropologists Ingold and Hallam, improvisation is how people work out a way of negotiating social and cultural life. These scholars understand improvisation as generative, relational, temporal, and fundamental to the way people work: *“Because improvisation is generative, it is not conditional upon judgements of the novelty or otherwise of the forms it yields. Because it is relational, it does not pit the individual against either nature or society. Because it is temporal, it inheres in the onward propulsion of life rather than being broken off, as a new present, from a past that is already over. And because it is the way we work, the creativity of our imaginative reflections is inseparable from our performative engagements with the materials that surround us”* (Hallam and Ingold 2007: 3).

Improvisation is a fundamental principle of inreach as both a concept and methodology of artistic research. And this is understood both as a strength and at times a limitation of the research process – it can be overwhelming and particularly difficult when working alone or isolated from one’s occupational milieu; as the dancer and choreographer Simone Forti has written of her own experience of solo improvisational practice: *“I think that improvisation was really beginning to pain me. I can remember saying that my inner ear could no longer take those limitless seas. There just seemed to be all this turmoil and turning of image upon image”* (Forti 1974: 32). However, within an occupational community that can make creative use of difference improvisation can enable significant experimental practices of communication, performance, organisation and creativity¹⁰⁶.

A correlate of the principle of improvisation in the world of techno science, as experienced in the everyday discourse of CTVR, have been ad hoc approaches¹⁰⁷. David Turnbull’s analysis of the building of the Gothic cathedrals of 12th and 13th century Europe helps to illustrate what is meant by ad hoc in this case: *“The example*

¹⁰⁶ This observation will be considered in Chapter 8.

¹⁰⁷ The ad hoc, site-specific and sometimes accidental nature of engineering work is elided by publishing habits within the techno scientific academy. It was often mooted within CTVR that the academic literature biases positive results over negative results, *‘the graph must be seen to curve upwards’*. This often means that the learning from accident or incident within the experimental process is under published. This in turn misrepresents the experience of engineering for new researchers, and breaks a chain of tradition that is so fundamental to engineering as a techno scientific occupation. In the third wave of transversality, this paradox is partially addressed through the *‘This Week @ CTVR...’* e-newsletter, circulated by L.d.S. from February – November 2014. This is discussed briefly in Chapter 8.

of the Gothic cathedrals undermines some of the great myths about science and technology. There is no great divide between the past and the present or between science and technology. Techno science then and now results from site-specific, contingent, and messy practices. It can be and often has been ad hoc, un-unified, atheoretical, and lacking a common measure, yet still result in robust structures and traditions. Fundamentally, like the cathedrals, techno science is the product of collective practice based on the earlier work of others” (Turnbull 1993: 332). Both improvisation and ad hoc approaches necessarily work with the affordances and push against the limits of community contexts. The material-semiotic agencies and constraints of such contexts are what motivate action.

4.2.2 Motivations of this choreographic process

Inreach emerged out of the author’s initial experience of working as an education and outreach research assistant with CTVR, from November 2010 to August 2011. CTVR’s director maintained oversight of the education and outreach activities and so this role involved working closely with L.D. and the wider management team¹⁰⁸. The main task outlined involved curating and hosting screenings of the film *A Communications Primer* by Ray and Charles Eames¹⁰⁹. A secondary activity involved hosting a workshop for telecommunications researchers, as part of the CTVR Plenary 2011, on alternative ways of communicating science. It was this workshop which led to the formalisation of a choreographic process called *inreach*, and signalled a shift in the research practice from Education and Outreach assistant to PhD candidate with CTVR.

¹⁰⁸ There was encouragement to initiate activities as well as helping to produce those already sketched into the *Design for Change* proposal. One such initiative devised by the author was called *How do you Imagine the Internet?* and was carried out as a way of getting to know the researchers within CTVR and learning about their own occupational imaginaries. This was a prototype dialogic situation, involving a cut-and-paste workshop where telecommunications researchers created collages and photo-montages of their image of the Internet. The same workshop was carried out in a primary school class of 8 year old girls. The images created by both of these groups of people were exhibited as part of CTVR’s stall at the BT Young Scientist Exhibition 2011, where the same question was extended to the visitors. This resulted hundreds of drawings being made and installed as a kind of ‘flock’ within CTVR’s exhibition space. A short video of these drawings was made a number of months later. <https://www.youtube.com/watch?v=nsDfYhd8Jl8> [Accessed 16. 09. 15] See Appendices for Video Essay Links and Images.

This was an exploratory phase, but the line of events demonstrates the kind of choreography at work within the *inreach* process – where one thing leads to another, intuitively, over time and in response to context. While there was support in carrying out such initiatives, there was very little critical recognition of the value of such actions. Over time, this meant that the choreographic process developed a kind of super-ego, which at times inhibited analysis of the dialogic situations.

¹⁰⁹ See Appendices: Chapter 4; page 34 and 35; Figs. 23-25. To view an online version of the film please visit https://archive.org/details/communications_primer [Accessed 25.04.16].

The Communicating Science workshop at the CTVR Plenary in 2011 marked a turning point in the author's engagement with CTVR. It brought to light a discontinuity between the management team's aspirations for communicating communications and the normal expectations of CTVR's researchers in relation to communicating science. The question *How do we communicate communications?* was not a purely technical matter but encapsulated a multifaceted ideal implying all sorts of political, social, personal, cultural, aesthetic, organizational, and educational, demands. The Communicating Science workshop unintentionally and unexpectedly catalysed inreach as a choreographic process that sought to engage with what communicating communications could meaningfully become under the real, local and lived conditions of CTVR. Inreach was not aiming at developing a 'general theory' of communicating communications, but instead sought to develop practical ways for artistic and engineering researchers to mutually develop processes for the "the transmission of practices" (Turnbull 1993: 327).

The question that was most often posed in conversations about education and outreach with CTVR's management team was *how do we Communicate Communications?* The screenings of the Eameses' film was part of an effort to address this question by opening up a public dialogue on telecommunications engineering. While the screenings were well attended and generated interest, there was a sense in which this inquiry itself was blocked by an idealization of the Eameses as a solution to the problem. Was communicating communications only to be a celebration of a film essay on information theory made in 1953, or was there something more pressing at stake?

There was something about the way the Eameses addressed problems of communication that proved fascinating for CTVR, particularly for L.D.. Initially, the Eameses were posited as a model of the kinds of output that the communicating communications strand might produce. Thus, close attention was paid to the Eameses own accounts of their working processes, to the way they spoke about design, to the way they talked about problems and about the accidents and incidents of their day-to-day work. Many sources were drawn upon to gain insight on these processes, from scholarly literature on design history to video and audio clips or transcriptions of the Eameses in interview (Miller 1956, Bowman 1980, Kirkham 1995, Colomina 2001, Demetrios 2001).

The earliest phase of their career and life together was explored more closely than any other aspect of their work. This was because the Eameses, though they were

trained individually in architecture (Charles) and painting (Ray), largely learned how to work together by working together. They were experimental in their approach to their materials and they learned as they went along, from each other firstly and gradually by bringing together a community of practitioners and researchers and in turn learning from what became the collective of the Eames Office (Schrader 1970, Bowman 1980, Kirkham 1995, Demetrios 2001).

However, an effect of the Communicating Science workshop, as will be shown a little further on, caused the author to doubt the Eameses as a model for the possible outputs of communicating communications. The question 'how do you communicate communications' switched instead to a deeper concern: *what does communicating communications for CTVR?*

Thus, the inquiry shifted into an active, exploratory and improvisational mode that sought to draw out materials and matters of concern to CTVR's researchers that could have relevance publicly¹¹⁰. The Eameses were not jettisoned in this switch, but rather they were reconsidered by the author as a model of process (phronesis) rather than a model of output (film-essay). This will be discussed more fully in chapter 5. The next sub-section revisits the Communicating Science workshop, the event from which inreach emerged as a conceptual and heuristic tool for sustaining an applied engagement of artistic research practices with CTVR.

4.2.2.1 'Alternative' ways of Communicating Science

The Communicating Science workshop took place during CTVR's Plenary 2011, in Cork city, in the south of Ireland¹¹¹. The objective of the CTVR's Plenary meetings are typically to set out details of the short-to-medium term research objectives for the centre. As a relatively informal meeting of academic researchers and industry partners of telecommunications engineering, the CTVR Plenary is typically an occasion for formal presentations on academic and industry led research, interspersed with semi-formal meetings and workshops, and bookended by informal social interactions, such as eating, drinking and socialising together. On this occasion, the Plenary was informally launched by a screening of the Eameses' film *A Communications Primer (1953)* accompanied by a brief series of contextualising talks by guest speakers¹¹².

¹¹⁰ The painter Gerhard Richter writes that "What' is the hardest thing because it is the essence. 'How' is easy by comparison. To start off with the 'How' is frivolous, but legitimate. Apply the 'How' and thus use the requirements of technique, the material and physical possibilities, in order to realize the intention. The intention: to invent nothing – no idea, no composition, no object, no form – and to receive everything: composition, object, form, idea, picture." (Burrows 2010: 45)

¹¹¹ See Appendices: Chapter 4; page 35; Figure 26.

¹¹² The screening was advertised as evenings of "film and lively discussion about contemporary understanding of communication & design, questioning how we communicate complexity, and how we

The workshop was tacitly a part of CTVR's Communicating Communications agenda for its Education and Outreach programme. CTVR's management team introduced the idea of running a workshop on communicating scientific research as a way of catching any attendees to the Plenary who were not scheduled as part of mainstream 'work meetings'. Unfortunately, the Communicating Science workshop was accidentally framed within CTVR's Plenary Agenda 2011 in two contradictory ways. In one version of events it was framed as "*a workshop to develop communication skills for high-level scientists*" and in another version it was framed as a "*Workshop...exploring alternative ways of communicating scientific research*"¹¹³.

The *Communicating Science* workshop was devised by the author within a paradigm of artistic experiment and improvisation, in this case drawing upon methods of conversation and experimental writing¹¹⁴. This paradigm not a familiar one for the wider research community of CTVR, but it was hopefully devised in such a way that participants could embrace an exploratory and alternative approach to communicating scientific ideas. Based on previous experiences of hosting creative workshops, the author felt that the tension between a conversational approach and experimental writing would at least engage CTVR's researchers¹¹⁵.

There were two key influences working through the score for the Communicating Science workshop. The first was CTVR's interest and advocacy of the film *A Communications Primer*, particularly the ways in which the narrative and montage of

design for communication." The Eameses film *A Communications Primer* was the jumping off point for conversation and thinking: "*This Film is particularly important for the way that it articulates an extraordinary insight into contemporary telecommunications, illustrating powerful concepts that remain important to the work of engineers and designers today. This film is relevant to anyone who uses information and communications technology in their day-to-day lives, whether professionally or otherwise.*" The evening included "*short responsive and contextualizing presentation by Gary Boyd, Senior Lecturer at the Centre for Architectural Education UCC*" and was chaired by Denis Linehan, a Lecturer at the College of Arts, Celtic Studies and Social Sciences, UCC. The event took place at the Glucksman Gallery, a contemporary art gallery in Cork city. For more on this early phase of research into the Eameses film visit <https://communicatingcommunication.wordpress.com/events/> [Accessed 16. 09. 15]

¹¹³ The impression given out about the workshop was somewhat contradictory, both formal and informal, which led to an asymmetry of expectations in the group who attended.

¹¹⁴ A reminder that the experimental approach undertaken throughout this research derives from the contact improvisation of the new dance/contemporary dance developed through the Judson School of Dance, and from 20th century experimental and instruction based works from Dada to FLUXUS.

¹¹⁵ This tension between strangeness and familiarity is indicative of *phronesis*. This is a concept that will be discussed further on in this chapter. As David H. Fisher explains, via the theory of Paul Ricoeur, "*Phronesis... disrupts familiar ways of seeing; it disrupts the narcissism of liquid life, inviting a different kind of movement than the restless search for the new, the gratifying, the linked. A conversational movement between figure and ground – figure as the immediate focus of perception, ground as tradition (Gadamer), ground as the polysemic voices of the Other (Ricoeur) – becomes a basis for expanded possibilities of judgement and action in the present, responding to the claims of the other.*" (Mootz III and Taylor 2011)

the film portrayed essential aspects of information theory that underpinned contemporary telecommunications research¹¹⁶. The second influence was the way technical aspects of telecommunications research and policy have been framed and understood through metaphor and analogy (De Vries 2008)¹¹⁷. The Eameses' use of cinematic form enabled the passive voice of science to become inflected and enriched by cultural images and metaphors. The idea of 'Metaphor' was thus selected by the author and agreed upon by CTVR's management team as a relevant topic for the Communicating Science workshop. The agreed purpose of the workshop was to open up a situation for "*exploring alternative ways of communicating scientific ideas*".

Devised in consultation with CTVR's management team, the Communicating Science workshop was scored for groups of no more than eight participants per session¹¹⁸. The intention was to host a dialogic exploration on the uses of metaphor in the day-to-day of the engineering researchers work-life experience. Conversation would be focused through experimental and collective writing techniques, followed by a short period of free writing where researchers could explore privately their own use of metaphor in relation to an aspect of their research work. It was understood that this format would be unfamiliar to the participants, but that small group numbers would encourage contributors to share ideas and opinions. In this way, it was anticipated that a balance between strange and familiar ways of articulating research could be facilitated.

The purpose of the workshop was to open up a shared awareness of metaphor in day-to-day research, and to reconsider the affects and uses of metaphoric language. The score for the workshop has been extracted from the author's notebooks from this time and can be simplified as follows¹¹⁹:

- i) *write down, in your most jargon filled and complex language, the kind of work that you do, the kind of research that you do.*
- ii) *at the centre of a page, write a metaphor that you might use (to describe your research) in your area of research.*

¹¹⁶ CTVR's Director often referred to the way in which the Eames' 'captured' the complicated theories involved in communications and information technologies by drawing upon images and scenarios from the living contemporary world of the 1950's and images from the ancient history of communications technology and media.

¹¹⁷ For example, some radio's are referred to as 'cognitive'. The use of spatial metaphors in spectrum policy has been criticized as inhibiting alternative models of resource management(De Vries 2008).

¹¹⁸ The intention was to repeat the same workshop on each day of the Plenary, but with an openness to changing aspects of the workshops structure and pace as appropriate.

¹¹⁹ This score is taken directly from the Field-Notebooks, May 2011.

- iii) *pass the sheet around, as fast as you can, and write your immediate responses to people's 'metaphors' and subsequent words written.*
- iv) *then, from the vocabulary that you now have, rewrite a description of your work.*

The constraint of working with other peoples words frequently elicits humorous sentences, images and ideas from this style of writing workshop. The idea was to read aloud the texts, if people felt comfortable, and to begin opening out a dialogue in this way on the affect and use of words, metaphors, and language more generally within the everyday techno scientific discourse of CTVR. In a small group, the experience of writing and reading in such a close and collective way can be quite intimate and mysterious, leading to new insights on self and collective ways of knowing and being in the world¹²⁰.

4.2.2.2 *The invention of Inreach*

The Communicating Science workshop was set up in a generic corporate board room, one of many within the hotel complex hosting CTVR's Plenary. With an expectation of no more than eight researchers, a small workshop space was set up to one side of the room. A long oval conference table took up the larger part of the available space. The light from the windows was partially obscured by the horizontal slats of office blinds, but the room was well lit by overhead lighting. The small workspace arrangement was organised to be conducive to informal and open conversation, designed with the intention that contributors would be sitting in a circle together. This arrangement aimed to reduce hierarchical power relations and open up a space for dialogue.

As advised by CTVR's management team, the expectation was that any participants would be slow to arrive. However, when the door of the boardroom was opened at the allotted time, approximately 20 engineering researchers moved swiftly into the space, instinctively taking up positions around the long boardroom table. This collective behaviour and body language signalled a strong expectation that the workshop would take the form of a conference call or lecture, with a facilitator at the head of the table, delivering information to the attendees. In other words; no-one was expecting conversation, let alone experimental writing.

The overwhelming reality of the situation: the strangeness of the corporate board room, the large, mainly male, group of engineering researchers, the absence of co-

¹²⁰ The seeds of the *Engineering Fictions* experiment are evidenced in this workshop. This will be detailed in Chapter 6.

facilitators or other artist-researchers, the tacit disparity in epistemic traditions, all compounded together quickly in a shock. The author was intimidated and unable to improvise well enough under the circumstances to change tack or motivate engagement. The score was only partially enacted. The participants expectations were incompatible with the workshop design and gave rise to an atmosphere of impatient skepticism. A mild panic set in for the author and there was no recourse but to close the session early.

This workshop situation revealed a discontinuity between the management team and the larger research body of CTVR. The collapse of the workshop was partially down to poor judgement and inexperience on the part of CTVR's management team. There was a casual assumption that attendance would be poor¹²¹. The workshop was scored with small numbers in mind, and yet when the large group attended, there was no other facilitator on hand to assist in dividing the group or hosting simultaneous sessions. Moreover, there was a general lack of awareness of the level of engagement involved in hosting such an experimental dialogic workshop, both on the part of the author and on the part of CTVR's management team.

On the one hand, CTVR's management was not aware of the improvisational and contingent work involved in scoring and facilitating the workshop. However, the facilitator had implicitly trusted that CTVR's management were fully involved, and had been listening to the requirements and implications of the workshop situation, particularly the necessity of small numbers. On the other hand, it is true that the author did not have a precise language or value system for her own practice at this time, and neither did CTVR's management have a language for their desire to support different modes of communication within CTVR.

In many ways, the collapse of the workshop demonstrated an insufficient language for the subtleties of experimental creative practices in a techno scientific context. Ironically, in retrospect, it is quite evident that this insufficiency is what was being addressed in the workshop. The hope was that the communicating science workshop would open up a dialogue around the way words are affectively and pragmatically used within the techno scientific domain. It was implicitly hoped that the workshop could raise a consciousness and catalyse self-reflexivity through dialogue about the sufficiency or insufficiency of language in terms of communicating with non-experts and non-specialists in particular.

¹²¹ From the point of view of the author, such assumptions were seen to be self-stereotyping actions on the part of those working under a techno scientific paradigm.

Words were taken-for-granted by the author as a common point of reference for the aesthetic and techno scientific paradigms, and thus a valuable material to work with in order to foster experimental dialogic communications within the research organisation, as it continued to bifurcate into ever more occupational realms of expertise and experience. But this was an assumption. While the collapse of the workshop was a result of many different decisions and responses and cannot be placed squarely on any one issue, its most immediate and lasting effect was to undermine the sense of trust that had developed in between CTVR's management and the author. It also placed a significant doubt in the mind of the author as to her own capabilities and purpose within CTVR¹²².

The “*emotional load*” of the collapse of the Communicating Science workshop changed the course of the author's research engagement with CTVR from ‘*How*’ to ‘*What*’¹²³. *How do we communicate communications?* seemed like an arrogant question: *What does communicating communications mean and do?* seemed like a more urgent question¹²⁴. The purpose of Communicating Communications was no longer trusted enough to assume. What had seemed like possibility had sunk into doubt. And in particular an occupational doubt as to the tenability and value of experimental artistic practices as the author's to co-exist within CTVR.

In the weeks after the Communicating Science workshop, a different approach and mentality was adopted, one that eschewed any pretence at outreach. The situation was reconceived as an opportunity to develop a more mutual and reciprocal practice of communication in between art and engineering. It would be called inreach. The humour of the name was encouraging and yet realistic. It served as a reminder of the dangers of not respecting or attending to inherent differences between epistemic occupations, yet it encouraged engagement.

¹²² This loss of trust and onset of doubt happened gradually over time, long after the Plenary. The collapse of the workshop was adrenalin raising. In response, a new workshop was devised and run the following day; one that involved a powerpoint presentation, guided discussion in a more conventional pedagogic format, and followed by the experimental writing exercise. This session was much more effective. Also because there were fewer numbers. See Appendices: Chapter 4; page 37; Figure 27.

¹²³ ‘Emotional Load’ is an expression of choreographer Yvonne Rainer: “*When I talk about connections and meaning, I’m talking about the emotional load of a particular event and not about what it signifies, its signification is always very clear...*” (De Keersmaecker and Cvejic 2012)

¹²⁴ In section 2.5.2.2 the theories of technological politics were briefly introduced. Such theories develop an understanding of technology as a material embodiment of political philosophies. For theorists of technological politics, changing the system means engaging with a “dialectical analysis of society's is and ought”. The author's intuition to switch focus from *How do we Communicate Communications?* to *What is the meaning and action of Communicating Communications?* becomes legible, retrospectively, as significant of theories of technological politics.

Inreach became the name for a yet to be realised process within CTVR that asked *what if inreach were developed in counterpoint to outreach?* This intuitive and improvisational choreographic process was begun in the wake of the Communicating Science workshop as a way to generate experiments that could open up a different kind of communicative practice within and through CTVR.

4.3 Recalling the scores...

This thesis deals with two of the *inreach* experiments, *Room 3.17* and *Engineering Fictions*. The choreographic process for each of these experiments unfolded more or less concurrently but there are fairly discrete strands at work through each. The same principles and motivations apply to each experiment, and additional motivations and contingencies will be mentioned where relevant in the next two chapters. The purpose of this section is to state, as simply as possible, what was involved in the experiments. This is done by recalling the score of each experiment based upon straightforward questions like; When and Where did the experiments take place? Who was involved with the experiments? What kinds of actions happened during the experiments? What kind of materials were used? etc. The purpose here is not to make an analysis, but to as simply as possible introduce the action and material and structure of the experiments. In short, an effort is made here to tell some facts about the experiments, as remembered after a significant period of time has passed¹²⁵.

A score, for choreographer Jonathan Burrows provides “one way to get an overview of time and materials. It freezes time in a concrete form, allowing you to glimpse what can be hard to grasp perceptually in real-time experience... A score is a conscious way to distance you from the thing you’re making or doing. It can mediate...” (Burrows 2010: 142). The score for each of the experiments developed intuitively and in response to the observed and felt needs of the context. It is true to say that the choreography began developing a long time before any specific experiments began to materialise. Yvonne Rainer once said that “if you have people moving around and no language for it, then it’s a dance” (*The Philoctetes Centre* 2007). This is a good way to describe how the experiments began to develop. They were an improvised dance first, gradually becoming scored through a process of writing and re-writing, both in Field-Notebooks and Field-Journal, and later in the thesis.

The experiments were structured and each did involve quite a specific score. It’s just that at the time, as a largely improvised and changing structure, they were not

¹²⁵ *Room 3.17* took place in December 2012. *Engineering Fictions* took place from January 2013 – June 2014.

conceptualised consciously as scores. There were definite phases and tasks and movements to each experiment. The Field-Notebooks demonstrate this most of all by way of the choreographic thinking through language and word-play. For example, the scores for the *Room 3.17* experiment employed manifesto-like phrases such as '*Room 3.17 is a Foil*' and characterised those who engaged with the experiment, including the choreographer-host, as participant observers. The experiments were dance-like and sought to perform inreach into existence¹²⁶.

The experiments sought to mutually develop consciousness through correspondence and collaboration with the unfamiliar within CTVR. inreach was a dance that attracted others to co-improvise, despite the often inherent ambiguity of the language of invitation¹²⁷. There was no incentive to participate other than the possibility of helping to "*shape new insights into the fields of telecommunications engineering and art-making*" (Foley 2012). In the following sub-sections a cursory introduction to the experiments is made by remembering and briefly retracing the score and performance of each.

4.3.1 *Room 3.17*

This experiment involved conversation, filmmaking, and installation. It took place in a small 'cubby office' in Dunlop Oriel House called 3.17. Hence the experiment was named *Room 3.17*. It was an attempt to bring together many different embodied knowledges and non-knowledges about antennas. The intention was to gather myriad material through CTVR's workers and use this material to create a book called *The Art of Antennas*.

4.3.2 *The score as remembered...*

While the choreographic process has shown to have been developing since the Communicating Science workshop in May 2011, the actual score for *Room 3.17* was devised between October and December 2012. The score was devised mainly within the environment of *Room 3.17* and in collaboration with core members of CTVR's management team. Frequent conversations took place in L.D.'s office on the same floor at the other side of the building. It was an intense period of occupying CTVR, drawing together materials that could support the dialogic situation. Visits were

¹²⁶ This phrase, '*performing into existence*', was used by L.D. as a way of imagining how the networks of the future would need to be designed. They would have to be light on their feet, so to speak. The artistic research practice can be seen to be *mimicking* the language of CTVR's management, as if playing the role of *Echo*.

¹²⁷ But, as Cvejic notes that "*performance makers understand each other well when they operate with... notion[s] that appear[s] so underdetermined and jargonized*" (De Keersmaeker and Cvejic 2012: 13) It is possible then to say that those who involved themselves in the experiments shared a kind of latent commonality as performance makers; as material-semiotic agents, as dancers.

made to the Antenna Lab, and conversations in person and via email elaborated the dimensions of the score.

The poetic goal of the *Room 3.17* experiment was to gather materials together for a book called *The Art of Antennas*. The implicit goal of the experiment, however, was to rehearse possibilities for catalysing inreach, a dialogic process of communication, within the research centre. The score was devised with all of CTVR in mind (as much as is possible), from researchers and administrators to the building's security officer. People were contacted via email, by word-of-mouth and through a news-screen in the hallway of Dunlop Oriel House, and invited to participate in the experiment. A Doodle-Pool was set up for people to self-select a time suitable to them. Specific times were kept for participants travelling from other parts of the country. The experiment was scored to take place on the 3rd floor of Dunlop Oriel House. The corridor to Room 3.17, *Room 3.17* itself, and an adjacent lobby space were allocated as the principle physical zones of the experiment. The seminar room on the 2nd floor was scored to be re-configured to accommodate a gathering in the round after the event, where mince-pies and mulled wine would be provided and an informal group conversation could unfold.

The score for *Room 3.17* also required setting up particular equipment, gathering materials and organising the space of the experiment. The materials required by the score included Super 8mm film-stock, Super 8mm camera, batteries, audio recording equipment, a tripod, and a digital camera. The score also required materials to be sourced and gathered through conversation with the Antenna Lab researchers, relating to antenna research. The score required that a make-shift photographic studio was constructed in a lobby space at the end of the corridor from *Room 3.17*. Paper backdrops, Tables, Lighting and power extensions, etc. The score also required that there be two chairs within the space of *Room 3.17*.¹²⁸

The score was split in two: an invitation and a series of tasks. While the invitation was available to all the participants, the tasks were known only to the choreographer. The wording of the open invitation which was extended to CTVR was issued as follows: "*You are invited to become a participant observer, seeking a deeper understanding of the world of... Antennas. Come to Room 3.17 during the week of the 10th of December 2012, between the hours of 10am and 5pm, on Monday, Tuesday or Wednesday. You are requested to bring with you an image/object/text or any other item that conveys something of your knowledge, ignorance, experience, understanding, memory*

¹²⁸ Many of the materials were sourced in collaboration with CTVR's executive officer, G.W.

and/or impression of Antennas. Your point-of-view as a member of CTVR is vital to achieving an understanding of this typically elusive world. Your participant observation will help to shape new insights into the fields of telecommunications engineering and art making." The invitation makes clear that each participant would need to free-up at least 30mins of their time for the experiment. However, the score allotted a full 60mins to each *participant observer*. This was to allow more time for those who desired it, and also to accommodate an interval between each visit¹²⁹.

4.3.3 *The experiment as remembered...*

The experiment was run from 10th to the 13th December 2012. The experiment ran from 10am to 5pm each day. Twenty-eight people from CTVR participated in the *Room 3.17* experiment. These included PhD researchers, Post-Doc researchers, Principle Investigators, Administrators, Management, and external researchers affiliated through the research centre by way of L.D. Each participant spent a minimum of 30mins in *Room 3.17*, with some spending up to 90mins. Typically, the experiment stayed running until after 6pm.

The *participant observer* would arrive onto the 4th floor of Dunlop Oriel House, to be greeted by the choreographer (*the occupant of Room 3.17*). They would be led down to the make-shift photographic studio, where the choreographer would contextualise the experiment through informal and relaxed conversation, while photographing the contribute. A query would be made as to whether or not a recording of their conversation and time in *Room 3.17* would be permitted. A disclaimer was signed stating yes or no to this question. The participant observer would be then led to *Room 3.17* and improvisation would begin.

The invitation aspect of the score established a contract with the *participant observers*. An exchange was to take place, but its dimensions were not clear. There were some unknowns. There was perhaps a risk involved in the encounter. The tasks were relatively minimal, with the exception of using the film camera, and the intention was to refine the tasks and their ordering through the running of the experiment. They were framed as instructions for the choreographer-host to follow:

- *welcome and receive the contribute*¹³⁰
- *photograph the contribute*

¹²⁹ G.W. assisted closely with the *Room 3.17* experiment, acting as a correspondent for J.F. and a foil. Details of a provisional score for the encounters within Room are sketched out via email by J.F. and shared with G.W. See Appendices: Chapter 4; page 38 and 39; Figure 28.

¹³⁰ The contribute is the name of the image/object/text/item brought by the participant observer and *contributed* to Room 3.17.

- *request consent to record conversation*
- *request that participant observer spends time alone in Room 3.17*
- *request that participant observer places their contribute in Room 3.17*
- *converse through the contribute, through Room 3.17*
- *demonstrate how to use the film-camera*
- *shoot film*
- *converse after the filmmaking*

Everyone participated, no one refused to carry out any of the tasks. The freedom to interact with *Room 3.17* was embraced. Many people moved objects, and made connections between one part of the room and another. Many people shared their stories or knowledge of antennas. At 5pm on the 13th of December, those CTVR's workers who were available to gathered together in the seminar room to share conversation, food and drink and to 'decompress' after the experiment.

4.3.4 *Engineering Fictions*

The second inreach experiment was a forum to support dialogic exchange within CTVR. At the heart of the E.F. sessions was conversation and writing. A balance was sought in the experiment between dialectic and dialogic processes (e.g. writing and conversation). The writing was often developed through constraints or rules. The conversation was typically open until it went quiet or got distracted off topic in an unproductive way. Then the host would intervene and initiate a period of writing. There were ten sessions in 2013, which took place in the seminar room at Dunlop Oriel House from January to June. Each of the ten sessions involved a 'catalyst' and a 'seed'. The catalyst was typically a person who wished to facilitate a conversation around a topic of concern to them, referred to as the seed. Below is a list of each of the session, the 'seed' of each session and the 'catalyst'. In parentheses is a word to describe the occupational world to which the catalyst is most strongly associated.

1. *Number-Language* catalysed by J.F. (art)
2. *Cognitive Radio* catalysed by L.D. (engineering)
3. *Limits* catalysed by S.mG. (engineering)
4. *Chance* catalysed by N.oD. (art)
5. *Medieval Hypertext* catalysed by M.S. (history)
6. *Thresholds* catalysed by A.D. (art)
7. *CAGE* catalysed by L.W. (art)
8. *Misunderstanding* catalysed by C.G. (engineering)
9. *Symmetry* catalysed by E.D. (engineering)
10. *The Talking Tombstone* catalysed by E.O. (visual ethnography)

The author acted as host and correspondent for the sessions. Invitation to catalyse an *Engineering Fictions* session was extended on the basis of an intuited correspondence in-between art and engineering. The seed of each session was always left up to the catalyst to determine, but it was usually agreed upon through email or in conversation with the host. Sometimes the host acted as a kind of foil for the catalyst's decision, a sounding board, a listener. In some cases there was minimal interaction between the host and the catalyst in preparation of the *Engineering Fictions* session. This was usually because the host and the catalyst already had a strong conversational habit together, and were somewhat familiar with the open-ended nature of the research process, as was the case with L.D.. Once the E.F. sessions began, the host would remain open and attentive to potential catalysts for the sessions, both within CTVR and beyond. This is discussed further in Chapter 6.2.3. Each session was publicised internally through the CTVR mailing list. It was also posted on a dedicated blog: www.engineeringfictions.wordpress.com

4.3.5 *The score as remembered...*

The E.F. sessions usually took place from 5pm to about 7pm in the seminar room at Dunlop Oriel House. They happened more or less every two weeks.

Setting up the space was an important part of the session. It established the contract with the participants. It could take half an hour to set up the space: moving furniture, setting up the electric kettle, cups and plates from the kitchen, food and tea, coffee and milk. Jugs of water. Depending on the catalyst and the seed there might be other equipment and materials to set up. Typically it was very lo-fi. Each session depended upon the catalyst and the seed. These would bring variation to what was essentially a repetitive process. People would arrive, help themselves to refreshments. Conversation would unfold. Writing would happen, sometimes according to some constraints. Sometimes the constraints would be invented ad hoc on the spot, sometimes they were prepared. The writing would be read aloud and people would listen. Some more conversation might unfold. Then people would leave. The space tidied back to the way it was, more or less.

E.F. was open to anyone on CTVR's internal mailing list to attend. It was also open to anyone from CTVR to invite other people to attend. People were invited along by word-of-mouth. The hope was to bring people together gradually and meaningfully.

4.3.6 *The experiment as remembered...*

Below is an excerpt from the Field-Journal. In this excerpt the author is remembering her conversations with a number of CTVR's researchers, who are involved with catalysing an Engineering Fictions session. This excerpt is presented here to give an insight into how the dialogic and choreographic process was written about and recalled in the everyday practice of participant observation. This excerpt also offer a glimpse into the practice of reflexive writing which unfolds over nearly 200, 000 words of the Field-Journal, from Sept. 2014 to Feb. 2015. Excerpts like this will be followed later in the thesis with descriptions of the *Engineering Fictions* experiment in Chapter 6 and again in Chapter 7. The critical intention of placing these unedited and un-interpreted excerpts in the body of the thesis is to allow the artistic research practice some space to speak for itself.

24th May 2013 PM

Met with C.G. just now about the upcoming Engineering Fictions on Tuesday 28th. I asked him why he was taking part in Engineering Fictions. He said it was enjoyable. Initially it was just curiosity, he wanted to try it out. Then he wanted to try it again. Now he finds it useful, in that it provides an alternative mode of thinking. His work is very demanding. It requires that you apply a strict logic continuously. You must explain and justify why A connects with B for example. You must make the connection explicit. Whereas, Engineering Fictions, allows you to make connections in another way, not in a linear or logical way, but in a lateral way I suppose he means. He asked what I hope to get from the sessions. I said I was hoping to bring them to a conclusion mid June, and then to begin to analyse them. I said that I had initiated them through intuition, it seemed like the right thing to do, at that time, to get this practice of discussion and writing working within CTVR. And at the back of it I believe that there is a deep connection between L.D.'s question 'How do you Communicate Communications' and this particular kind of material-discursive performance that is Engineering Fictions. I laughed that what I need to do is apply the logic retrospectively through the analysis of the sessions. I will have to build the connection retrospectively - while the engineer is continuously trying to build the connection between A & B in her work. In a sense, it seems that Engineering might defy John Cage's rule no. 8, the one that says you can't create and analyse at the same time, that they are different processes. I've done nothing but create create create since I came to CTVR. It's been very difficult for me to disengage and not respond in some way to all that is happening around me, to all the people and their research - it is all so terribly interesting, and exciting, and confusing! And I think I enjoy not

understanding in a way, because I know I have a connection to make then, I know I have a job to do. The problem is that you can over load this sometimes - when you do understand something you can continue to believe that you don't, because you keep receiving new information, or information that is distracting you from your own knowledge, your own sense of purpose and your own sense of understanding. Not that understanding is finite, that's not what I mean. I digress.

Back to C.G.'s topic. He's chosen the subject of 'misunderstanding'. I think this is a fantastic topic. Ambiguity has come up quite a bit, and it forms a fundamental tension, an indeterminacy. He said initially, within Engineering Fictions, at the L.D.'s session it was just himself and J.K. who did not speak English as a first language. And the idea of writing and sharing writing with this deficiency as he understood it was a little bit scary - or at least a bit unsettling. He said he wasn't afraid, but more what I took to mean apprehensive. There are misunderstandings in every communicative act, whether it be technical or social. In each domain we deal with misunderstanding in particular ways. Working through computers and coding may demand that we deal with misunderstanding in a particular way. Working through interactions with others may mean that we deal with misunderstanding in other ways. Sometimes we don't deal with them. But in engineering, the error always demands your attention. The error is the call, and it must be responded to - or you're not an engineer perhaps. I'm not sure how misunderstanding applies to art - it must have something to do with representation... and this comes back to the shift in paradigm from the representational paradigm to the performative paradigm. The immanency of life and its force. Intra-action of matter and discourse. Not the dichotomy of these things. So C.G. is going to introduce the topic. He isn't entirely sure how he will do this. He said he would like to find a text, or something he could read out. I suggested that he could write something, much in the same way L.W. did, and then read that out as the catalyst. We talked how the writing might happen - whether there would be a constraint of some kind that would tie in with the topic somehow, or whether the free-writing route would be the main approach. C.G. talked about wanting to shuffle up the texts and to see if the same sense could be made from it - he is interested in how a word-game might work. He talked about eliminating certain words from a text, and I suggested the use of redaction, that perhaps free writing could be employed first and then redaction could be employed almost like the popcorn devise. There is certainly a sense that meaning is something that is pliable, and that this is a very attractive matter, but not something that is enabled within the everyday work of a telecom's engineer. C.G. is working in the world of cognitive radio too. I asked if there was an image that I

could include in the email – C.G. is going to have a think about this all. He is very considered. And I think he is enjoying the new pathways that this approach is opening up for him, and that he can consider his own work in another way - which brings new meaning to it. It doesn't mean that he's going to learn to solve problems in his everyday work by engaging in creative or experimental writing, it's not determinate either way. It's entirely possible. That's the thing. It's a broader practice of mind and of thinking.

When we were almost finished our chat, S.mG., L.dS. and a few others came in for the afternoon coffee break. We were in the kitchen at CTVR. S.mG. made a joke that he didn't want to interrupt our nerdy session. We laughed and told him about the Engineering Fictions session coming up. He will be there, which is great. I asked if he might bring along his philosopher friend P., who often eats lunch at CTVR. S.mG. said he had asked him to come along before, but that P. was a bit afraid that he wouldn't be able to 'cope' with all the engineering talk. It's funny, there really is a fear about new language, even if it is disguised as a kind of laziness. It's a subtle problem but a very influential one I think. Shibboleth. He might manage to twist his arm for Tuesday. I'd like there to be a good crowd for C.G.'s session - he's very courageous to catalyse a session. His supervisor, N.M., was surprised that he was going to lead a session, he said 'he's such a shy person'. I don't really see C.G. as shy so much as quiet spoken, polite and courteous. He's playful and enjoys things that he doesn't fully understand. He probably has negative capability. He certainly does, he always reassures me when I say that I'm struggling, he says 'We're all in the same boat'. It's a good attitude. So I'd like for him to be supported and heard, and for everyone to engage.

Part of me had considered recording our conversation, but it wasn't appropriate and I'm glad I didn't. I took a note or two. S.mG. said it was interesting, this Engineering Fictions. He said it's more about Fiction and bringing our Engineering Backgrounds to it. It is fiction, and it has to become meta-fiction now. I must consider this, and how, when and where the critical dimension will become important to bring to bear. I mean... I will apply my analysis... but in the same way I want to fold CTVR researchers into a creative process of sorts, I also want to fold them into a critical and reflective process too. I guess it becomes a question of how to do this exactly.

S.mG. joked that sometimes he thinks that I'm carrying out a psychological experiment on all of the researchers in CTVR, that really I'm a psychologist disguised as an artist.

4.4 Summary

The purpose of this chapter has been to present the principles and motivations underlying the emergence of *inreach* as a choreographic process within CTVR. It was shown how *inreach* emerged through the collapse of the *Communicating Science* workshop during the CTVR Plenary 2011. The workshop was shown to have collapsed for a number of reasons, but mainly it was a lack of understanding of the *What of communicating communications*. By choosing to think of *what communicating communications* actually means within the lived context of telecommunications engineering and CTVR, the author set about to invert her role as *Education and Outreach assistant* to that of an imagined role of *inreach catalyst*¹³¹. This was an intuited role, and needed to be ‘performed into existence’ much like L.D.’s *Networks of the Future*.

Without a language for *inreach* beyond intuition, it was necessary to improvise and model it by way of choreographic process and experiment. This chapter also presented a suggestive introduction to the *inreach* experiments *Room 3.17* and *Engineering Fictions*. The score and performance of the experiments were remembered in this chapter, in an effort to evoke an impression of the experiments prior to developing a detailed story of the choreographic process and presenting sample encounters from each experiment in Chapters 5 and 6. A reading of the experiments is developed thereafter in Chapter 7.

¹³¹ This move is suggestive of a technological politics, whereby the author seeks to “become aware of one’s place in the system”(Wisnioski 2012: 46) and thus to become aware of a correspondence in-between art and engineering research practices.

5 inreach experiment # 1: Room 3.17

5.1 Introduction

In this chapter the *inreach* experiment *Room 3.17* is elaborated. The purpose of this chapter is two fold. Firstly, the aim is to tell the story of the choreographic process leading to a dialogic situation within CTVR called the Room 3.17 experiment,¹³² and secondly, the aim is to offer a partial insight into the lived experience of *Room 3.17* by annotating a transcript of one of the dialogues which took place during the experiment.

When it took place, the experiment was imagined unconsciously as a kind of dialogic dance, it was not a rigid set of protocols for action to achieve a specific end result¹³³. The experiment was scored-in-process, in a reflexive manner (Rapport 2014)¹³⁴. The score for this experiment becomes re-composed from Field-Notes and the author's memory, as was discussed in Chapter 4, helping to tease out the details and the movements of the experiment and the dialogic situation it formed¹³⁵. The choreographic process leading to the *Room 3.17* experiment, discussed in this chapter, shows that there were many influences at work upon the score¹³⁶. These

¹³² The word choreography is not used metaphorically here, it is meant quite literally and concretely. Much of this work has been initiated through movement, through bodily interaction, mimesis and orality. *inreach* is being posited here as a choreographic process of movement, communication and improvisation.

¹³³ Recognising the unconscious movements of the choreographic process has been made possible by a continuous and automatic documenting of participant observation with CTVR from the beginning. This process of recording was a normal part of the author's artistic research practice, but it became extended through the research with CTVR and became more rigorous and systematic.

¹³⁴ Reflexivity is a term that is used in anthropology as a way of acknowledging the embodied knowledges of the self and how these inform and influence any engagement with others. Reflexivity is a way of attending to both personal and social knowledges. Nigel Rapport argues that "*we must use our knowledge of the complexity of our own selves to resist the temptation to generalize or simplify those of others... In this way we can avoid privileging the social over the personal, and eliding others' individuality with their membership of a social or cultural group*" (Rapport 2014: 34) A reflexive consciousness is an important kind of awareness and attentionality to develop, and particularly so under asymmetrical conditions of occupational difference. e.g.: as in CTVR, where the majority discourse is techno scientific, but where there is also a desire for difference. Occupations developed by way of an aesthetic paradigm are very much in the minority within CTVR, and they are also more familiar with reflexive approaches to research and social interaction. Thus, raising a consciousness of reflexivity through experiment became an aspect of *inreach*.

¹³⁵ The hope is to develop the *inreach* experiment scores in collaboration with a dramaturge after the examination process is completed. This will be discussed in Chapter 8.

¹³⁶ The scoring of this process, as a nascent process, has just begun through the writing of this thesis. There is a strong intention to extend *inreach* and to continue to learn its possibilities and affordances beyond this research. An excellent example of how the score for *inreach* might be developed, particularly as more experiments have been unfolding, is a recent text by Anne Teresa De Keersmaeker and Bojana Cvejic (De Keersmaeker and Cvejic 2012).

were dynamic, open-ended, and in many ways excessive, enabling a material-semiotic agency to convect and mediate within CTVR. Bojana Cvejic describes such influences as materials that operate in the creation of a dance or process of choreography and “give material resistance to actions; they may not make it into the composition, yet they shape its imaginarium, a zone of influence which is not only felt, but also retraceable in the material” (De Keersmaecker and Cvejic 2012: 13) The choreographic process was four-fold involving the following broad actions: *attuning*, *sourcing*, *informing*, *imagining*. In section 5.2 of this chapter the choreographic process for *Room 3.17* is retraced.

Phase Zero of the four-fold process involved attuning to manifestations of transversality within CTVR. This meant listening and responding with CTVR’s workers, paying attention to their actions and initiatives and parsing these for principles and motivations. This was a largely automatic and ad hoc process supported by systematic note-taking and often informal audio recording¹³⁷.

Phase One involved sourcing what are called choreographic objects, materials that will ‘urge participation’ within a group. Such objects, in the case of *Room 3.17* the antenna, “tend to find their point of departure in the form of an everyday object: a balloon, a piece of cardboard...” (Manning 2013).

Phase Two involved a process of self-learning, whereby the choreographer (the author) sought to enrich her knowledge of dialogic approaches by participating in the work of artist Alex Martinis Roe. The purpose of this phase was *informing* the structure of a dialogic situation for CTVR.

In *Phase Three* a poetic goal for the first inreach experiment was imagined as *The Art of Antennas*, a publication that could open up a dialectic correspondence in between art and engineering research by way of the choreographic object of the antenna.

With the choreographic process outlined, in Section 5.3, a ‘sample encounter’ which took place in *Room 3.17* is presented. The ‘sample encounter’ between C.G. and J.F. in *Room 3.17* is chosen for two broad reasons. Firstly, this dialogue takes place roughly in the middle of the week long experiment and offers a good insight as to

¹³⁷ Once again, a reminder: the language of transversality is employed here in order to make sense of the choreographic process. This language was not available to the author at the time of these initial *inreach* experiments and thus was not used in practice. However, transversality was intuited in practice. *Phase Zero* did involve *attuning* to CTVR and its aspiration for improved communication within the organisation. *Transversality* offers a language for a more granular and unconscious process of communication within institutions and groups. This language emerged after a period of reflection, mainly from 2014 -15.

how the stories, objects and ideas began to accumulate and resonate with or disrupt each other through *Room 3.17*. Secondly, this dialogue is a good example of the kind of reciprocity or mutuality that is possible in between aesthetic and techno scientific paradigms. It demonstrates a generosity of listening and voicing, of peer-learning, and of sharing imagination, aspirations and hopes. Finally, in Section 5.4 a summary of the chapter is made

5.2 A Choreographic Process for Room 3.17

5.2.1 Introduction

In the lead up to the Plenary 2011, roughly around April of that year, the author had relocated to a small cubby office on the 3rd floor of Dunlop Oriel House, where CTVR was headquartered¹³⁸. From this research space, the purposeful choreographic process of inreach began. The early works of the Eameses were studied in an effort to gain insight on their working processes and philosophy. A renewed attention was paid to topics of concern being discussed by CTVR's management team, and to opportunities for developing education and outreach initiatives that might resonate with the intuitive orientation of inreach.

A number of major proposals were devised and written collaboratively with CTVR researchers as part of the ESOF City of Science to take place in Dublin in 2012¹³⁹. This dialectic process of proposal writing was formative in identifying collaborators and co-catalysts of inreach, and generally building up a lively sense of artistic research as being active and relevant within CTVR.

¹³⁸ The PhD Lab had proved distracting for the author. Her own physical presence felt incongruous in the PhD lab, amongst the engineering researchers. The author was often interrupted in her work by curious engineering researchers attracted by the materials she was studying or working with. While this was encouraging, the unpredictability of the approaches was disconcerting and made the author feel quite vulnerable and exposed. Therefore a quieter space was required for identifying relevant paths for the research – rather than continually responding to spontaneous queries and tasks introduced through the more open-plan environment.

¹³⁹ These were ambitious proposals that sought to structure performative lectures on the future of the electromagnetic spectrum. These proposals drew together theories and practices of the commons, and re-mixed them with concepts behind the emergent technology of cognitive radio. The possibility of reimagining spectrum as a sharable and natural resource was brought together with possibilities for contemporary dance choreographies inspired by William Forsythe. The *cognitive radio* was imagined as a kind of dancing radio, that could negotiate spaces and gaps in between the proprietary bands of spectrum, and the logic of improvisational dance was proposed as a valuable model for reimagining ways of using such resources. Additionally, *Found Education* workshops were proposed where people from various epistemic, creative and technical occupations could come together to share skills, knowledge, ideas and to work experimentally together on self-directed tasks. See Appendices: *A Sample of Proposals...*; page 80.

A number of lines of inquiry were being developed at this time: (a) studying with the Eameses through their film-works, (b) exploring the meaning of research concepts emerging through CTVR, such as *Cognitive Radio*, in relation to the history and philosophy of communication, and (c) better contextualising and understanding the tradition of relations between occupations of art and techno science¹⁴⁰.

This open-ended research enabled dynamic movements of thought and imagination that were shared through conversation and dialectic exchange with CTVR's researchers over this time. This was the beginnings of the choreographic process of inreach. In what follows the key phases of the choreographic process leading up to the first inreach experiment, *Room 3.17*, are narrated.

Phase Zero involved attuning to manifestations of transversality within CTVR, responding to and mimicking them in order to create space for dialogic encounter; *Phase One* involved sourcing a choreographic object through which a dialogic situation could be set up; *Phase Two* involved *informing* artistic knowledge in order to facilitate dialogic situations; and *Phase Three* involved *imagining* poetic goals for the experiment that could give it a public sense of orientation and purpose.

5.2.2 *Phase Zero: Attuning and responding to manifestations of transversality.*

The learning from the collapse of the 'Communicating Science' revealed a discontinuity between the aspirations of CTVR's management team for communicating communications and a more general expectation amongst CTVR's workers of what it means to communicate techno scientific research. While CTVR's management team demonstrated a facility with conceptual language that insinuated a coefficient of transversality within the research organisation, this was a relatively localised practice in the context of the wider research organisation.

CTVR's headquarters at Dunlop Oriel House was the primary location of this research. It was within the specific context of this building that further movements of transversality, complementary to the *Design for Change* proposal but not caused or commanded by it, were observed and catalysed. A good example of such movements was encapsulated in CTVR's decision to renovate and enlarge its Test-Bed at Dunlop

¹⁴⁰ Concurrently with her research through CTVR, the author was sustaining a professional art practice, collaborating with other artists and making and exhibiting work. This was in no way separate or compartmentalised from CTVR, but served as a reserve into which research could spill over, accumulate and concretise. This separate yet connected artistic practice helped to open up space for lateral reflection, or indirect reflection, where the complexity of the research engagement with CTVR could condense and release. In effect, there was a dialogic relationship between the authors professional and academic artistic research practice. See www.differenceengineartists.org for examples.

Oriel House. This process was begun during the summer of 2012 and was led by CTVR's Executive Director (at the time) P.S.

The renovation of the Test-Bed served a pragmatic and utilitarian function, it was in disrepair, poorly lit and ventilated, and all a clutter. Nonetheless, the move to renovate the Test-Bed manifested a deeper intentionality, a hidden curriculum that ultimately sought to augment transversality within the research organisation.

Many months after the renovation of the test-bed, P.S. reflected that the “*secret intention*” of the space was that “*The ultimate effect would be to bring photonics and wireless researchers into the same physical space and so maybe closer to the creation of a joined up network model in the conceptual sense. Ultimately, I hoped that it would succeed in making the invisible work of CTVR visible*” (Foley 2015)

5.2.2.1 Renovating the Test-Bed

The Test-Bed was the official space of experiment within CTVR. It was used by many diverse teams and individual researchers, from post-graduate to ‘leading edge’ technology-transfer research. At the time of writing, it was used by researchers on location at Dunlop Oriel House, but also remotely by researchers from all over the world who linked with its infrastructure in order to run experimental simulations over the network.

This facility had not always been available to CTVR. Many researchers had been frustrated that the Test-Bed had been used as a dumping ground for disused equipment and other odds and ends. Thus, Post-plenary 2011, a major renovation of the test-bed was planned, coordinated by P.S. in collaboration with post-doc researchers, principle investigators, the centre's Director and a handful of Ph.D. students.

Situated on the third floor of Dunlop Oriel House, the Test-Bed in 2011 was a gloomy, brown-tinted room. It had long ago been a large open room, but had since been partitioned, leaving it with fewer windows than it was designed for. Its inner perimeter was skirted by waist high desks, mounted with various black and grey boxes, blinking with reluctant light, or, on a busy day, displaying muted neon blue, green and orange Tetris-like graphics; impressions of sensed signals and detected radio wave formations. The still figures of wireless researchers would sometimes be observed near these machines, silhouetted through the glass door pane that permitted a view from the corridor. Occupying the test-bed, amongst the sensing

equipment, were coils of cables, odds and ends of computers, a few loose tables, some chairs. There was a toy-train and some tracks¹⁴¹.

On the surface, the motivation for the Test-Bed renovation was largely driven by utilitarian principles – it had the potential to act as a space that would facilitate simulations and experiment for particular research groups, but it was also intended as a space to “*showcase the science*” of CTVR¹⁴². On the same floor, on the other side of the Test-Bed partition, a row of “cubby” offices had been constructed, with one window in each. These spaces had mostly been disused, filled with rubbish and old filing cabinets, and neglected cleaning equipment¹⁴³.

Room 3.17 was one of these cubby offices, and had been reclaimed from relative dereliction for the purposes of this research. This space unofficially became a creative studio and research space for coming to terms with the ‘*What*’ of the Communicating Communications research agenda. There were no objections to the space being used for such purposes, and something of a ‘gentrification’ occurred following the author’s occupation of it, with a number of other researchers reclaiming the vacant rooms as research spaces¹⁴⁴. The renovation of the Test-Bed meant the relocation of a number of researchers from the cubby offices adjacent to it¹⁴⁵. It meant the dismantling of the rooms and the relocation of researchers to other parts of Dunlop Oriel House.

The dismantling of Room 3.17 was significant on a number of levels. Up until the occupation of Room 3.17, this research was carried out in the Ph.D. research lab on the 2nd floor of Dunlop Oriel House¹⁴⁶. This was a semi-open plan space with limited facilities to support the various modes of artistic research methods. Room 3.17 had provided a suitable space for artistic research, improvisation and experimentation. The dismantling of Room 3.17 meant the re-integration of such artistic research and experimentation methods to the Lab. This change introduced a degree of both anxiety and excitement into the research process; the change would mean a different

¹⁴¹ One of the PhD students, J.T., had been experimenting with signals on the move by using a toy-train as a simulator. See Appendices: Chapter 5; page 40; Figure 29.

¹⁴² See Appendices: Chapter 5; page 40; Figure 30.

¹⁴³ These small offices each had a tall window at the gable wall. Cleaners working in the building would sometimes be seen to take unofficial breaks there, taking pause to rest and look out into the distance over Merrion Square park.

¹⁴⁴ An artist and Phd student had been occupying a larger corner office space on this floor for a number of years. When he left, the space was allocated to a visiting fellow from Virginia Tech.

¹⁴⁵ Researchers in the cubby’s over this period of time included Sven Anderson (artist), Rachel O’Dwyer (artist and media theorist) and a visiting fellow from Virginia Tech, Allen B. MacKenzie.

¹⁴⁶ See Appendices: Chapter 5; pages 41 and 42; Figs. 31 and 32.

way of working - a more saturated kind of engagement with CTVR¹⁴⁷. The dismantling of Room 3.17 was embraced as a serendipitous opportunity to develop the first inreach experiment for communicating communications. Though it was not verbalised as such at the time, the author was permitted to follow the logic of her artistic research, which sought to facilitate a dialogic situation within CTVR¹⁴⁸.

The purpose of the dialogic situation would be to address the 'What' of communicating communications, to draw out materials that mattered to the researchers of CTVR, including those of the author. The intuitive aspiration of inreach was to draw out co-efficients of transversality within CTVR, leveraging a resonance in between artistic and engineering research, and in between the discrete territories of expertise within telecommunications engineering research.

Because *A Communications Primer* (1953) had effectively opened up the world of telecommunications engineering to the author and because the Eameses' approach to design resonated so intuitively and continuously with CTVR's management, their work was recognised as material that mattered. A decision was made to study their early work, in an effort to develop a working theory of their practice. The principle here was to tune into the material that was presented as meaningful to CTVR, and

¹⁴⁷ The anxiety was related to how the choreographic process had developed until now. Having available wall and floor space for moving, relating and ordering material had become an important tool for the artistic research. Having a private space that could also accommodate conversations, spontaneous movement, sharing, rearrangement, noise and discussion of materials was vital to the research process. Such movements would be more difficult to negotiate within an open-plan research Lab. It would be challenging, and the author worried that it could possibly render aspects of the choreographic process immobile or static. This limitation extended also to engineering researchers. For example, there were few whiteboards installed in the Lab, even though diagramming was used by engineers everyday to share ideas and conceptions of systems and processes. Similar to the test bed, the PhD Lab was organised by benches skirting the inner perimeter of two large rooms connected by an open doorway. This space accommodated computers and printers, with a small storage room converted to house a server. There was an unevenness in the spaces within the lab, with researchers on one side of the open-plan facing into the backs of buildings and with very few windows to permit natural light, while the other side of the lab accommodated large Georgian windows permitting plenty of natural light and heat during the day. Therefore, while one side of the lab would enjoy good light but excessive heat, the other side of the lab would enjoy relatively comfortable temperatures with poor natural light. The physical conditions of research were structured by asymmetry.

¹⁴⁸ The word dialogism was developed by Russian theorist Mikhail Bakhtin. Dialogism, according to Bakhtin, is "*the characteristic epistemological mode of a world dominated by heteroglossia. Everything means, is understood, as a part of a greater whole – there is a constant interaction between meanings, all of which have the potential of conditioning others.*" This idea is similar to concepts of complexity. Heteroglossia governs the operation of meaning in any utterance: "*It is that which insures the primacy of context over text. At any given time, in any given place, there will be a set of conditions – social, historical, meteorological, physiological – that will insure that a word uttered in that place and at that time will have a meaning different than it would have under any other conditions*". Dialogism resists the ideology of thinking that there is or can be a unitary language and understands that "*the unitariness is relative to the overpowering force of heteroglossia*" (Bakhtin 1981: 426-28)

trust that by attending to this material a deeper sensitivity to CTVR's latent transversality might develop.

5.2.2.2 *Blacktop: a story of phronesis, an art of inquiry.*

In Chapter 2, the concept of phronesis was introduced in relation to Guattari's concept of transversality. This connection was made over a period of time when the Eameses' film *Blacktop* (1952) was being studied in order to gain insight into their working process, when read alongside the history of their work and design philosophy. *Blacktop* was televised as a visual backdrop to the entertainment show *Stars of Jazz*. The film was edited according to J.S. Bach's *Goldberg Variations*. Both of these facts insinuated an improvisational choreography at work within the Eameses' design process. Therefore, the film *Blacktop* was studied more closely. The way the Eameses used the camera, adapting the lens in an ad hoc fashion in order to get particular shots and focus, became understood as an inductive "way of inhabiting a problem" and learning through doing (Rogoff 2013 [2006]). This gradual understanding is noted in the Field-Journal:

"I have a theory that the camera can be used as a means of developing something like a quality or attitude of phronesis, a circular kind of knowing that comes through a symbiosis of theory and practice. It is a kind of knowing that emerges through reflexivity. In coming to understand the Eameses' early film work more, I have come to believe that their practices of filmmaking were, initially at least, more about learning than about projecting an image of the world. They were in fact learning through the lens, they were participant observers of their own built environment through the lens of the camera... in a sense they were auto-ethnographers, but quite unconsciously. Learning comes through adaptation to complex situations, experiences, and information" (Foley 2012-2014: 22nd November 2012).

Through this study, the Eameses' film work was compared with practices of cinema verité and experimental ethnography (Russell 1999, Koenig 2005, Aufderheide 2007, Boon 2008). In the following sub-sections, a brief discussion is made of how phronesis emerged from the study of the Eameses' film *Blacktop*. The connection between the Eameses' methods and those of participant observation will subsequently be developed¹⁴⁹. As will be shown, a combination of *phronesis-as-filmmaking* and *participant observation* formed the principle task of the *Room 3.17* experiment.

¹⁴⁹ By re-tracing inreach through the theoretical distillery, a four-fold methodology begins to emerge. This methodology combines *phronesis*, *participant observation*, *transversality* and *situated knowledges* incorporating a meaningful framework that can hold the choreographic process of inreach. A full exegesis of this four-fold methodology would require deeper research than can be afforded at this time but offers a promising pathway for elaborating inreach as a more general process.

5.2.2.2.1 Learning through *Blacktop*

Made in 1952, *Blacktop* was the Eameses' first 'official' film, and arguably their most experimental¹⁵⁰. The film can be described simply as a montage of soapy water moving over 'blacktop', otherwise known as asphalt, or tarmacadam¹⁵¹. The film's sub-heading describes it as "*the story of the washing of a school play yard*". The placing of an abstract term alongside a descriptive statement is a common feature of the Eameses' approach to ideation, and reflects their ethos of communicating the familiar and the unfamiliar in contiguity¹⁵².

As little is known about how this film was made, or what motivated it, a close reading of the film was made in order to imagine the embodied decisions made by the Eameses in the editing process and to develop a sense of the quality of choices at work. This involved paying attention to the timing of the shots and the nature of the movement within each shot; how the water flowed, how the camera moved, whether each shot was more or less abstract.

Such an analysis meant employing a kind of *choreographic thinking* (Manning 2013). Through this process of analysis and translation it became clear that a tacit and haptic exploration of variation, flow and counter flow was under investigation by the Eameses through the camera. The use of Bach's *Goldberg Variations* as the soundtrack to the film emphasised the implicit choreographic concerns in the work. In *Blacktop*, shot after shot, the viewer is presented with variations of water and soap suds moving over asphalt: black and grey interrupted at times by yellow lines of the play-yard's games, some leaves, some weeds and shrubs, some fencing, some reflections on the water; but mostly water moving and changing – water transformed by soap suds; grey asphalt turning to black.

The author began to see the making of *Blacktop* as of the Eameses way of inhabiting a problem (i.e., *how to make a film*). By inhabiting the problem, the Eameses produced a film that can be read as conscious trace of an unconscious and embodied learning process. Through this reading of *Blacktop* the critical dynamic of phronesis becomes visible as a process of attending sensually to the situation at hand, to its affordances and constraints.

¹⁵⁰ It received critical acclaim at the Edinburgh Film Festival the following year.

¹⁵¹ See Appendices: Chapter 5; page 42 and 43; Figs. 33 and 34.

¹⁵² For example, their multi-media pedagogical intervention at the Lamar Dodd University of Georgia, involving sound, visuals, film, smells, to introduce the subject of communication *through* any available communication technologies and traditions, was called both 'Art X' and 'A Sample Lesson for a Hypothetical Course' (Bowman 1980)

The design history of the Eameses makes clear that the apparatus of the camera was a way of structuring situations and of imposing constraints, in such a way that enabled tacit learning through display and translation. According to Ray, Charles was “*always interested in documenting things, and using photographs rather than pages of explanations. He had a very strong belief of being able to see something rather than having to describe it, so we’ve always used photographs for that*” (Bowman 1980). According to Charles, for Ray, painting was the apparatus of both hermeneutic and poetry: “*She has a very good sense of what gives an idea, or form, or piece of sculpture its character, of how its relationships are formed. She can see when there is a wrong mix of ideas or materials, where the division between two ideas isn’t clear. If this sounds like a structural or architectural idea, it is. But it comes to Ray through her painting...*” (Kirkham 1995: 80). From what can be gathered through the design history on the Eameses, *Blacktop* appears to really have been a choreographic experiment exploring themes of variation and constraint.

The Eameses operated along the seams of the film industry in California¹⁵³. In the early 1950’s they were storing a projector and some editing equipment for their friends, Amanda and Philip Dunne, while they were shooting *The Gaucho* in South America. As the Eameses did not have any film to show, they decided to make one (Bowman 1980). This meant learning how to use a movie camera, but also learning how to adapt the camera to enable close-up shots: “*Close-up lenses were too expensive and we had very little money, so he [Charles] devised ways of doing it by using cardboard tubes and calculating the exposure, and rubber bands. You know, there was always this technique, everything has been done that way, the technique of how to accomplish something if it has to be accomplished with what means one has at his*” (Bowman 1980)¹⁵⁴. This attention to the ‘*means one has at his disposal*’ is a good example of the phronesis of the Eameses’ process. Hans Georg Gadamer understands this praxis as “*another kind of knowledge. Primarily, this means that it is directed towards the concrete situation. Thus it must grasp the ‘circumstances’ in their infinite variety...*” (Gadamer 2013).

The abundant archival material of the Eameses’ working lives and practices confirms an abiding principle of sharing knowledge by communication. Their work was not shaped by an over all theory, but a commitment to the task at hand; the details,

¹⁵³ The Eameses were close friends and working partners with film Director Billy Wilder. They designed one of their reclining chairs based upon Wilder’s napping habits at work.

¹⁵⁴ This same attitude underpins *Engineering Fictions* in the way that rules are devised, constraints imposed. There is a conviction that regardless of the constraints, the individuating subject can articulate their own intentionality, albeit unconsciously or serendipitously.

constraints and affordances of the problem situation¹⁵⁵. Underpinning their design approach was the requirement of legibility and exchange, fundamental principles that supported communicating within and between groups¹⁵⁶. If something was done or made, it had to be legible to another person so that it could be understood, learned from and built upon. Speaking about their involvement in an L.A. public schools project with Doreen Massey, this requirement is laid down by Ray: *"And if they [the children in the workshop] had to make a list, it had to be legible to someone else. If they had to describe something, as part of the project, they had to write it so it could be understood. They had to keep track of what they had done toward the project and they had to relate to each other, because they all had a part in the project"* (Bowman 1980).

Such an approach is radically non-competitive. It stems from the Eameses understanding of the value of common and shared needs and goals. Ray suggests that this demanding collectivist approach to knowledge transmission was rooted in their childhood experiences of living and working: *"Charles used to talk about replacing vitamins... There have been richnesses in the life of the things that he knew and things that I knew. Charles finds them missing, just in circumstances today. For instance, there isn't the sense of responsibility demanded of children as it was in his time and my time. He had known life on a farm, where it was absolutely necessary that certain things be done. You have to find out how to do them and not be drowned in them, but handle them. And if it isn't demanded, he feels those qualities have to be restored in some way, and I think that's an underlying thing that he had, that he kept searching for"* (Bowman 1980).

The making of *Blacktop* can be read as an allegory of this search and the beginning of a working process which the Eameses extended and built up through their design Office¹⁵⁷. Such processes deftly combined techne, episteme and phronesis. They continuously oriented towards the 'concrete situation' of a problem in its 'infinite variety', seeking out the limits and employing them aesthetically in order to produce understanding and share this with others.

¹⁵⁵ Charles Eames once said of the Eames Office work: *"Looking back on our work, I see no design – certainly nothing haphazard, and not much that could really be called accidental. What I think I see is a natural, though not predictable, growth toward a goal that has not ever been specified."* (Schrader 1970: 12)

¹⁵⁶ This ethic is prescient of transversality.

¹⁵⁷ This is a poignant point. Whether the Eameses were unable to find the right template through which to transmit their knowledge and working processes, in the manner of the Gothic masons, or whether the culture of the time was unable to commit to this collectivist process is questionable. This would be worth further investigation, as the Eameses are very often read in the dualistic terms of modernity, whereas when viewed through a medieval lens, their working methods and support for the development of an 'occupational community' reveals a wealth of practical knowledge.

Charles summarises this effort in an interview with filmmaker Paul Schrader in 1970: “When dealing with some fairly elaborate problems, such as the computer, the city, the Aquarium, etc., we have usually tried to reduce the general problem to a series of small simple units that even we could really understand, and pass something of this particular understanding on” (Schrader 1970).¹⁵⁸ *Blacktop* marks an early and formative moment in a life-long and collective effort of learning-by-doing in order to transmit both values and knowledges. The commitment to telling the story of learning produced through embodied encounter with materials and people (after all, the play-ground was being washed by someone), and the quality of phronesis that became evident by way of a imaginatively contextualised reading of the film, resonated with principles of experimental ethnography and in particular the practice of participant observation. The material-semiotic agency of the latter becomes an important aspect of *Room 3.17* and so a brief summary of how it is employed in the first inreach experiment is developed in the following sub-section.

5.2.2.2.2 *Approaching Participant Observation as an art of inquiry*

In the lead up to the first inreach experiment *Room 3.17* the practice of participant observation was weakly understood by the author¹⁵⁹. Part of the reason it was employed was as a ‘hook’ to draw members of CTVR into the encounter. It was also employed as a way of learning what the term could mean by putting it into action, by acting it out in a kind of literal and parodic way. Animating the term through the situation of *Room 3.17* was also a way of acknowledging the post-colonial history of anthropology; participant observation in this case pushed against traditions of ‘*salvage ethnography*’¹⁶⁰. But there was a faint parody of this tradition in the air. After all, *Room*

¹⁵⁸ The ‘we’ in this quote refers to the Eames Office, the work-place of designers and artists and trades people who collaborated on film and exhibition projects, on furniture and design projects. There is an open sense as to whom the understanding will be passed on to.

¹⁵⁹ The author was aware of ‘The Writing Culture Debate’ catalysed by George Marcus and James Clifford compilation of texts in their book *Writing Culture: The Poetics and Politics of Ethnography*. The tension of anthropology as an “colonialistic, exploitative and imperialistic” was impossible to ignore, and the author was tentative about assuming the role of ‘ethnographer’. The use of the phrase *participant observation* in the *Room 3.17* experiment was an admittance of this tension – and way of opening it out to others.

¹⁶⁰ The language of the experiment evokes the ironic allegory that *Room 3.17* is a remote and disappearing culture (the artists). Its disappearance is caused by the enclosure induced by colonists (the engineers) who want to use this native territory for their own experiments. Some amongst the engineers hope to learn from this disappearing culture, and so they wish to devise ways of salvaging its customs and ways of knowing before it is too late. Therefore, a call is made for participant observers to come and explore *Room 3.17* and to learn its ways.

3.17 was being dismantled and dissolved into the new, empirical Test-bed. Working with and through the ambiguity of the term ‘participant observation’, the experiment opened up a zone power-sensitive conversation. It was an experiment open to all members of CTVR, regardless of their specific expertise or occupation. Thus, through actively engaging with the ambiguity of its meaning, participant observation became a way of playfully leveraging transversality within CTVR.

The call for participant observers was met with a mix of curiosity, bemusement, bewilderment, and a straightforward pragmatism on the part of the CTVR community at Dunlop Oriel House. Participant observation was proposed as a practice of inquiry, an art of inquiry perhaps, that could be taken up by the wider culture of CTVR. This is what *Room 3.17* was modelling, without self-consciously declaring it or even consciously knowing it. It was rather an intuitive action; a knowing it through being it. As Tim Ingold would put it: “*In a nutshell, participant observation is a way of knowing from the inside*” (Ingold 2007: 5)¹⁶¹. The receptivity to becoming a participant observer within *Room 3.17* was ‘evidence’ of a movement of transversality that was more distributed within the culture of CTVR than had been imagined.

Through the experiment of *Room 3.17* the author/artist was *modelling* what she had been tacitly learning about communicating communications through her own processes and practice of ‘participant observation’ with CTVR, otherwise understood as a choreographic process of artistic research. In this practice, she had been studying with and learning from the beings and things around her, particularly informed by CTVR’s management team but also by many others, speculating with them “about what life might or could be like” as a consciously collective research organisation.

The transversality at work through *Room 3.17* manifested as an *art of inquiry*, where people were thinking as they were making. As will be shown, *Room 3.17* was enabling of “*knowledge to grow from the crucible of our practical and observational engagements with the beings and things around u*”, which is what Tim Ingold refers to as the *art of inquiry* which can develop through participant observation (Ingold 2007:6).

This tongue-in-cheek allegory reflects the anxiety and uncertainty of the author, but her determination is nonetheless to honestly disclose her own biases and doubts.

¹⁶¹ This is understood not as a dichotomizing of mind/body, self/other, inside/outside – but rather as an acknowledgement of the situated and embodied knowledges producible through the self in dynamic intra-action with her environment. This also resonates with the theory of technological politics, becoming aware of one’s place in the system.

5.2.2.3 *Summary of Phase Zero*

The first inreach experiment sought to find ways of catalysing a dialogic situation such that matters and materials of concern to CTVR could manifest in a more general way, beyond specialisations of expertise or occupational boundaries. The renovation of CTVR's test-bed was attuned to as a manifestation of a nascent transversality at work within CTVR's management team. This impression was corroborated a number of years later in an conversation with P.S. who acknowledged that the 'secret intention' of the renovation was to bring optical and wireless researchers together in a shared experimental environment, so that they might begin to communicate and more organically articulate the complex research agenda for CTVR (Foley 2015).

The renovation of the test-bed was embraced as an opportunity to extend the choreographic process of inreach by hosting an experimental dialogic situation in *Room 3.17*. The purpose of this experiment was to draw out material that mattered to CTVR researchers and open up a dialogic process within the research organisation. In an effort to better attune to CTVR's aspiration to communicate communications by way of the work of Charles and Ray Eames, their film work was studied more closely. It was felt necessary to find a language for the intuitive attraction of the Eameses' work to CTVR's management team. The Eameses' ad hoc auto didacticism became understood as an art of inquiry, a way of inhabiting a problem, that was evocative both of phronesis and participant observation.

In the next section, it will be shown how the topic of the antenna presented itself as a choreographic object that could catalyse the dialogic situation of this experiment. The antenna became a choreographic object by way of a series of coincidences and encounters with various researchers within CTVR, and via a couple of summer interns to Dunlop Oriel House.

5.2.3 *Phase One: Sourcing the choreographic object – ANTENNA*

Deciding upon a name for this phase in the choreographic process has, appropriately enough, oscillated. There are many kinds of things and objects that facilitate relations, whether as catalytic touch-stones (Fleming 2010) or boundary objects (Star 2010). It was upon revisiting some of the early proposal writing with CTVR that the choreographic work of William Forsythe was remembered as formative in

structuring connections and conjunctions in between the often invisible and always dynamic research fields of telecommunications engineering¹⁶².

Remembering this permitted the 'object' of *Room 3.17* to be re-named as a choreographic object. Erin Manning's interpretations of Forsythe's concept of 'choreographic object' describe them as objects that "*activate an environment for movement experimentation. The idea is to create an atmosphere that slightly tweaks the time of everyday movement, inviting it to tend toward the time of the event*" (Manning 2013: 93). For Forsythe, a choreographic object is "*an alternative site for the understanding of potential instigation and organization of action*" which "*would draw an attentive, diverse readership that would eventually understand and, hopefully, champion the innumerable manifestations, old and new, of choreographic thinking*" (Forsythe 2015). The principle of thinking choreographically resonated with CTVR's thinking submissive philosophy, alongside the nascent field of cognitive radio engineering and research. While little was known about these areas of practice and knowledge, the idea to bring such metaphorical associations into dynamic relation with each other seemed necessary under conditions of occupational difference within CTVR.

In this section, both the conscious and unconscious orientation of research toward the antenna as a choreographic object for communicating communications is laid bare. The conscious direction emerged through an ad hoc task, assigned to the author, of finding appropriate work for a couple of young summer interns seeking to gain work experience in the field of telecommunications. As a legacy education and outreach assistant, the task fell to the author to develop a curriculum of work for the interns. The unconscious direction emerged through assisting visual artist Sarah Browne in her work, devising a short video interview based upon her use of objects as a way of developing choreographic thinking and as ways of asking questions with others.

5.2.3.1 *Making the invisible visible: a trip to the Antenna Lab*

During the summer months of 2011 two transition year students undertook an internship with CTVR¹⁶³. In response to CTVR's desire to "make the invisible

¹⁶² The ESOF City of Science proposals included two frameworks for performative lectures, including a choreography of cognitive radio. These proposals were called *A Tale of Two Spectra* and proposed looking backwards and forwards in time to examine how electromagnetic spectrum has been thought and used. They were strongly influenced by L.D.s use of the language of arts performance in describing networks of the future.

¹⁶³ Transition year is a non-examination year in the secondary education system in Ireland. Students are typically between the ages of 15 and 16 in this year. One of the interns was the son of a member of CTVR's management team. The other intern came to CTVR serendipitously. His mother, a modern furniture collector and trader, provided Eames furniture as part of the staging of CTVR's first screening of the film *A Communications Primer* at

visible”, they were invited to “*explore how one might map the digital world*”. During the CTVR Plenary 2011, a conversation with one of the Antenna Lab researchers suggested a desire for antenna research to be acknowledged and understood more generally within CTVR. The author had an interest in the object of the antenna, particularly the large masts that held them aloft in landscapes and cityscapes, hidden-in-plain-sight by their sheer ubiquity. Hence, a resonance began in between artistic and engineering research interests here.

The task of finding appropriate kinds of exposure to telecoms engineering for the interns coincided with the author’s curiosity to visit the Antenna Lab. The Antenna researchers were warmly receptive of the young interns and showed an eagerness to explain and demonstrate how the antennas work generally and how they are designed with particular constraints in mind. Each Antenna was discussed as unique and having a particular purpose. The Antennas design was described, and demonstrated through various experimental apparatuses, as dependent upon the conditions of use, how and where the antenna would be used, the kind of wave frequencies it would be serving, etc. It became clear that each antenna was quite singular and had a praxis of its own. It also became clear during this encounter that the Antenna researchers were passionate about the technology they were developing and enthusiastic to share their research with others¹⁶⁴. During the conversations and demonstrations within the Antenna lab it became apparent that there was a discontinuity of awareness in between the specialist fields of research within CTVR. No one really knew what the Antenna researchers did, and other researchers from CTVR rarely inquired. Yet the antenna might be said to be at the very heart of telecommunications engineering, relevant to both optical and wireless domains.

The Antenna engineers spoken with on this occasion did not have any theory as to why there was such a discontinuity of awareness and interest in the various fields working in contiguity with each other in CTVR. It was just the simple reality of how research was organised and carried out in an everyday sense¹⁶⁵.

Science Gallery. In the course of arrangements, it transpired that her son’s work experience opportunity had fallen through, and she asked if CTVR might take him on. He helped out during the February screening of *A Communications Primer*, taking photographs and helping usher the crowd. The following summer he returned for a further two weeks work experience.

¹⁶⁴ CTVR’s management had tempered expectations for this visit. It was anticipated that the visit would not be very interesting or would not generate much in the way of conversation or an open flow of ideas. The imaginative aspects of antenna design, the craft-like process of shaping them according to purpose, the metaphorical power of the antenna had not been perceived prior to this visit.

¹⁶⁵ This was largely due to the fact that it had simply not been considered before. Each specialist department focused on the task at hand, solving problems as they arrived through a benign research chain-of-command.

Through this casual and somewhat awkward encounter between CTVR's summer-interns and post-doctoral antenna engineers it became clear that there was a lack of non-task-based or critically recreational conversation and correspondence between subfields of telecommunications engineering. Such communication only occurred when there was direct task to be addressed, such as a specific problem that needed the expertise of one specialism or other. The synchronicity of the interns presence with the author's curiosity enabled a brief yet important conversation to open up about the communication and organisational habits of CTVR's engineers. During this encounter it was decided that the antenna could act as a choreographic object for kindling actions around communicating communications, if the right occasion presented itself.

5.2.3.2 *The Path of a Choreographic Object... the influence of Sarah Browne*

In February 2012, the author spent a week assisting and shadowing Irish visual artist and friend Sarah Browne, as she set about completing her film work *Second Burial at Le Blanc*, in south-central France¹⁶⁶. Later that year, the author was invited to make a short video to contextualise Brownes work for an exhibition of her work at the Contemporary Art Gallery, Vancouver, Canada¹⁶⁷. The author chose to focus upon the way Browne works with objects, both how they inform her work and become her work over time.

Sarah Browne's research-based practice investigates the material means of communication and the creation of shared meaning through exchange and transaction. Browne is attentive to invisible social power structures and material realities and brings a feminist ethic to bear through her work. What was of interest in the making of the video were the processes active within Browne's practice.

The ways in which she employs objects and things, directly and indirectly, in her work helps her to pose more precise and provocative questions, generating conditions for understanding the complex apparatuses of human communication. Of interest particularly was how objects and things operate as a kind of mute host for a question, a matter of concern, that becomes charged by its activation in preparation for exhibition. Browne's careful praxis with objects and things subtly informed the selection of the antenna as a choreographic object.

¹⁶⁶ For more on Browne's work please visit www.sarahbrowne.info. [Accessed 21.09.15]

¹⁶⁷ See Appendices: Chapter 5; page 44; Figs. 36 and 37.

The video made is a birds-eye view looking directly down on a yellow table taken from the artist's home¹⁶⁸. The frame accommodates just the artists hands as she presents a selection of objects that have informed or continue to inform her research-based practice. This video serves two purposes: firstly, it contextualises Sarah Browne's working process for a gallery audience, and secondly, it offers insight to the agency of objects and things within visual art research-based practices (Browne, Stott et al. 2009, Prince 2012). The following is an excerpt from the transcript of the video interview¹⁶⁹. Each of the insights offered by this interview helped to unconsciously inform the framing of the antenna as an object to think through and with, but also as a choreographic object that would "*urge participation*" (Manning 2013: 92). The video has no sound other than the voice of the artist¹⁷⁰. Thus, Sarah Browne's working methodology informed the choreographic process of inreach and in particular helped to affirm a consciousness of objects and still-things, and their material-semiotic agency in catalysing movements of thoughts and bodies.

5.2.3.2.1 On the company of objects...

"Some of the objects I work with are fabricated already. And then some of them are just objects that I feel I need to have around me to think. So the materiality of what things feel like and where they came from is really important to me. Some of these things eventually become used in a work, and some of them are more like touchstones that I like to have around me in the studio, and some of them stay for quite a long time. So for example; this is a tin of beef. And this tin of beef used to have a label. And the label was of a kind of generic

¹⁶⁸ Still-images from this video are presented in the Appendices.

¹⁶⁹ This interview was conducted at Fire Station Artist's Studios during the summer of 2012. Many conversations with the artist had taken place in relation to the process of art making prior to the scoring of this Interview. These conversations began during the process of making the second part of a film *Second Burial at Le Blanc*, in the small town of Le Blanc, central France. Over the course of production in February 2012, conversations on objects, filmmaking and experimental ethnography informed an understanding of the potency of objects as things, and in this sense, as routers of complex economic, social and cultural activity and custom. Browne's engagement with *objects-as-things* has been noted by art critic Tim Stott in her work for the Venice Biennale in 2009: "...to write of things rather than of objects is to understand them as a network of social relations, a gathering around matters of concern. Perhaps we are connected more by these matters of concern than by anything else; matters that we gather to dispute, and the things through which we gather are always in dispute also, divisive, never simply matters of fact" (Browne et al. 2009). Le Blanc was the last village in France that accepted the franc as payment for goods and services, though technically the franc was no longer legal tender, having been replaced by the Euro a decade earlier. Browne devised a customized stock-ticker that both would track and print out euro currency exchange rates and work as a countdown clock to the moment when French francs would finally pass from use in Le Blanc. The clock, understood by Browne as a "paradoxical object, which accumulates masses of paper as it measures time running out", was intended as a gift to the village of Le Blanc. The film is in two parts. The first documents the donation of the gift to the town. The second part documents the last moments of the clocks operation, when the Franc finally passed out of circulation (Prince 2012).

¹⁷⁰ The subjunctive mood of the artists voice as she thoughtfully and critically teases out the functions of these objects in her process reveals much that a plain transcription cannot afford. Please visit <https://vimeo.com/46123323> Accessed 14.07.15 @ 14:43.

Irish green field and it had also a large body of red text on it, saying that it was EU surplus beef. I came upon this tin in a charity shop, and it was given to me. And even though I was vegetarian I couldn't, well I decided not to eat it since it's beef stew, but I was kind of intrigued by this sealed vessel as something that held... value in stasis. Because, it was given to me, it wasn't allowed to be sold, because it was this surplus that had to be given away. So, somehow, this is something I like to have around me, to think about and to think through."

5.2.3.2.2 *On the object as a way of asking a question...*

"So for me an object isn't really an answer, it's more of a question. But an object helps me to ask a question. So if I'm trying to understand something complicated about economic relationships, or particularly about things that are extremely abstract, like finance; which is fundamentally not about objects really, its about abstraction; then by distilling that into an object it becomes something kind of mute, but kind of useful as a way of saying, I don't understand this, do you understand this, can you help me understand this? So the object somehow condenses these things into a question that then gets activated." The objects are "a way that I can touch what the ideas are about" "hold them in my hands and turn them over and think about them."

5.2.3.2.3 *The Object-as-thing: a bridge between the sacred and the profane...*

"The art objects that I make they can cross this threshold from art into life I suppose, and in a way, often then they become twins of each other, they become doubled. And they become doubled often through their presence in a gallery space which is twinned with their presence in somewhere that's elsewhere, typically that's in a film. So as you encounter the object in a gallery space which you understand to be physically real, in front of you, existing, and truthful, the object is also represented somewhere else where, and this elsewhere is as the object is being made, or its as its being used with a group of people, and what kinds of relationships it has there. So this for me, this twinning, is really important. This kind of connection between a gallery space and this other place. This is what gives me some rationale for showing in galleries in the first place."

5.2.3.2.4 *The Object-as-Thing as a way of asking a question collectively through inductive filmmaking...*

"The films are often somewhat documentary based, I mean they are related to documentary but they couldn't really be seen as objective in any particular way, because they utilise this very peculiar circular loop the way they come into being. In that the making of the object, gives license to make the film, and then the fact that you're making a film tends to be this social event that enables the making of props and the meeting of people and a whole other kind of situation that can come into play. That is what it means to make a film for me."

Recently I was reading Lizzie Borden, an interview with her about this film *Born in Flames* which was made in the late 70's and early 80's, and she talks about two models of filmmaking. One of which is inductive, and one of which is deductive. So she describes her process of making a film as having to do with asking a question and then constantly responding to what feedback is given with that question. Which is against the kind of classical idea of having a script and executing it. So somehow, I suppose, I see my way of making films as related to that, where the object is a tool for asking a question."

Sarah Browne's research-based art practice informs the choreography and score for *Room 3.17* in a number of ways: (a) this processual practice highlights the efficacy of objects and things as tools for asking questions collectively; (b) It introduces the filmic language of induction, informed by feminist filmmaking methodologies; and (c) demonstrates the power of a dialectic twinning between the object/thing and the institutional space of encountering (for example, a museum or gallery, or a shop, a home, a street, a field) and the imaginary elsewhere generated through film¹⁷¹. While neither Browne nor the author employ the concept of choreographic object (not having been conscious of it at the time), the process Browne describes can be understood in terms of choreographic thinking. As Erin Manning elaborates, "*The choreographic object activates experimentation and play by bringing together the pastness of experience (the object as we know it) and its futurity (the object-ecology in its novel unfolding).*" The ways in which Browne's objects project into the past and the future are suggestive of their choreographic integrity¹⁷².

5.2.3.3 To set up a splendid oscillation...

The above heading was written into the Field-Journal in October 2012 during the intensive process of devising a basic score for the first inreach experiment. The author writes, "*Set up the tension. Set up the oscillation. Find ways to do that. Find out what are the ways one can do that. It can't ever be just one way. And the way to find the ways is through other people, because it is only through other people that we can really establish the limits of variance. If there are indeed such limits. And there is only a finite amount of time to do this...*" (Foley 2012-2014: 3rd October).

¹⁷¹ The idea of twinning or the double comes up again in Chapter 6.2.3, when the practice of writing is extended toward fiction and it becomes known that the subjectivity of the writer is double: an artist and a craftsperson. This is a doubling that the author has recognised in the working processes artist Sarah Browne. (What may have been particular about the Eameses was their ability to communicate intimately and yet indirectly with each other, as Ray was very much a painterly and dancery in her work and Charles very much a craftsperson.)

¹⁷² Sarah Browne has worked closely with choreographer and dance artist Fearghus Ó Conchúir on a number of his dance productions, both dramaturgically and as a producer of objects to dance with. It would be valuable to explore the idea of choreographic object in relation to her work further. But this is beyond the scope of this thesis, unfortunately. Visit <http://www.fearghus.net/> for more on Fearghus's work, and <http://www.sarahbrowne.info/> for more on Sarah's work.

Choreographic objects tend to “*find their point of departure in the form of an everyday object: a balloon, a piece of cardboard, a mirror. That they are everyday objects allows for a certain ease in the encounter with them – they are recognisable, malleable within our habitual movement practices, already available to our imaginations: we think we know what they can do*” (Manning 2013: 92). In the case of CTVR, the everyday objects are perhaps a little less everyday than the norm. The antenna, however, is familiar in quite an intimate way to many people who grew up alongside analogue television. The antenna was intuited to afford an ecology of connection and conjunction not only in-between the epistemic and technical worlds of wireless, antenna and optical engineering, but also in-between everyday aesthetic and techno scientific paradigms. As choreographic objects, antennas were intuited as “*invitations to move-with*” that could support the experimental choreographic process of *inreach*, and help it to come to know itself (Manning 2013).

5.2.4 Phase Two: Informing the structure for a dialogic situation

So far, the first phases of the choreographic process have been outlined. Phase Zero involved attending to manifestations of transversality within CTVR, tuning in to an appropriate occasion to intervene experimentally. Such an occasion was afforded by the renovation of the Test-Bed and in response to the imminent dismantling of *Room 3.17*. Phase One involved finding a choreographic object that could become an attractor for an event supporting dialogic experimentation in the setting of a ‘*choreographic encounter*’ (Manning 2013). The concept of *inreach* helped support and devise an experimental exploration of what communicating communications might mean as a collective endeavour for CTVR, and why it might matter.

In *Phase Two* of the choreographic process, attention was turned towards ways of hosting dialogic encounter within occupational organisations and institutions. The Eameses’ work was studied in this regard; they were deeply attentive to the power dynamic of guest-host relations, to an almost neurotic level¹⁷³. The social and discursive habits of CTVR (as a collective of researchers and colleagues) were observed by the author through various encounters within the research centre:

¹⁷³ According to his Grandson, Eames Demetrios, for Charles Eames in particular, the guest/host relationship was understood as “*one of the most basic, even primal, human relationships. Every society in the world valued this relationship... Charles felt that it was also part of how one designed and exhibited or a chair or a building. He often suggested that one of the challenges of the modern city was that if we are all guests, then ‘who are the hosts?’*” A spontaneous comment made by Charles, to his colleague Jehan Burns Kuhn, rationalising the level of care paid and “trouble” taken towards guests to the Office was; “*We can’t stand the idea of not being loved*” (Demetrios 2001: 155-65).

formal meetings and lectures, casual conversations in the corridors and landings, task specific conversations with lead researchers, the casual kitchen conversations of the 'coffee club'¹⁷⁴, etc.

The author understood that a range of subtle and tacit skills were required to host or facilitate creative encounters. Thus, artists whose work dealt directly with interpersonal and institutional relations through research informed by feminist philosophy and embodied criticality was sought out by the author. Inreach is informed by peer-to-peer pedagogical principles and values.

In April of 2011, around the same time that *Room 3.17* was occupied for the purposes of developing this research, an opportunity arose to participate in a workshop by visual artist Alex Martinis Roe. The workshop was named *Genealogies: Frameworks for Exchange*. Roe's work as an artist has been "*primarily concerned with relations between people, and the way these relations are both produced by and are productive of language*". In a letter to the feminist philosopher Luce Irigaray, with whom the artist has developed a correspondence, Roe explained her work: "*I exhibit situation designs, conversation pieces and installations. In this work, I try to allow the specificity of the relations between interlocutors (including 'viewers', participants and myself) and the spatio-temporal context of their encounter to negotiate the production and historicisation of the artwork*"¹⁷⁵ (Martinis Roe and Murphy 2011).

¹⁷⁴ The 'coffee club' was a casual gathering of the post-doctorate and senior researchers whose time was more regularised than PhD researchers. It wasn't exclusive per se, but it reflected the meritocratic and temporal organising of hierarchy within the research centre. Typically the post-doctorate researchers would take coffee breaks at 11am and 4pm. These occasions were typically vociferous affairs, good humoured, and yet impersonal. The mood of conversation was typically more declarative than subjunctive. The style of conversation might be described as a jovial argumentative dialectic.

During the 3rd wave of transversality within CTVR, the coffee club took on a new meaning and purpose. When S.McG., one of CTVR's post-doc most socially engaged, experimental and collaborative researchers, and 'president of the coffee club', was preparing to move over-seas with his family, a democratic election kicked off in earnest within the coffee club, such that all of CTVR became involved. As S.McG. was leaving, a new coffee club president was needed. Parodic and absurd campaign posters were designed and posted in the kitchen promoting new candidates for the presidency of the coffee club. Many of these posters were designed by S.McG. in 'trickster' tribute to his colleagues. Another colleague drew up strict rules for the elections and posted them in the kitchen. PhD researchers in the Lab began making campaign videos of the candidates and there was a screening of these video's in the seminar room, during which time the election took place, votes were cast and counted, and a new president was elected. What emerged was a collective parody of democracy and western politics, that was at the same time a tribute to a colleague and friend, a shared celebration. This organic and spontaneous theatre was an extension and evolution of the choreographic process of *inreach* as taken up by CTVR researchers. This took place during the Spring of 2015.

¹⁷⁵ A fuller description from the artist's website: "*Beginning with the artist's encounters with the Belgian feminist philosopher Luce Irigaray, the artist then facilitated a series of online videoconference conversations between her own interlocutors and female writers who are important to them. These conversations sought to address the specific nature of each genealogy, and to explore the relationship between textual and embodied theoretical exchange. She then held workshops with prospective*

The author enrolled as a participant in Martinis Roe's workshop, which took place at The Hugh Lane Gallery in Dublin. Afterwards she interviewed the artist to understand more about her process and philosophy. The intuition at work here was to learn from Martinis Roe's work, by engaging deeply with it, and allowing this to inform the author's engagement with CTVR. The practice and process of Martinis Roe gave courage to the author, informing her score for the *Communicating Science* workshop. Thus, the author can be seen to be mimicking and extending the process of smuggling developed by L.D.

5.2.4.1 *Learning by doing – Frameworks for Exchange*

The *Frameworks for Exchange* workshop was devised by Alex Martinis Roe in order to explore the materiality of encountering and exchanging feminist theories with others. This workshop was one aspect of a body of ongoing work: exhibitions of multimedia installations of video-conferencing recordings, and structured live encounters that support "embodied theoretical exchange among different people, from different cultures, generations and practices" (Martinis Roe 2011-15).

Of general concern in this practice is the production and reproduction of an ethics of difference, by drawing out the embodied and situated knowledges of the people encountering each other, themselves and the art work. In this way, these *Genealogies and Frameworks for exchange* resonate with the feminist objectivity of Donna Haraway (Haraway 1988, Haraway 1997), and with the political practices of Félix Guattari (Guattari, Pindar et al. 2000). The *Frameworks for Exchange* exhibition manifested the political efficacy of art to get at problems of epistemic authority and authorship, and the vulnerability inherent in communicative acts.

The workshop was facilitated by visual artist Alex Martinis Roe. It took place in one of the large, white multipurpose rooms of The Hugh Lane Gallery. In the room, a loose herringbone pattern of long white tables was arranged. At one end of each of these tables a duet of chairs were arranged. The workshop was set up for dialogue. There were a couple of sheets of paper on each of the tables, and an audio recorder.

audiences, which explored different ways of thinking about and listening to one another's female authorial genealogies. Documents from these workshops joined the edited online videoconference recordings in exhibitions, which all included an opportunity for the visitor to engage directly with the project themselves. Some material from these recordings and workshops, that is not included in the exhibitions, lies in libraries – under the same title – in the cities where the exhibitions took place."
[Accessed 10.07.2015 <http://www.alexmartinisroe.com/Genealogies-Frameworks-for-Exchange>]

What unfolded in the workshop was a series of dialogues between six relative strangers. The focus of the workshop was on female authors and to “bring attention to the inter-subjective relations underlying textual genealogies, to... invite them into form” (Martinis Roe and Murphy 2011). The participants were paired off with each other, to have a chat about female authors that had influenced them. After this conversation, each participant completed a worksheet called ‘authorial genealogies’, including their name and the date. An example of the text from one of the worksheets is transposed below. The writer was a young female art graduate named C.F. who was in dialogue with the author. The handwriting is typeset in underlined Italics:

authorial genealogies worksheet – 27 .04. 11 – C.F.

Chantal Mouffe (sp?)

(whom I have not met) I would/would not like to/can/cannot meet her I don't know if she is alive... I would probably want to read more of her work before meeting her anyway, so I wouldn't feel so uninformed/brainless.

Emma Mahony (whom I know) I ~~did~~/did not read her texts before meeting her. We ~~do~~/do not know each other well She is a lecturer so she wouldn't know who I am, but I'd know her. It might be a bit creepy if she sees this... but she introduced me to my thesis topic a few years ago so that's why I remember her and Jessica said an interesting thing about not wanting to read/look at something because it might ruin your own ideas, by making them seem unoriginal. I find that happens to me a lot.¹⁷⁶

Each participant filled out one of these worksheets. They became framed and were exhibited as part of Martinis Roe's *Genealogies; Frameworks for Exchange* exhibition at *Pallas Contemporary Projects*, Dublin. The process of the workshop was subtle and unassuming. It structured a seemingly benign process of remembering and revealing textual and epistemic relationships between individuals and the female authors of texts. But what was revealed was a deep trouble with the way people relate to knowledge and the way people value their own personal, situated knowledges in relation to others who are understood to have claims to epistemic authority.

What Martinis Roe subtly and carefully draws out through the dialogic situations she establishes amongst strangers, within the institutional context of contemporary visual art, are modernist and hierarchical assumptions about authority, authorship, originality, know-what and know-how. This is what Hallam and Ingold refer to as a

¹⁷⁶ See Appendices: Chapter 5; page 45; Figure 38.

“backwards reading” of creativity and authorship that is symptomatic of modernity, which instead privileges...

“...a power not so much of adjustment and response to the conditions of a world-in-formation as of liberation from the constraints of a world that is already made. It is a reading that celebrates the freedom of the human imagination – in fields of scientific and artistic endeavour – to transcend the determinations of both nature and society. In this reading, creativity [and authorship] is on the side not only of innovation against convention, but also of the exceptional individual against the collectivity, of the present moment against the weight of the past, and of mind or intelligence against inert matter” (Hallam and Ingold 2007: 3).

In other words, Martinis Roe’s structuring of the dialogic situation served to manifest the persistence of the enlightenment male authority as gatekeeper of knowledge and value. This can be read as a hidden curriculum that serves to undermine and undervalue the equal authority of voice. That is not to say that manifesting hidden curricula is the explicit aim of Martinis Roe’s work. Her approach is affirmative and elliptical, exemplary of embodied criticality (Rogoff 2013 [2006]). Critic Laura Preston understands Martinis Roe’s practice as *“an exploration of intimacy; both as an imagined connection and as the actual yet untranscribable consequences of traversing subjectivities” (Martinis Roe and Murphy 2011).*

What was learned through participating in this workshop was the possibility of structuring and channelling vulnerability in communication, enabling the articulation of feelings and doubts held in reserve and yet quietly ever present. The use of a template for dialogue and writing was carefully constructed so as to maximise the authorial voice and genealogy of the participant, while providing enough tension and form to push the imagination against (Burrows 2010). *frameworks for exchange* workshop offered a processual model, based upon a principle of an ethics of difference, that was valuable to the author in learning to trust her own approach within CTVR. These minor precepts were carried along through the choreographic process, somewhat unconsciously, and brought to bear in the experimental score for *Room 3.17*.

After the Communicating Science workshop of Plenary 2011, the author became more sensitized to the need for such frameworks for exchange and encounter in between the discrete epistemic and technical worlds of CTVR, which were growing to include knowledges and practices of an aesthetic paradigm. It became clear that

attuning to flashes of transversality within CTVR was important for structuring ways of communicating communications. Deepening knowledge and insight into ways of attuning became more important. Once again, the working processes of Charles and Ray Eames offered insight, and so too did the literature of experimental ethnography and anthropology. These ways of attuning to living and breathing contexts served to shape the final Phase of the choreographic process leading to the *Room 3.17* experiment.

5.2.5 Phase Three: Imagining a poetic goal for Room 3.17

During *Phase Zero* an effort is made to become more sensitized to manifestations of transversality within CTVR. Attention is turned towards the Eameses' early practice in an effort to develop a language for their relevance to CTVR and to developing richer practices of communication within the organisation. In studying the Eameses' early film *Blacktop* a theory begins to form that their practice was constituted in part by phronesis, an ethical way of relating with the world that has been translated as 'moral knowledge' or 'practical wisdom' (Code 2003, Gadamer 2013). This thought becomes extended into relation with ethnographic and anthropological practices of observation, in particular *experimental ethnography* and *participant observation* (Russell 1999, Ingold 2014)¹⁷⁷. The renovation of CTVR's experimental Test-Bed becomes identified as a nascent co-efficient of transversality. The imminent dismantling of Room 3.17 was embraced as a serendipitous opportunity to develop an inreach experiment that could facilitate a dialogic situation within CTVR.

The intention for inreach was to draw out co-efficients of transversality within the research organisation that could generate communication in between the discrete territories of expertise within telecommunications engineering research, and also in between occupations of artistic and engineering research within CTVR. The motivation was to catalyse an experimental and creative approach to communication. In *Phase One* it was shown how the antenna was intuited as a choreographic object¹⁷⁸. In *Phase Two* it was shown how Alex Martinis Roe's art process informed the concept and possibilities of a dialogic situation, and gave courage to the author's choreographic process. In this, the final phase of the

¹⁷⁷ Many of the Eameses film works are legible as experimental ethnography, where peoples and cultures are studied through their objects rather than face-to-face. Examples of such films include *Bread* (1953), *House – After Five Years of Living* (1955); *Textiles and Ornamental Arts of India* (1955) *Two Baroque Churches in Germany* (1955); *Day of the Dead* (1957)(Koenig 2005).

¹⁷⁸ At the time, the antenna was simply recognised as an object that seemed contiguous with many levels of knowledge and practice within CTVR, but was also accessible in an everyday sense. It was not necessarily theorized as a Choreographic Object, rather, it was intuited as such.

choreographic process, *Phase Three*, the connections and conjunctions made thus far begin to flow together towards an experimental dialogic situation in *Room 3.17*.

5.2.5.1 Enabling Constraints

The explicit catalyst for the *Room 3.17* experiment was an open call for exhibition proposals in response to the theme of *OSCILLATOR: Everything in Motion*¹⁷⁹. The call was released by Science Gallery Dublin in the Summer period of 2012. The theme immediately resonated (pun intended) with the antenna as a choreographic object (see *Phase One*). It manifested an opportunity to make connections within CTVR, vertically and horizontally, and to generate a convection of communications¹⁸⁰.

The OSCILLATOR call acted as an enabling constraint against which the nascent choreographic process of inreach could press, in an effort to set in motion communication of a different order and quality through CTVR. This was an opportunity to bring the discrete worlds of wireless and optical engineering into contiguity with antenna science and design through artistic research. Likewise it was seen as an opportunity for the occupations of art and engineering research practices to more intimately communicate and share knowledges¹⁸¹.

After some discussions with CTVR's management team, it was decided to compose a proposal that would establish a resonance in between aesthetic and techno scientific paradigms and to open up a different kind of communication in between discrete expertise within CTVR. A proposal was developed that would leverage the antenna as a matter of concern for CTVR and for a general audience. Thus a research exhibition was proposed called *The Art of Antennas*, written by J.F. and L.D. in collaboration with the CTVR/DIT Antenna Lab.

¹⁷⁹ The abstract for the exhibition *OSCILLATOR: everything in motion* read as follows: "What oscillates? From swinging pendulums to throbbing beats and harmonics, Oscillations are repetitive variations from one state to another that usually occur over time. Found in human-made systems and in physical, biological, and informational processes, they can arise either by design or by accident. Sometimes they're a critical component, essential to the correct function of a system, other times they might be a curiosity or a nuisance, or even a catastrophic force. Although well documented there are oscillations that we still can't quite mathematically explain, from the vibrations of Eulers disk to the peculiar regular and chaotic motion of a Swinging Spring. In short, oscillations are ubiquitous and as such the perfect fodder for a Science Gallery exhibition!" A couple of correspondences were picked out from this description – the idea of variations from one state to another over time spoke to both the work *Blacktop* and to the concept of Choreographic Object; the antenna seemed to be well described in the abstract, inviting a more concrete proposal.

¹⁸⁰ This is the language of transversality. At the time, however, the choreographic process of inreach was largely intuitive, operating at a kind of unconscious level.

¹⁸¹ See Appendices: Chapter 5; page 46; figure 39.

5.2.5.2 The Art of Antennas

The ambition was to design an exhibit that would tell a story of antenna design from myriad perspectives:

“The Art of Antennas will look at a range of different antenna types and through working with the makers, the crafts people, and those skilled in the black art. It will illustrate and describe the intricacies involved. It will expose the beauty and intrigue of the processes. It will uncover. It will do what no engineering texts do – it will capture the vague and the precise, the mathematical concepts and the gut feeling, the story of the making.”¹⁸²

The language used in the proposal, ‘to uncover and expose the black art’ of antenna design, reflects the hidden curriculum for CTVR, to communicate communications and to democratise knowledge. Instead of telling the story of antenna design through the passive and modest voice of the enlightenment modest witness, the intention was to produce a heteroglossic story of the knowledge and mysteries at work at the heart of telecommunications technology (Haraway 1988, Durham Peters 1999).

Early drafts of *The Art of Antennas* proposal outlined that the exhibit would be focused around three distinctive pieces – a book, an installation, and hands-on workshops:

1. *The first is a book that will be specially written, designed and produced for the show. This book is called The Art of Antennas – more details later – but essentially it will cross the divide of engineering and art. It will be based both on the mathematical concepts as well as the artistic practices that inform the field.*
2. *The second is an installation piece that will involve a radio transmission – different antennas can be attached a re-attached so that the viewer can understand some of the key concepts.*
3. *The third part of the piece will be a workshop that will be open to public and will involve making and testing antennas.*

The Art of Antennas proposal was concentrated yet ambitious. It sought to address ways of bringing together “ideas of science and poetry within a whole that has a place for both of them”, and which could demonstrate that “different ways of thinking co-exist and

¹⁸² This description of *The Art of Antenna’s* was drafted by CTVR’s Director, in correspondence with the author.

are appropriate on different scales. No one of them dominates or invalidates the others” (Midgley 2001: 6).

In this sense, *The Art of Antennas* proposal reflected an admixture of utopian, pragmatic and feminist principles making it a tacitly political and ethical proposition. The proposal proceeded *“from an awareness of the imperfections of our social and political conditions”* and is *“oriented beyond existing conditions, sometimes to the future, sometimes to the past; it is art that asks us difficult questions about the conditions we live with and the potential we have to change them”* (Noble 2009: 12-19). In scale and principle *The Art of Antennas* was generative of what might be called a poetic goal.

5.2.5.3 A Poetic Goal for Room 3.17

The Art of Antennas proposal was submitted in October 2012 to Science Gallery. There was a sense of enthusiasm about this proposal within CTVR, particularly from the Antenna researchers. It was meaningful to these researchers that a non-instrumental interest was being shown in their work and in the object of antennas. Over the course of shaping this proposal, an educational language of antenna design began to emerge, much like what was sought through the Communicating Science workshop during Plenary 2011. For example, one antenna researcher put forward the following explication of the antenna:

“In a way antennas are like eyes. Instead of light the ‘see’ invisible energy that fills the universe and they make it observable to us. They convert that energy into images, sounds, controls. In one word, they convert that energy into information (i.e. transferrable knowledge). But the very cool thing about antennas is that they can be also used to communicate that information. That means not only can we use them to capture energy coming form the most remote galaxies but also to send a message to a friend or to a satellite into the space. The energy that antennas can transfer is part of nature, like light. It’s just that we can’t feel it unless it is converted into something our senses can perceive. So it’s not surprising if antenna designers take inspiration from nature to make this technology work. For instance, concepts borrowed from fractals, genetics, swarm intelligence, and neural networks have been successfully employed to realise antennas. It’s like we use what we learn from visible nature to interact with invisible nature” (Burrows 2010).

This excerpt offers an insight into the everyday world of antenna research and design. Increasingly, this techno scientific field employs metaphors as conceptual tools that can literally help them to shape the antenna design and to determine how it captures and receives energy, how it throws and releases this energy as information between other antennas.

What became perceptible through these correspondences with the antenna researchers was that *The Art of Antennas* needed to be a collective undertaking, much like the ways antennas were designed. It would have to be choreographed in small steps, responsively over time. In this way its actual structure would take shape as work went along. To perform this proposal into existence would require much time, contribution and collaboration by CTVR's researchers. This was in effect its weakness. From CTVR's point of view, however, the workload fell to just one person, the artistic researcher. Thus the proposal fell short of its own principles¹⁸³.

The proliferation of 'calls for proposals' exacerbates a common misunderstanding that *form follows function*. As Turnbull explains in relation to the way Gothic Cathedrals were built, "*There is no deterministic internal logic of function or form. The structure of the cathedrals results from the combined forces of religious beliefs and aesthetic values, a developing, but limited, set of building practices, economic opportunities, modes of communication, and the work of others. These factors all interact as a whole to produce a particular form*" (Turnbull 1993: 326). Turnbull demystifies the building of the Gothic cathedrals, pointing out that the 'Gothic style' was invented after the cathedrals were built, and that the builders would have had no notion of such a unifying style.

Even as *The Art of Antennas* proposal was submitted and commitments were made by CTVR's management team to support the endeavour if it was accepted, it began to (reluctantly) sink in that there was an incompatibility between the nascent choreographic process of inreach and the common practice of submitting determinate plans to 'calls for proposals'. It became known over time that this was widely acknowledged amongst CTVR's engineering researchers as a recurring problem, whereby research proposals laid out like strict plans or blueprints are increasingly expected of researchers who, in reality, work in an ad hoc and experimental manner¹⁸⁴.

¹⁸³ Moreover, there was no team assembled or available to produce this work, bar the author (and as the well known saying goes there is no team in 'I'...).

¹⁸⁴ The generally accepted approach within CTVR was to make the research proposal as determinate as possible, secure the funding, and then work as normal, making changes ad hoc and as required by the circumstances of research. This was indeed acknowledged in the case of the *Design for Change* proposal. It was understood that aspects of the agenda would shift and change according to the lived reality of research. A growing concern, however, is the assessment of outcomes in some cases of funding in Europe. The stated aims are measured against the actual outcomes, impacting upon the allocation of grants. Such a procedure completely ignores the actual lived practice of technoscientific research, and demonstrates a hyper-abstraction and detachment from epistemic processes. Note: This is highly anecdotal, but it indicates an area of increasing tension and communication breakdown between levels of administration and research.

It became clear that another approach was necessary, one that would require duration, patience, and a high co-efficient of transversality. It was under these conditions that *The Art of Antennas* became more or less unconsciously reimagined as a poetic goal, not dissimilar to the aspirations of those 12th century cathedral builders who employed “a degree of rational functionalism... in the service of a higher aesthetic” (Turnbull 1993: 324). The ‘higher aesthetic’ in this case was to generate and support the convection of transversality within the research organisation.

With *The Art of Antennas* proposal submitted and the dismantling of *Room 3.17* imminent it was decided to build upon the momentum and enthusiasm generated through the OSCILLATOR proposal. The author decided to work imaginatively *as if* the proposal would be accepted and that it would be possible to develop a publication that could creatively open up the ideas at work in the proposal. Thus an idea emerged to use *Room 3.17* as a ‘magnet’ for inviting contribution and dialogue with the antenna acting as a choreographic object and topic. In this way, *Room 3.17* became the context and host for the first inreach experiment within CTVR.

5.2.6 *Summarising the Choreographic Process*

The choreographic process of inreach was intuitive, complex and non-linear. It followed principles of improvisation and ad hoc action, love of equality, trust, risk, honesty and sharing. Inreach required that the author attuned to the emotional load of situations rather than what they seemed to immediately signify or symbolise (De Keersmaecker and Cvejic 2012: 13). Inreach involved thinking and feeling across, around and through various ideas, objects, histories, and practices, in an effort to tune into material-semiotic agents operating in situations of low transversality or communicative discontinuity within CTVR.

In the case of CTVR, the choreographic process was motivated by a discontinuity in between CTVR’s management and the wider research organisation. This discontinuity was found in between the ‘how’ and the ‘what’ of the communicating communications research agenda. The ‘what’ of communicating communications needed attention, prior to the ‘how’. Thus the author worked to tune into materials that mattered to artistic and engineering researchers, and to trust these materials to catalyse communication within CTVR. Inreach was not pre-determining or prescriptive.

The choreographic process which led to the formation of the first *inreach* experiment, *Room 3.17*, has been simplified and translated as a four-fold process. Of course, these were not clear cut phases in practice, they were enmeshed and lively, interfering as well as harmonising with each other.

- *Phase Zero* involved learning a language for CTVR's attraction to the Eameses' design process. The concepts of *phronesis* and the practice of *participant observation* emerged through a contextualised study of the film *Blacktop*. This language and attentional practice supported the perception of a manifestation of transversality: the renovation of CTVR's Test-Bed. The immanent dismantling of *Room 3.17* was embraced as an opportunity to score the first *inreach* experiment.
- *Phase One* involved sourcing a choreographic object that would invite participation and resonate in some in-between discrete areas of research (wireless, optical, antenna design) and administration, and in-between the occupations of art and engineering. The antenna was sourced as choreographic object for *Room 3.17*.
- *Phase Two* involved learning ways of thinking and structuring dialogic situations. The work of Alex Martinis Roe gave courage to the aspirations for *inreach*, and helped to show ways of channelling vulnerability through dialogic tasks of speaking, listening and writing.
- *Phase Three* involved imagining *inreach* as a poetic goal as much as a choreographic process, understanding that it would be a durational and collective process, contingent upon changing situations and motivations. In the case of the *Room 3.17* experiment, *The Art of Antennas* became a poetic goal of the dialogic situation. While the intention was clearly to gather material for a book called *The Art of Antennas*, a degree of "*rational functionalism*" enabled the situated and embodied knowledges of *inreach* to maintain commitment without rushing to enact the plan.

Such was the choreographic process which led to CTVR's first *inreach* experiment, *Room 3.17*. In the next section, the score for *Room 3.17* is re-traced and simplified from the Field-Notebooks and Field-Journal, and through various correspondences and conversations that informed it. The idea of the experiment was discussed with CTVR's management team and enthusiastically endorsed. The score for *Room 3.17* was generated collectively and was written out and facilitated by the author.

5.3 Room 3.17 – A sample encounter

[The following text is written in the present tense in an effort to bring the reader into an imaginary walk-through of the Room 3.17 experiment.]

Room 3.17 is located on the third floor of Dunlop Oriel House. It is referred to by CTVR management as a ‘cubby office’. In April 2012 Room 3.17 was appropriated as a studio space for researching *communicating communications*, part of the Design for Change proposal.

The Room is narrow and long, approximately 4.5m X 3m. It has one tall window that faces onto a busy junction below. Dunlop Oriel House is situated on a corner, where three roads meet. Room 3.17 is noisy with traffic. Over time black dust from the exhausts of vehicles deposit over the surfaces in Room 3.17. The carpet is old, dusty and brown. It is coarse, and ribbed. The walls are a mix of dull pale yellow and a gridded wallpaper. They appear to be made from thin MDF or plywood. It is easy to stick pins into this material. There is a long fluorescent office light in the centre of the ceiling. It is a fake ceiling, with ceiling grids. Through the small apertures wires and pipes are dimly visible. There is a bookshelf behind the door, hung half way up the wall. Over by the window there is a large, heavy desk, with a chair. There is a rug. Underneath the window is a small radiator. On the adjacent wall beside this is a narrow shelf, upon which there is a plant and some odds and ends. On one end of the room is a window. At the other end, a door. The door has a glass window above it to let light onto the corridor. The corridor is very dark and narrow.

When facing into the corridor from Room, the exit onto the landing and stairwell of Dunlop Oriel House is to the right. To the left is a small lobby space. For the purposes of the experiment, this is converted into a make-shift photographic studio, with a white backdrop and lighting.

Room 3.17 is primed with research materials¹⁸⁵. There are books on the shelves relating to science, mathematics, art, design. There are technical objects that look like sculptures made by children. There are many stacks of academic papers on design history and theory, on feminism, on philosophy, on theories of the commons, on ideas of The Singularity and the concept of Gaia. There are references to theatre, and to performance in general. Along the plastic strip containing the internet ports and plug sockets, mid-way up one wall, there are small objects and postcards and other miscellaneous things. There are mementos from exhibitions; there are drawings of antennas; there is a hammer; there are photographs and images. There are small antenna’s stuck to the wall in places. Sketchbooks are laid out, open to

¹⁸⁵ See Appendices: Chapter 5; page 47

read. There are nails on the carpet and a hand made book containing a short story. There is a projector, projecting a movie of an animated gif. This movie demonstrates the iterative phases in the design of a particular antenna. It has the appearance of an abstract figure, with sloping shoulders and a head that changes shape and size over time. The animation is looped. It is projected onto the wall of the room, from a position on the bookshelf.

The Room is neat but busy. There is a lot to look at and engage with. Nothing out of the ordinary, nothing forced. Just the materials of a research inquiry resonating a correspondence between art and engineering. Room 3.17 is an experimental apparatus for a different kind of epistemic communication.

5.3.1 A sample conversation in Room 3.17

In the following section a sample conversation from *Room 3.17* is presented. The intention is to provide insight into the way the encounters unfolded, and to give a sense of the kinds of insights, questions, problems and concerns that emerge by way of a choreographic object. Sensorially, this is a very impoverished account. It is based upon the audio recording made during the encounter between the host (J.F.) and the guest (C.G.). Descriptions are offered in between the dialogue that attempt to suggest the kind of actions going on when the host leaves the guest to observe and engage with the environment of Room 3.17. The encounter is labelled according to the kind of general action unfolding at different times:

Welcome - Attuning; Encountering; Conversing - Farewell.

As was briefly mentioned earlier, this dialogue is one of 28. Each of these dialogues yielded rich materials - stories, memories, feelings, facts, anecdotes, questions, musings, ideas - all triggered through the choreographic object and enhanced by each participants contribute to *Room 3.17*.

There were many issues at stake in the dialogues, subtle tensions of privilege and power between various specialist domains of knowledge within telecommunications, and between academic and administrative workers. There were poignant memories of childhood, of the importance of the transmission of knowledge and love, equality and justice. There were enthusiastic anecdotes that demonstrated the passion and excitement researchers had for their subject, as well as expressions of the banality of every-day research and the sensation of discontinuity between epistemic and cultural domains.

Room 3.17 was scored in such a way that every participant more or less went through the same movements and tasks. But the array of responses was not

repetitive – they were full of variation. The focus here, however, is upon the movement of the choreographic process of *inreach* through CTVR. The dialogue with C.G. is insightful in its own right, but it is the ‘emotional load’ of the dialogue, the experience of it in the real-time of the experiment that impacted upon the next movement of *inreach*. C.G.’s reciprocation with the choreographic process was affirming of *inreach* and moreover expressed a desire to engage further. This affirmation, albeit unconsciously, supported the choreographic process, and gave courage to the author in developing the subsequent experiment *Engineering Fictions*. In the following subsections, the dialogue with C.G. is transcribed and annotated in places, to give a sense of the flow and action of the experiment *Room 3.17*.

5.3.1.1 Welcome

It is Wednesday the twelfth of December, just after 12pm. This is the third day of the experiment *Room 3.17*. The weather is cool and unsettled. It is not raining. Room 3.17 is warm, the radiator is hot and the window is partially open to let air in¹⁸⁶. C.G. and J.F. have just arrived into the room after photographing the object C.G. has brought in contribution to the experiment. It is an A4 sheet of white paper, with the image of a low, widely spread and fast flowing river waterfall printed onto it. It looks vaguely tropical. The audio recorder has been switched to record.

J: It’s not really my room anymore. Because, everybody’s been in here, and the point was to make it a group space.

C: Okay.

J: There’s been fourteen people who have left something behind in the room. So what you’ve brought along, I know you have a story to tell about it, but we’ll talk about that later. Okay? So for the first part of the half hour, anyway - but if it’s a little bit more than that it’s fine - I just want you to hang out in the Room and have a good look around at everything in here.

C: Okay, sure.

J: And pick things up, move things. You can write on the walls if you feel like it. Or make associations between things. Basically it’s your room now, so you can do as you wish. So I’m going to leave you for five minutes...

C: Five minutes, and I’ll have a look...

J: Have a good look, and then what I’m going to do is I’ll come back and I’ll show you how to use this

¹⁸⁶ The building is heated as one unit by the University and there are no controls to manage the temperature of individual rooms. It could at times become very hot.

Super 8 camera. So we're actually making a film as we go. So everybody who comes in shoots a Super 8 film. And I'll tell you about that after.

C: Okay.

J: So, for now just relax. And I want you to find a place to put your image that you brought. So there's scissors and glue and tape and thumb tacks. You put it wherever you feel it works okay? Or where you feel it belongs.

C: So I'll find a spot...

J: Yeah, I'll be back in about five or ten minutes. So enjoy.

C: Okay.

5.3.1.2 *Attunement*

J.F. leaves the room. The audio-recorder is listening. The door closes. The floor creaks. There is a hum of traffic. Time passes. There is a sound of rustling. The sound of objects on wood. A couple of taps. Distant voices are heard from the street. A faint jingle of metal in a pocket, coins or keys. The sound of a nose blowing. The floor creaks. Seagulls call out. The sound of thumbtacks pushing against plastic. Paper pushing over a surface. A smack and a rustle. Traffic. The floor squeaks. Traffic gains. A faint rustle dims it. A rapping on wood. J.F. returns after ten minutes.

5.3.1.3 *Encountering I*

C: Come in, yeah...

J: Did you find somewhere for your...?

C: Yeah I found it... up there...

J: Oh cool, great. Eh, that's... okay, well, before we discuss anything I'm going to show you how to use the camera, okay?

J.F. takes up the Super 8mm camera and begins to introduce C.G. to it. She checks if he has ever encountered such a device before. He has not. She gives some contextual information about it. Then she begins to explain each part; the viewfinder and the light meter; the trigger to sense the light and release the film for exposure; the lens and focus ring; the film meter that shows how many feet of film are used up. C.G. takes the camera and explores the different parts as J.F. explains each. He tries out the focus, checking whether it is easier to film with or without his glasses. He prefers without. The focus is difficult. J.F. explains that by holding down the trigger the film is released past the aperture, and becomes exposed:

J: And when you release your finger, it'll stop. So you have 30 seconds of film to shoot.

C: 30 seconds? To focus everything?

J: Well, you decide. You set your shot up first. Okay... I mean, you don't have 30 seconds to actually film, I mean you have 30 seconds of film that you can use. If you understand me?

C: Yeah.

J: So, I want you to have another look around the room, and maybe pick out a few things that you want to film.

C: Okay.

J: So things that are interesting to you... and then you decide: well, I want to focus on something for a full 30 seconds. Or do you want to have...

C: Okay so I can stop and then...

J: Of course.

C: Okay, okay, okay.

J: So you... as long as you, so you can hold the trigger down and count: One... Two... Three... release.

C: Okay, okay.

J: Or you could hold it down and count to ten and release. But you have thirty seconds in total to play with. Okay?

So that's why I'm saying take your time. You don't have to rush it....

...So, have another look around, get used to using the lens and everything before you start filming...

J.F. tells C.G. to call her when he's finished shooting the film. She will wait in the make-shift photo studio at the end of the corridor. She says they will chat about antennas when she comes back. He thanks her, and she leaves.

5.3.1.4 *Encountering II*

After ten minutes C.G. opens the door and calls for J.F. to return.

C: Come on in...

J: Did it work?

C: It is really hard to... I hope so! It's really hard to use a camera, I didn't know that!

J: (laughs) Yeah, well the focus probably isn't...

C: The focus yeah... I didn't really, em, I don't know if there's any trick you know to understand if it's focused or not? I know more or less, how it should be...

J: Well, there's a little kind of grid in the centre there... and, and... it kind of helps and kind of doesn't. It's not very clear.

C: You have to...

J: Sometimes, I don't know if you saw the grid in the centre of the...

C: yeah, yeah.

J: So I think that's like a prism focus, or something, and some cameras have a split focus, so its much clearer.

C: okay, okay.

J: So it's not easy to use basically.

C: Okay, I won't pretend to be... a... expert camera person today...

J: Don't worry. Was it interesting or was it purely, you were finding it difficult because of the focus or... could you enjoy it?

C: Well I think it was interesting that, it's just... I think that what I wanted to do won't be really good because I'm not able to use it... but anyway...

J: Well, what were you looking at, maybe you could tell me?

C: This.

J: Oh, the pope?

C: Yeah, the pope. Yes. It caught me immediately when I came here. And what I wanted was to... how do you say... eh...put it in focus, and then release the focus, so basically...

J: You're pulling back.

C: As it is I don't have much practice so, you will see.

C.G. has focused on a contribution made to Room 3.17. It is a composite image of two screen-grabs from an online news video. The images slightly are overlapping. The first is of the Taoiseach (Prime Minister of Ireland) Enda Kenny checking his mobile phone while seated in the front row of a large audience. The second image is of Pope Benedict (Head of the Roman Catholic Church) at a podium delivering a speech. The A4 sheet was pinned to a wall in Room 3.17 and annotated with red marker by one

of the participant observers. An arrow points to the image of Enda Kenny's mobile phone from the sentence "*This is an Antenna*". A second arrow points to the image of the Pope from the sentence "*So is this*". The implication is that both the phone and the pope are Antennas. But they are of a different order. The former is a technical object, a device for sending and receiving electronic signals. The latter is a human being¹⁸⁷.

J.F. explains that the film will take a while to be developed, so it won't be until the new year before C.G. will be able to see whether his shot worked or not. J.F. asks what else C.G. was looking at. He mentions butterflies and the face of a man and then he pauses...

C: Can I just ask you maybe...

J: Yes. Anything.

C: Em. I mean, I won't ask you *who* put up the pictures, but, which images or what... were brought by our Lab?

J: Yeah. Em. It's a good question. Em. I can point to a few that some of them brought. Say for instance these, this was constructed by someone. Em. That one there. And the little rabbit... (laughs)

C: Okay.

J.F. explains that a lot of material has been brought, but also that a lot of what was already in the room has been moved around or adapted. Like the 'little rabbit' antenna. Someone stuck the rabbit face onto the two antennas. These antennas were collected in the course of research, through conversation with the Antenna Lab researchers. Many items were given to room in advance, before the experiment was scored. C.G. is not so much interested in *who* brought what, but rather he is curious to know how people responded to the invitation to be participant observers of *Room 3.17*...

C: Well it's not... there is not a curious thing about, eh, who brought what, but it's just to see how engineers... I mean... when they move to art; *how do they think?*

If they think like engineers or if they try to abstract... so that's why I was kind of curious... most of the time when we talk to each other we never really get the chance to talk about this... So I think it's a nice way to know people.

J: Mmmm...

¹⁸⁷ See Appendices: Chapter 5; page 50; Figure 45.

C: That's why I was asking what was brought by the people from the Lab...

J: Was there any discussion about what people were bringing or?

C: No, no... no actually... I talked to E.dP.; but he just told me '*no I'm not supposed to talk about what I did*'... so I...

J: That's funny...

C: He said '*it's a surprise*' and '*go and see*'...

...I don't know if it's because we are... because we are working on a team of things, and when you meet... around each other... basically we stick to our topics, of what we are dealing with everyday. And we probably don't have the chance to talk about other things. I mean in the Lab, you see computers, you see antennas; so I think, being in this such room will give us like... not motivation... em... I'm not able to talk today...em... oh...

J: Opportunity... or?

C: Well, it's kind of *input* but still that's not the word... em... ahh!

J: Do you have a word in your mother tongue?

C: Em. *Inspiration*. Is something I guess.

J: Yeah.

C: Yeah, to think about other things. So I think it's interesting. It will be nice to see tomorrow, actually, to talk to the people, and to see what they think when they have stimulation. *Stimulation*.

J.F. begins to ask C.G. about the object he has brought with him. Carlo expresses regret at what he has brought...

C: Maybe if I had been here before, if I had to choose to bring something, I would have brought something different.

J: What would you have brought?

C: Because actually, I didn't know what to expect, so...
for instance I was caught by this pope;
so it's not like in the way of transmitting signals of something but it's like communicating; so sending messages, but not like electromagnetic waves; also any kind of message, also to control people...

J: Influence?

C: Influence people... but anyway, when I brought that, I was thinking of the shapes of antennas. And so right now most antennas are basically *fixed* things.

J: Yeah.

C: It would be curious to see - I was curious - to see if it was possible to have some kind of antenna which doesn't have a defined shape.

But as I said, if I had been here before I would have brought something different, some how not related to antenna itself...

J: Well we can talk about that.

C: The point is, I don't have an idea now. It's just... I know it would have been something different.

J: Yeah, yeah. But tell me, what *did* you want to talk about in this image...

C: Well, basically... In the beginning what I thought is that, this is a waterfall so, the image of this water coming down, and following the shapes; having basically not a defined shape but a shape which can change and adapt to things. That was the kind of idea I had about the antenna. So in the future maybe antennas won't be like an object, or a part of the object, but will probably be spread all around. So that's why I chose that.

J.F. makes a connection between C.G.'s idea of an antenna, designed with an indefinite shape and made of a fluid material, and to some of the other conversations that have taken place in Room 3.17. J.F. recognises in C.G.'s image of the antenna a way of conceptualising a solution to specific problem felt by photonics/optical engineers to do with the rigidity of hardware and the reliance upon software to make adaptations in the antenna:

J: Well, em, M.R. was talking about the array antenna and how you could allow, well, I don't really know how to state it now, because I know what he meant, but I find it hard to speak about it.

C: Don't worry.

J: So he was talking about how the antenna can kind of target in an array the...

C: Beamforming?

J: Yes! Something like that.

C: To aim at some object...

J: And it kind of would move in that sense. But that's about as flexible as an antenna can be. Well, I don't know if it is but, he seemed to be suggesting that a part of the desire is for the antenna to maybe become, like you say, more flexible, more mutable.

C: I know that there are some shapes for antennas which are also being printed, so they're kind of flexible, so that would be the next step probably.

J: Yeah, yeah.... But this is sort of far away in the future.

C: Yeah, yeah, this is nothing related to engineering, I don't even know if it's possible or not, you know. They want to write papers and see if it is possible to have these kind of antennas. As I said, it's just that we are dealing with art so why not eh...

J: Why not leap ahead?

C: yeah, yeah (laughs) very far ahead!

J: It's science fiction almost. But if you don't... like, N.M. was in here and he brought in the pictures up there...

C: Of space?

J: Yeah, it's of the voyager satellite. And he said that coming in here gave him a chance to look into this telecoms, sort of astronomical radio, if that's the right word. Anyway, and how, to just look at how the voyager satellite has been launched into space and now it's at the edge of the solar system, and here on earth the engineers are still talking to the satellite, they're still drawing down its signal. But they're doing all the work. The satellite is the same. But it's almost that... that kind of crazy ambition, to send the satellite out so that it would reach into space, into the unknown, has allowed for a whole load of technology to develop. It's like they had to set a target that crazy for anything to happen on earth. And I think what you're suggesting with the waterfall is similar, it has to be so far ahead of what's possible, for it to happen...

But that was one of the things that struck me when I came here first, was that it appeared to me to be the case that the engineers here, if they thought about something, if they imagined it, that then the task was to make it real. Would you agree?

C: Well. Most of them would. I think it's kind of our job. So that if you propose something which is not real, it's a kind of fanta-science... you know if you propose something that cannot be built basically your job is kind of pointless... not *your* job, our engineers job.

So I think this is somehow the reason why they are constrained to think about something that is... which can be built. Or something which is feasible. This is what I think about engineers.

My job, I don't really know if it is feasible or not, I don't really care, its just you know, you just go a bit higher, and not be limited by our reality.

C.G. makes the point again that he would have brought something else if he had seen the room in advance, if he had had the experience. He says that he would have brought “*something different. Not even related to shapes or antennas.*” J.F. encourages him to elaborate. He returns to the object of the Pope.

C: You know, I was struck by this pope. You know, I think it's really nice. The idea is *like* an antenna, not as an actual device through which to transmit signals but as a way to influence people, to communicate; even like the ear, you know, to listen. I would have probably chosen something, not exactly the same of course, but I think after I've seen this I would have... I still have to think what...

J: What is it that strikes you about the pope being referred to as an antenna?

C: (laughs) I come from is a very religious country...

J: Where are you from again?

C: Italy. And I come from a small village where, maybe young people not so much anymore, but, there is some influence from the church in the region.

It's kind of scary, how people are influenced by a religion. It seems that they don't even think about what... they just absorb it. Or they take as what counts just from that guy, or not just from him but...

J: The institution?

C: The institution, exactly... so... it's kind of (inaudible) for me, how some people don't really think that they're so limited by what... it seems that they're just waiting for something to be told to them.

So (C.G. gestures to the antenna-object of the pope) it's got meaning, it's true. An antenna communicating in this one direction to other people, and... many ideas come to my mind... like, TV; not the signal, but how people can be influenced and controlled by Television. With the internet it's a bit better because you have a kind of control, but still, it's not that much different, because in the end people are still watching videos... it's like bringing TV on the internet, the way the communication works it's almost the same...

The conversation throws up examples of how political and social communication continue to fall into a one-directional, hierarchical broadcast mode, with lip-service paid to participatory or democratic agency through social media. C.G. wonders if it is in human nature to want to be told what to do and how to think. J.F. brings the discussion back to the Antenna:

J: So... the idea of the antenna, a literal thing, it's a device and so on. But then there's all these other issues around it, like, would you... how would you understand the idea of the antenna now? Today, from your point of view? Of what it is...

C: Ahhh... it still depends, if you're talking from a technical point of view or not. They are totally different answers. I would say from a more engineering and pragmatic point of view, I would stick to, maybe not to a device, a physical device, but a technology which can deliver messages. In a more abstract way I would say, it's a way to convey ideas not just for the sake of bringing information but also to control or to...

J: Yeah. For that influential element. Yeah....
Part of me is thinking 'aren't these two things the same'?

C.G. then asks J.F., "*What is this experiment about?*"

J: Well, it's really eh... on a really simple level it's just a way of pulling content out of everybody in CTVR around the topic of Antennas. Because we want to make a book called *The Art of Antennas*.

C: Okay, 'kay, 'kay.

J: So, and that book is... we wanted to explain in a broader way and in a specific way what Antennas are, and how they are understood, and how they work. So we want to... like, we'd love to be able to explain, say, Maxwell's equation, in a way that is accessible.

That you learn something though; that it's as relevant to a mathematician as to the antenna engineer as to myself or somebody on the street. So we want to find a way that we can talk about something that's usually isolated somewhere, as kind of specialist...

C: Yeah, yeah it's.. I agree... usually when you talk about technical things there are... people who are technical think that other people don't really care; they are kind of wrong, because it's...

J: Well, there's a great beauty in what...

C: Yeah, but, I think one of the main limits of science, not science, but maybe technical subjects, it's just... they try to keep to the topics for themselves... they are not able to make it understandable to other people... so I think people who are not really into science most of the time probably think this is too difficult, they don't want to understand because they don't *need* to understand it; it's kind of wrong... so... it's nice... not to go into details, because it's difficult for us as well... but like, the main concept, or...

For instance, *thesis-in-three*, actually I really like it. It was a really nice idea to try to explain to people what science... or, people who pretend to be scientists (laughs)...¹⁸⁸

J: Engineers (laughs)

C: Yeah, engineers.

J: Yeah, I think it's good... I'm a bit worried that... I think it's a really good idea to do the thesis-in-three. I'm a bit worried that it will become kind of more formulaic as it goes on. You just end up relying heavily on metaphors and analogies that maybe haven't been well developed, or well thought out. I think you need to give time to things, to find the right analogy. You know?

C: So...

J: So an analogy, you know the word analogy?

C: Yeah, yeah, yeah.

J: Yeah, so like, em, even the fact that P.S.¹⁸⁹ brought in that colander there, and that was her way of understanding an antenna. You know, like, pouring water through it, it'll take so much stuff...

C: Okay...

J: ... and other bits will be left, you know? But, there's lots of things; like even the waterfall that you've brought, or the fractal antenna, you know, things that are sort of, you know, they're opening out a new understanding of this one specific thing, and I think it does take a little bit of time to think about what that might be...

C: Yeah, I think...(laughs)

J: So that was another reason to get so many people to come in and give something, because, that way we can get a kind of breadth, a spectrum, of different, maybe...

C: Points of view...

J: Or, like, so sometimes it can be very literal. It's like, A.L.¹⁹⁰ brought, actually brought in one of his antennas that he designed, you know, so he talked to me specifically about that, and how that worked, and then that compared to Penny's understanding...

C: (laughs)

¹⁸⁸ Thesis-in-Three is a competitive forum for PhD candidates to share their research with a public. Each presenter has to explain their research thesis in three minutes, using only three slides.

¹⁸⁹ P.S. was CTVR's Executive Director at this time.

¹⁹⁰ A.L. is a PhD researcher with the DIT/CTVR Antenna Lab.

J: It's like this and the domestic understanding right side-by-side. But they both reveal something very specific, you know, they both *tell* you something...

C: Yeah.

J: So, I guess this is about opening out the language a bit. And then, for me, that's one of the reasons why I've been doing this experiment. The other reason then, because I'm interested in how we might help cultivate a culture of sharing knowledge across disciplines, you know...

C: Okay.

J: Or with a general public say, or just with each other even. Like you said earlier, you don't have the opp... it doesn't happen that you can talk about your work in a wider sense...

C: From a wider perspective...

J: ... because you've a job to do and you need to be focused on it.

C: Yeah, yeah. I think it's interesting... it's the job, but it's also the environment you... like say when... I think what is striking here is like... I guess it's striking to me... different images of different things...

In our Lab it's probably, well, we don't have too much other than computers, so that's also...

I was actually, on Saturday, going to Google - friends coming over they had a friend here - so we went to see it. And I was kind of, not shocked, but surprised by how things are arranged inside, it seems inspiring for creativity.

So, it would be interesting to have some of these things (gesturing towards materials in *Room 3.17*) down stairs in the Lab. To see what...

J.F. laughs and explains that this is exactly what is about to happen. And that this change was another motivation for hosting an experiment in *Room 3.17*.

J: Before you arrived I was in the Lab. I moved out because it was so different to my typical working situation, which would be, an Art Room, a Class Room, or my home studio. You know, where you're used to *things* being around, and you're also used to being on your own.

C: Yeah.

J: And being based where there's lots of other people, em, was a bit weird. I found myself a bit nervous...

C: Okay.

J: And just a bit 'oh, is somebody... they don't notice I've...?' It feels a bit self-conscious, or at least I did.

So when I found this room, it was derelict, nobody was in it, and it was very smelly, and kinda dusty...

C: (laughs)

J: So, I just asked if I could use it, and I've been here for a year... but, they're going to demolish this section here...

C: Because of the new lab?

J: Yeah the Test-Bed. So, I don't mind though, because I knew it wasn't good for me to be isolated from everyone else, the point is that my research is finding ways of communicating...

C: Merging things...

J: ... across different disciplines, you know? Em, so this is sort of a way for me to invite people in to my perspective... and then, I'll go down into the general space again...

C: I think it will be sort of interesting to see... different things in the Lab. So, I think it's going to be inspiring. I think..? We'll see!

J: That's what I think. But it could be that there's something really tangential, like something on the fringe of what you're doing, like you're doing a job, and... but there could be something in the back of your mind, that for some reason when you do this, it reminds you of this thing over here, and it could be that there's a really good reason why you thought of that thing over there. But that it takes a while for your intuition to catch up with your brain, or your brain to catch up with your intuition. So, if that thing on the wall, or that thing over there and you put it on the wall in the work-space, it could be that your brain and your intuition would catch up with each other.

C: Yeah.

J: Like I find, there's things on the wall or in my note-books, and I'm looking back thinking, that's really obvious, the connection. Like it's really, really obvious. But at the time...

C: It was not.

J: So, like even... I think your waterfall, em, I think there's something really powerful in that. And, it could be that that's an intuition... and it could take a while...

There is a rapping on the door. Nearly an hour has passed. The next participant observer has arrived. J.F. greets them at the door and asks for another few minutes before getting started. She directs the latest participant observer to the make-shift photo studio to wait. C.G. says that he is "*curious to know*" how the *Room 3.17*

experiment plays out, and “to see *also how the Lab will be when you move down*”. J.F. laughs and says “*I’ll bring my rug*”.

5.3.1.5 Farewell

J.F. reminds C.G. that he is welcome to return to the room on Friday, should he wish to make any further contributions, or to have another look. She reminds him that there will be mince pies and mulled wine in the Seminar Room at 4.30pm. The intention is that all the participant observers of *Room 3.17* will be able to informally share their experience with each other, and continue the conversation. The welcoming, attuning, encountering and conversing in *Room 3.17* on this occasion lasted 56mins.

5.4 Summary

The motivation working through the choreographic process of the *inreach* experiments was shown in Chapter 4 to be an effect of a discontinuity in-between the *how* and the *what* of the *communicating communications* agenda for CTVR. After the collapse of the *Communicating Science* workshop it was felt necessary to gain experience and insight of *what* materials mattered to CTVR’s researchers and staff. In attending to the *what* the *how* might present itself (Burrows 2010).

The four-fold choreographic process involved first of all *attuning* with CTVR (*phase zero*). A language was sought for CTVR’s attraction to the Eameses’ work. Through studying their early works and their educational approach the skill of *phronesis*, so necessary to developing a practice of participant observation, emerged. These were ‘primed’ (non-verbally and non-explicitly) through the actions of filmmaking and dialogue the *Room 3.17* experiment.

In a very pragmatic way, the experiment emerged because *Room 3.17* was being dismantled as part of the renovation of CTVR’s Test-Bed. The experiment was subtly ritualistic in this sense, a fond-farewell for one home (*Room 3.17*) before relocating to another (the PhD Lab on the 2nd floor of Dunlop Oriel House). But it was an intuition that *transversality* was at stake in the renovation of the Test-Bed that helped to prompt action.

Allies were sought to reinforce the possibility of the experiment (*Phase One*). The confluence of a meeting with the Antenna Lab researchers and the OSCILLATOR proposal for the Science Gallery highlighted the antenna as a choreographic object that could urge participation with “*a spirit of experimentation*” (Manning 2013: 92). The work of other artists, in this case Alex Martinis Roe, was sought out, participated

with and learned from. Martinis Roe's *Genealogies for Exchange* helped to inform the approach and facilitation of the dialogic situation of *Room 3.17 (Phase Two)*. Combining the choreographic object of the antenna with CTVR's desire to find "new ways of understanding ourselves" and different approaches to communication, the poetic goal of the experiment became encapsulated in the name of an imagined publication: *The Art of Antennas*. In many ways, this imagined publication remains the poetic goal of the choreographic process of inreach.

The spirit of this poetic goal has been one of communication in between and under conditions of occupational difference. *Room 3.17* established a temporary space time for a different kind of communication within CTVR. The tasks of coming to *Room 3.17* with a contribute, of *attuning* to the space and time of the experiment, of placing the contribute, of observing the environment reflexively through the lens of the super 8mm camera, and of conversing openly about the experience all combine to structure a different way of communicating in between the occupational matters of concern of artistic and engineering research. This accumulative and unfolding process was elicited through the transcription of the 'sample encounter' between J.F. and C.G. as each communicate 'new ways of understanding' in between engineering's occupations and in between occupations of artistic and engineering research.

6 inreach experiment # 2: *Engineering Fictions*

6.1 Introduction

In this Chapter the second inreach experiment *Engineering Fictions* is elaborated. The purpose here is to outline the choreographic process leading to *Engineering Fictions* (E.F.). The E.F. experiment ran from January to June 2013, with sessions hosted in the Seminar Room of Dunlop Oriel House roughly every second Tuesday. As outlined in Chapter 4.3.4 there were ten sessions of E.F. in the 2013 season¹⁹¹.

Two ‘sample encounters’ from this *inreach* experiment are chosen to offer an insights on how the sessions worked and the kinds of dialogic communication that was enabled through them. Session Two and Session Seven are outlined in Sections 6.3.1 and 6.3.2 of this chapter. These were chosen because of a call and response relationship between their topics(seeds). While this was a unique coherence during this season of E.F., it was a coherence that was implicitly and unconsciously imagined possible and worked for on the part of the author as part of the experiments poetic goal.

Recalling that in chapter 4 the principles and motivations of inreach were outlined, these now carry forward through this experiment as they did through *Room 3.17*. Improvisation and ad hoc processes continue to inform the action of the experiment, as do principles of risk, sharing, and love of equality. The motivation of this experiment continues from the learning developed through the collapse of the Communicating Science workshop (section 4.2.2), and filters through the author’s participant observation with CTVR. The simple purpose to augment dialogic communicative practices amidst a prevailing discourse of argumentative/competitive dialectic remains. Moving through these principles and motivations is a desire to explore and develop ‘ways of transmitting practices’ (Turnbull 1993).

The E.F. experiment was empowered by the receptiveness of CTVR’s workers to *Room 3.17*. The principles and motivations of the intuitive choreographic process of inreach were felt to be, partially at least, mutual and/or reciprocated. *Room 3.17* structured an opportunity to magnetize materials that mattered to CTVR’s research community and to sensitize a more collective process of sensing and recognising co-

¹⁹¹ There was a second season of E.F. which ran from January to May 2014. A decision was made to focus on the genesis of the inreach experiments in this thesis. In Chapter 8 the communicative ripple-effect (transversality) of these initial inreach experiments will be outlined and briefly discussed.

efficients of transversality within CTVR. The choreographic object of the antenna enabled this process of attraction¹⁹².

In section 6.2 the four-fold *phases* of the choreographic process are elaborated, as was done in the previous chapter, and in section 6.3 two sample encounters of E.F. are introduced, which demonstrate a call-and-response dynamic. These samples are chosen because they suggest the potential of E.F. to open up channels for choreographic thinking in between occupational differences within CTVR.

6.2 A Choreographic Process for Engineering Fictions

6.2.1 Introduction

In this section the choreographic process is re-traced. The *phases* of this choreographic process are not discrete from *Room 3.17*. There are moments of resonance and overlap. Many of the *phases* of the *Room 3.17* experiment also influenced and informed the *Engineering Fictions* experiment. They will not be repeated here, but the reader is encouraged to keep these resonances in mind and to acknowledge coincidence, variation, and repetition as significant of a choreographic process. Also, the *phases* of the choreographic process must be understood not as teleological processes, one following after the other, but as simultaneous and interweaving movements¹⁹³. The choreographic process is broken into *phases* according to the main action or intention involved; *Attuning*, *Sourcing*, *Informing and Imagining*. Again these are not discrete to each phase.

In *Phase Zero* of the choreographic process, a matter of concern presents itself by way of the *Filling the White Spaces* workshop hosted by two of CTVR's lead researchers L.D. and T.F. in September 2012. This workshop manifests a coefficient of transversality at a larger scale, one that suggests the place of CTVR's research agenda within a global organisation of telecommunications research and practice. This coefficient can be identified as electromagnetic spectrum policy.

¹⁹² Curiously, within *Room 3.17* the antenna began to assume an allegorical quality as it became personified through the experiment. One of the participant observers, S.mG., for example, began to make faces out of many of the antennas that were placed around *Room 3.17*. There was a movie projection on one wall of *Room 3.17* which showed an iteration of an antenna being designed through a modelling process developed by genetic algorithms. The movie, to S.mG., looked like a head and shoulders changing shape in rotation. In response, S.mG. placed two eyes and smiling mouth in the centre of the 'head'. The effect was subtle but very comical. In dialogue with S.mG. he queried J.F.'s choice of this movie asking whether there were other options. In doing so, he made apparent an unconscious aesthetic choice on the part of J.F. to personify technology, to make it human scale. This resonates as a way-of-being-with-technology which considers that "technical engagements are not just technical but have an immediately and intimately social dimension". (Mitchum 1994: 276)

¹⁹³ The image of kites moving dynamically on the wind comes to mind.

The *Filling the White Spaces* workshop, as will be shown in section 6.2.2, was seen to be attempting to raise the question of ‘adjusting the blinkers’ on electromagnetic spectrum policy by illustrating other possibilities for managing this resource, particularly by way of a principle of sharing¹⁹⁴.

This same struggle manifested at a smaller scale within CTVR some months later in January 2013, when a dialogic communication was opened up via internal email in response to a provocative talk on the future of telecommunications networks by Prof. Misha Dohler¹⁹⁵ that was hosted in the Seminar Room of Dunlop Oriel House. This manifestation catalysed a possibility for the author to self-organise a dialogic exchange through materials that mattered to CTVR, in this case the material-semiotic concept of spectrum sharing. Shortly after this email exchange happened, the E.F. experiment was begun, on the 29th January 2013.

Phase One of the choreographic process outlines the sourcing of *choreographic objects* for the E.F. experiment. This phase takes the ‘model’ as a choreographic object and begins to open up a dialogic inquiry through it by way of (a) the Eameses’ concept of making ‘*fictions of reality*’; (b) the von Bertalanffian concept of a ‘*verbal model*’; and (c) the possibility of writing fiction informed by Irish author Pat McCabe. The author’s choreographic thinking on the model gradually led to a structure for the E.F. experiment by bringing together from within CTVR material-semiotic agents named as ‘*catalysts*’ (people) and ‘*seeds*’ (concepts). Structured by the abstract language of ‘*catalysts*’ and ‘*seeds*’, the specificity of the choreographic objects for E.F. are enabled to vary session to session.

Phase Two further informs the structure of the E.F. experiment. On this occasion methods that were developed through an open artistic collective, co-founded by the author, known as *The Writing Workshop* were drawn upon to support dialogic exchange within the context of CTVR. Methods devised through *The Writing Workshop* had been drawn upon before in the scoring of the Communicating Science workshop in May 2011 (see section 4.2.2.1), and had proved unsuccessful. Later, an opportunity arose to score another writing workshop as part of the *Open Here* festival, curated by L.D. and R.oD. in the summer of 2012. While there was a risk

¹⁹⁴ The language of Guattari is drawn upon here for clarity. At the time, this was all more or less intuited without language. There was a sense that CTVR were struggling to wrestle power and to steer the debate towards equality of access to a natural resource, e.g.; electromagnetic spectrum.

¹⁹⁵ Prof. Misha Dohler is Chair Professor of Wireless Communications at King’s College London. To view his extensive research profile visit: <https://www.kcl.ac.uk/nms/depts/informatics/people/atoz/dohlerm.aspx> [Accessed 23.09.15]

involved, the author embraced the opportunity as a way to recover and extend her practice in the wake of the Communicating Science workshop¹⁹⁶. The workshop's *Hackronym* and *R.S.V.P.* are shown in this chapter to have informed and empowered the extension of experimental writing and dialogic communication within CTVR through the E.F. experiment.

Finally in this section, *Phase Three* involves imagining a poetic goal for E.F. At this point, E.F. is imagined as an iterative and accretive process, where one session will depend upon the next in some way, bifurcating over time. Therefore, supporting the continuity of E.F. is imagined as the poetic goal for this inreach experiment.

6.2.2 *Phase Zero: Attuning and responding to manifestations of transversality.*

The success of *Room 3.17* was empowered the process and continuation of inreach. Through conversations during *Room 3.17* the sense that inreach was an important process for CTVR to develop became stronger. This mutuality was exemplified through the conversation of C.G. with J.F. as outlined in Chapter 4.3.1.

Through the *Room 3.17* experiment, inreach was becoming legible as a choreographic process of drawing out materials that mattered to CTVR and could animate possibilities for communicating communications. The antenna 'contributes' given to *Room 3.17* by the participant observers served to constrain conversation to such a degree that, paradoxically, they opened up all kinds of ideas and stories tangential and yet related to the *Room 3.17* experiment. The relationship between the participant observer and their contribute was an important aspect of inreach that was worthy of further exploration. It seemed important at this time to sustain the energy of dialogic communications that had been generated throughout the week of the *Room 3.17* experiment.

Therefore, *phase one* of the choreographic process for *Engineering Fictions* involved attuning to manifestations of transversality, and responding a way that could sustain, amplify or improvise with this movement. This meant a renewed listening and attunement to materials that mattered to CTVR. Two separate yet related events were sensed to manifest movements of transversality. The first event was the *Filling*

¹⁹⁶ One risk of hosting any open-workshop is always that there will be no participants. This can be dispiriting. The author, however, felt it was important that she try once again to host a writing workshop with occupations of a techno scientific paradigm. The writing workshop was an integral aspect of her own artistic practice, and it was important that she be able to find a way to bring this practice to bear within the occupational context of CTVR. The openhere festival was a good opportunity to make adaptations to the workshop and to experiment. If it was successful, she felt it would be possible then to extend this experimental process through CTVR.

the *White Spaces* workshop which took place in September 2012, and the second event was an email thread, catalysed by L.D., in reaction to a talk given to CTVR by Prof. Misha Dohler. The author conceived of a resonance between these two events that manifested (a) a matter of real concern to CTVR; and (b) a need for structured dialogic exchange within CTVR. To both test and enact this conception, the author proposed the second inreach experiment, *Engineering Fictions*.

6.2.2.1 Filling the White Spaces

In September 2012, the author was approached by T.F. to see if it would be possible to develop a graphic for an upcoming event which could be used on the information materials for delegates¹⁹⁷. The event was called *Filling the White Spaces*, and the graphic needed to evoke a current dilemma in telecommunications spectrum management.¹⁹⁸

The electromagnetic spectrum is the resource upon which all information and communications technologies depend. It is through this spectrum that information travels, according to different frequencies and according to different management regimes: “*The entire radio spectrum is divided into blocks, or bands, of frequencies established for a particular type of service by the process of frequency allocation*” (Doyle 2009: 5). This division of the radio spectrum is carried out by the International Telecommunications Union (ITU) which is a specialised agency of the U.N. The way prevailing spectrum management regimes operated at this time, there were very few bands of spectrum available for recreational or entrepreneurial use. This gave rise to the aphorism that ‘*spectrum is managed into scarcity*’. CTVR came up with its own aphorism, to help to shift mindsets and call for action, ‘*spectrum can be managed into abundance*’.

6.2.2.1.1 TV White Space

TV White Space is the name given to the spectrum that was de-occupied in October 2012, when Television channels switched from analogue to digital operation internationally. This digital switchover meant that a large amount of spectrum became idle. As one of CTVR’s key areas of research was in *Cognitive Radio*

¹⁹⁷ This request reflects how the author was perceived within CTVR largely as someone who had representational skills. Ironically, the author’s skills lay more in non-representational practices and methodologies. But such a mode of artistic research practice was not conceivable, and therefore not perceivable, by many of CTVR’s workers, and in many, many instances by the author herself. The author became desensitized to her own strengths within CTVR, until other artists became involved such as D.mN, from late 2013 onwards.

¹⁹⁸ See Appendices: Chapter Six; page 51; Figs. 46 and 47.

technology¹⁹⁹, the digital switchover was recognised as an important opportunity to experiment and trial alternative ways of using and managing spectrum: “One of the medium-term possibilities for cognitive radio is in the provision of wireless broadband using TV band frequencies...We need cognitive radios to be able to deliver new ways of managing the spectrum. We need cognitive radios to be able to efficiently and effectively manage the very complex and multi-faceted communication systems that exist today and to underpin the more dynamic self-organising systems of the future” (Doyle 2009: 27-32).

The *Filling the White Spaces* workshop was hosted by CTVR and the Science Gallery (Trinity College, Dublin) on the 26th September 2012²⁰⁰. The purpose of the workshop was two-fold: (a) to inform an Irish audience about the opportunities afforded by TV White Spaces, and (b) to signal a “Call for Action” to discuss the real possibilities of using Ireland’s TV White Spaces to trial alternatives for managing spectrum.

The author developed a graphic for the events information material and also photographed the event on behalf of CTVR. While the technical details of spectrum management and TV White Space trials were outside of the author’s knowledge or experience, what was discernable was a struggle to interrupt and diversify a hegemonic regime, and to enable fairer and more equal access to a natural resource.

The event was organised as a ‘call for action’ and subsequently an initiative called *White Spaces Ireland* was established as a way of sustaining discourse and generating actions beyond the event itself. What was made evident through the *Filling the White Spaces* workshop was a commitment to redressing the prevailing narrative that spectrum was a scarce resource, and to sustain pressure within the field to

¹⁹⁹ What is a Cognitive Radio? “A cognitive radio is a device which has four broad inputs, namely, an understanding of the environment in which it operates, an understanding of the communication requirements of the user(s), an understanding of the network and regulatory policies which apply to it and an understanding of its own capabilities. In other words, a cognitive radio is aware of the context in which it is operating.” (Doyle 2009: 36) A cognitive radio can also make autonomous decisions based on what it observes or senses in its environment (other radios for example) and it has the ability to learn from its actions. The technology is in development, these descriptions make give a false impression that the technology is already fully functioning.

²⁰⁰ The event was attended by 120 individuals drawn mainly from industry and the public sector, but also from academia. The early part of the day included presentations by speakers from Microsoft, Spectrum Bridge, Neul, Adaptrum, Fairspectrum, and BskyB. Each of these companies had been involved in running TV white space trials around the world and/or are recognisable as suppliers of infrastructure, for example: databases and radios, for these trials. The later part of the day was focused on Ireland, and the possibility of running TV White Space trials located there: “The discussion was meant to act as a CALL TO ACTION as well as providing an opportunity to discuss issues: Application and business potential, building of consortia, getting permissions, building an Irish geolocation database, practicalities of the trials and issues relating to changing policy and legislation...”. Quote and information taken from the White Spaces Ireland website: <https://whitespacesireland.wordpress.com/fws-event-sept-26th/filling-the-white-spaces-2692012/overview-of-the-event/> [Accessed 22.09.15]

acknowledge the conceptual and political challenge of enacting a change in management regimes.

The ‘as if’ aphorism that ‘*spectrum is managed into abundance*’ became a kind of clarion call during the event, characteristic of CTVR’s affirmative and pragmatic approach technological invention and change. This event made an impression on the author as it offered a glimpse of CTVR’s working principles of risk, equality, and sharing. It also underlined the sense of passion and commitment CTVR held in relation to spectrum management. This was clearly a matter and material of concern for the research organisation, and which had wider societal implications.

A number of months later, however, this concern was somewhat undermined during a talk given by Prof. Misha Dohler to CTVR, in January 2013. Prof. Dohler was invited to speak about his research on the future of telecommunications²⁰¹. It was in reaction to this talk that a further clarion call was made to defend experimental spectrum research, which catalysed a spontaneous critical dialogic communication amongst some of CTVR’s researchers. This will be discussed in the next section.

6.2.2.2 *Misha Dohler’s talk... and the silence of the engineers.*

Prof. Dohler’s lecture comprised two topics: the first was about the use of digital data in the development of ‘*smart cities*’; and the second was entitled ‘5G – *The Future*’, which related to the development and implementation of faster telecommunications networks. Dohler’s talk was provocative, engaging, and entertaining²⁰². The lecture was business oriented, with an emphasis on market driven, industry informed research. An emphasis was placed on software as a solution to burgeoning demand for information and communication technology (I.C.T.) connectivity. In the lecture, higher value was assumed for software that could work with existing telecommunications infrastructures and substrates, as this was understood as the swiftest and most efficient way to realise the ambitions of governments to develop ‘*smart cities*’. In relation to the 5G talk, ‘*small cells*’ were seen as a solution to a burgeoning demand for ICT connectivity²⁰³.

²⁰¹ See Appendices: Chapter Six; page 52; Figure 48.

²⁰² Please make reference to the Field-Journal by searching for 22nd January 2013. A link and password is provided in the Appendices – for the purposes of examination only.

²⁰³ ‘Small cells’ is an umbrella term for “operator-controlled, low-powered radio access nodes, including those that operate in licensed spectrum and unlicensed carrier-grade WiFi. Small cells typically have a range from 10 meters to several hundred meters. Types of small cells include femtocells, picocells and microcells – broadly increasing in size from femtocells (the smallest) to microcells (the largest). Any or all of these cells can be based on ‘femtocell technology’ – i.e. the collection of standards, software, open interfaces, chips and know-how that have powered the growth of femtocells.” <http://www.smallcellforum.org/about/about-small-cells/small-cell-definition/> [Accessed 22.09.15]

CTVR's Director, L.D., had been unable to attend Prof. Dohler's talk due to teaching commitments, but had heard about the presentation through CTVR's management team. This hear-say caused L.D. some concern. L.D.'s concern was rooted in the spectrum management dilemma which the *Filling the White Spaces* workshop had sought to address. On the evening after Prof. Dohler's talk, at 7.19pm on Tuesday the 22nd January, L.D. circulated an email to the internal CTVR mailing list:

Guys,

I heard from P.S. and M.C. that Mischa Dohler made the point that you do not need to worry about spectrum – it is all about cell size.

I wish I had been there to take him up on this – I had to go to a lecture.

However, I am wondering whether everybody's silence at the event meant you all agree?

Of course, when you look at the contribution of shrinking cells – along the lines of Marty Cooper analysis²⁰⁴ – you see the overwhelming contribution of shrinking the cell size makes to capacity increases. But that to me this is only part of the picture and a very disjointed part.

- 1. Small cells need spectrum – many of the models based on mobile operators reusing their existing spectrum assignments for small cells really run into trouble when you get to the large scale deployments of small cells. So spectrum has to be found for these cells as well. Some of the freeing up of spectrum through spectrum sharing approaches is actually geared to small cells. For example, the latest moves by the FCC at 3.5GHz is about this. Small cells 'share' with big cells – so ignoring issues around spectrum whether they be about finding more spectrum or about sharing techniques that small cells can avail of is not a good idea as far as I am concerned.*
- 2. There are many who say that even if you really believe that small cells provide most of the answer you still need to think about other options. Because every tiny bit of extra capacity counts you need to move forward on all fronts – shrinking cell size, technology (e.g. MIMO) AND spectrum. Simon Saunders has some good work on this here – <http://www.ogcome.org.uk/static/uhf/real-wireless-report.pdf>*

²⁰⁴ Marty Cooper is the inventor of the mobile telephone and has helped to shape the wireless industry. He has been a long time advocate of spectrum sharing:

<http://wirelessestimotor.com/content/articles/?pagename=Martin%20%22Marty%22%20Cooper%20-%20Inventor%20of%20the%20cell%20phone> [Accessed 22.09.15]

3. *More importantly freeing up spectrum and dynamic access techniques are not just about capacity – in fact it is not all just about capacity – it is about the freedom to challenge the status quo and build alternative networks, it is about openness and innovation.*

I can't believe no one started a fight and defended spectrum research?

L

L.D.'s email (Doyle 2012) prompted a chain of responses, the first of which was written by the author that evening at 7.46pm²⁰⁵. The author responded with some personal impressions of the talk. The tone of this response reflects the honesty of the conversations that would often take place between J.F. and L.D.. This particular email was recognised as an opportunity to extend such conversation within the 'agora' of the CTVR mailing list, as a mode of dialogic communication, and to see if/how it would be picked up:

I have to say I was a bit confused by the talk (more so than normal!) A couple of quotes from Mischa:

"Spectrum or Power are not problems" – "Change in Design Paradigms" – "Acknowledge the Heterogenous nature of the wireless arena".

Surely by acknowledging the heterogeneous nature of the wireless arena would involve spectrum and acknowledgement of spectrum? He stressed that all of the different systems at work in this arena would need to work together... but then seemed to be saying something else... and I don't know enough about this at all to speculate.

I think he was impressive in his rhetoric and persuasive... but this is the opinion of someone (me) who doesn't have a deep knowledge of engineering and the problems it attempts to resolve, or at least manage. His rhetoric was often times contradictory, probably reflecting in some way the difficulties (or license) of working in industry and the academy simultaneously – there is a certain conflict of interest at work perhaps.

He seemed to be arguing most strongly as an entrepreneur and as a businessman, concluding, as he did, by saying that his pep talk to staff on a Monday morning at WorldSensing was to say:

"Life is not about Money... Life is about a lot of Money"

[I was curious too about his comment: "We spend a lot of time talking about Shannon. Okay. We know the limits..."]

Apologies for the meagre response, I hope you'll continue to humour the neophyte in the corner ☺

²⁰⁵ The timing is important because it suggests that the e-mail exchange was more like a conversation or dialogue than a series of letters written over time and with the possibility of reflection. The writing of emails in quick succession is more like an oral conversation.

L.D. next responded by saying that *“N.M. did just ring me though – pointing out that Mischa was more nuanced than I gave him credit for, which your response seems to say as well.”* Following this email a direct mail was sent from lead researcher N.M. to the author explaining a little more about the reference made to the ‘Shannon Limit’ in telecommunications engineering²⁰⁶.

The next shared response was from lead researcher D.P. who picked up on the quote that *“power and spectrum”* were not problems. D.P. writes: *“I’m not at all sure what he would mean by spectrum and power are not problems; power consumption of mobile broadband is on track to dominate telecoms power consumption over the next decade or so...”* These responses were exchanged within three hours of the initial email sent by L.D., and there were more to follow the next day²⁰⁷.

The point being laboured here is that the excerpts taken from the Mischa Dohler talk by the author were catalytic of further feedback and discussion because they offered a diffractive reading of the session, that is to say it was open-ended, non-judgemental and exemplary of a dialogic communication. The apparent ‘*Silence of the Engineers*’ during Prof. Dohler’s talk did not necessarily signify passivity or acceptance. (As choreographer Jonathan Burrow’s has observed, *“Silence is no more neutral than nudity”* (Burrows 2010: 184)). The swiftness of the responses to L.D.’s apostrophe *“I can’t believe no one started a fight and defended spectrum research!”* suggested an expectation of critical dialogue on the issues raised within the lecture. L.D.’s expectation of CTVR’s researchers as willing to deliberate was initially disappointed. However, the spontaneous discussion catalysed through CTVR’s internal mailing list suggested that while there was a receptivity towards critical dialogue, perhaps a more sustained internal agora within CTVR was needed that could rehearse and practice embodied criticality and dialogic questioning.

Typically, conversations within CTVR were either task-driven or recreational, i.e. the coffee club in the kitchen; playing foosball in the kitchen. Occasionally there would be talks and seminars, or coming-and-going parties for staff, researchers and visitors.

²⁰⁶ There is an etiquette in the personal reply. Most people on the internal email list would have understood what the reference to the ‘Shannon Limit’ meant. N.M. addressed a succinct explanation to J.F. inviting any further questions or comments at any time. Additionally, this exchange more generally signalled that CTVR’s internal mailing list was becoming a platform whereby *“a wider range of voices outside of the purely technical and regulatory domain”* could participate (CTVR 2012).

²⁰⁷ The responses on the following day were mainly from PhD researchers, and they presented as a synthesis of the talk more than a dialogic.

There was the annual Christmas Party where music, food and dancing came together in the Seminar Room at Dunlop Oriel House. But there was no tradition of sustaining dialogic communication in between research matters within the organisation, a dialogic that might support *parrhesia* to embrace “*the freedom to challenge the status quo and build alternative(s)*” (refer to L.D.’s email above), regardless of how many constraints or standards or thresholds had to be met and upheld.

When considered in relation to the affirmative response to the *Room 3.17* experiment, this email thread reinforced an idea that had been surfacing for the author to run some kind of dialogic forum within CTVR. Two days later, on the 24th January, the author sent an informal proposal to CTVR’s management team suggesting a bi-weekly writing workshop at CTVR. In effect, the email seeks permission to experiment:

I have had it in my mind for some time now to begin hosting non-formal/in-formal writing workshops here in CTVR, but I’ve been struggling to know how to frame it. I think Mischa Dohler’s talk and the subsequent email discussion has some how helped me, as well as reconsidering the Eames once again, and so I would like to propose bi-weekly workshops loosely titled: Engineering Fictions. (This plays off the field or mode of Science Fiction writing, but also draws inspiration from the Eamesian notion of creating ‘Fictions of Reality’ through their films and exhibitions. Hence, Engineering Fictions.)

My hope is that people will be comfortable enough to drop in on each session, as and when they are free, and that over a few months a regular group will congeal, though still be open to new members. I also want to open this out to folk who are not necessarily a part of CTVR, but who are invited in through common interest (art, technology, engineering, society, etc.), so the membership would become a network in a way.

I will loosely facilitate the first few sessions, but after this, any member can opt to facilitate a session, so that the direction becomes self-directed by those involved, writers submit to the interests and direction of the facilitator at each session... or they are of course welcome to disrupt that facilitation if they so wish. A friendly kind of unpredictable mutiny is often the best way to generate interesting writing and ideas.

So firstly I’m wondering if it’s okay to proceed with this? And secondly I’m wondering if there is a particular day I could book in to host these workshops? I have every second Tuesday from 6-7.30pm in mind, using the Seminar Room as the venue (Foley 2012).

The response was affirmative from L.D., albeit with a minor caveat: “*Fantastic idea – work away – really great! I will def try and make some. I am not sure who will go for it from here but do it anyway*” (Ibid).

6.2.2.3 Summary

Phase Zero of *Engineering Fictions* involved attuning to manifestations of transversality within CTVR. Félix Guattari's describes transversality as "*a dimension opposite and complementary to the structures that generate pyramidal hierarchization and sterile ways of transmitting messages*" (Guattari 1984: 22). While neither this language nor the concept of transversality was consciously known during this period of participant observation with CTVR, it is clear that the research organisation was struggling to enact and catalyse something like transversality within the international organisation of spectrum management at this time²⁰⁸.

L.D.'s astonishment that CTVR's engineers would not or could not defend one of its key areas of research affirmed the author's intuition to catalyse inreach within CTVR, this time through facilitating an open-ended dialogic forum of some kind within the research organisation. This forum would aim to be self-organising, led by CTVR researchers, though initiated through the author's experimental research to find out material that matters for communicating communications.

This dialogic became conceptually framed by the name *Engineering Fictions*. The naming of the forum was both a seed and a catalyst of it²⁰⁹. Just as *inreach* was an intuitive and reflexive process, which did not quite know itself at this time, so too was *Engineering Fictions* an experiment that was making itself up as it went along, a kind of *ad hoc* process resonant with the tacit methods of engineering (Turnbull 1993, Carroll-Burke 2001), nonetheless improvising by way of a choreographic thinking. In phase two of the choreographic process the identification of the choreographic objects, *catalysts* and *seeds*, is retraced.

6.2.3 Phase One: Sourcing Choreographic Objects - CATALYSTS and SEEDS

6.2.3.1 Introduction

In phase one of the choreographic process the name of the second inreach experiment was proposed by email to CTVR's management team. At this time, it was not entirely clear what the structure of the dialogic situation would be, except that it would draw from the experiences of the Communicating Science workshop and of the *Room 3.17* experiment. It was intuited that a choreographic object would be

²⁰⁸ Transversality, however, must be facilitated as an unconscious movement. It does not follow a declarative logic.

²⁰⁹ As is characteristic of *inreach* processes, a poetry of naming serves to constitute the experiments, following Audre Lorde's claim that "*Poetry is the way we give name to the nameless so it can be thought*" (Lorde 1993: 37).

necessary to bring people together and ‘*urge participation*’ (Manning 2013). While the antenna was clearly identified as a choreographic object of *Room 3.17*, the dialogic communication unfolded when each participant observer began to speak through the contribute they brought with them (or constructed) and placed in *Room 3.17*. The singularity of the person and the particularity of the contribute resonated together to generate possibilities for dialogic communication within the space of experiment.

Over the course of participant observation with CTVR, the concept of the ‘model’ emerged as a choreographic object for the author, a ‘seed,’ that enabled an imaginative resonance in between (a) the Eamesian concept of ‘*fictions of reality*’; (b) the von Bertalanffy concept of a ‘verbal model’; and (c) the possibility that writing fiction could aid in sustaining a dialogic communications within CTVR. Thinking through the seed of the ‘model’ unconsciously and over time begins to structure the E.F. experiment.

As will be shown, an email questionnaire seeded with systems theorist Ludwig von Bertalanffy’s argument for ‘verbal models’ catalysed an exchange in between the author and several of CTVR’s engineering researchers²¹⁰. While the model acted as a choreographic object in the formation of the E.F. experiment, the abstract language of ‘catalysts’ and ‘seeds’ become placeholders for choreographic objects that were brought to the E.F. forum by contributors. This structure allowed the choreographic objects (catalysts/people and seeds/topics) of the experiment to vary from session to session.

In the following sections, each of the seeds are described and the way they informed and enabled the enactment of *Engineering Fictions* is retraced. In section 6.2.3.2 the Eamesian concept of *fictions of reality* is discussed. In section 6.2.3.3 a correspondence is seen to open up between the concept of *fictions of reality* and the idea of systems theorist Ludwig von Bertalanffy’s *verbal model*. An imaginative resonance between the model and fiction began to unconsciously structure the naming of the second inreach experiment as *Engineering Fictions*.

²¹⁰ The concept of ‘a verbal model’ becomes referred to as a ‘seed’ and the action of sending the email questionnaire out to CTVR’s internal mailing list is referred to as ‘catalysing’ exchange. CTVR’s management team often employed action metaphors such as ‘catalysing’ and ‘seeding’ to describe and communicate engineering research. The author was often referred to as a catalyst by L.D., and during preparatory conversations on the *Room 3.17* experiment, the ‘contributes’ and the choreographic object of the antenna were often referred to as ways of seeding discussion. This pattern of ‘catalysts’ and ‘seeds’ is palpable throughout the participant observation with CTVR. It is evident, for example, in the email sent by L.D. in reaction to Prof. Dohler’s talk. Here, L.D. was a catalyst and the (impression of the) privileging of ‘small cells’ (over attention to spectrum management) was the seed.

With a commitment made to run this experiment, the author sought support in learning how to better facilitate dialogic communication within the context of CTVR. An opportunity arose to take part in a creative writing workshop with Irish novelist Pat McCabe. This was intuited as a chance to learn some of the rules and constraints of a fiction writing practice that could become complementary to engineering research practices. The intuition was that developing a balance between the spoken and written word within the experiment of *Engineering Fictions* would offer a way of sustaining its dialogic²¹¹. In section 6.2.3.4, therefore, the author's effort to develop a habit of writing the unconscious as a way of learning how to better facilitate dialogic processes and source choreographic objects within CTVR is discussed.

6.2.3.2 *Fiction as a Model*

In Chapter 5.2.2.2 the experimental film *Blacktop* was discussed as significant of the Eameses' approach to learning and communicating as a process of inhabiting a problem. The Eameses acted as 'conceptual personae' in this research, acting as a kind of bridge in between the occupations of artistic and engineering research.

If there was a doubt in the choreographic process of inreach, the Eameses could be returned to as a way to think through the problem, and to reimagine the movement of relation required under the particular circumstances. The intuitive choreographic process of inreach was continually seeking out choreographic objects that could facilitate relevant dialogic communications within CTVR that could establish resonances in between occupational difference. Over the course of participant observation, the model cropped up enough times to suggest itself as meaningful and relevant. This was corroborated by the Eameses' singular understanding of how the model functioned in their work as a fiction of reality (Schrader 1970).

The Eameses²¹² described their work as a kind of trade: "*In practice, we think of ourselves as tradesmen – it's a kind of custom trade; people come to us for things*" (Eames

²¹¹ E.F. was devised with CTVR's research community in mind. It was intuited that there would be a tendency towards a didactic catalysis of the seed. That is to say, if the seed was 'diagram' the intuition was that it would be catalysed didactically, in a kind of 'banking-style' teaching where by knowledge is deposited in the space of learning. The E.F. experiment aimed to encourage a catalysis that was more open and questioning rather than didactic, in other words, more experimental. If the catalysis was didactic however, the writing process could counter this, particularly by modes of *free-writing*. If this writing was read aloud, back into the forum, then the didactic would be softened and a dialogic could begin to unfold. The oscillation between open and closed, didactic and non-didactic, was tempered by the *host* of the E.F. session. These were all intuitive *inreach* decisions made deliberately over the course of participant observation with CTVR.

²¹² It was Charles who did most of the public speaking and writing, so technically it would appear that the theory of their working process propounded through these public texts is

1977, Adamson 2010). The things they made for people and themselves (furniture, films, exhibitions, toys, etc.) were understood as “*models, in one sense or another*” (Ibid). The Eameses’ concept of the model in their public discourse was always to do with communication: “*There are ‘models before the fact’ – like an architect’s proposal model for a building that’s not yet built – and there are ‘models after the fact’ - like a scientist’s model of a giant molecule or a galaxy. In both cases, the model is something you build in order to communicate about a structure that interests you*” (Eames 1977). By thinking through the Eameses’ concept of the model in the context of CTVR it became legible as a way of structuring a process of communication. A model could be something performed or enacted. It could be a gesture, a kind of choreography, the purpose of which was to “*communicate about a structure that interests you*”. For the Eameses the model shifted from noun to verb: modelling.

The Eameses’ language was consistently generous, its subtle ambiguity leaving room for interpretation much like the language of performance (De Keersmaecker and Cvejic 2012). For example, their comparative attitude imagined fiction as “*a model or simulation against which to try out possible reactions*” (Schrader 1970:15).

The phrase ‘*fictions of reality*’ emerged as a description for the *National Fisheries Center and Aquarium Film* (1967) made by the Eames Office as a report to the Department of Interior on a proposed *National Aquarium* for the U.S. Charles Eames described this two year undertaking as follows: “*Aquarium wasn’t a selling job, it was a report. Mike Kerwin, a venerable member of Congress, was interested in this and this was to be Mike Kerwin’s monument. But Mike Kerwin didn’t have any idea really of what an aquarium should be. As he or someone else said, ‘Anything to keep those little children from peeing in the Capitol’. This is about the level these projects get started. The only thing you can do it try to create a level someone else would be embarrassed to fall below*” (Schrader 1970:12).

The Eames Office made a point of researching and presenting the proposal so thoroughly that when the Department of the Interior watched the film they believed that the Aquarium was already built. It became in this sense a ‘*fiction of reality*’. Paul Schrader argues that “*the irony and power*” of the Eames Office film proposal for the *National Aquarium* “*is that it is greater than the Aquarium ever can be. In its finest form the*

Charles’. However, it is clear from the literature that such a distinction cannot not easily be made. The Eameses were a partnership and their thought and principles of action were imbricated. In the context of mid-twentieth century America, a time when gender roles were being reinscribed at the pace of consumer culture, it would be an easy option to suggest a dichotomy between intellect and intuition. In this thesis, it is not possible to get into the intricacies of the division of labour and the dimensions of collaboration and cooperation at work in the Eameses. There is scope for future research here, however, particularly against a contemporary back-drop of economies of sharing and occupational communities.

Aquarium exists in the mind, and the physical structure can only be a pale imitation of the dream.” He suggests that if the ‘fiction of reality’ that was the *National Aquarium* were to be built it would have been “*a rare demonstration of the Realpolitik power of an idea*” (Schrader 1970: 12).

The composite power of fiction-as-model, and ‘the power of an idea’, demonstrated by the Eameses through the collective work of the Eames Office resonated with the language and aspirations observed through CTVR. This comparison percolated unconsciously through the choreographic process of structuring the E.F. experiment. The idea that fiction could act as a model suggested that it could operate as a choreographic object in between occupations of artistic and engineering research. Perhaps there was enough resonance in between the concept and practice of fiction and model making that could facilitate choreographic thinking and potentially enable a ‘transmission of practices’ (Turnbull 1993)? It was through such these imaginative resonances that the idea of the model became relevant and opportunities were sought to open it up as a seed for conversation within CTVR.

An opportunity to raise this conversation presented itself through a call for participation in a competition for PhD students as part of the European Meeting of Cybernetics and Systems Research (EMCSR). This call introduced another resonant seed in the formation of Engineering Fictions: the General Systems Theory of Ludwig von Bertalanffy. The author proposed a paper and was accepted to present as part of the Ludwig von Bertalanffy PhD Colloquium Award competition in April 2012. The author’s contribution to this competition was to tease out the meaning of transdisciplinary research from the context of CTVR. The paper developed a contiguous analysis of CTVR’s research philosophy, the claims of transdisciplinary research methodologies and the aspirations of Russian poet Velimir Khlebnikov to develop a number-language that would enable universal communication and therefore world peace. Each contributor to the EMCSR Colloquium Award had to relate their research to the overall framework of Ludwig von Bertalanffy’s philosophy of “Unity through Diversity”.

As a kind of thought experiment, a very minor aspect of Ludwig von Bertalanffy’s General Systems Theory was leveraged. As will be explained in the next section, von Bertalanffy’s claim that ‘a verbal model is better than no model at all’ became a choreographic object for urging participation within CTVR, under the auspices of research for the EMCSR competition, by way of an internal email questionnaire. von Bertalanffy’s claim for ‘a verbal model’ catalysed by the author in conversation with

L.D. and was seeded in an internal CTVR email. There was a double purpose here, on the one hand, the author was developing a research paper for a prestigious conference, thus performing her academic duties. But on the other hand, she was inhabiting the problem of communicating communications and seeking a way to rapidly prototype dialogic communications through CTVR's internal email. This dual purpose was at once oppositional and complementary. The author was effectively trying to create and analyse at the same time. This encapsulates one of the major struggles of inreach and of communicating communications.

6.2.3.3 A catalytic conversation on 'A Verbal Model'...

In April 2012, the author took part in the European Meeting of Cybernetics and Systems Research (EMCSR) in Vienna. The paper presented was entitled "*Exploring the 'transdisciplinary': A Contiguous Analysis via a Russian Futurist Poet and von Bertalanffy's General Systems Theory*" and was presented competitively as part of the *Ludwig von Bertalanffy Young Scientist Award 2012* (Foley 2014). As part of the EMCSR presentation the author wished to demonstrate her experimental and dialogic approach within CTVR to the colloquium delegates. It was through this nascent research that the work of Ludwig von Bertalanffy inadvertently became a matter of debate, acting as a spontaneous choreographic object within CTVR²¹³. The focus here is upon how this research inadvertently helped to source and shape the choreographic object of E.F., therefore there will be no further discussion of the EMCSR colloquium presentation.

There was a subtle argument couched within a concluding paragraph of the opening chapter of von Bertalanffy's book, *General Systems Theory* (1968)²¹⁴. Having discussed the advantages of mathematical models ("unambiguity, possibility of strict deduction, verifiability by observed data") von Bertalanffy goes on to say that "this does not mean that models formulated in ordinary language are to be despised or refused" (von Bertalanffy 1968: 24). The argument put forward was as follows: "A verbal model is better than no model at all; or a model which, because it can be formulated mathematically, is forcibly imposed upon and falsifies reality. Theories of enormous influence such as psychoanalysis

²¹³ The proposal for the EMCSR PhD Colloquium Award was written by force of imagination and intuition rather than on the basis of scholarship. It was made in an effort to devise constraints that could focus the choreographic process of participant observation with CTVR at that time. Writing the proposal and subsequently the paper and presentation for the EMCSR PhD Colloquium Award was a process of self-learning, an attempt to organise and structure the research process. It did so indirectly. And the theories and ideas of Khlebnikov and von Bertalanffy have percolated through the *inreach* experiments here and there. The author won the award. See Appendices: Chapter 6; page 53; Figs 50 and 51.

²¹⁴ Ludwig von Bertalanffy (1901-1972) was a biologist and one of the founders of General System Theory.

were unmathematical or, like the theory of selection, their impact far exceeded mathematical constructions which came only later and cover only partial aspects and a small fraction of empirical data”²¹⁵ (von Bertalanffy 1968: 24).

At this time, the orientation and purpose of this research was tentative. von Bertalanffy’s validation of ‘verbal models’ felt like a kind of support. The author’s understanding of von Bertalanffy’s statement was teased out in conversation with L.D. as follows: *“I thought it was really more of an open invitation, I took it as a kind of a ‘welcome in’ to this... that there doesn’t have to be... we don’t all have the same language exactly, but a verbal model is better than nothing... or I suppose I was just trying to give myself permission into the field or something!”* (Foley and Doyle 2012 (a)) This excerpt reveals an occupational insecurity which, working outside of a familiar context and language, began to raise doubts about the intuition that verbalising was a good place to begin making sense together in between artistic and engineering research, and in-between the discrete specialisms of engineering research. As a stranger to the occupation of engineering the author had felt that her testimony of this intuition would not be heard or valued. Thus, the author sought to find allies, ‘*conceptual personae*’, that could support her intuition and experience, and would carry testimonial authority within a techno scientific paradigm (De Keersmaecker and Cvejic 2012)²¹⁶.

L.D. recognised the excerpt from von Bertalanffy’s text as a “*controversial statement*”. Through conversation the author and L.D. began to think through von Bertalanffy’s statement together, and consequently insights emerged about the ways in which mathematical models can often be deployed in a political way, for example in the area of spectrum management, as L.D. elaborates:

“So there is a vested interest. In the world I come from, [for example] the TV people want this [a conservative mathematical model] because they don’t want anyone using the [electromagnetic spectrum] frequencies at all. They’re afraid that if anyone else uses [these frequencies] it’ll interrupt [their service], so they want to put in models that will make it seem like nothing [no spectrum] is available. The cognitive radio people want this [liberal mathematical model] because we think all the technology is so brilliant that even if [there is interference] we can still cope with it. And, in reality, it’s somewhere in the middle... We would prefer some model than none. Even if it’s completely inaccurate, even if it’s falsifying reality. And in fact most of the models we use falsify reality” (Foley and Doyle 2012 (a)).

²¹⁵ See Appendices: Chapter Six; page 52; Figure 49.

²¹⁶ This can be thought as a kind of ventriloquism.

The issue raised in this conversation is not so much that mathematical models can be used for or against particular political, social and economic ends. As a tool, a model can afford myriad uses, for better or worse. Rather, L.D. articulates that the problem becomes one of ‘*recognition*’; of being able to recognise that the results of an experiment or simulation could have been otherwise had another model been used. The implication was that ethical and political decisions are often taken for granted in the everyday of telecommunications engineering research and practice. The inability to recognise the model as a more or less ambivalent tool is understood by L.D. as a kind of amnesia: “*a forgetting of the context*” and the “*underlying assumptions*” inscribed in the ways and contexts that models are deployed (Foley 2012(a))²¹⁷.

By inadvertently raising these issues, von Bertalanffy’s relatively benign statement on models becomes “*controversial*”. L.D. translates the sentence as follows: Mathematical equations can be reductive of “*the more complex reality... And he’s arguing that it’s better not to reduce it to something that is obviously elegant but actually untrue.*” What emerges through this conversation is the disclosure of a previously unconscious bias on the part of CTVR’s Director: “*I think we need to talk about this more and this is why it’s brilliant to bring this up. I mean, the fact that he [von Bertalanffy] even uses the word model with the word verbal to me is interesting, because I would never put it like that. I would put it that no model is the verbal thing, and the model is the mathematical thing. So I think that’s really interesting*” (Foley and Doyle 2012 (a)).

L.D. acknowledges that her own approach to engineering is unusually informed by other fields of knowledge, such as artistic research, and recognises that it is important to raise a more general discussion about normative habits of thought within the occupations of telecommunications engineering. At the same time, by speaking her thoughts spontaneously, she discloses a blind-spot in her own understanding of what a model can be, e.g. that a model could be verbal. It was agreed during this conversation that it would be a worthwhile thought experiment to get a sense of what other engineering researchers might make of von Bertalanffy’s argument for verbal models.

6.2.3.3.1 A catalytic email correspondence on ‘A Verbal Model’...

The ‘thought experiment’ took the form of an email correspondence, circulated through CTVR’s mailing list in early March 2012. The responses and insights

²¹⁷ This concern is resonant with a theory of technological politics as outlined in section 2.5.2.2.

generated by this mini-experiment were used to inform an aspect of the presentation to the EMCSR PhD Colloquium Award. The email correspondence was a way to get a sense of the kinds of interpretations that would be made of this deliberately de-contextualised quote. Would biases emerge? Would any reference be made to the implications of abstracting a quote from its context and how this might interfere with its intended meaning? How would the verbal model be read by engineers who routinely apply and develop mathematical models in their research? Would a moral significance be attributed to the verbal model over the mathematical model? Thus on Friday 2nd March 2012 at 9:45 AM an email was circulated through the CTVR mailing list with the subject line stating: *A research request for 'feedback'...* There were eight responses to the email, each generous in thought and consideration²¹⁸.

6.2.3.3.2 Responses to a 'Verbal Model'...

Generally, the statement was read in two parts as follows: (1) *A Verbal Model is better than no model at all;* (2) *or a model which, because it can be formulated mathematically, is forcibly imposed upon and falsifies reality.* There were two instances of clearly contrasting responses to this statement. The first was adamantly against the argument in the statement, interpreting it as a “wild generalisation” that “implies there’s something constricting and false about mathematics”. This respondent was biased against the verbal model, writing that; “*A verbal model is so likely to be laced with ambiguity that it can be interpreted to be more likely to be correct, and hence be considered more accurate,*” and that; “*A verbal model has the comfort of the implicit; [i.e.] ‘that’s not what I meant, you silly thing’.*”

These interpretations of the excerpt suggested a defensive tone as the reader perceived a claim that mathematical models are generally “constricting and false”. This respondent went on to write: “*I’m being quite generous to the statement, which seems to have a very cause-and-effect attitude. It reads to me as ‘because it can be formulated mathematically [ergo it] forcibly imposes upon and falsifies reality’. Which is pretty damned stark, and says to me the author thinks all mathematical models are forcibly imposed on and falsify reality. Which I think is out-and-out silly. The models may have to approximate beyond a point, but that’s only them doing what language does by default.*” The same respondent noted that in the case of models falsifying reality “*the problem isn’t with mathematical models, but with people forcing them on things inaccurately, in ignorance or nefariously*”. The respondent went on to argue that “*It’s also much easier to ‘prove’ or at least indicate that a mathematical model falsifies reality. But that’s not least*

²¹⁸ See Appendices: Chapter 6; page 54; Figure 52.

because truth and falsehood are mathematical concepts.”²¹⁹ By chopping up the email correspondence into these statements the tone disintegrated a little too polemically. It must be emphasised that this respondent peppered the response with emoticons, and was obviously enjoying the thought experiment of responding to such a provocative statement. Nonetheless, the respondent was unequivocally against the statement. No other respondent established such an explicitly oppositional position. This response demonstrated the kind of good natured, argumentative/competitive dialectic that was common amongst the research community of CTVR.

The second respondent did not make a distinction at all between the parts of the statement, but seemed to read it as a whole concept. This respondent was in a general agreement with the statement, and proceeded to outline in a pedagogical way an understanding of the relationship between verbal and mathematical models: “A common sense model built upon words/everyday language, is probably the first step to model a certain system/problem. Normal language helps us to figure out what a problem/system is, pro’s/con’s, trade-off’s, etc. After we have identified the scenario where we move within, and we have an intuitive idea of what we want to formalise, it comes to the technical jargon, and mathematical modelling comes last” This respondent understood models as part of a process of learning about some system or problem, a process that which was described by the following formula:

(1) Verbal Model → (2) Technical Model → (3) Mathematical Model

Note that this respondent had added a third Model, a ‘Technical Model’. The respondent elaborated on this formula by saying “Actually I think of it as a loop, where one can go back and forth between (1), (2), and (3), according to the need...in describing the reality and/or helping us to reach certain design goals”.

The first respondent can be characterised as offering a ‘binary’ response to the statement, understanding it as an either/or argument, whereas the second respondent, characterised as offering a ‘grey’ response, took a more ‘complex systems thinking’ view of the argument. These two responses indicate extreme positions on the spectrum of responses received via the email correspondence. The other responses in between resonated at various registers between each of these two contrasting positions, but collectively they read as falling under these two characteristics (binary and grey) with four responses in each.

²¹⁹ This is an interesting philosophical claim, and well beyond the scope of this thesis to discuss. But it illustrates how rich a ground this thought experiment turned over for debate and discussion.

What this thought experiment brought to light for the author was a tension between ways of thinking amongst CTVR's researchers²²⁰. A couple of key insights emerged: in half the responses there was a bias at work which asserted that numbers and mathematical models were productive of knowledge. These responses discarded verbal/spoken models as 'unsatisfactory' for the production of knowledge. This attitude is perhaps best exemplified by one of the respondents who quoted Lord Kelvin:

"I often say that when you measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind".

On the other hand, there was a recognition of the value of verbal models in the production of knowledge and insights about scenarios under observation in the world. One particular respondent's email demonstrated writing as a process of thinking out the value of both mathematical and verbal models in the context of Engineering:

"We need theories to do science but often our theories are far from precise. As engineers we need mathematically formulated theories to allow us to prove, test and build on existing theories. But saying that, if the theory is incorrect/imprecise we do need to keep that in mind when we use it.

Mathematical proofs often lead us to think of things as fact. When in reality most of what we use are models of the real world that are not perfect. I think that is where the verbal theories are needed to remind us of this divide, between the models we use (as fact in mathematics) and the root of those models.

Furthermore, I feel that verbal models are sometimes needed to give a level of abstraction from current practice. Using verbal models takes away the 'fact' of the theory and thus allows a researcher to approach the problem from many different places...

I believe that both mathematical and verbal forms of theories need to co-exist. Each brings a level of clarity to the problem that the other can't provide and both allow engineers and scientists to explore theories in different ways."

6.2.3.3 Summary of Feedback on a 'Verbal Model'

Some key insights from the responses are as follows:

²²⁰ It seemed at times that there was a habit of self-stereotyping at work within CTVR – the idea that engineers all think alike and are inherently unimaginative and boring. The purpose of this thought experiment was, in part, to challenge this unspoken self-cliché.

- Firstly, the onto-epistemic dimension of the 'model' was taken for granted in all but one of the responses: "*I, and I think many technical people, would have a degree of suspicion that this word 'model' might be overstating our level of knowledge on the subject*".
- Secondly, the use of models towards political ends (as suggested in the von Bertalanffy quote) was acknowledged as a rhetorical problem, more so than an ethical one.
- Thirdly, some of the responses demonstrated a correlating of the 'mathematical concepts' of 'Truth and Falsehood' with moral value judgements of 'Good and Bad'. There was an ambiguous sense, in just over half the responses, in which *Truth=Good=Fact* and *Falsehood=Bad=Fiction*.
- Thirdly, the feedback from the engineers affirmed that there was an appetite for dialogic correspondence within CTVR. Many respondents were curious to know how the feedback would be interpreted and used.

The email responses to the 'Verbal Model' argument influenced the formation of both the inreach experiments in an unconscious and indirect way, acting as a kind of primer for negotiating dialogic communications under normative conditions of argumentative dialectic, and where Western scientific conceptions of what constituted knowledge held a dominant authority. What this thought-experiment subtly indicates is a larger trouble which turns "*on the question of the relationship between local and universal knowledge*." David Turnbull proposes that "*for different knowledge traditions to coexist in a common third space they need to simultaneously agree to build such a space and to perform together*" (Turnbull 2005:234). This speaks to the heart of what inreach sought to catalyse within CTVR, a nascent transversality.

At a very simple level, this email exchange helped the author to begin to engage mutually with CTVR researchers, and to become gradually recognised as a co-researcher, albeit one from a different occupational and knowledge world. The email exchange served as a minor interruption of quotidian research within CTVR, one which provoked thought and deliberation on a largely taken for granted tool: the model.

Studying the Eameses' work presented the idea of a model as a 'fiction of reality' and as a 'structure you use to communicate about something that interests you'. By studying the work of Ludwig von Bertalanffy, the argument that 'a verbal model is better than no model at all', was read as an empowering statement by statement, one

that gave her courage to open a research conversation with the research community of CTVR.

The structure and score for second inreach experiment thus began coming together by setting up a critical conversation between the Eamesian concept of models as ‘fictions of reality’ and von Bertalanffy’s claim that ‘a verbal model is better than no model at all.’ The author sought to find a way to sustain a productive tension between the material-semiotic figures of ‘model’ and ‘fiction’ in order to create a platform for dialogic communication within CTVR. To this effect the author recognised a need to deepen her own skills and knowledge of fiction as a material-semiotic agency that could open up mutual conversation within the research centre.

An opportunity to do so arose through a local actors studio in Dublin called The Factory. Irish novelist Pat McCabe was running a creative writing course beginning in early 2013, to which the author applied in late 2012. Shortly after the Prof. Dohler email exchange the author was notified of her acceptance onto the course. The influence of this writing class on the formation of the inreach experiment E.F. will be discussed in the following sub-sections.

6.2.3.4 *Developing a habit... with Pat McCabe*

One of the earliest connections made in between occupations of art and engineering was the practice of writing²²¹. Engineering became understood as *a way of writing the world* that was at once literal and metaphorical, material and semiotic²²². Through participant observation with CTVR, the practices and affects of telecommunications engineering became ambiguously re-imagined as a kind of writing at various scales: from the code in the software to the lines and cables of a world-wide telecommunications infrastructure sketched industrially across surfaces and woven through the substrate of the earth and its oceans.

Engineering Fictions enlarged possibilities understanding writing as a shared practice in between occupations of art and engineering and became an experiment in the

²²¹ “I consider that engineering is a way of writing the world, though I’m not sure how many engineers might actually recognise this in their own work... A great challenge for us today is to receive poetically, and to be conscious of how we perform our world into organisational systems. The important role of performance and reception is something which the engineers within CTVR are engaging with directly in their development of future communications systems”(Foley 2012).

²²² This phrase is drawn out in one of the early field-notebooks. The phrase is ambiguous particularly when *spoken*. The word ‘writing’ might be received as ‘righting’. Such phrases are less manifestos than questions – playing with words and with ambiguity was a way of asking questions, inhabiting problems, and gradually opening up dialogue with others.

‘transmission of practices’. This experiment was intuited as a platform for practicing communication differently, dialogically, within CTVR²²³.

It was deemed necessary to learn more about the demands of fiction writing, in order to gain some understanding of how a correspondence might be developed within CTVR through the choreographic object of the *Engineering Fictions*. By November 2012, concurrently with preparations for the *Room 3.17* experiment, it was felt necessary to come to terms with the meaning and possibility of writing within CTVR. The E.F. experiment sought to facilitate writing as an experimental practice that could draw out matters of concern to CTVR’s researchers, and thus help to inform what Communicating Communications might become for CTVR.

In December 2012, an opportunity arose to apply for a ten week creative writing class with Irish novelist, Pat McCabe at a local acting studio in Dublin city²²⁴. Applicants to the class were selected by McCabe on the basis of a one page cover letter outlining one hopes for the class, and a 500 word sample of work²²⁵. The hope was to become more familiar with setting limits and rules for writing, as the author explained in her application:

“I am not ‘trained’ in any particular style or form of writing. I don’t know any rules. I try to set up parameters, to work within them and push against them, but the parameters I set are too elastic, and probably far too abstract” (Foley 2012).

This was in fact a way of framing the problem confronting the formation of the inreach experiments with CTVR. In this context, it was recognised that setting rules was a routine activity and a necessary skill in engineering research. Experiments in engineering necessitated the establishment of agreed thresholds and parameters. If

²²³ The occupational world of telecommunications engineering is deeply informed by Claude E. Shannon’s mathematical theory of communication. The word communication is inflected with a mathematical directness that seems to leave little space for ambiguity: “*The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have meaning; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem*”(Shannon and Weaver 1949)

²²⁴ See Appendices: Chapter 6; page 56; Figure 53. Patrick McCabe (born 27 March 1955) is an Irish writer. Known for his mostly dark and violent novels set in contemporary, often small-town Ireland. McCabe has been shortlisted twice for the Booker Prize, for *The Butcher Boy* and *Breakfast on Pluto*. Both have been turned into films. (McCabe 2012)

²²⁵ An excerpt from *The Hammer* was submitted. This short story was written in 2011 as an allegorical exploration of the concepts ‘limit’ and ‘horizon’. The title comes from a mapping of an expression of L.D.’s (*When you have a hammer all you see are nails*) and a personal object (A Hammer) of sentimental and ontological value. This short story is included in the appendices. Through an exploratory and sense making process of writing, an experimental fiction emerged.

attention could be paid such skills in artistic research practices, then perhaps more relevant and appropriate experiments could be explored within CTVR. Pat McCabe's message to the participants was reassuring in this regard:

"Whether or not creative writing can be taught is a question almost as old as time itself and, lets face it, the jury is still out. But some aspects can be taught, and with assistance, writers attempting to find their voice can be supportively guided and encouraged" (McCabe 2012).

The first session took place on January 31st 2013, a week after the first *Engineering Fictions* was hosted in CTVR. The thrust of the course was to assert the importance of habit and discipline for the creative writer, and the necessity of bringing the persons unconscious life to bear in writing. The experience of these workshops was exhilarating and challenging. The participants were urged to develop a practice of 'early morning writing' by McCabe, who was drawing upon the teaching of writer Dorotea Brande (Brande 1934) and had informed McCabes own personal 'habit'²²⁶.

Participating in these workshops encouraged a habit of writing to develop that was distinctive in two ways. Firstly, this was a habit of writing that fostered a consciousness of and engagement with the lively workings of dreams and the unconscious. Secondly, it was a habit of writing that developed an inventiveness in forming constraints appropriate to the intentionality, the desires, and 'dramatic needs' of the writing and the characters emerging through it. But participating in these workshops also had another, somewhat unexpected effect. They extended the idea of doubleness.

In the practice of writing there is a general acknowledgement that the writer is split and must come to learn to manage a certain duality in her nature. In McCabe's course it was acknowledged that the writer was both 'artist' and 'craftsman'²²⁷. The

²²⁶ From 2013 to 2014, over the course of the two seasons of *Engineering Fictions*, a practice of early morning writing was more or less maintained. The purpose of this practice was to "teach the unconscious to flow into the channel of writing", in the words of Dorotea Brande. The instructions are as follows: "So if you are to have the full benefit of the richness of the unconscious you must learn to write easily and smoothly when the unconscious is in the ascendant. The best way to do this is to rise half an hour, or a full hour, earlier than you customarily rise. Just as soon as you can – and without talking, without reading the mornings paper, without picking up the book you laid aside the night before – begin to write." This was the training that was recommended through Pat McCabe's writing course, it was to simply practice by establishing a routine. The purpose here was not to 'become a writer' but was to be attentive to the process of writing and reading, thinking and listening. This process of early morning writing was thought to accelerate the capacity for catalysing transversality. This will be discussed in Chapter 8. (Brande 1934)

²²⁷ This evoked to the author the Eameses and Sarah Browne's working process.

former is of a vulnerable, subconscious, sensitive and attentive disposition. The latter is practical, ironic, rational, to the point of being absurdly detached. Writing involves an oscillation between technical problem solving and emotional and wilful efficacy in conveying ideas and stories. This ‘archetyping’ of the writer was a device to describe the *action* of writing; involving skills of observation, logic and imagination that move along lines of the unconscious, emotional and cerebral²²⁸. Thus, a reflexive and critical practice of creative writing was developed in parallel with the on-going scoring of the *Engineering Fictions* experiment. The image of writing practice developed through McCabe’s workshops seemed to strengthen the intuition that artistic and engineering research practices were a natural foil of each other²²⁹. This practice helped to develop a competency and familiarity with unconscious processes, and the strange ways they raise themselves into the everyday²³⁰. The training provided through the Pat McCabe writing course also supported a more robust engagement with rules and limits as employed through fiction. These insights on the ‘doubleness’ of writing were treated as significant and affirming of the foil-like relationship operating in between the occupations of artistic and engineering research within CTVR, as exemplified through the *Room 3.17* experiment²³¹.

²²⁸ These sentences are paraphrased from the notebooks developed through this writing class.

²²⁹ As a relevant aside, it is worth bringing a little insight in here as to the line of thought that revealed connections between telecommunications and writing. It is not so far fetched, as far as myth goes at least. Italo Calvino writes of his affinity with the Greek Olympian god *Hermes-Mercury*, “god of communication and mediation, who under the name of *Thoth* was the inventor of writing” [read *telecommunications engineers* for *mercury*]. He describes the winged-footed *Mercury* as “light and airborne, astute, agile, adaptable, free and easy” [read *Cognitive Radio* as *Mercury’s* winged shoes], a figure who “established the relationships of the gods among themselves and those between the gods and men, between universal laws and individual destinies, between the forces of nature and the forms of culture, between the objects of the world and all thinking subjects”. With this deft description of the “inventor of writing” Calvino asks “What better patron could I possibly choose to support my proposals for literature?” [read CTVR as Patron of the Arts] (Calvino 2009 [1988]) An additional note: IRIS is an apparatus developed through CTVR for sensing signals. Iris is also a personification of the rainbow, and understood to be a messenger of the gods, but presumably with less freedom than *Mercury*. She is said to link the gods to humanity. [read ‘the artist’ as ‘iris’ as understood by ‘mercury’ a.k.a. CTVR] A Myth too far perhaps? No. Just a parody.

²³⁰ Arguably, it seems that it was this process of writing that suggested the Guattarian concept of *transversality*, when the author began reflecting upon the choreographic process of *inreach* in 2014-15.)

²³¹ Additionally though, the feature of ‘doubleness’ in writing is really fascinating (not least of all because the author herself is a twin). The way that writers are conscious of, and write about this doubleness is equally fascinating, demonstrating a disciplinary self-knowledge that seems to be inflected in the aspiration of CTVR towards *communicating communications*. It is also fascinating because of there seems to be a doubleness at work in telecommunications engineering, inscribed in the figure of the *antenna* and the *radio*. A radio is at once a sender and receiver. Through the antenna, the *radio* is at once receiving and sending information and filtering noise. Thus a parody of the *radio* is established through the artistic research practice. The *radio* carries a similar (though not at all the same) doubleness to the *writer*. The parodying of these figures of the ‘writer’ and the ‘radio’ is a kind of thought experiment, and this research does not seek to *prove* a correlation between the two. Instead, the fact that the practice of the writer brought to mind the work of the radio is understood ambiguously, and permitted to remain so. This ambiguity opens up a ‘channel’, so to speak, across and through

The purpose of engaging so fully with writing was also to come to a better understanding of what it means to unlearn and relearn a practice that one is supposed to be fluent in²³². To make strange one's own practice and habits. The habit of moving between unconscious and critical processes proved invaluable to the facilitation of *Engineering Fictions* and the sourcing of *catalysts* and *seeds* for the sessions. The writing habit developed a sensitivity to subtle connections and also bolstered a courage to act upon these connections spontaneously and without becoming too reflective or slowed down by doubt. Writing according to Pat McCabe and his intercessors was a practice in *the art of recognition*. A good example of this will be shown in section 6.3 in a discussion of the sample encounters from the experiment.

6.2.3.5 Summary

In *phase one* of the choreographic process the model and fiction were sourced as choreographic objects to help orient the formation of the second *inreach* experiment *Engineering Fictions*. These concepts were engaged with firstly through the work of the Eameses, who considered the model as a kind of 'fiction of reality' and as a way of communicating about a structure of interest.; and secondly through the work of systems theorist Ludwig von Bertalanffy who made an empowering argument that 'a verbal model is better than no model at all'. Both of these ideas affirmed an intuition to develop the second *inreach* experiment by way of writing. As the previous section, 6.2.3.4 has shown, the figure of the writer has traditionally been understood as a kind of split personality, at once artist and craftsperson. This identification resonated with the experience of participant observation within CTVR, where it seemed that the occupations of art and engineering acted as a foil of each other. The habit of early morning writing involved a kind of unconsciousness raising that was intuited as necessary to the choreographic processes of *inreach*. This was referred to in the writing class as *the art of recognition*.

All in all, *Engineering Fictions* was intuited as a forum for writing and dialogic communication and exchange. The mode of facilitation of this experiment necessitated coming to terms with the discipline of writing, and this in turn sensitized the author to potential *catalysts* and *seeds* to act as choreographic objects for each session of E.F. The structure of the dialogic situation of E.F. was informed by the

which a deconstructive/creative correspondence and/or contiguity might develop between the 'worlds' of art and engineering research.

²³² Prior to working with CTVR the author engaged in art writing, a form of criticism, and also experimental writing in the context of visual art, as will be discussed in section 6.2.4.

author's previous experience of running The Writing Workshop. Through participant observation with CTVR the forum of The Writing Workshop became adapted, firstly through the *Communicating Science* workshop, as was discussed in Chapter 4.2.2.1, and secondly through the Openhere festival, curated by CTVR researchers L.D. and R.oD. in the Summer of 2012. In the next section, *phase two* of the choreographic process will be outlined and discussed.

6.2.4 *Phase Two: Informing the structure for a repeating dialogic situation*

6.2.4.1 *Introduction*

Engineering Fictions was an adaptation of previous practice by the author called The Writing Workshop. This earlier practice became informed and changed through participant observation with CTVR. The Writing Workshop was an important aspect of the author's artistic practice, and functioned as a way of structuring creative self-learning within a community of shared interest but of occupational difference. The skills developed through facilitating this forum gradually became adapted through the context of CTVR, in a way that could facilitate a dialogic in between occupations of artistic and engineering research. In the following subsections The Writing Workshop is introduced and the adaptation of this forum through CTVR by way of the Openhere festival is discussed.

6.2.4.2 *The Writing Workshop*

*The Writing Workshop*²³³ was a practice established in 2007 by Jessica Foley and Jessamyn Fiore with the aim of sharing, experimenting and developing creative work evolving through the use of language, particularly written and spoken word²³⁴. Participants of The Writing Workshop came together in a not-for-profit contemporary art gallery called *thisisnotashop* on Benburb Street, on the North West Side of Dublin's inner city. Participation in The Writing Workshop (TWW) was open to anyone interested in its aims. TWW invited participants to 'host' sessions around a theme or action, framing a discussion, inviting participation, developing ideas and potentially generating writing exercises or more ambitious projects. There were frequently guest 'hosts' of TWW including the New York based Theatre Company, *Wreckio Ensemble*; contemporary artist Séan Lynch and novelist Kevin Barry. TWW was interested in the crossovers and possibilities for inter-disciplinary collaboration, mutual education and peer learning in artistic research and practice. There was a

²³³ Visit <https://thewritingworkshop.wordpress.com/> for information on the archives. [Accessed 23.09.15]

²³⁴ Jessamyn Fiore is a New York based curator and writer as well the co-director of the Estate of Gordon Matta-Clark. She is also the curator of the Jean-Paul Najar Foundation opening in Dubai, UAE, in November 2015. Visit <http://jessamynfiore.com/> for more information. [Accessed 23.09.15]

tendency toward visual art, performance, and spoken word, with writing acting as an underlying synaptic practice and tool, a common ground²³⁵.

TWW was motivated by a desire to support visual artists who wished to engage with writing. During a period of post-graduate study in NCAD it became apparent to the author that there was a fear of writing amongst visual artists. It was considered an inaccessible and exclusive practice. TWW was established in response to this perceived anxiety, as an effort to demonstrate that a broad creative community could share and develop knowledge and techniques together without fear of judgement or ridicule. It was established as a kind of open peer-to-peer school for experimentation as well as facilitating and supporting the production and exhibition of new work to a diverse contemporary art audience. TWW's blog affirms the forum as a 'safe space' that acknowledges the vulnerability inherent in communication²³⁶. Through the gentle constraints of exercises and rules, this vulnerability becomes disciplined, and creative work becomes possible.

The early sessions of TWW involved participants reading aloud written work, or sharing ideas for work in progress. After a couple of sessions however, a goal was set to develop new work towards and exhibition. Underpinning this goal was a desire to learn how to collaborate creatively, how to learn from others, and to gain insight and technique in an ethos of sharing and making knowledge in a social way. On the 28th of August, The Writing Workshop blog posts a new agenda:

*"The ambition of the group is now to develop interdisciplinary projects, combining and overlapping interests: poetry with visual interpretation, short story into monologue, prose into theatre, textual and visual experimentation."*²³⁷

The participants formed collaborations of two or three individuals to share skills and act as mentors of each other²³⁸. A number of months later TWW blog describes the development of this collaborative process:

²³⁵ See Appendices: Chapter 6; page 57; Figure 54.

²³⁶ Educator and theorist Jan Masschelein might identify this approach as "poor pedagogy". He writes, "A poor pedagogy is inviting to go outside into the world (not into the parks, homes and kingdoms), to expose oneself i.e. to put oneself in an uncomfortable, weak 'position' and offering a means and support to do so." This practice of poor pedagogy offers a means for experience and becoming attentive to oneself in the world (Masschelein 2010: 283).

²³⁷ <https://thewritingworkshop.wordpress.com/seasons-so-far/season-i/> Accessed 31.07.15 @ 19.20

²³⁸ As the primary contributor to TWW blog, it's interesting to see how the author refers to her own approach to these collaborations: "Jessica will most probably slot between several groups and find ways of drawing together several strands with the view to creating some kind of document or publication".

*“Within the Workshop, what has begun is a cross-fertilization of ideas, crafts, styles, forms, and personalities. Short story writers begin to play with the monologue form and the idea of performance. Poetry into performance. Research into text and installation. Information into narration.”*²³⁹

Between the months of August 2007 to February 2008 TWW participants developed new work, exhibiting this work at *thisisnotashop* from the 21st February to the 2nd March. The exhibition included participatory research based installation, performances, readings, and food²⁴⁰. The Writing Workshop thus set out to support cross-disciplinary experimentation across the visual, literary and performance arts in the production of new work. The processes unfolding within each session, however, struck a balance between free-play and semi-structured exercises, enabling a certain freedom within constraint.

It was the fecundity of this tacit practical philosophy that carried onwards into the scoring of the *Engineering Fictions* experiment, more so than the ambition to produce or exhibit new work. The desire to establish a shared or common place for artistic research, experimentation and practice regardless of training or occupation also carried through. *Engineering Fictions* sought to act as a catalytic space for the practice of dialogic communication within CTVR. What carries from TWW through into *Engineering Fictions* is also its quality of ‘poor pedagogy’, that social gesture which “offers means that helps us to get in the position of the vulnerable, the uncomfortable position, the exposition” while offering “exercises as the art of sharpening our attention” (Masschelein 2010).

In Chapter 4.2.2.1 the Communicating Science workshop was discussed as the source of the experimental process of inreach. During this challenging workshop an exercise from The Writing Workshop was tried out, but it proved to be too loose to be effective within the context of telecommunications engineering. While the collapse of this workshop was somewhat traumatic, the author’s desire to try again prevailed. In the summer of 2012 an opportunity arose to adapt The Writing Workshop forum to the *Openhere* festival, curated by CTVR and hosted by the Science Gallery²⁴¹. This adaptation is discussed in the following sub-section.

²³⁹ <https://thewritingworkshop.wordpress.com/seasons-so-far/season-i/> Accessed 31.07.15 @ 19.27

²⁴⁰ For further information about the activities of The Writing Workshop please visit the blog: <https://thewritingworkshop.wordpress.com>

²⁴¹ “Science Gallery is a world first. A new type of venue where today’s white-hot scientific issues are thrashed out and you can have your say. A place where ideas meet and opinions

6.2.4.3 Adapting The Writing Workshop through the Openhere festival 2012

Openhere was a four day festival critically gathering around the question ‘What does it mean to be open today?’²⁴² The festival sought to address social, technological and cultural issues surrounding the concept and reality of the digital commons. The organisers, CTVR and the Dublin Art and Technology Association (D.A.T.A.), brought together a ‘transdisciplinary community of critical theorists, engineers, artists, designers and industry professionals to expand debates surrounding the digital commons’. By styling the event on the form of a festival, the curators aspired to structure an embodied, affective and intellectual engagement with questions of the digital commons that would attract and engage a diverse audience. As well as more traditional lectures and key-note presentations, *Openhere* facilitated workshops, experiments and screenings.²⁴³

The author became involved in the *Openhere* festival through conversations with the curators during the preparatory phase of the festival. CTVR was facilitating a demonstration of a complicated technical experiment to set up a temporary mobile telecommunications infrastructure within the Science Gallery. They were stuck for ideas as to how the communications network could be made more tangible to *Openhere* festival delegates and visitors to the Science Gallery. The author suggested involving a writer to communicate at random with people who signed onto the network. In the following sub-sections the experiment is outlined and the author’s engagement explained. It was through these conversations that the idea of running a Writing Workshop as part of the *Openhere* festival emerged.

6.2.4.3.1 The Mobile Commons experiment

One of the experiments facilitated during the *Openhere* festival, in conjunction with the *Hack the City* exhibition curated by Science Gallery, was *The Mobile Commons*. The

collide. Since opening in 2008, over 1.9 million of you have visited us in Dublin - ranking us amongst the top ten free cultural attractions in Ireland. We're all about opening science up to passionate debate and want your opinion.” <https://dublin.sciencegallery.com/about> [Accessed 23.09.15]

²⁴² *Openhere* was curated by Rachel O’Dwyer, (then a PhD candidate with CTVR, since graduated), Linda Doyle (CTVR’s Director) and Benjamin Gaulon (D.A.T.A.). Both Rachel and Benjamin, at this time, were coordinating D.A.T.A. *OpenHere* ran from the 28th June to the 1st July 2012 in Science Gallery, Dublin.

²⁴³ *Openhere* was funded and supported through CTVR, with additional support from Science Gallery, D.A.T.A., the Higher Education Authority of Ireland and Dublin City of Science 2012. Dublin City of Science 2012 was part of the ESOF City of Science programme 2012. Many proposals to this programme were put forward by CTVR, and some were accepted. In a move to optimize funds, human resources, and impact, *Openhere* was decided as CTVR’s principle contribution to Dublin City of Science 2012. Partial funding of one of the festivals demonstrations, the installation of an OpenBTS network within Science Gallery, was received through Science Gallery’s *Hack the City* exhibition. This demonstration was called *The Mobile Commons*. For more information visit <http://openhere.data.ie/?p=500> Accessed 30.07.15 @ 21:43

aim of the experiment was to establish a temporary commons for mobile phone users, whereby they could switch from their commercial network provider onto The Mobile Commons. This was a free GSM (Global System for Mobile communications) network that employed OpenBTS software to temporarily replace the physical infrastructure of the core commercial mobile networks. It operated within Science Gallery over a two day period during the Openhere festival.

The Mobile Commons was an experiment in running a GSM network that could function similarly to a commons, whereby anyone who wished to could access the resource. It was a complicated undertaking by CTVR research engineers and artists in collaboration with core developers of the OpenBTS system. Setting up the network and maintaining it over a two day period was an impressive technical and collaborative achievement. Moreover, the experiment was motivated by a desire to challenge a status quo commercial model of GSM networks, as the public advertisement on the Openhere website explains:

“Mobile networks are often leading exhibits of closed proprietary networks, locked down for non-market public or creative use by telecommunications companies and hardware manufacturers. The Mobile Commons wishes to challenge this model and engage critical issues concerning the architecture of cellular networks. As mobile computing and communications become increasingly ubiquitous, there has never been a better time to elaborate an agenda and usher in urgent debate about open mobile networks: their affordances, models, users, audiences, publics and implications. While there have been isolated and fitful attempts to do this, cellular networks have yet to be integrated into passionate general debates about access, connectivity, and resources that surround, for example, public space or the internet.”

This text expresses a passion and determination to bring attention to a debate that is felt to be glossed over by commercial and corporate interests. *The Mobile Commons* aspired to share knowledge with an audience about the fact that alternative networks are technically possible that could offer access to telecommunications in a manner similar to age-old commons. *The Mobile Commons* did not call for the innovation of new technologies or software, it was demonstrating the existence of such technologies. The experiment was a call for new ways of thinking, imagining and potentially scoring cellular mobile networks²⁴⁴. The rhetoric of *The Mobile Commons* experiment begged the question as to whether debates offer the most compelling

²⁴⁴ This resonates with the clarion call of the *Filling the White Spaces* workshop discussed in section 6.2.2.1.1 – to ‘manage spectrum into abundance’.

approach for enacting change-in-mind? This was similar to the questioning posed by the idea of inreach within this research, and partially explored through *Room 3.17*.

During the design process of Openhere the question of raising critically engaged and imaginative conversations on the digital commons was discussed. *The Mobile Commons* was an impressive technical experiment, but it was unclear how it could best be rendered tangible to people who casually came into proximity with it. While there was an artist involved in monitoring and visualising ‘network events’ (such as people joining the network, placing calls, sending messages) over the two days of deployment, it was felt that this would not enact its significance as a material-semiotic agent of a telecommunications commons.

In separate conversations with the curators R.oD. and L.D., the author suggested that the network could act as a platform for a multi-textual live performance. The author suggested: *Perhaps a writer or theatre maker could be involved to prompt and draw out interactions through the network? Perhaps a dialogue could be enacted through the network... after all, if it was a commons perhaps there would be a different relationship to interference? Perhaps messages would be open and absorbent, bleeding into each other, contrasting with each other, harmonising and generating dissonance, layering upon each other in a kind of meshwork? What would dialogue through a commons-like GSM network be like, and would it be distinct from a social network?* These were hypothetical questions that sought to draw out how the form and material of the medium itself might inform and shape communication. Such questions were concerned not only with how technology enables or limits human communication, but also how such technologies influence human imagination and creativity.

The Irish novelist Julian Gough was invited to enact a fictionalised narrative voice on the network, sending un-elicited messages to persons joining *The Mobile Commons*²⁴⁵. The possibility of dialogue was thus opened up. It was during these preparatory conversations thinking through ways of engaging people with ideas of the digital commons that the author proposed experimentally facilitating an adaptation of *The Writing Workshop* as part of the Openhere festival, as a way of inhabiting this problem of relating embodied knowledges through artistic research practice.

6.2.4.3.2 HACKRONYM – an experimental writing workshop

²⁴⁵ You can learn more about Julian Gough through his website: <http://www.juliangough.com>
Accessed 30.07.15 @ 23:05

Openhere was programmed alongside Science Gallery's exhibition *Hack the City*. In an effort to generate a dialogue not only within Openhere but through Science Gallery, a writing workshop was devised that could resonate with both programmes. The workshop was scored in such a way that could counterpoint the hacking ethic that was apparently at work through both events²⁴⁶.

Hacking in the digital domain has been shown to be a “dense ethical and technical practice” committed to an idea of “productive freedom” (Coleman 2013). As Coleman's ethnography of digital hackers has shown it is a practice that reformulates “key liberal ideals such as access, free speech, transparency, equal opportunity, publicity, and meritocracy” (Coleman 2013: 22). As part of Openhere, The Writing Workshop was curious to draw out the possibilities for verbal hacking. Based upon participant observation with CTVR, the acronym was chosen as a choreographic object to think with and through, and potentially to hack. Acronyms were often decried within CTVR as a necessary evil of engineering occupations. Thus the workshop was named *Hackronym*²⁴⁷ and advertised through the Openhere website, social media and private mailing lists thus:

“Acronyms are pervasive yet remarkably inconspicuous creatures. They lurk on the external walls of banks, they pepper memo's meandering through bureaucratic cabinets, they cloak the everyday working practices of corporations and institutions in a guise of simplicity and efficiency. We use them for shorthand digital slang [L.O.L.] and we use them to index the complex and idiosyncratic jargon of disciplines and industries, from education to engineering. Apparently useful devices, they frequently confuse, undermine and inhibit understanding. The acronym's seemingly objective and cool personality belies something perhaps a little more sinister... So isn't it about time that the acronym was hacked? Isn't it about time that we opened this creature out? Isn't it about time that these letters associated by dots and other letters told their own story? Isn't it?! The Hackronym Writing Workshop offers a place and time to reconsider, reinterpret and misinterpret those acronyms that, perhaps unconsciously, have been plaguing and undermining our communicative potential day-to-day. No previous verbal hacking or writing experience required. The Workshop will be facilitated by Jessica Foley, in the spirit of The Writing Workshop.”

Two different workshops took place in a wing of Science Gallery on the 28th, 29th and 30th June 2012, during the Openhere festival. The focus of each workshop was the idea of hacking acronyms in some fashion, and responding to and opening out the

²⁴⁶ See Appendices: Chapter Six; pages 57-58; Figs. 55-57

²⁴⁷ The name for the workshop was invented by Aidan O'Donovan in conversation with the author.

discussions and presentations of the Openhere festival²⁴⁸. In the first workshop each participant chose an acronym to work with, and hacked it by assigning meaning to each letter. For example, the acronym S.O.P.A. was chosen by one participant. This acronym stands for *Stop Online Piracy Act*. The participant hacked the acronym so that it became: *Some Oppressors Push Always*. The acronym was thus critiqued from the inside out. Having each hacked an acronym, the participants began to write a piece of text that would contextualise or historicize the new acronym, thus creating a piece of counter-factual fiction. This fictive history was written collectively by the group. In other workshops the constraint of the haiku form was used as a complementary way of drawing out hackronyms. The final workshop, however, was the most formative in catalysing the possibility of the *Engineering Fictions* experiment within CTVR.

6.2.4.3.3 R.S.V.P.

The R.S.V.P. workshop was intended to open up a dialogic around issues and ideas and feelings that were emerging through the Openhere festival. This workshop was important because it attracted several of CTVR's engineering researchers²⁴⁹. On this occasion it was decided to relax the workshop format. A more open and conversational approach was taken, that told the story of the two previous workshops, where acronyms were hacked and counter-factual fictions and haiku were composed²⁵⁰. A line of inquiry was thus opened up. The same 'popcorn' exercise as attempted during the *Communicating Science* workshop was tried again, in the spirit of The Writing Workshop. Each participant wrote a word that resonated with them in relation to Openhere at the centre of an A4 page. By quickly passing around each sheet to the other participants and making a word-web, each of the A4 pages filled up with words in response to words. Once full, each participant read aloud the words on their sheet, one at time, while the other participants listened and wrote down a list of those that appealed to them.

The gentle rule for this exercise was that each participant could write as freely as they wished, but they had to employ *all* of the words in their list. With these

²⁴⁸ The workshop was more structured than The Writing Workshop would have been. After the 'Communicating Science' workshop during Plenary 2011 it was deemed necessary to have a few constraints that could be used to guide thinking, conversation and writing.

²⁴⁹ The curator's of Openhere were hopeful that CTVR's researchers would engage with the festival, but it was suspected that they would not see the relevance of the subject matter to their work. It was a common-sense that if the concerns of an event were not explicitly or logically connected to the domain of telecommunications engineering, that is, if its relevance was not spelled out, it would not be engaged with. This is one of the mind-sets that CTVR's management team was keen to shift; but again the question remained, *How?*

²⁵⁰ This decision was made in response to the participants interest in what had been going on. The author felt it was more valuable to relax the 'plan' for the workshop, and improvise a correspondence in-between the plan and the unfolding situation. This is just another way of scoring.

'foundation words' each person composed a piece of writing. What emerged were a group of texts that were experimental, dense and richly concerned with contemporary social experience. Here are three samples from this workshop:

And there was a space – it had no boundaries, no control, no constraints. There were no rules, but after a lot of thinking humans decided to take initiative and to define what freedom really was. After all, it was not this nothingness. So rules began to be drawn – how, when and where all this space could be used or shared, what dimensions will we grow. No, humans thought – we have to put in some central control in the spectrum and have some choice finally. Society was born.

Foundation Words [Border Wallpaper Sky Control Initiative Actions Limitations Rules Inhibiting Nothing Space Spectrum Think Static Society Constraints React Think Choice No Boundaries]

We live in a 24/7 world of commodity, where we believe our horizons are broad and we are given free access to virtual dynamic spaces, connected to many peers, members of many societies... We can say anything, read about spectrum of things. But aren't we just humans reacting impulsively like sheep?

Foundation Words [Border Horizon Impulse Broadness Space Spectrum Sheep Human React Dynamic]

I consider myself human. I am human. In these past months, I have secluded myself in the freedom of the mountains; the tips of even greater mountains, reaching down into the oceans. This is the choice I have made. I have found conversations about the open spectrum to be inhibiting. I don't know how to build in the open. I react. The debate has become so expressive; there is a growing loudness to it. This is choking my speech. There are of course exceptions. I consider my choice. It is a step away, into the enclosure of the mountains and landscapes. Places and things I can feel and touch. This is the ground. There has been too much flexibility. This open spectrum myth is confusing my society. They think the job is already done, because the rhetoricians say so. But the actor is required here and now more than ever. Some anarchy must engage with this discourse. A softness might emerge then, from out of the burn and the flag. The open spectrum may survive, not as myth but as a

condition of a techno-political subjectivity, self-aware and listening. Open. I could share space in this condition.

Foundation Words [Mountains Freedom Dimensions Share Spectrum Choice Expressive Loudness Flexibility Speech Exceptions Actor Inhibiting Flag Burn Society I Am Consider Human Softness Anarchy Reach Think]

Each participant spoke, listened and wrote through their experience of the Openhere festival. The writing was improvised within this specific context. Each participant read aloud what they had written. Each participant listened. The experience was emotionally engaging but in quite an ordinary way. Meaning had been made and communicated through the workshop. A dialogic had opened up. The workshop condensed for a moment a current of transversality working through the group in that place within that moment. This experience roused tacit questions: *Could this writing practice be enacted durationally within CTVR? Could CTVR act as a host for writing, speaking and listening? Could structured writing experiments catalyse dialogic and listening habits within CTVR? Could such a practice draw out materials that matter to CTVR's researchers and staff such that could inform ways of Communicating Communications?* This dialogic situation facilitated through the Openhere festival was empowering of the choreographic process of *inreach* and gave courage to the experiments *Room 3.17* and *Engineering Fictions*.

6.2.4.4 Summary

Phase Two of the choreographic process involved informing the structure of the dialogic situation of *Engineering Fictions*. The dialogic structure was modelled on The Writing Workshop, and adapted iteratively through CTVR. Firstly, by way of the *Communicating Science* workshop in 2011, as discussed in Chapter 4.2.2.1; and secondly by way of the Openhere festival in July 2012.

The receptiveness of CTVR's engineering researchers to the writing workshop forum was encouraging. The strength of the process of verbal modelling, when combined as writing, speaking and listening, seemed to offer a way of facilitating a more ongoing dialogic situation within CTVR. The affirming experience of the Openhere festival prompted a reconsideration of the significance of writing as a valuable tool of communication, particularly when catalysed through choreographic objects. In a sense, the Hackronym and R.S.V.P. writing workshops of the Openhere festival began to shape a poetic goal of a sustained dialogic situation within CTVR. In the following and final phase of the choreographic process, therefore, the imagining of a poetic goal of the *inreach* experiment *Engineering Fictions* is discussed.

6.2.5 Phase Three: Imagining a poetic goal for Engineering Fictions

6.2.5.1 Introduction

In *Phase Three* the poetic goal of the E.F. experiment is discussed. As was shown in *Phase Zero* 6.2.2, the second *inreach* experiment was proposed in the wake of the email exchange prompted by L.D. in reaction to the hear-say around Prof. Dohler's talk at CTVR. The proposal is intuitive rather than carefully planned, with the reference to the Eameses' concept of 'fictions of reality' and Science Fiction writing as merely suggestive rather than prescriptive of what the writing forum will entail.

The poetic goal of E.F. is that it might be sustainable as a communicative platform within CTVR, that it might be general enough to the urge participation of people from different occupations, but specific enough that meaningful dialogic and dialectic communications could be developed through it.

The running of the E.F. experiment was in a sense a simulation, an effort to trial a dialogic situation, and to develop experience and understanding of what is involved and required by such a poetic goal. In this sense, E.F. was imagined as both an experiment and as a model of a dialogic situation²⁵¹. This meant that each session of E.F. involved reflection and adjustment. It was an ongoing iterative process that learned as it went. In the following sub-sections the general idea of E.F. is discussed, and the first session of E.F. is presented. When compared with the 'sample encounters' it should be possible to discern how this iterative process unfolded. Again, this will require the reader to make comparisons between sections, to build up resonances and dissonances of the choreographic process in their own minds.

6.2.5.2 Engineering Fictions: 'a friendly kind of unpredictable mutiny'

In the email proposal to CTVR's management team the second *inreach* experiment is described as a forum for writing and sharing ideas and interests by way of 'a friendly kind of unpredictable mutiny'. *Engineering Fictions* was imagined as a forum that might catalyse possibilities for thinking laterally and non-linearly and facilitative of communication in-between occupations of art and engineering. The intuitive ethos of the forum resonated with what Jacques Rancière refers to as 'intellectual emancipation' (Foley 2012), and what Gemma Corradi Fiumara refers to as 'communicative co-existence' (McCabe 2012). *Engineering Fictions* sought to draw out and amplify existing

²⁵¹ Eames Demetrios referred to the *National Aquarium* film by the Eames Office as a project which "took the idea of modelling to a new level, in the sense that the finished film conveyed a powerful feeling of the intellectual and visceral experience of the proposed aquarium" (Demetrios 2001:208) In a sense, this was the poetic goal of the E.F. experiment – that it could model and convey simultaneously the possibilities of dialogic in-between the occupations of art and engineering.

internal communicative practices within CTVR, e.g.: the use of email as a dialogic tool.

An additional hope was that *Engineering Fictions* would urge the participation of other ‘catalysts’ through the research community of CTVR. Hence, on the 25th January 2013 an email was circulated within CTVR with the Subject line: *Engineering Fictions – A new bi-weekly writing room at CTVR*²⁵². The initial invitation email stated:

Engineering Fictions is a forum for writing, for those interested or involved directly in the arts and/or engineering. Participants are invited to discuss and share ideas which are of interest to them, with a view to inspiring some interest amongst others. Appropriate to their own time and interest, each participant is invited to catalyse a session of Engineering Fictions at some point, setting a theme or action for the evening framing discussion, inviting participation, developing ideas and potentially, well, writing!

Each session is informal and non-formal; there are no prescribed exercises, writing styles or genres. However, each session is directed or catalysed by at least one of the participants.

Initially, the participants will be mostly people involved with CTVR. However, each participant is free to extend an invitation to anyone outside CTVR they feel would be interested, or would benefit from, such a writing forum.

The first *Engineering Fictions* session was a tentative exploration of TWW model could play out and change within the context of a telecommunications research centre.

6.2.5.3 29th January 2015²⁵³

The first *Engineering Fictions* session was modelled very closely on *The Writing Workshop*. The catalyst was the author. The introductory notes prepared for the session emphasised that it was a “safe forum for experimental and developing writing” and acknowledged the experiment as a kind of “inreach engagement”. The session was understood as a catalyst for “transdisciplinary actions which may promote meaningful and enriching discourse”, particularly across the occupations of art writing and telecommunications engineering²⁵⁴. The invitation email gave the following description of what would take place:

²⁵² It was also circulated to a number of people outside of CTVR whom L.D. and the author felt would be interested in becoming involved in the experiment.

²⁵³ See Appendices: Chapter 6; pages 59-61; Figs. 58 and 60.

²⁵⁴ The language in the notes is quite dense and this suggests that the practice is unsure of itself, cloaking the more simple imperative of modelling play-work within CTVR.

Jessica Foley will act as the ‘catalyst’ for the evening, and the point of departure will be the writings of Russian Avant-Garde Poet and Essayist Velimir Khlebnikov²⁵⁵. Jessica will share some of her research around this ‘poet of the future’, opening out conversation and hopefully leading everyone to a point where writing is simply inevitable!

The score for the workshop was roughly sketched out between various documents and notebooks. For the purposes of this thesis, it is re-composed according to hypothetical actions at intervals over a two hour period, as Table I below shows:

Attunement 6.00 – 6.15 PM	Catalyst/Seed 6.15-6.40 PM	Conversation 6.40-7.00 PM	Writing 7.00-7.20 PM	Sharing 7.20 – 7.40 PM
Gathering	Talking	Listening	Playing	Reading
Eating	Thinking	Thinking	Dreaming	Listening
Drinking	Imagining	Talking	Listening	Talking
Talking	Speculating	Wondering	Trying	Learning
Sitting	Questioning	Deciding	Storying	Hearing
Waiting	Opening	Contradicting	Thinking	
	Listening	Wandering	Articulating	
		Laughing	Framing	

Table 2 Engineering Fictions - A working score, January 2013

The purpose of this section is to give a sense of the experimental and exploratory nature of the workshop, how it was really feeling for its own structure, trying things out within an understanding that the process would be reiterated and tried again in the subsequent session.

The poetic goal of the experiment was that it would be engaging enough to urge participation both within and beyond the first session. There was no guarantee that anyone would turn up to the first session. In the following subsections, the actions and activity of the first *Engineering Fictions* session are recalled under the following headings: *attunement*, *catalyst/seed*, *conversation*, *writing*, *sharing*.

6.2.5.3.1 Attunement

The idea that “Even a little is enough” informs the preparation of the context and space (Brande 1934). Furniture is reconfigured. By creating an open semi-circular seating arrangement with couches and chairs, a space to work within becomes available. These are small gestures. At the hearth of this furniture arrangement, two low green plastic tables are placed, upon which are laid out biscuits on plates and napkins. A table to the side is set up with an electric kettle, cups and spoons, a range of teas and coffee, sugar and milk. The possibility afforded through this reconfiguration is to make space within the seminar room of Dunlop Oriel House. A space for social relations and dialogic exchange; what Lefebvre calls

²⁵⁵ The ‘seed’ for this session was based upon research developed through the EMCSR PhD Colloquium Award (Foley 2012)

“concrete abstractions” (Masschelein 2010). The tea, the coffee, the time to assemble, the biscuits, and later the fruit, these are simple ways of decompressing and making space. The arrangement of the space gives people a chance to attune to each other and their surroundings. Five people attend the first session. Two engineering researchers from CTVR, an historian from UCD who is invited by L.D., and two artists who are PhD students of L.D.. Attuning gives everyone a chance to see each other, to hear each other, and to settle into the environment.

6.2.5.3.2 Catalyst/Seed

The catalyst plants and grows the seed. The seed is the material to be worked with. The choreographic object. A catalyst performs catalysis. The etymological understanding of the word catalysis helps reveal the purpose the catalyst, i.e.; to completely loosen the ideas she wants to share through the group. She shakes out her thoughts to the group. It is the way she catalyses the seed that activates and reveals what the material is. The 'how' induces the 'what' in this space of experiment. In this scenario there is an implication that truth and belief coincide in what the catalyst has to say. From this truth other truths are spoken²⁵⁶. J.F. catalyses the seed of 'Number-Language' and the work of the Russian avant-garde poet Velimir Khlebnikov.

6.2.5.3.3 Conversation

As the catalyst finishes shaking out her say, she allows some time to open up a silence, and then conversation begins. What the catalyst has said is now completely vulnerable to the group. Meanwhile, the 'social imaginary' of the group has become active (Castoriadis 1998, Taylor 2004)²⁵⁷. Dialogue and questioning begins (Marcet 1817).²⁵⁸ This is a space of relative spontaneity.

This first session opened up a correspondence in between the author's research practice and the knowledge domain of telecommunications engineering. In this session she framed her practice as a mode of art writing. Her ideas at this time were provisional. She explained her thoughts on this practice to contributors to the session that:

An art writer is described as someone who responds to the visual arts they experience, and who offers insights which open out other qualities of engagement and understanding. It's not

²⁵⁶ The work of Adrian Piper is resonant here. In the early 1970's Piper developed a series of street-based performances serialised under the title 'Catalysis'. Through these performances Piper's goal was "to observe the various reactions of bystanders to behaviours that violate normal categories of human social interaction and decorum... Piper's public performances were intensely interactive, eliciting responses that ranged from feigned ignorance to disgust to self-reflection"(Kester 2004: 70). The word 'catalyst' is common in the Science and Technology research domain. It was picked up from CTVR by the author and employed for it's familiarity. But it was a word chosen more as a question than a statement. It was used in order to see what it could actually afford the author within the context of CTVR. It was never certain whether catalysis would take place. It always depended on the confluence of people in space, what was spoken, what was shared, what was heard, what was written, etc.

²⁵⁷ Charles Taylor intends 'social imaginary' to mean: "the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations". Cornelius Castoriadis develops a philosophy around the social imaginary. For him the social imaginary "is more real than the 'real'".

²⁵⁸ There is a rich history of conversation as a mode of learning in science. Jane Marcet (1769-1858) inspired and informed Michael Faraday, for example, through the power of conversational and dialogic technique in her text-book 'Conversations on Chemistry; in which the elements of that science are familiarly explained and illustrated by experiments' (1806).

so much explaining as it is continuing a story and expanding upon it. For me, art writing involves thinking through art. The art writer is a careful observer, a respectful listener, a challenging storyteller.

Engineering is often described in contrast to science; where science aims to understand the world, engineering aims to change it. For me, art writing is an oscillation between these two aims towards understanding and change.

In reading these statements aloud the author was raising questions within the group. She is attempting a “*politics of connective aesthetics... oriented toward the achievement of shared understandings and the essential intertwining of self and other, self and society*” (Gablik 1992: 2-6). A subtle and imaginative proposal was made that perhaps there could be such a practice as *engineering writing* just as there was a practice of *art writing*? Perhaps this practice already existed?

In many ways, this suggestion was reaching for a counter-point to academic methodologies of ethnography and technical writing. Just as *Room 3.17* was teasing out what it could mean to practice a kind of collective participant observation E.F. was catalysed by a questioning of the possibilities and significance of developing habits of self-reflexive and spontaneous writing within CTVR²⁵⁹.

From here the catalyst began to speak about an aspect of her research that was exploring the Russian Futurian idea of ‘*Number-Language*’, developed by the poet Velimir Khlebnikov (Jacoby 1984, Foley 2014)²⁶⁰. The catalyst began to build up a ‘surround’ through which conversation, listening, thought, and writing could emerge

²⁵⁹ This acts as a counter-point to debates in anthropology relating to representational writing practices, such as ethnography. The author is seeking to understand how she can write her participant observation with CTVR, and who she can better understand the tensions of such critical writing practices. The author is indirectly and somewhat unconsciously engaging The Writing Culture Debate of the 1980’s, catalysed by George Marcus and James Clifford (1986) which gave onto three resolutions of anthropology: “(1) the scientific epistemology on which anthropology had been hitherto based – that anthropology would one day evolve the perfect language for describing ‘real human nature’ or ‘real cultural essences’ – was in fact a provincial, and politically unsavoury, Western specificity; (2) all writing was rhetorical, so any claims made by anthropologists about the others they studied spoke less of incontestable givens and more of the hegemonies of political and professional scriptural practice; (3) all so-called grand or meta-narratives of knowledge and progress might be called into question and, by juxtaposing them against the equally specific narratives of diverse other cultures, deconstructed”(Rapport 2014:26).

²⁶⁰ L.D. had sourced a copy of Velimir Khlebnikov’s poetry from the Library, at the recommendation of artist Sarah Browne. While his poetry was of superficial interest to L.D., she passed it on to the author who she felt might find it interesting and perhaps even useful to her research. Whenever the author was recommended a source or path of inquiry by L.D. she took it with serious interest, and gave it consideration. This is a sign of transference at work between L.D. and the author at this time. That is to say, of the unconscious at work in-between them. C.G. Jung argued that *transference* was “an entirely natural occurrence in any relationship”(Jacoby 1984)

(Demetrios 2001, Turner 2013)²⁶¹. The goal for Khlebnikov was to model a “*universal language*” referred to as *Zaum*, or ‘*beyonsense*’ (Douglas and Schmidt 1985, Janecek 1996, Foley 2014). As the catalyst, the author did not explain anything, she simply spoke of what was true for her. Instead of explaining, she shared quotes with the group by reading aloud sections of text that seemed relevant to the concerns and materials she was working with:

1. *If two neighbouring valleys are separated by a ridge of mountains, a traveller can do two things: blow up the wall of mountains or begin a long and circuitous journey around them. Word creation is the blowing up of linguistic silence, the deaf-and-dumb layers of language. By replacing one sound in an old word with another, we immediately create a path from one linguistic valley to another, and like engineers in the land of language we cut paths of communication through mountains of linguistic silence. From the essay ‘Our Fundamentals’ by Velimir Khlebnikov (Janecek 1996: 139).*
2. *There is a line among the fragments of the Greek poet Archilochus which says: ‘The fox knows many things, but the hedgehog knows one big thing...’ For there exists a great chasm between those, on one side, who relate everything to a single central vision, one system, less or more coherent or articulate, in terms of which they understand, think and feel – a single, universal, organising principle in terms of which alone all that they are and say has significance – and, on the other side, those who pursue many ends, often unrelated and even, contradictory, connected, if at all, only in some de facto way, for some psychological or physiological cause, related by no moral or aesthetic principle. From ‘The Hedgehog and the Fox’ by Isaiah Berlin. (Berlin 2009: 3)*
3. *“History would be an excellent thing if only it were true.” Tolstoy (Ibid)*

This is how the author catalysed the seed in this session. There was no synthesis of the ideas as in a full dialectic. It involved a kind of thinking out loud to the group, working through the choreographic object of a poetic number-language and various other texts in relation. The others in the group, the contributors, listened and asked questions or made observations and comparisons. This was a conversation that had

²⁶¹ The idea of a ‘surround’ comes from oral histories collected by Eames Demetrios of the Eames Office members. Phillip Morrison described the Eames working relationship as follows: “Ray makes a surround around Charles; Charles makes a direction for Ray (Demetrios 2001: 217). But this term is also used by Fred Turner in his study of multi-media and American liberalism post-WWII. Turner theorises the development of the ‘democratic personality’ in America at a time when it was understood that “individual character and national culture came into being via a process of communication”. During this period, Turner traces a turn “away from single-source mass media and toward multi-image, multi-sound-source media environments – systems that I will call surrounds.” p. 13 In many ways, the author’s work with CTVR took up the mantle of generating ‘surrounds’ through which telecommunications research could be articulated differently. The experiments can be understood as ‘surrounds’ in this regard.

no imperative for closure. When the conversation seemed saturated and brimming into thought a writing exercise was proposed.

6.2.5.3.4 Writing

Free-writing is led by the conversation and whatever lines of thought begin to move from the listening and speaking. The constraint is time. A person may write as much or as little as they feel within, but the purpose is to write without judgement or criticality, as if thinking aloud or daydreaming. The 'popcorn' game is played out also. Here a set of constraints is set in play, and the writing must negotiate the rules while remaining as lucid and open as possible. This game focuses upon listening and attending to the affordances of words, permitting them to push the person to say what they wish to even within a constrained and limited vocabulary.

The catalyst proposed a ten minute session of *free-writing*. The group began to write in their notebooks. The catalyst set the time for ten minutes. Free-writing means writing freely, according to what feels most loose and available to the writer. Which might be nothing. The catalyst wrote about how she felt the first *Engineering Fictions* session was going and what she had heard so far from the discussion. Below is an excerpt from the catalysts free-writing:

What do I really want to write about? How do you think it's going? Not bad. My face is very red and only some have touched the biscuits. Still, everyone is writing now. They are all writing. And... well. The big thing is the recognition that a certain fiction goes into making the technology develop. What kind of fiction, or from where do these fictions emerge? From cartoons? From books? From conversations? From films, advertising, YouTube? It's a bit like a snake eating its own tail. Is it a race to the bottom? What are we writing for? For whom and why? We are inscribing the world with so many technological systems, so many infrastructures. It's all a kind of inscription? Am I a hedgehog? Am I a fox trying to be a hedgehog? I want to believe there's a way to let go and a way to control. It's all an oscillation.

After the period of free-writing the catalyst told the group about the 'Popcorn' exercise. As there were no loose sheets of paper available they worked with the napkins provided with the biscuits instead²⁶². Each person wrote a word in the centre of their napkin, then passed it around quickly in a clockwise motion, filling all the napkins up with a word-web. Each person read aloud their word-web. Each person listened and wrote a list of the words they like from what the others had read. Then,

²⁶² The author did not bring loose A4 sheets because she was not sure that they would get to this exercise.

each person wrote using everyone else's words combined with their own. They wrote using up all of their listened for words, only once.

6.2.5.3.5 Sharing/Reading

Whoever wishes to reads aloud their writing to the group. Time is allowed to open up on either side of the reader. Thus silence accommodates communication. Anyone may speak once the writing has been read. At the right moment, another may read.

On this occasion, everyone read aloud in turn what they had written. There was a lot of laughing. The catalyst made some notes of what she heard from the spoken writings in her notebook as follows:

- *X was large but had no function*
- *She had solutions but didn't know how to ask questions.*
- *The fox is still bigger. The hedgehog is a victim.*
- *That YoYo Leaking is ruining my digital signals.*

When everyone had shared and began to make gestures towards leaving the catalyst collected up the napkins and thanked everyone for their time and contributions. Without intending to, the author began an archive.

6.2.5.4 Summary

The day after the first *engineering fictions* session one of CTVR's management team (P.S.) asked how it went. The author replied as follows:

It went really well I think! It felt really good, for me at least. There were five of us all together M.S. (a friend of L.D.'s and an Historian in U.C.D.), N.oD., S.mG., L.D. and myself. Everyone got writing, and even shared what we had written, which was great and the whole point really. Some very funny and insightful stuff came out, S.mG.'s story was deadly, I think we should publish it!

L.D. is going to catalyse the next session on the 12th February, something to do with Cognitive Radio, so that'll be good I think. She wrote something great about L.dS.'s dislike for the word 'novel'. Funny!

From this first session, the E.F. experiment began to take shape through correspondence in between *catalysts* and *seeds* and the temporary community of people who would turn up to contribute. In this sense, E.F. was a forum '*designed with change in mind*'²⁶³. The first session embraced the risk that another session may not happen and that there may have been no interest amongst CTVR's workers.

²⁶³ This was a paraphrase developed through one of the author's early conversations with L.D. about the research agenda of CTVR.

However, L.D. proposed to catalyse the second session and thus a provisional yet powerful gesture of recognition and continuity was established.

The poetic goal of *Engineering Fictions* was essentially to sustain *Engineering Fictions* and to learn about communicating communications through this process. The intention was to learn how to both catalyse and sustain dialogic communications within CTVR such that could support correspondences to emerge in between occupations of artistic and engineering research. E.F. was considered to be at once an experiment and a model for *communicating communications*.

This concludes the retracing of the basic choreographic process of *Engineering Fictions*. This iterative and responsive process continued throughout the run of the experiment from January to June with the particularity of each session depending upon the nature of the catalysts and seeds. In the following sub-section the choreographic process is summarised.

6.2.5.5 Summary of the Choreographic Process for *Engineering Fictions*

On the *Engineering Fictions* blog during this period the forum was described as “*part art-practice and part research-methodology*”. It was described as a forum that was ongoing yet seasonal. The poetic goal of *Engineering Fictions* was continuity, a kind of communicative sustainability in between occupations of artistic and engineering research. It was imagined sometimes as a “phatic space”, a dialogic situation that might support the “unravelling of epistemologies”. The idea was to allow epistemic mind-sets and blind spots reveal themselves through the dialogic process of catalysing seeds; *speaking and listening, writing and reading, speaking and listening*.

The choreographic process that informed this poetic goal was four-fold. In *phase zero* an ongoing process of attunement with CTVR led to the intuition of a manifestation of transversality through an internal group email. The email thread was used spontaneously and conversationally in way that elicited a semblance of dialogic. The matter of concern was defending an awareness of the politics of spectrum management and sustaining a commitment to access and sharing of electromagnetic spectrum. The movement of this concern was traced from the *Filling the White Spaces* through to the talk by Prof. Dohler on the future of telecommunications research. The spontaneous dialogic of the email, catalysed by L.D., prompted a decision to initiate a second *inreach* experiment named *Engineering Fictions*. The naming and framing of the *Engineering Fictions* experiment was evocative of a choreographic object.

In *phase two*, the genesis of the naming of *Engineering Fictions* was sourced through the work of Ray and Charles Eames, and their conception of the interdependence of the model and fiction. A model for the Eameses was something you use to communicate about a structure that interests you that can act like a 'fiction of reality'. An internal email questionnaire on an excerpt from Ludwig von Bertalanffy's *General Systems Theory* (1968) generated insight into how CTVR's researchers considered the model. The argument that '*a verbal model is better than no model at all*' was empowering for the author. In order to facilitate the choreographic object *Engineering Fictions*, the author sought to improve her own understanding of the model by way of writing fiction. A writing class with Pat McCabe helped to develop a habit of 'morning writing' which in turn enabled unconsciousness raising that was recognised as valuable to the choreographic process of *inreach*. The intuition that art and engineering operated as foils of each other (as per *Room 3.17*) was strangely reinforced during the writing class when it was pointed out that traditionally the figure of the writer is *double*: an artist and a craftsperson. And while *Engineering Fictions* was understood as a choreographic object in general, each of the sessions could facilitate further choreographic objects by way of the 'catalyst' and 'seed' that would activate each session.

In *phase three*, the dialogic situation of E.F. was shown to have been informed by an iterative adaptation of The Writing Workshop through CTVR. The first iteration was through the *Communicating Science* workshop at the Plenary 2011, and the second iteration was through the Openhere festival, curated by CTVR and D.A.T.A., during the summer of 2012.

Finally, *Phase Three* showed that the poetic goal of E.F. was imbricated in a process of simultaneously experimenting and modelling communication through the dialogic situation. The poetic goal was, as mentioned earlier, one of continuity. Of developing the choreographic process of *inreach* such that a correspondence and communication in-between art and engineering might be sustained within CTVR.

The experiment *Engineering Fictions* ran from January to June in 2013²⁶⁴. Some sessions were more successful than others, drawing more or less contributors. The experiment, however, had strong support both from CTVR's management team and from PhD researchers in the Lab²⁶⁵.

²⁶⁴ A second season of E.F. took place from January to May 2014.

²⁶⁵ On a number of occasions C.G. offered advice and encouragement to the author in promoting the experiment within the PhD research Lab. The author's more subjunctive approach was not perceptible to the PhD researchers – the author had to learn to raise her

In the following section, the intention is to provide examples of the *Engineering Fictions* experiment. Two particular sessions are chosen because of the call-and-response relationship between them. This call-and-response was generated over time by way of the choreographic movements in-between the occupations of art and engineering catalysed through the E.F. sessions. While L.D. catalysed a session on *Cognitive Radio* Session Two, visual artist L.W. catalysed a session in response to *Cognitive Radio* in Session Seven. While these sessions are distilled in Chapter 7, the intention here is to lay them out as clearly as possible in relation with each other for the reader to compare and imagine, hopefully gaining some insight into how the E.F. experiment actually played out.

voice quite literally within the space of the Lab. The Field-Journal records the difficulties of this process of learning to engage with the dialectic of the engineering context, particularly the period of March/April 2013.

6.3 Engineering Fictions – Sample encounters

The first season of *Engineering Fictions* established a choreographic process of experimenting with and modelling dialogic communication within CTVR. In the following pages two of the sessions are selected out of a total of ten. The reason for selecting these two sessions out of all the others is because they establish a call-and-response relationship with each other.

Each Engineering Fictions session requires a catalyst and a host. Sometimes, as in the example of the first session, these roles are performed by the same person. But this is a very difficult task. Therefore, the role of the host of E.F. must be acknowledged. The choreographic work of the host helps to sustain the sessions, providing a sense of continuity for contributors coming from within and from outside CTVR. The host of CTVR is the person who remains sensitive to catalysts and seeds that might benefit through the dialogic situation. The learning developed through the Pat McCabe writing course in particular helped to emphasise how hosting involved making relations in between unconscious and conscious processes of communication within a particular context. The host is required to practice an intuitive yet disciplined *art of recognition* within a particular location. In this way the host becomes able to source *catalysts* and *seeds* for the E.F. sessions. It was through such a practice that L.W. became involved with CTVR's research and performed as the catalyst for Session Seven.

The sample sessions are translated in such a way that the reader might begin to build up correspondences and counterpoints between them. These sessions were chosen because they related and informed each other more or less mutually. A brief introduction is given to each session: why the catalyst was invited, how the topic developed as a seed, what happened in the session, how and whether constraints were improvised for writing, and what kinds of insights, texts, and conversations were produced. They are presented here in chronological order and are written in the present tense in an attempt to evoke a sense of the immediacy and spontaneity of the choreographic process.

6.3.1 E.F. Session Two – Tuesday, 12th February 2013

After the first E.F. session, L.D. offers to catalyse the second session of the second *inreach* experiment with CTVR. L.D. and the author exchange a brief conversation about the plans for Session Two. The week before the session L.D. sends the host J.F. (hereafter referred to as the host) an email proposing the topic or seed for discussion. The host copies this proposal into a new email to create an invitation to

the next E.F. session. This email is circulated internally via the CTVR mailing list by the host:

Greetings CTVRians,

A note to inform you of the next Engineering Fictions session to take place at CTVR:

*The next Engineering Fictions will take up the theme of **Cognitive Radio**, and will be catalysed by Linda Doyle.*

Cognitive Radio is a major topic of research in the Engineering domain and has received much attention over the last decade. The session will be seeded by a short reading on cognitive radio based on material from traditional engineering text. To accompany this reading two works of art will be briefly described. The first is Imaginary Landscape No. 4 (March No. 2) by John Cage. This is a piece composed for twelve radios (twenty-four players and conductor). For this work, 2 performers are stationed at each radio, one dialling the radio-stations, the other controlling amplitude and timbre. The second work that will be discussed is the short film The Cognitive Radio (2012) by Sarah Browne which she made as part of a workshop she ran at the Ikon Gallery in Birmingham.

The session will take place at CTVR, Dunlop Oriel House, in the Seminar Room. As usual please bring along with you whatever writing materials you prefer to use. Tea, coffee (and a small treat) will be provided.

Please feel free to invite or bring along anybody you think would enjoy engaging in some discussion and writing around this topic. [If you can, let me know if you're hoping to come (or if you are bringing anyone) so that I can have enough cups etc. at the ready.]

Looking forward to seeing you then,

Best wishes,

Jessica.

6.3.1.1 Attuning to the 'phatic space' of E.F.

There are six people present for the E.F. session. They gather towards the far end of the seminar room at Dunlop Oriel House. At this end of the room there are hard, pink couches, some large office plants, and two round, low, luminous green (chartreuse coloured) plastic tables. Some black chairs have been gathered in a circular arrangement along with the pink couches to give an overall 'campfire' organisation for the session. Adjacent to this seating set-up are tea and coffee making facilities. There are some biscuits on plates on the low tables. Whoever wants to makes themselves a cup of tea or coffee. Everyone settles down into the seats arranged in the round. When a quiet builds the host welcomes everyone and invites the catalyst to seed the session.

6.3.1.2 Seeding the E.F. Session²⁶⁶

L.D. welcomes everyone present and thanks them for coming. L.D. begins to introduce the idea of *Cognitive Radio* through a book that she published in 2009 called *The Essentials of Cognitive Radio*:

In very simple terms a cognitive radio is a very smart radio. Radios have been getting smarter in the last few decades. Current communication systems use radios that can adapt their behaviour in many ways. For example 3G communication devices have the ability to dynamically alter their power output in order to ensure power imbalances, which negatively affect communication, do not arise between different users. Mobile phones can cleverly process the incoming signals they receive in order to mitigate against the various different distortion effects that the signal experiences...

...All this type of functionality is invisible to the user, but the fact remains that the communication systems we use today are able to adapt and change their behaviour in a variety of ways to maintain connectivity in the face of varying conditions and circumstances....

...A cognitive radio takes this type of adaptive behaviour and goes much further... In other words, a cognitive radio is fully aware of the context in which it is operating. A cognitive radio processes the inputs it receives and makes autonomous decisions on how to configure itself for the communication tasks at hand... A cognitive radio has the ability to learn from its actions and for this learning to feed into any future reactions it may have.

A cognitive radio is made from software and hardware components that can facilitate the wide variety of different configurations it needs to communicate (Lefebvre 2009: 404).

6.3.1.3 Catalysing the Seed

Because L.D. has written about the experience of catalysing this E.F. session on her own blog, this account is drawn upon here rather than paraphrasing. On the 13th February L.D. posts about the E.F. session. It happens to World Radio Day, and L.D. recognises this as a happy coincidence. L.D.'s describes the E.F. session as follows:

...I seeded the session through talking about Cognitive Radio and the composer John Cage. Let me explain – When I wrote a book on Cognitive Radio I ended the book with a few sentences that speculated on the future. They went as follows:

²⁶⁶ See Appendices: Chapter Six; page 61 and 62; Figs. 61 and 62.

“How ‘cognitive’ the next generation radios will be remains to be seen. During a discussion in our research group about our aims for our research, one to the team suggested that we should aim for a radio that is so cognitive it gets bored. Whatever the level of academic folly in this, cognitive radio is never boring.”

*So this is where the jump to John Cage came in. John Cage (<http://johncage.org/>) was a very famous composer. Among his huge body of work are four pieces composed for radio – i.e. in which radio is the instrument. In 1951 he composed *Imaginary Landscape No. 4*. The piece is scored for twelve radios. Two performers play each radio – one dials the frequency, the other changes the volume and tone. The piece of course is very indeterminate as what you hear when one of the operators dials a specific frequency from the score depends on what station, if any, is on that frequency and what is actually playing at the time. There are three other pieces for radio namely, *Speech* (1955), *Radio Music* (1956) and *Music Walk* (1958). The score of *Radio Music* is shown below – it includes a list of frequencies that are to be selected, dashes indicating silence and the total time for the piece is 6 minutes.*

Anyway, in my head I imagined our cognitive radios getting bored and deciding to collectively perform a John Cage piece for their own amusement and subsequently possibly composing something themselves as they get braver.

One of the intriguing things about the John Cage pieces is that the frequencies selected by Cage are ones that are in the AM radio bands. In many places around the world, AM radio is being turned off. So if you look at some of the performances of the pieces such as the here (<http://vimeo.com/49007247>) in NYC, the performers will have mapped the frequencies to those in a different band. In the example here they use the FM band knowing that they are more likely to hit active radio stations. There of course is also an argument to be made that the Cage pieces can no longer be played once AM radio turns off for good. This discussion led us all to ponder not just on the algorithmic framework that Cage created but also on the ‘lost’ radio stations – and pine for some form of ‘radio archaeology’ to unearth them.

6.3.1.4 Conversation and Writing

As L.D. mentions in the previous section, a conversation develops through the seed of Cognitive Radio. Once the conversation seems to be brimming to a close, the host queries what kind of writing might best be tried out. The catalyst chooses to try a

'popcorn' exercise²⁶⁷. (This exercise has been described earlier in this Chapter in section 6.2.4.3.3.) For L.D. the constraints of this exercise resonate with John Cages instructions for tuning a radio-set into a frequency band to achieve reception.

The host explains the rules of the *popcorn* exercise to the group one step at a time. First, each person in the group is given a plain sheet of paper onto which they write a word that has spontaneously popped into their mind in response to the seed. Next comes the popcorn bit. Each person quickly passes their sheet of paper to their neighbour (in an already agreed direction by the group), and each neighbour places a word on the sheet in response to the word(s) already on the sheet. This movement of sheets and thoughts continues until the pages are quite full of words. Next, listening. When each person receives back their original sheet in turn they read aloud all the words written there. The rest of the group listens and writes down in their notebooks any word they like the sound of. They each make a list of words (*Foundation Words*). The host then explains that each person is to write their own text using all of the words in their list. The writing is given around 20 mins. Some people move to other parts of the room, to lean on tables or to get a bit of space on their own. Others remain in the seating set-up. The following are a selection of texts written during the session:

C.G.

Will a cognitive radio be able to write songs? Will a cognitive radio be able to have feelings? Will a cognitive radio be creative? Will a cognitive radio be able to think? It is interesting to know why we want to be cognitive. It might be 'cos we want to prove to ourselves we are able to generate something which can do what we can do. Or even to do more than we can do. Or is it to prove the opposite? That is, nothing can be as capable as human beings are? Or is it to build something which allows us to achieve what we wouldn't be able to achieve by ourselves...?

J.K.

17 'Silent Notes' do not make a piece, but they may as well force a rhythm. A 'rhythm' is essential for cognitive radios to infer about their electromagnetic surroundings. Electro-magnetic surroundings for a non-interested party are a plain noise. Noise fills up the gaps between the 17 silent notes. (Provided we are still in 2013)

²⁶⁷ This exercise was adapted from Wreckio Ensemble who conducted a session through The Writing Workshop in 2009. It's a technique that the theatre group use to write scripts together. This technique is catalytic of ideas and can generate surprising and often surreal associations.

S.mG.

Parenting a Cognitive Radio

Congratulations on the birth of your very own cognitive radio. As a new parent there are a number of things you should know. Your radio can be anything you want it to be. The only stipulation is that it cannot be cognitive.

Your radio should in fact be a lemming. Unlike real cognitive human babies, it must play nicely with friends.

It must be aware of the environment in which it is working.

It must be aware of other radios in the space.

It must be aware of the regulations and it must be aware of itself.

Thus, your cognitive radio should be a characterless, self-absorbed radio.

It should be afraid to try new things.

It should be afraid to venture a rogue transmission.

Unlike a cognitive human baby, who learns from mistakes, your bouncing baby cognitive radio should only learn from what it is told. It must not under any circumstances end up like a human brain in a radio. It must be a 1984 human. It must follow the rules.

If your cognitive radio decides to be a little too smart, one of the countless other young cognitive radios in the spectrum playground will report your cognitive radio and you will be punished.

6.3.1.5 Reading, Listening, Conversing

The host keeps time, letting people know when the writing time is nearly up. Everyone is given the chance to finish. The group gathers back together in the round. The humour is good. People are stimulated. The host invites any one who feels comfortable to read what they have written or to offer any thoughts or observations. Time is taken to allow hesitations to subside. The host chooses to read her text, sharing it with the group. The group listen. Others read their texts. Laughter and observations mingle. It seems to be a surprising experience for the group. When all is read, and conversation brims to a silence, and everyone feels ready to move on the host draws the session to a close, thanking the catalyst and the participants. The host invites anyone who wishes to leave their writings as part of an E.F. archive. The texts are collected up in a folder and stored in the PhD Lab. The host reminds people that anyone is welcome to attend the sessions, and anyone is welcome to catalyse a session. The group are invited to contact the host if they have any desire to do so.

6.3.2 E.F. Session Seven – 14th May 2013²⁶⁸

6.3.2.1 A prelude...

In April 2013, visual artist L.W. invited the author to have a conversation with her on an internet radio station collective called *Radio Al Cabira* (www.radioalcabira.com). This conversation would take place as part of L.W.'s week long residency at *The Market Studios*²⁶⁹. L.W. was interested to learn more about the *Cognitive Radio* and how the author's artistic research practice was playing out within the context of telecommunications engineering. L.W. was interested to learn how these different ways of knowing and being in the world were influencing each other. L.W. was also keen to open up a conversation about the technology, science and politics of radio waves and the internet, and welcomed any additional guests to the discussion.

The conversation was hosted at The Market Studios, and lead researchers, L.D. and T.F., from CTVR came along to join in. It was a relatively informal encounter, but particularly strange for L.D. and T.F. as the conversation took place in the midst of L.W.'s art works and live-performance space. The four interlocutors sat on cushions on the floor, while L.W. streamed the conversation through the Internet Radio Station, Radio Al Cabira. The questions that L.W. posed to L.D. and T.F. were simple yet profound, and they opened up a very curious and informative conversation about cognitive radio technology and electromagnetic spectrum. L.W. was curious to know more about the constraints on radios currently, and she could see a social and political crisis reflected in the technological effort to design *cognitive* radios. It was on the basis of this conversation that the author invited L.W. to catalyse a session of *Engineering Fictions*. L.W. agreed and decided that she would write a text based upon their radio conversation and read it aloud to catalyse the E.F. session. L.W. would catalyse the seed through a performed reading. L.W. chose the idea 'CAGE' as her seed.

The week before the session was due to take place an email was composed and circulated by the host within CTVR, and to the handful of external members who

²⁶⁸ See Appendices: Chapter 6; page 63 and 64; Figs. 63 – 65.

²⁶⁹ The week long residency was entitled *Insert Emoticon*. Over the course of seven days Louise created random interactions from/with the audience, performing a set of minimal and pathetic actions that integrated sculptural objects and sound. Louise's work and sensibility is "anchored in shifting perspectives of human behaviour, in the politics of the everyday and in hybrid spaces between internalized worlds of pleasure and externalized habits imposed by society. Her practice tips her/our daily struggles into absurdity, where certain socially conditioned behaviours are reflected upon in a series of repetitive performances"(Ward 2013)

had learned of the sessions through word-of-mouth and wanted to attend. The following was written and circulated through CTVR's mailing list and via the E.F. blog as an invitation to participate:

I'm delighted to welcome artist L.W. to CTVR for this weeks Engineering Fictions, to catalyse discussion and writing around the idea: CAGE.

Tuesday 14th May – CAGE with L.W. – 5-6.30pm @ CTVR

The idea for this Engineering Fictions session arose through a recent discussion of cognitive radio between myself, L.D., T.F. and L.W. which was broadcast online (www.radioalcabira.com) from The Market Studios. Over the course of this discussion the word CAGE began to act as a synapse between various ideas. L.W. will tease her sense of this out with us through conversation and writing this Tuesday.

As an artist, L.W.'s sensibility is anchored in shifting perspectives of human behaviour in the politics of the everyday and in hybrid spaces between internalized worlds of pleasure and externalised habits imposed by society. Her art work tips her/our daily struggles into absurdity, where certain socially conditioned behaviours are reflected upon in a series of repetitive performance.

I realize that for many of us in CTVR there is an intensive conference taking place this week around Cognitive Radio, and so I suggest what better way to decompress after a day of cutting edge discussion and presentation than through some writing and relaxed conversation (I know I will definitely need it!).

As per usual bring along your own writing utensils – also, feel free to bring nice treats – also, feel free to bring a friend!

6.3.2.2 *Attuning to the phatic space of E.F.*

This Engineering Fictions session happens to coincide with an International Ph.D. Course entitled “Cognitive Radios and Networks: Theory and Practice,” organised cooperatively between CTVR and Aalborg University and hosted at Trinity College Dublin. The author attends the Course and writes reflexively about this experience in the Field-Journal (15.05.13):

“I’m learning the Cognitive Radio is not necessarily one thing – that it is not necessarily ‘an’ object. I think it is a concept which enables projection from many, from various occupants of the telecommunications world, projections infused with theories and ideas from computer

science and information theory. *Cognitive Radio is a Dream, it is an ideology as much as it is a technology. And there are tensions here naturally. The politics around this tension is opaque. There are no clear sight lines. There is a creeping sense that power is shifting back into the control of the Incumbents, and away from the aspirations of a community of engineers who are motivated to develop a technology that will enable better ways of being in the world, better ways of being as neighbours in the world, through our tools. As Linda described it this evening: “The incumbents see cognitive radio as a tool to help them get more, not as a way to open up telecom’s to new players”. I’m paraphrasing from notes here. Linda spoke this evening about Sharing. She is using this concept as a way into new ways of thinking about Spectrum and how it can be used by incumbents such that new players are not excluded. Sharing as Linda sees it builds a sense of community, which in turn builds trust, which in turn enables sharing.”*

At the beginning of the afternoon lectures on the 14th May 2013, as part of the Ph.D. Course, the author stands up in the auditorium in front of the delegates and informs them of the *Engineering Fictions* session to take place that evening in CTVR. She has not planned to do this, but the coincidence of L.W. catalysing a seed related to Cognitive Radio seems like an important one. The result is the largest attendance yet at an *Engineering Fictions* session, approx 15 people. The space is set up as usual, with tea and coffee and some food. The arrangement of the furniture has to be extended to accommodate the numbers, more than twice the average. Once everyone is settled and a silence brims the host speaks a little bit about the ideas behind *Engineering Fictions* and then introduces the catalyst, L.W.

6.3.2.3 Seeding the E.F. session

L.W. speaks a little bit about herself and her practice as an artist. Then she begins her performance, reading aloud the text she has written in response to the Radio Al Cabira conversation at The Market Studios (Ward 2013):

CAGE

Radios are put into cages. If they broadcast beyond their cage, they lose frequency or power. The cage is to avoid radios interfering with each other and garbled messages. Radios have been heavily regulated in this way for about 100 years. The initial reason was to avoid interference between radios but this fed readily into a capitalist model – once radios were put into cages, they could easily be bought and sold on. Bigger networks could buy bigger cages and they could do whatever they wanted in this cage.

Cognitive radios would get rid of the need for cages. They would say “we don’t need to have those really straight lines, we will be able to figure out what the

interference tolerance is and we will be able to figure out how to respect you... you can respect me and we can all get along happily”.

This led us to talk briefly about a space that I’m involved with in New York called CAGE – the ethic of this space is to work simultaneously with others... using the space when it’s free... collaborating... reserving time slots when needed... overlapping in this framework. This is where the group Radio Al Cabira was formed – an internet radio show that has multiple users with access to login details... setting up shows whenever there is an available slot. The name of the space CAGE was formed by an artist called Karin Schneider. The members who participate at this space have multiple definitions for this word in relation to the activities that happen there. On the one hand it was initiated as an attempt to break away from the cage of the art market that can determine one’s creativity. On the other hand , it could be perceived as a cage of protection from this art world or society in general and a place where like minded individuals can generate new models for artistic production/living, collaborating with people from different disciplines... therapists, engineers, programmers, writers, etc.

Returning to the conversation on Cognitive Radio – I took notes about how the capitalist system of giving out licenses for cages is now starting to crumble because radios are becoming slightly better, i.e. more cognitive, being able to deal with interference... meaning the barriers are starting to become loosened between different systems.

What would happen if the existing radios opened their cages now and what new forms of simultaneous broadcasting could happen? The cages would open and the animals would be let out.

“Radios are in cages. They’re animals. They only deal with their own kind. They create a certain etiquette to deal with their own kind. What CTVR is doing is giving radios a certain kind of etiquette – a system of rules and manners that will allow them to meet all sorts of different people (radios) from different cultures and diversity. We’re getting used to diversity. If we opened those existing radios today, who only deal with monocultures – if they met another radio, they would most likely kill it for fear of it and they just wouldn’t get on with it at all. There would be massive interference and chaos and breakdown. Those radio systems that exist right now are not ready for that.”

I wondered, has this ever been tried? The cages opened. Maybe this is the point where the cage fighting begins. CTVR makes them ready for multiple cultures so that they will be able to have ‘proper interplay’. So in other words, they are being conditioned to do what we tell them to do? What is ‘proper interplay’?

“If these cognitive radios are established, in a way, we are basically telling the world how to behave?” (how to live in harmony?)

Who decides how the world should behave... especially when it comes to what is being broadcast – what about censorship – will this still be an issue... certain broadcasts will be left in a cage alone to die... will there be regulations for cognitive radios? Is a cognitive radio just a different form of broadcasting/self-organisation... like checking out your food at Tesco, scanning your own boarding pass in the airport... self labour... find your own place to broadcast if there is space free... what happens when there is no available space for the cognitive radio... when all the parking spaces are full?

“Sphinxes and Greek mythological figures”... these are the radios of the future. “Hybrid radios” and communications.

Sounds utopian but how will this work in practice? Are some cognitive radios stronger than others? What about viruses? Do viruses apply to radio frequencies? What about the pirates? Is this a cognitive radio within certain legal boundaries? Will there be a legal cage developed for all the cognitive radios that allows it to operate under certain restrictions?

A cage can be something we create for ourselves – it contains the people we associate with. Or it can be something we are trapped in... a place where we are told to behave in a certain way. In the reality of our daily lives, what happens when our cages are open? When someone breaks into your cage or when you share your cage with others?²⁷⁰

6.3.2.4 Catalysing the Seed

When L.W. finishes reading aloud her text, a silence breaks. Conversation begins from some corner. The Field-Journal (15.05.13) makes a record of how the seed is catalysed from here:

Louise Ward catalysed the Engineering Fictions session yesterday around the word CAGE. She read aloud a text which she had written, derived from the internet radio broadcast of a conversation between T.F., L.D., myself and herself on the subject of cognitive radio last week. It was broadcast on www.radioalcabira.com. Alcabira means 'the many'. We did a popcorn exercise and it worked really well. L.D. recommended that we do that instead of free-writing. The free-writing is a bit intimidating. Popcorn has rules. You do what your told. You play within the rules. It's fun. But it can be very serious fun. Take your pleasure seriously. So L.D. inspired us all through her rendition of CAGE and how this related to her own practice as an artist and also how she found it related to the Cognitive Radio.

²⁷⁰ This text was written by Louise Ward after a group discussion on Cognitive Radio that took place at The Market Studios on Thursday 2nd May 2013 with Linda Doyle, Tim Forde and Jessica Foley. The text was written using ideas and information put forward by the group as well as personal thoughts.

[...]

We did the Popcorn exercise. And it was difficult because many in the group do not speak English as a first language. Maybe I should suggest that we can use our own first language. Then we would have to use words we don't recognize. And then most of the English speakers would be at a disadvantage. We would become 'weak receivers'.

6.3.2.5 Conversation and Writing

Conversation opens up. When it seems as though there is a pause, a full steady silence, a ready silence, writing is proposed by the host. It is usually only an instant, this silence. It impresses its own time. This time, 'popcorn' is proposed. Its rules offer a kind of familiarity, the game of it is familiar. To CTVR. The host explains the exercise. Writing begins. The Field-Journal makes a record of this unfolding (15.05.13):

We carried out the popcorn. There were paper jams. The flow was not as rapid as it can be. But I emphasised - Do not Think - React. It's about the only time I will advocate for this! It works. It's a good way to loosen things up in the mind. It turns out that I was not the only person to put ANIMAL at the centre. I suppose that is a direct response to CAGE... but it's funny, at the time of writing I had actually no awareness of that link... strangely enough. The mind absorbs and disguises just as quickly. Why does the mind do this? Why do we need disguise? Here is what Louise wrote - I'm writing it because I want to read it and type it anyway - and because it is beautiful - and because I realize that I have been here so long all my thoughts are now feelings and I can no longer present them clearly - I need to make them thoughts again, these feelings²⁷¹. And maybe feelings are just disguised thoughts anyway?

How do I Change You?

You've been sleeping in the Holes of others.

I should drag you back to the Cage where you belong.

Your randomness has been so hard to track.

You move without Squareness - you have no definite form.

You say People need you.

You have high expectations for the 'future of radio'.

You Disappear before I can catch you.

²⁷¹ This suggests almost a mirroring of the foil. Louise has become a foil to Jessica. She enables her to see her situation with more light. It is reasonable to imagine that this is what Jessica was to Linda from the beginning of her work within CTVR.

Your magnetic appeal inspires hope for new models of behaviour, as you broadcast in unused space and change position.

Dissolving barrier by barrier.

Existing in a Void.

Living with Disorder and Dissonance as you move and make space for others.

All the words underlined are the words Louise chose from those that people in the group read aloud from their Mind-Maps. Here is Carlo's piece of writing - which many people felt was actually channelling Séamas' style of writing, even though Séamas was not present!

Radio Farm

It's 2100. All radios finally break free from their cages. One among these radios, Radio Napoleon, feels more equal than the others and decides that some rules must be set.

1. Radio freedom is no longer tolerated.
2. Radios must return to their cages and severe limitations to their rights will be given.
3. All Radios (except Radio-Napoleon) are expected to obey the rules. Randomness in Radio-behaviour will not be allowed.
4. Radios breaking these rules will be segregated in tight frequency bands.
5. Radios are not allowed to argue about these rules. In fact, the word 'Why' will be forbidden.

Carlo's text relates to Animal Farm. It's strange reading this back now, a day later. And I realise that this horrible scenario is felt a little bit by L.D. at this time. The feeling that the incumbents have appeared supportive, that Liberty has appeared but that it has become another kind of captivity, through some kind of compulsion for totalitarian power. Radio-Napoleon is present in the pages of reports that L.D. has been reading recently, where Incumbents seek to support Cognitive Radio research and development to reinforce their own status as incumbents, and not so that the field will become more open to new players, or more open to diversity. It's difficult to tell where the metaphor ends and the reality begins...

After a period of time, perhaps 20 mins or more, the group gathers together again. (Some had moved to use the table surfaces at the other end of the room). Some of the writings made were as follows:

Louise (continued):

This is your revolution. Understanding that complexity is Fundamental. More police are on their way. But the reality is 'I Believe in You'. Your range is little known, yet known by most. Competition breaks down as you hop in and out. Look at the damage of the past.

Anonymous:

Liberty and Freedom should be achieved without anarchy, by sharing common goals and cooperate. Human beings purpose should be to unleash their own power, but anyone should have at least one chance of doing that. Duality and Plurality are two tremendous values, which can free people from stereotypes and prisons, real or virtual. Sometimes people appear to be in a self-built cage, but it happens that the cage is just fear, and they only need the right key to be free and realize their own objectives. Sometimes the method for doing that is simple, but we are used to look at things from the wrong viewpoint.

Anonymous:

Any community must give Liberty to its persons. Each person isn't equal to the others and so there is diversity. To live with this diversity we need respects to each others. There are commons that must be shared in the community; this is achievable only with co-operation*. Some people abuse of the commons (I think because some people live in Angst) So the community makes laws and protocols. These laws brings a lot of limitations but for the community are necessary. These laws generates prisons, the angst causes cages.

*and this is a lot complex because.

6.3.2.6 *Reading, Listening, Conversing*

When the writing is period is over, the host invites whomever wishes to read aloud what they have written. Many people do. Many do not speak English as a first language, and are learning day by day. The sounds of the many accents and intonations of other places and cultures demands a focused listening. Everyone listens carefully in order to hear what each other has to say about CAGE. The session continues until it brims to a close. The host invites people to leave their writing as part of the E.F. archive. At the end of this session some of the delegates from the

Ph.D. Course on Cognitive Radio express an interest in returning to E.F.. They say it is a unique and valuable experience.

6.4 Summary

In this Chapter the choreographic process leading to the second inreach experiment was retrieved and retraced. As a choreographic process, inreach was beginning to take shape as a valuable way of facilitating and structuring dialogic situations under conditions of occupational difference. In this context, the occupational worlds of artistic and engineering research come into relation with each other and seek to learn from each other different ways of sharing ideas, posing questions and problems, telling stories and communicating together.

Section 6.2 elaborated the four-fold *phases* of the choreographic process for *Engineering Fictions*. In *phase zero* it was shown how L.D.'s centre wide clarion call to defend spectrum research and to "*challenge the status quo and build alternative networks*" was legible as a gesture towards transversality within the organisation. L.D. wished for the engineering researchers of CTVR not to be silent in their opinions, and to voice their dissent as much as their assent to talks such as those given by Prof. Dohler.

In *phase one*, a correspondence was developed between the concepts of fiction and the model, through the 'fictions of reality' of the Eameses and the argument for the verbal model made by Ludwig von Bertalanffy. The email correspondence with CTVR researchers catalysed by the latter helped to develop an intuition that 'catalysts' and 'seeds' could act as abstract choreographic objects that could support inreach. In an effort to come to terms with the model, a discipline of creative writing was developed through Pat McCabe's writing class. The constraints of storytelling, and the practice of early morning writing, developed a kind of unconsciousness raising that served as training for the choreographic process of hosting the *Engineering Fictions* sessions. Writing was shown to be a practice of double persona: the artist and the craftsperson. The intuition that writing was a relevant tool for generating a correspondence in between artistic and engineering research had found a source.

In *phase two* it was shown that the dialogic structure for *Engineering Fictions* emerged through an iterative process of adapting The Writing Workshop within the context of CTVR. And in *phase three* it was shown that the poetic goal of *Engineering Fictions* was to sustain a continuity of dialogic exchange within CTVR.

Engineering Fictions is legible was an improvisational and ad hoc experiment within CTVR. As a choreographic process, its movements corresponded and connected with other practices and ideas, drawing them into the intuitive purpose of inreach: to catalyse communication in between the myriad epistemic and technical occupations operating within CTVR. Inreach was a process that sought to enable differing knowledge traditions to coexist and correspond with each other and perform together.

Engineering Fictions was initially imagined as a way of structuring a material-semiotic correspondence in between the concepts of 'fiction' and 'model'. Through this structure others could then catalyse dialogic by way of chosen seeds; choreographic objects that would 'urge participation,' both releasing and encouraging choreographic thinking as much as day-dreaming through speaking and listening, writing and reading.

In section 6.3 *Engineering Fictions* was shown to have facilitated an experimental and iterative process of modelling dialogic communication within CTVR, that extended beyond CTVR into the international field of telecommunications engineering, via the Cognitive Radio Course, and through the practices and experiments of contemporary visual art, via The Market Studios and L.W.

In the next chapter a reading of the inreach experiments *Room 3.17* and *Engineering Fictions* will be made by thinking with the theoretical distillery developed in chapter 2 and rehearsed in chapter 3. While there are undoubtedly many different ways these experiments can be read, the commitment here is to the relevance, efficacy and rigour offered by the theoretical distillery. The theories were drawn gradually out from the author's participant observation with CTVR and the largely unconscious movements of inreach. As a kind of personification of the artistic research process and participant observation the theoretical distillery serves to tell a story of inreach translating details of its choreographic process.

7 Distilling the inreach experiments

7.1 Introduction

The focus of this Chapter is to develop a close reading of the inreach experiments through the theoretical distillery developed in Chapter 2. (A brief summary of the theoretical distillery will be provided in section 7.2.) The aim of this chapter is to offer insights on inreach as both a concept and a process-based methodology, and to articulate how the value of inreach developed within the research culture of CTVR through the experiments *Room 3.17* and *Engineering Fictions*. The following chapter, therefore, seeks to show the affect of the inreach experiments in relation to how CTVR begins to augment its own internally persuasive discourse through an ad hoc hidden curriculum of communicating communications.²⁷²

A reminder that the *Design for Change* proposal (discussed in Chapter 4) made a claim that CTVR could and would 'Communicate Communications'. Living up to this claim fell to the author and the Director of CTVR. Over time, this claim became translated and re-oriented, between the author and CTVR's Director (L.D.), as a question; 'How do we Communicate Communications?' The purpose of the inreach experiments was to structure and facilitate ways for dialogic processes to emerge within CTVR that could (a) gain insight on normative communicative practices within CTVR, while (b) influencing and changing those practices through dialogue with artistic research, and (c) eventually begin to formulate dialectic communications through open-ended dialogic processes²⁷³.

In the wake of the 'Communicating Science' workshop at CTVR's Plenary in 2011 (discussed in section 4.2.2.1), an intuitive decision was made to encourage dialogic processes with workers at CTVR's Headquarters in Trinity College Dublin. This prototypical process was named inreach, and would involve setting up situations and encounters that would catalyse experimental communicative practices within CTVR.

²⁷² The reader is urged to keep in mind that CTVR's hidden curriculum operated more like a 'hidden-in-plain-sight-curriculum', given that it was actually published in the *Design for Change* proposal, and given that this funding proposal was successful and accepted by a team of international expert reviewers and Science Foundation Ireland.

²⁷³ This last point is not addressed in detail within this thesis, as the focus of the thesis is to articulate the provenance and value of inreach in the context of CTVR (first wave transversality). However, as the TABLE ??? shows, dialectic was indeed produced in the second and third wave of transversality. It's important to keep in mind that the terms of dialogic and dialectic are not understood as oppositional. The belief held here is that they can be complimentary, yet very different, processes that serve to shape thought and communication.

The invention of inreach was an intuitive response to the ‘authoritative discourse’ at work within CTVR. This phrase, developed by Mikhail Bakhtin, refers to discourses whose authority has already been acknowledged and sealed in the past. Bakhtin gives examples of “religious dogma, or of acknowledged scientific truth or of a currently fashionable book”. As such, authoritative discourse is “the word of the fathers” that “permits no play with the context framing it, no play with its borders, no gradual and flexible transitions, no spontaneously creative stylizing variants on it” (Bakhtin 2004 (1981)). The concept of inreach permitted the author to experiment and discriminate ways to produce dialogic processes within CTVR that could draw out “*internally persuasive discourses*” from the existing research culture. Bakhtin explains this phrase as follows: “*In the everyday... of our consciousness, the internally persuasive word is half-ours and half-someone else’s. Its creativity and productiveness consist precisely in the fact that such a word awakens new and independent words, that it organizes masses of our words from within, and does not remain in an isolated and static condition. It is not so much interpreted by us as it is further, that is, freely developed, applied to new material, new conditions, it enters into interanimating relationships with new contexts.*” (Ibid.) The purpose of inreach was to open up possibilities for communicating communications, which intuitively became an experimental process of bringing internally persuasive discourses of CTVR into relation and struggle with each other.

Inreach was a concept that affectively improvised its own methodology, in conversation with CTVR. Through the use of this concept, the author ultimately sought to find a way to begin communicating communications from the inside out. The aim of inreach was to help generate different processes of communication within CTVR. Inreach was a concept that opened up a space for artistic research and choreographic processes within the context of engineering research at CTVR. Inreach, as a concept, acted like a choreographic object for the author, enabling her to begin an affective process of questioning and dialogue with CTVR. As William Forsythe has explained, “Choreography is the term that presides over a class of ideas: an idea is perhaps in this case a thought or suggestion as to a possible course of action” (Forsythe 2015). Forsythe goes on to say that “Choreography often serves as a channel for the desire to dance” (Ibid). In the case of CTVR, the author desired to find ways of working with and alongside engineering researchers while orienting CTVR’s attention towards the problem of communicating communications as shared by its research community. She wished to ‘dance’ reciprocally within this new context, and she began to do so by challenging and responding to the *Design for Change* proposal.

The following reading of the inreach experiments is guided by three questions: (a) *What traces of transversality are legible in the descriptions of the experiments provided through Chapters 4 – 7?*; (b) *What traces of CTVR's Hidden Curricula become legible?*; (c) *What traces of occupying politics/Occupying Politics²⁷⁴ become legible?* Each of these questions is concerned with the affect of inreach within CTVR. Inreach is thus distilled in this chapter as both a tool and a process of communicating communications. It is by no means the only tool or process for communicating communications, but it is the one that was borne out by this specific correspondence between artistic and engineering research in the context of CTVR over a specific period in its institutional history. Inreach can be understood as a process at once pluralistic and singular.

Through the inreach experiments, CTVR's workers (including the author) began to subtly story their relation to the occupations and disciplines of art and engineering from within the context of academic research. The contributors to the inreach experiments thus began to articulate CTVR from the inside out. It is through the combined work of participant observation and artistic research that the affective life of inreach becomes legible.

Each experiment involved a relational process evocative of various moods or affects. Two moods become particularly legible through this affective reading of the inreach experiments: parody and lyric.²⁷⁵ While aspects of these are legible in both experiments, parody is discussed in relation to *Room 3.17* and lyric in relation to *Engineering Fictions*. The materials gathered through *Room 3.17* for example captured a prevailing mood of parody suggestive of a critical social, political and cultural consciousness at work. A reading of *Engineering Fictions* suggests that this experiment supports the emergence of a 'minor literature,' one generative of lyric and uncreative

²⁷⁴ Please make reference to the glossary for definitions of these terms. There are deeply imbricated, but the distinction is one of scale. *occupying politics* involves active reception at the level of individual, embodied criticality, whereas *Occupying Politics* involves passive reception at the level of groups or states at the scale of globalisation. These terms are an effort to bring a sensed ideology into language.

²⁷⁵ A caveat; these are by no means the only affects rendered legible through the process of inreach. These affects are interesting in the context of CTVR because they offer us extremes in the way people responded to the questions posed through the inreach experiments. These affects are evocative of the relational and interpretative challenge of researching under conditions of occupational difference. The trouble with focusing on two of anything is that this may be perceived as a reinforcement of binary thinking or Cartesian dualism. Rather, and it is beyond the scope of this thesis to expand in more detail, the relation between lyric and parody reflects a condition of storytelling and resonates with the mythological figure of the trickster.

writing (the latter by way of language games informed by the ‘technical esperanto’ of academic engineering).

7.2 *Recalling the theoretical distillery*

As was shown in Chapter 2, the theoretical distillery emerged from artistic research practice in correspondence with CTVR over a number of years. The theoretical distillery is a composition of theories that offer a way to make sense of the author’s lived experience of inreach and the insights offered by other contributors to the inreach process. The theories emerged from the process of artistic research and participant observation after a period of critical reflection. The theories of the distillery at times compliment and counterpoint each other.

The theory of the *Hidden Curriculum* emerged through the experience of ‘smuggling’. The author’s artistic research practice was smuggled into CTVR through the authoritative discourse of education and outreach. The author therefore became a form of ‘contraband’ within the organisation. In contemporary art theory, ‘smuggling’ has been theorised as an act of criticality and resistance, “*a form of surreptitious transfer, of clandestine transfer from one realm into another*”. Irit Rogoff understands the act of smuggling as a “*performative disruption that does not produce itself as conflict*” (Rogoff 2013 [2006]: 190-91). What is valued in such actions is the unpredictable possibility of making knowledge transversally, non-linearly. The implicit value of smuggling lies in the possibilities afforded under conditions of occupational difference. The act of ‘smuggling’ both catalysed and enlarged conditions of *occupational difference* within CTVR. The phrase *occupational difference* was coined out of the author’s experience of becoming an artistic researcher and participant observer within CTVR. This coinage is an example of one of the tools of inreach, naming conditions and processes as they are encountered and happening (Lorde 1993)²⁷⁶. A poetic understanding of the process of naming shows that enables thought and agency.

The theory of *Transversality* developed through a process of studying the work of Charles and Ray Eames, particularly their 1952 film *Blacktop*. The Eameses work, and that of CTVR, seemed to share a mode of knowing referred to as *phronesis* which oriented their design process. Aristotle theorised *phronesis* as “*less a capacity to apply rules than an ability to see situations correctly*” (Aristotle and Crisp 2000). As such it has

²⁷⁶ Audre Lorde’s description of poetry as “*the way we give name to the nameless so it can be thought*” offers precedence to such processes of ‘embodied criticality’, appropriate to the artistic research practice in this case.

become understood a “*mode of knowing within which hermeneutical consciousness emerges and which makes ethical life possible*” (Pappas and Cowling 2003). The concept of phronesis helped the author to develop a vocabulary and heuristic for *inreach*. While phronesis offered a theory of ethical action at the level of the person, transversality offered a theory of ethical and communicative action at the level of collectives of people, organisations and institutions. Thus the two were seen by the author to be complementary and pertinent to the challenge of communicating communications. *Inreach* can be understood, therefore, as a process that enables the bringing together of diverse theories, through a methodology combining artistic research and empirical observation (participant observation informed by feminist objectivity) within the context of CTVR.

Smuggling artistic research into CTVR served to foil (draw out the qualities and affects of) the research centre’s already existing condition of occupational difference (e.g. different ‘classes’ of engineering research: optical, wireless, antennas, etc.) The concept of phronesis became a heuristic tool for the author to understand the process of negotiating occupational difference within the context of CTVR. During the reflective, yet performative, process of writing the thesis it became necessary to theorise the occupation of engineering and to attempt to come to terms with its *occupying politics*. A set of theories were thus sought out that could help to develop partial insights on the occupation engineering as a coefficient of technology. The history and philosophy of engineering and technology were drawn upon to help develop a richer sense of engineering as an occupation, beyond the local context of CTVR.

The theoretical distillery materialised through these three sets of theories that could act as stills, or ways of stilling, the process of *inreach* enough to draw out insights and develop an understanding of its affects within CTVR²⁷⁷. In the following sections, a brief reflection on each of these theoretical ‘stills’ is made in preparation of making a fuller distillation of the *inreach* experiments.

7.2.1 Transversality and its co-efficients

Félix Guattari proposes *transversality* as “...a dimension that tries to overcome both the impasse of pure verticality and that of mere horizontality: it tends to be achieved when there

²⁷⁷ The metaphor of the distillation of spirits, particularly whiskey, is doubly relevant to the context of telecommunications. Marconi’s experiments in wireless telegraphy was funded through the Jameson family of whiskey distillers in Ireland. One of the contributors to *Room 3.17* was a note: *Whiskey Makes You Radio*. The theoretical framework can thus be considered a ‘triple-pot framework’, so-to-speak.

is maximum communication among different levels and, above all, in different meanings.”²⁷⁸ (Guattari 1984: 18) Verticality refers to top-down hierarchical organisational structures and systems of communication within groups and organisations (authoritative discourses), and horizontality refers to lateral, ‘ground-level’ communications (internally persuasive discourses). Transversality is a dimension that de-privileges both of these structures, inviting a dynamic movement of communication as kind of *convective* process²⁷⁹. Transversality can be thought in relation to Bakhtin’s concept of ‘dialogue’: “A word, discourse, language or culture undergoes ‘dialogization’ when it becomes relativized, de-privileged, aware of competing definitions for the same things. Undialogized language is authoritative or absolute” (Bakhtin 2004 (1981): 427).

In this thesis, the concept of transversality is used as a heuristic tool to think through and to offer insight on the discriminating movements which formed the inreach experiments. For example, it became apparent through the principles perceived by the author in the actions and language of L.D. in her work as CTVR’s Director that a dimension of transversality was sought for the research centre. The *Design for Change* proposal inscribed movements that afforded the formation of an ‘internally persuasive discourse’ of endogenous communication that could counterpoint and foil normative habits of the ‘authoritative discourse’ of engineering research (Bakhtin 1981). These inscriptions gradually became translated by the author as choreographic proposals made by L.D. through the *Design for Change* proposal, particularly through *Workpackage E. and Communicating Communications*.

In chapter 2 it was shown how L.D.’s collaborations with art and new media theories and practices demonstrated a dimension of transversality. L.D. sought to learn from artists and design activists, out of a personal interest initially. Over time, by making partial connections between the worlds of art and engineering, L.D. became more aware of the possibilities for epistemic reciprocity, and sought to open up pathways to such effect. In terms of transversality, L.D.’s actions can be understood as, (a) an acknowledgement of, as yet ill-defined, limitations of communication within the research culture of CTVR; and (b) an attempt at ‘auto-adjustment of the blinkers’ that could expand on possibilities for other communicative practices within CTVR.

²⁷⁸ It is worth bearing in mind that the hospital is the living model through which Guattari develops his concepts and ideas.

²⁷⁹ The word convection may suggest the physical motion of a liquid when heated towards boiling point. Etymologically the word means “*carrying together*”. This word describes the kinds of social relations aspired to within CTVR and within the author’s own artistic research practice.

Guattari suggests that “the official adjusting all of the blinkers, and the overt communication that results from it” depends upon what happens at the level of leadership-management and financial administration within an organisation. L.D.’s actions demonstrate an intuitive attentionality to *co-efficients of transversality* within her organisation²⁸⁰. The apparatus that catalysed the ‘auto-adjustment’ of CTVR’s communicative blinkers was the *Design for Change* proposal. This proposal was used by L.D. as an opportunity to make change within the culture of the research centre..

The communicating communications strand of the *Design for Change* proposal inscribed permission for artistic and creative research practices to enter CTVR (thus catalysing this research). This inscription and its affects was an act of smuggling.

Artistic research practices, understood as inherently reflexive, were recognised as a potential ally for the self-organizing communicative aspirations of CTVR. As former Executive Director of CTVR, P.S. explains: “*I think that you [the author] being in the centre was kind of the expression of her [L.D.’s] desire for that artistic practice [reflexivity] all the time, not just doing things for an end in themselves, but also using, almost kind of using the experiment as something that can be converted into an artefact that has meaning*” (Foley 2015). P.S. elaborated that reflexivity was understood as *more than* “*just scientific process, which seems to be kind of linear*” (Ibid). This excerpt offers insight into the way artistic research practices were imagined to operate within CTVR. Such research was imagined dialogically as a process of open-ended and reflexive communication that could synthesize into meaningful ‘artefacts’, thus shaping alternative modes of dialectic within the research culture ²⁸¹.

In the simplest terms, the inreach experiments were part of a quiet yet committed initiative that sought to make convections (affective relations) between dialectic and dialogic communicative processes within CTVR²⁸². In so doing, the author and her artistic research practice became another co-efficient of transversality within CTVR, alongside L.D..

²⁸⁰ L.D.’s political intuition and feminist criticality inform her leadership practice. L.D. is attentive to “*pragmatic opportunities to disobey the cultural and social ‘rules’ that constrain attempts to secure political agency for socially and intellectually marginalized people*”(Code 2003). This quality of attention and political consciousness is a mark of her management skills.

²⁸¹ This articulation of artistic practice within CTVR is resonant with Ray Eames’s description of the film *Blacktop*: “*...it meant something possible, that a film could be dealing with an abstract image and could have meaning.*”(Bowman 1980)

²⁸² The author does not wish to set up a false dichotomy between these processes. The intention is to affirm that these are intermingling processes, and that they serve to support and challenge each other. The work-life communications within a typical engineering discourse evidenced a bias towards an argumentative, non-listening dialectic. Calling to mind what Richard Sennett refers to as “*the familiar dialogue of the deaf*”(Sennett 2012).

7.2.2 A Hidden Curriculum for CTVR

The communicating communications strand of *Design for Change* was an imaginative and choreographic proposal. It was a resistant action that reimagined the purpose of education and outreach in a way that was relevant to the *Design for Change* vision for CTVR. This reimagining served to formulate a hidden curriculum that intervened in the everyday of the research centre.

In broad terms, CTVR's research responded to various and differing needs of the university, EU funding bodies and industrial sponsors. Increasingly, research agendas are conditioned and constrained by parameters set by funding bodies. Such parameters are treated less as a starting point for research practices and more as an end to be met.²⁸³

L.D.'s passion for the work of Charles and Ray Eames made them a touchstone and catalyst of a reimagined education and outreach agenda for CTVR. The author was invited to help catalyse public discourse around telecommunications research through the work of the Eameses, as part of the changing education and outreach agenda of CTVR. It was during these early months working with CTVR in the capacity of education and outreach assistant that the author became a part of a hidden curriculum for CTVR.

Many educational theorists recognise the value of the hidden curriculum as a conceptual tool for thinking alongside and with organisations and institutions of learning. Kathleen Lynch (Lynch 1989) has shown, from a neo-Marxist perspective, how educational and research organisations are involved in reproducing the consciousness necessary for social relations under systems of capitalism, while Jane R. Martin has theorised Hidden Curricula as learning-states (Martin 1976). Learning is said to be shaped by 'states' of character, e.g. docility, cognition (believing or knowing), emotion (anxiety), skill (linguistic), attitude (optimistic), and so on. In other words, learning states are dispositions or orientations of a person in relation to her inner and external world. Learning states are bound up in an ongoing struggle between authoritative discourse and internally persuasive discourse, as described by Bakhtin.

²⁸³ L.D. discussed this reality many times; research organisations have to respond to strict parameters set by funding bodies. CTVR had to work inventively within such constraints in order to enact research freedoms. By recognising "*this is what the funding will allow us to do*" in relation to Education and Outreach it became possible to play within the constraints, in this case to augment occupational difference. Turner, F. (2013). The Democratic Surround: Multimedia & American Liberalism from World War II to the Psychedelic Sixties. Chicago and London, The University of Chicago Press.

In the literature, there is an understanding of hidden curricula as neither good nor bad, but as social and psychic tendencies or orientations that can both reproduce and resist dominant ideologies and norms. After the ‘Communicating Science’ workshop, during Plenary 2011, it gradually became apparent that artistic research practices were being employed to inform a hidden curriculum within CTVR. This meant that CTVR had made room for artistic research to intervene in and co-exist with engineering research. Mikhail Bakhtin has theorised that “*when someone else’s ideological discourse is internally persuasive for us and acknowledged by us, entirely different possibilities open up*” (Bakhtin 2004 (1981): 427). CTVRs ‘ideological discourse,’ as articulated in the *Design for Change* proposal and by CTVR’s Director, L.D., was intuitively and ‘internally persuasive’ for the author. Thus, an array of approaches was devised by the author in order to become familiar enough with CTVR to begin to shape this hidden curriculum. Fundamental to any and all approaches was a tacit commitment to and philosophy of *listening*²⁸⁴.

The value of listening has diminished in communities that have become used to cultures of ‘competing monologues’ (Fiumara 1990) such as those of advanced capitalism. In such contexts, “*a single act of listening can... be undermined by a wider pattern of action...*” (Couldry 2010: 468). In many ways, not listening can be understood as a technique of self-preservation. But as Gemma Corradi Fiumara reminds us “*That which we are not capable of listening to reaches us in any case, in ways that may induce passivity or unutterable torpid states whereby we are increasingly restricted to ever more mechanistically territorial contentions, whether in favour or against something*” (Fiumara 1990). It is by patterns of *not listening* that ‘benumbing’ hidden curricula can begin to corrode the life of persons and communities. It is for such reasons that hidden curricula need to be critically attended to. By learning to listen with embodied criticality, and committing to this as an on going process of living as an interdependent creature amongst others, more generous forms of co-habitation, cooperation and organisation might be permitted to appear and flourish. Listening in this way becomes a key tool of inreach.

Developing out of various encounters with CTVR’s workers, listening was developed through proposal writing in particular. Such processes helped to establish a dialogic practice by way of existing dialectic structures employed by CTVR (such as writing

²⁸⁴ Such an attention to listening has developed through the author’s artistic research practice. By deciding to work and cooperate with others, regardless of occupational habit or orientation, the capacity of listening was forced to develop. Working with others, particularly those with whom we may naturally have friction, helps to tune in listening capacities. There is always a limit, and it is important to be able to recognise that limit and step into silence.

proposals for various exhibitions, conferences, grants, etc.). Listening was also developed by structuring workshops that leveraged tools of conceptual questioning, conversation, collage and diagramming, e.g. *How do you Imagine the Internet?*. In this way, new forms of dialectic communication began to develop through a habit of dialogic communication. It was by a discipline of multi-sensory, and multi-tooled listening that CTVR's hidden curriculum began to materialise through its education and outreach strand. The inreach experiments set in motion choreographic processes that helped to facilitate dialogic situations and structure experimental forms of dialectic communication.

The hidden curriculum for CTVR emerged through the education and outreach strand, emphasising values of listening, conceptual questioning and responding. While a discipline of listening was cultivated as a core process and tool of inreach other tools included techniques of collage and diagramming. These processes and tools supported the development of dialogic communication, forming a reimagined hidden curriculum for CTVR.

7.2.3 *Occupying politics of CTVR*

The inreach experiments enacted a choreographic process seeking to convect and mediate dialogic communications through CTVR. The underlying aim was to temper a prevailing 'authoritative discourse' of competitive dialectic communication into a metastable equilibrium (a dance) with 'internally-persuasive discourses' of emergent dialogic communication. inreach was thus a subtle and tacit social, psychic and political movement within CTVR.

The more overt introduction of artistic research practices within the research centre brought conditions of occupational difference within CTVR into a stronger light²⁸⁵. The presence of artistic research practices acted as a foil for already existing occupational differences within CTVR. Thus artistic research catalysed an action of foiling and began to infiltrate CTVR's hidden curriculum. To understand the affect of this foiling, it became important to look back to histories and philosophies of engineering as a way of coming to terms with CTVR's changing hidden curriculum.

²⁸⁵ Occupational difference within CTVR was pre-existent of artistic research practices becoming active within the research organisation. Occupational difference, for example, refers to the differences between wireless and optical engineering. Occupational Difference is a way of naming a fundamental otherness that is diffuse and elusive of categorization, but which is incumbent upon people to negotiate. Difference is frequently negotiated by establishing boundary lines, by exaggerating difference and otherness so that it seems no movement should travel in-between. The purpose of using the term *occupational difference* is to keep open the possibility of such movements, of a choreography and a dance in-between people, ideas, institutions, etc.

The provenance of the occupation of engineering suggests that it has always thrived within constraint and by negotiating 'forced integration' – hence the stereotyping of the occupation into clichés of handmaidens and/or heroes. In recent history, engineering has been acknowledged as a powerful co-efficient of technology, responsive to demands of both state and market. The occupation of engineering has often tended towards ambivalence, becoming blinkered by the intensive demands of a problem at the expense of asking simple heuristic questions such as 'What are we doing?' and 'Why are we doing it?' (Arendt 2000, Wisnioski 2012). By checking the hidden-curriculum for CTVR against a history and philosophy of engineering as a co-efficient of technology the inreach experiments become more relevant and less whimsical. They become recognisably movements of a nascent technological politics emerging from CTVR's occupational community.

'Smuggling' artistic research practices into the research organisation was largely an intuitive and unconscious (or forgotten/displaced) action on the part of CTVR's management. This was a political, social and psychic effort to foil the efficiency of engineering research by introducing inefficiencies and 'distractions' into the everyday research environment. Smuggling can be read as a process of occupying politics within CTVR that sought to augment occupational difference as a necessary condition for communicating communications, perhaps "a condition in which the only thing that survives the disgraceful fact of our mutual difference is the delight that difference makes possible" (Durham Peters 1999).

The inreach experiments effectively developed out of the author's prehension of CTVR's occupying politics, becoming sharpened as tools of participant observation were honed into a careful practice of listening and attending "*to persons and things*" learning from them and following them "*in precept and practice*" (Ingold 2014). The occupying politics of CTVR gradually became legible as a desire to "*become aware of one's place in the system*" such that a language might be shared for naming oppressive constraints and assuming freedom (Wisnioski 2012). Hence, one of the key tools of inreach is to hone in on concepts that might act as a liberation technology within a community or organisation (Diamond 2010).²⁸⁶ It is important, however, to keep in mind that the tools of inreach are imbricated and often quite interdependent.

²⁸⁶ Larry Diamond (2010) refers to liberation technology as "any form of information and communication technology that can expand political, social and economic freedom".

In Sections 7.3 and 7.4 a reading of these experiments will be made, by distilling them through the theories and concepts aforementioned. Other theories will be brought into the fold as required, to help illuminate the ideas and problems that begin to emerge in this reading.

7.3 Reading Room 3.17

7.3.1 Introduction

Inreach was a name given to the nascent process of encouraging dialogic communication within CTVR. As a subtle inversion of education and outreach and a way of resisting habit-based approaches to communication in this field, the concept of inreach offered a way for the author to provisionally “give name to the nameless so it can be thought” (Couldry 2010: 468).

The discontinuity experienced in the collapse of the Communicating Science workshop at CTVR’s plenary in 2011 was an affect of artistic research becoming a foil of an already existing (yet non-articulated) condition of occupational difference within CTVR. In the wake of this workshop, artistic research was in danger of becoming a decoy for existing conditions and challenges of occupational difference. The author took an intuitive decision to creatively amplify the failure of this workshop by inventing the concept of inreach and setting out to develop its methodology through experiments.

The purpose of inreach was to draw out and support ways of communicating communications from the inside out, rather than from the outside in. The concept of inreach was always teetering on the brink between an internally persuasive discourse and the mocking condescension of authoritative discourse towards a minor language (Eco, Ivanov et al. 1984)²⁸⁷. Inreach opened up the possibility of developing feminist objectivity from within “the belly of the monster” of rational, Western habituated epistemologies, so-to-speak (Haraway 1988). It involved the enactment of freedom,

²⁸⁷ The concept of inreach might be thought of as a smile in the face of a truth. The truth was that while CTVR’s management team seemed to value artistic research practices, it was made clear in the Communicating Science workshop that the rest of the organisation did not. Moreover, they had not concept of such work as research. The truth was that this organisation was not even conscious of or sufficiently sensitive to its own occupational differences. The truth was that there existed a huge asymmetry in conditions and value of research within CTVR. Inreach marks a limit and a horizon in the life of CTVR. It is a smile forced out of an ebbing anger, at the scale of the challenge ahead. As Umberto Eco explains; “We smile because we feel sad for having discovered, only for a moment, the truth. But at this moment we have become too wise to believe it. We feel quiet and peaceful, a little angry, with a shade of bitterness in our minds. Humour is a cold carnival”(Eco 1984).

afforded by CTVR, whose management sought to develop communicative practices beyond those of occupational habit²⁸⁸.

Room 3.17 was the first formal attempt at developing a craft of inreach through experiment with CTVR. This first inreach experiment was structured, but not predetermined, by the dialectic format of the OSCILLATOR proposal. This dialectic format was deployed as an enabling constraint, against which to push the imagination of what inreach might become. *Room 3.17* was structured and facilitated so that it might set in motion processes of dialogic communication that could support the realisation of a publication called *The Art of Antennas*. This was the explicit and poetic goal of *Room 3.17*. And while the time frame for this experiment itself was short and intensive, the realisation of the poetic goal (a book) was intuited as beyond the affordances of producing a PhD. thesis in the context of CTVR. The implicit goal (its hidden curriculum) of the experiment, therefore, was to encourage dialogic communication and reflexive processes within CTVR and to gain insights into how learning with and through occupational difference might be supported within the research organisation. The space of *Room 3.17* was imagined as such that could support learning in-between occupations of engineering in particular, that could open up a continuity of dialogic communication within the research organisation, channelled in this case by the choreographic object of the antenna. Along the way, it was anticipated that learning in-between research occupations of art and engineering might also develop.

7.3.2 *Room 3.17 as apparatus...*

An apparatus is a structure for making ready. The inreach experiments are apparatuses of the concept of inreach. *Room 3.17* was a space of artistic research within CTVR. When the author was informed that *Room 3.17* was to be dismantled to make way for an improved Test-Bed within CTVR, she made the decision to extend *Room 3.17* as a space for engineering research too. In this way, *Room 3.17* became a space that invited a change in the way CTVR's researchers talked and thought about telecommunications research and technology. The dismantling of *Room 3.17* was taken as an opportunity to make ready conditions for relation that could also begin to enact an ethics of occupational difference within CTVR.

This architectural change within Dunlop Oriel House was perceived and embraced as an opportunity to extend inreach. *Room 3.17* became an architectural tool for choreographing objects, people and ideas through the choreographic object of the

²⁸⁸ This PhD research has been fully funded through CTVR's Science Foundation Ireland budget.

antenna. This choreographic process can be understood in relation to the philosophy of phronesis. Thus, the experiment became a tool that brought engineering research into a different and somewhat strange relation with itself. The architecture of room 3.17 was re-purposed as an apparatus that could catalyse dialogic communication. This architecture became re-purposed through various instructions and constraints, devised through artistic research, that would re-direct how people moved and engaged with the room.

Artistic research was little understood within the context of CTVR. Casual conversations with CTVR researchers offered insights on how art was perceived as representational and symbolic, but rarely as social, political or choreographic. Rather than trying to somehow explain artistic research practices, or practice-based research, to CTVR, the author took the decision to model it directly. Therefore, *Room 3.17* was framed as a foil. The use of the word was helpful because it connected a material imaginary that related to metals and electricity, in short to telecommunications infrastructures. But a foil, as readers of Shakespeare's *Hamlet* may know, is also a figure that draws out the qualities of another. A foil is more potent than reflection or mimesis. The apparatus of *Room 3.17* was a foiling chamber, a space where CTVR's diversifying researchers could mingle and converse indirectly through materials relating to the figure of the antenna. The apparatus of *Room 3.17* became an of allegory for the extended Test-Bed: *sensing devices would be set in relation and correspondence with each other, sending and receiving information in various ways, according to various limits and thresholds*. It would be a space for dwelling in experiment, as well as for setting in motion prehensions and intuitions through material dialogues.

Room 3.17 was a making ready of dialogic processes in the spirit of experimentation (Manning 2013, Sennett 2013). It was the very beginning of a making ready of inreach as a curriculum proper within CTVR. But *Room 3.17* was also a making ready of an ending, marking a threshold of change. This small office room had become a studio, a place of artistic research, contemplation, and dialogue within CTVR. Through use it had quickly become a valued space for "reflection and invention" as artist Suzanne Lacy describes: "Within the studio there is silence, waiting. There we attempt to be present, in a specific place and at a particular moment, by paying attention: suspending perceptual closure and judgement, resisting conventional ways of knowing, being deeply curious about and open to what arises. Free, if only for seconds, from external disruption, many thoughts or sensations are possible: staring pleasurably, meditating, daydreaming, inventing, imagining nonsense, creating images, focusing intently, or unexpectedly resolving a problem" (Lacy

2010:317). *Room 3.17* was also an apparatus of transition, priming the movement and co-existence of artistic research practices to the space of the engineering PhD. Lab within CTVR²⁸⁹.

Room 3.17 was a manifestation of everyday foiling processes that go on relatively unnoticed and yet prehensible. The artistic research studio was foiled by the experimental space of the Test-Bed. A simple fact of the everyday demands for experimental research space within CTVR, and a trade-off of working as a minority occupation within the world of techno scientific research. What matters in such processes is that there is an ethics at work that can serve to negotiate the tensions and conflicts that are quietly, and sometimes violently, raised. Foiling in this research is strongly allied with a philosophy of friendship informed by contemporary art practices (Condorelli 2014). Declaring *Room 3.17* as a foil is a playful expression of the joys and trouble (sometimes violent trouble) of occupational difference. As the first inreach experiment, then, *Room 3.17* makes ready for complications, tensions and interdependencies of cooperation and collaboration, of dialogic and dialectic processes of communication within a context of telecommunications engineering research.

7.3.3 What kind of 'topic' is the Antenna?

As was discussed in Chapter 5.2.3, the antenna becomes a choreographic object through *inreach*²⁹⁰. In this section, however, the 'topic' of the antenna is opened out a little more as a way of making engineering strange to itself, as strange, indeed, as it was to the author. By making the 'topic' of conversation for the first inreach experiment the antenna, the author began to reorient and situate attention within CTVR towards its own devices. The choice of topic is important. It must be such that can allow for a gentle questioning by a culture or community of its own devices and habits, its own normativity, without becoming petrified into states of narcissistic character disorder or shameful self-consciousness (Schwartz-Salant 1982).

²⁸⁹ *Room 3.17* is a kind of 'wake' for itself, in a humourous way.

²⁹⁰ The antenna can also be understood as an alchemical object, a 'sensory organ'. "Every alchemical phenomenon," writes James Hillman, "is both material and psychological at the same time... Our minds still retain this alchemical propensity for transferring technology into psychology" (Hillman 2010). The antenna is a metal thing that resonates when electrical signals pulse through it. It can be said to 'catch' and 'throw' waves of information through the electromagnetic spectrum. Imagine that. In the Antenna Lab, there is an anechoic chamber, to dampen down all the resonance. The engineering researchers use 'genetic algorithms' to work through hundreds of iterations of possible shapes that the antenna might take, in order to 'catch' and 'throw' the required frequencies. Each antenna is unique in this respect. The copper cloth is cut to measure, so-to-speak. The antenna was a *thing-topic* that opened up the possibility of an 'alchemical mode of imagining' within CTVR, such that induced *correspondence*.

A theory of this method of making strange was developed by Victor Shlovsky in 1916 as a way to name and describe an artistic device in literature. Through *Room 3.17* a literary device becomes activated within the real-world work setting of CTVR. By partially abstracting, or displacing, the antenna from the everyday language and context of telecommunications engineering a kind of *estrangement* was seen to be enacted: a “*method of renewing perception*”, a way of making the familiar somewhat strange. This was a way of bringing attention to a matter perceived to be of common or shared concern within the organisation, and sharing it as such²⁹¹. It was through the artistic device of *estrangement* that the antenna was recognised as simultaneously enacting its literal and metaphoric material affordances.

A similar process was enacted intuitively by one of the participant observers (P.S.) of *Room 3.17*, who imagined the action of an antenna to be like that of a piece of kitchen equipment, a colander. P.S. understood this tool as that which let some things pass through it, but captured and held other things, depending upon what was passing through²⁹². This analogy was struck upon in the ordinary preparation of a family meal, the act of sieving pasta. Consequently, the colander became an important contribute to *Room 3.17*. This example offers insight on how reflexive thinking was encouraged by the apparatus of *Room 3.17*.

The antenna was a topic of concern to the researchers of CTVR. It mattered to them and it engaged them as relevant in different and various dimensions across the research organisation. Undoubtedly, it engaged the antenna engineers quite directly, as they had the most vested interest in the topic. But it was also true that non-antenna specialists relied on these devices to develop their own research.

The antenna was activated as a choreographic object of *estrangement* by CTVR’s researchers through *Room 3.17*. It began to trouble the discontinuity between the antenna researchers and their work, and the other engineering researchers who made use of their devices in their own research experiments²⁹³. The antenna was a topic that could estrange telecommunications engineering from itself, and begin to illuminate how frequently expertise was ‘handed-over’ across apparent occupational

²⁹¹ The same technique is legible in the work processes of the artists discussed through the design process of *Room 3.17*, Alex Martinis Roe, Sarah Browne, and Charles & Ray Eames.

²⁹² See Appendices: Chapter 7; page 65; Fig. 66.

²⁹³ About a year after the *Room 3.17* experiment took place, an engineering researcher from the Antenna Lab gave a presentation at CTVR Headquarters hoping to build a correspondence between his research and the work of wireless engineering. Unquestionably, the *Room 3.17* experiment sensitized the Antenna Lab to the relevance of it’s research more broadly across the work of CTVR. *inreach* is a long-term process.

boundaries rather than shared more dialogically²⁹⁴. This automatic 'learning-state' of discontinuity flattened communication within the multi-disciplinary research organisation to a technical transaction, "*a blunt fact of signal transmission*" extending the illusion that at "*a level of engineered communications, no semantics are needed*" (Huhtamo and Parikka 2011: 261). The estrangement of the antenna by way of Room 3.17 catalysed a consciousness of communication within CTVR as a common concern in a more widespread way than usual.

7.3.4 Tracing Transversality and its coefficients through Room 3.17

The suggestion that CTVR's engineering researchers would "*become participant observers of Room 3.17*" was a way of humorously questioning the ways that people related with and to each other and their environment within CTVR. It was a concept that was, at that time (2012), theoretically unfamiliar to the author and one that was weakly intuited as a an "*undercover technique for gathering intelligence on people, on the pretext of learning from them*" (Ingold 2014). CTVR's workers were invited to '*become participant observers of Room 3.17*', and this included the author. While the experiment was a way of addressing a discontinuity experienced within CTVR it was also a way for the artistic research practice to ask questions of methodology and disciplinary approaches to learning with and from others, and to generate conditions for "differing knowledge traditions to coexist" (Turnbull 2005).

In the language of the Room 3.17 experiment, the verb 'become' suggested a process, whereas the noun '*participant observer*' seemed like an oxymoron²⁹⁵. This formulation demonstrated an epistemic conflict within the artistic research practice that sought answers through the dialogic of experimental communicative practices²⁹⁶. The 'poetic goal' of the Room 3.17 experiment enabled this doubt to be turned over through the community of researchers within CTVR. In doing so, it was possible to foil (i.e. to

²⁹⁴ The task of communication since the 1920's has been defined by Claude Shannon's Mathematical Theory of Communication as "*reproduction of the signal*" from antenna A to antenna B: "*Transmission of intelligence and cultural products (from telegraphy, telephony, and radio to television and cinema) had been since then a question of the physics of signal transmission*". It seemed sometimes as if this efficiency had come to dominate all communications such that the recreational research made possible through dialogic processes was disappeared.

²⁹⁵ Just as Donna Haraway reclaimed 'vision' in her formulation of *feminist objectivity as situated knowledge*, Tim Ingold is at pains to reclaim and sustain the meaning of *participant observation*: "*For to observe is not to objectify; it is to attend to persons and things, to learn from them, and to follow in precept and practice. Indeed, there can be no observation without participation – that is, without an intimate coupling, in perception and action, of observer and observed (Ingold 2000: 108)*"

²⁹⁶ There was an uncertainty, at this time, as to whether participant observation was a process of the ocular-centric, enlightenment, colonial, white supremacist, scientist, or whether it could be a mode adopted by feminist objectivity. By bringing this question into the experiment, the artistic research practice was seeking to know itself through the context of the 'other', through difference.

both draw out the qualities of and resist the flattening power of) the post-colonial gaze associated with participant observation, and instead to affirm such practices as mutually valuable to artistic and engineering research practices, and interilluminating of both (Bakhtin 1981, Clifford and Marcus 1986, Russell 1999, Ingold 2011). The scoring of *Room 3.17*, with its invitation to make contributes to the research process for *The Art of Antennas*, supported the possibility of dialogic communication and at times facilitated mutual moments of speaking and listening.

7.3.4.1 *Emulating phronesis through film...*

The process of filming *Room 3.17* was a translation of the Eameses' film *Blacktop*. It was through developing an analysis of this film, and building up a sense of a general design ethos and approach of the Eameses, that the term phronesis was learned. The action of phronesis resonated with L.D.'s interest in the Eameses' work, particularly the ways in which they worked to recognise constraints in whatever design situation or problem they addressed themselves to. This was a practice that seemed shared in common with J.F. and L.D. Employing the super-8 film camera imposed a very different set of constraints upon the engineering researchers. Using *film*, a finite analogue material, enabled a different way of engaging with the environment of the experiment; temporally, spatially, and in an embodied way.

For Hans Georg Gadamar, following Aristotle, phronesis is "*the mode of knowing within which hermeneutical consciousness emerges and which makes ethical life possible.*" The process of filming introduced a quality of phronesis into the *Room 3.17* experiment that supported "reflective awareness" which Gadamer registers as crucial to any dialogue: "*Reflective awareness as a component of phronesis changes the terms of any dialogic relationship... Phronesis, therefore, emerges not only from a position of de-centred subjectivity, but also through a process of deliberation that produces relational awareness*" (Pappas and Cowling 2003). Thus, the method of *Room 3.17* aimed at modelling a particular quality of relation amongst its contributors. Phronesis depends upon each person in the conversation voicing their own prejudices, even as they shift and changing, and submit these to scrutiny in the course of the dialogue ²⁹⁷. It is therefore a vulnerable and open process of exposure, subtly yet powerfully educational. The intention of *Room 3.17* was to enact dialogic communications within the research culture of CTVR. The hope was to extend ethico-political relations that could generate possibilities for communicating communications with CTVR.

²⁹⁷ In this way it appears to relate strongly to Spivak's notion of *unlearning*, in a dynamic and conversational form.

The conversation with C.G. presented in Chapter 5 recognisably produces deliberation and reflective awareness, but there were many other conversations like this too which happened during *Room 3.17*. The action of filmmaking, of coming into contact with a tool-based process that was strange, demanded a process of learning that engaged and modelled a practice of phronesis. The materiality of film served to render this process more strange, grating against a digital culture of speed and visual instantaneity.

The intimate action of coming into touch with an apparatus (the film camera) in order to come into touch with an environment is a poignant and ambivalent gesture. The apparatus of the camera resonates with Félix Guattari's conception of co-efficients of transversality – those actions of things and people that can serve to adjust the blinkers, one way or another, on a groups ability to communicate processually.

The film camera, as both a tool and a method of estrangement, becomes activated as a choreographic object through a phronesis generated by each participant observer, each contributor, as they feel their way through *Room 3.17*. Likewise, the antenna as both a tool and a method of estrangement is activated within the experiment as a choreographic object that opens up a different way of relating and communicating moving towards “new ways of understanding” for the research culture of CTVR.

Through the choreographic objects of the antenna and the film-camera, the participant observers of *Room 3.17* are enticed to develop a shared language. The experiment combines choreographic objects from artistic and engineering research, and this serves to open up a condition of reciprocity and vulnerability that is required by institutions of occupational difference. This builds up as a kind of intensity of affective relations, an ‘emotional load’, which becomes catalytic of transversality over time.

<i>The apparatus of Room 3.17</i>	
Tool	Method
The room itself as artistic research studio.	The room was prepared as an installation of research – consciously displaying materials for contributors to engage with.
The film-camera	Becoming conscious as an embodied witness through the use of the film camera – enacting <i>phronesis</i> through the lens and shooting of film.
The antenna	The antenna as choreographic object through which contributors to <i>Room 3.17</i> tell stories, relay facts, pose questions, display knowledge.

The audio recorder	The recorder is used pragmatically to capture the conversations and ambience of <i>Room 3.17</i> . It becomes a time-keeper of each encounter. It is also employed symbolically to emphasise a philosophy of listening.

Table 3 *The Apparatus of Room 3.17*

7.3.5 Tracing CTVR's Hidden Curricula through Room 3.17

This inreach experiment is an effort to get at what matters to CTVR, in order to orient better towards addressing the possibility for communicating communications. This has been acknowledged as CTVR's hidden curriculum. *Room 3.17* involved an intuitive method of structuring and facilitating a dialogic situation that could draw out matters of concern to CTVR and, from there, to improvise ways and possibilities of communicating communications. The process and score generated through the performance of *Room 3.17* was such that enabled the author to come into touch with general learning dispositions within CTVR (including her own). These learning dispositions are detected laterally through an analysis of the contributes made to *Room 3.17* by CTVR's workers.

As was noted in Chapter 4, contributes were brought to *Room 3.17* by the participant observers as part of the score for the experiment. The gesture of the host was to receive these contributes and open up dialogic communication through them. The invitation to bring a contribute to *Room 3.17* was left as open as possible. The contributes gifted to *Room 3.17* remain in an archive of the inreach experiments as traces of the dialogic situation. By revisiting these contributes, thinking through them anew and with hind-sight, while retaining the embodied criticality and situated knowledges generated through the experience and recorded in the field-journal and note-books, a particular humour becomes legible. This humour is suggestive of a learning disposition, and also of a latent philosophy of technology, which manifests as *parody*. Table 4 (following page) names the contributes to *Room 3.17*, and codifies them²⁹⁸.

²⁹⁸ See Appendices: Chapter 7; pages 66-67; Fig. 68-71.

Literal (15 contributes)	Metaphorical (1 contribute)	Analogical/Simile (7 contributes)	Parodic (3 contributes)
Hand-drawn Diagram of an antenna in action.		Spy-Catcher: A Novel	Antenna Duncie Cap.
Clothes Hanger TV antenna.		Colander	Taoiseach-Antenna-Pope triad.
Marconi's Antenna Kite: an academic paper with images.		TV signal switchover – analogue to digital.	Antenna Tree.
Flat Square Antenna.		Hand made plastic kite.	
Lightening Mast/Antenna		Lightening Mast	
An Antenna		Album Cover – 'Raise your Skinny Fists to the Sky like Antennas'	
An Antenna.	Waterfall	Voyager Satellite	
Voyager Satellite		Art work by Nabakov.	
Antenna		Insects with Antennae.	
Fractal Antenna		Telecoms Mast	
Zigby radio device		Star shape	
Electromagnetic visualisation of antenna range.			
Television Aerials			
Antenna			
Antenna			

Table 4 The Contributions to room 3.17 organised according to description.

There were 15 contributes that can be generalised as *literal* responses to the call relating to antennas. These contributes are legible mainly as straightforward aids to explain the antenna. Collectively, they can be generalised as oriented towards didactic or pedagogical dialectic, perhaps unsurprising in the context of a university.

In some of these more didactic conversations, *Room 3.17* was perceived as a kind of quiz-game or similar to 'reality TV' entertainment, such as 'Come Dine with Me'. Often there was an eagerness amongst participant observers to compare their contributes with those of their peers. In general, these contributes conveyed knowledge and information *about* the antenna. The participant observers of these contributes had perceived the question as a request for encyclopaedic examples, descriptions and representations of antennas (Bal 2009 : 46). However, many of these literal contributes elicited personal stories and memories from childhood, particularly the 'clothes hanger' antenna's²⁹⁹.

The literal contributes enabled participant observers to bring their personal histories into the space of work. These contributes catalysed expressions of political

²⁹⁹ Many of the participant observers to *Room 3.17* recalled twiddling with metal hangers in order to achieve a good Television signal. Many of these stories were funny and poignant, and were associated with close family relationships, but also indicated the source of some peoples initial interest in telecommunications engineering. The visceral experience of 'being an antenna' while seeking out a clear TV signal was intoxicating and illuminating. This was before digital transmissions.

orientation and occupational esteem. Such storytelling has power in an institutional context. Narratives of whatever kind can “mobilize support and participation, elicit empathy and understanding on the part of authorities and potential allies, forge coalitions across difference, and begin to limn political possibilities beyond our current political idiom” (Polletta 2006). This rings true with the *Room 3.17* experiment. It was the possibility of contributing to telling the story of *The Art of Antenna’s* that brought a whole array of CTVR’s personnel together to encounter each other indirectly through *Room 3.17*³⁰⁰.

Seven of the contributes were legible as *analogical*, operating like similes and already opening up lines of partial connection between *Room 3.17* and the wider world. These contributes made lateral associations with the topic of antenna, once again forming connections between personal and political histories, aspirations and dreams. Many of these contributes were associated with the home and leisure life of participant observers: music, art, literature, food, and entertainment all featuring. Extending from the literal, analogical contributes can be read as “creative extensions through analogy” that may “forge a metaphor at each succeeding application” (Fiumara 1995: 80). The learning disposition expressed through the analogical contributes can be read as imaginative and reflexive. If the experiment had been repeated, analogical contributes may have forged metaphorical ones.

In the sample encounter given of *Room 3.17*, C.G.’s disposition towards the experiment was perceived as open-minded. In Chapter 5 it was shown that C.G. expressed a desire to extend his contribute into a more metaphorical or allegorical form³⁰¹. Nonetheless, C.G.’s contribute was metaphorical; the waterfall became a metaphor for C.G.’s vision of future antenna design³⁰²; as fluid and fast, taking on the contours and morphology of the environment, continuously transforming and shape shifting in response to its changes.

The dialogic that emerged through the image of the waterfall, within the context of *Room 3.17*, demonstrated the operation of phronesis in between J.F. and C.G.. Aristotle suggests that phronesis is “...less a capacity to apply rules than an ability to see

³⁰⁰ The material gathered through *Room 3.17*, the conversations, and film, remain archived. The hope is to bring this material together in an appropriate way, to tell a non-canonical story of *The Art of Antennas*. The poetic goal is not a disingenuous one. It is one that understands the percolating work of time on any creative endeavour, and trusts in this process of dialogic towards dialectic.

³⁰¹ These are false categories in a sense. As Gemma Corradi Fiumara points out the metaphorical effect of language is dependent upon context (Fiumara 1995). For the author, the antenna was an evocative metaphor, whereas for the community of researchers within CTVR, it was a literal device. Context therefore activates different levels of metaphoricality.

³⁰² Please see Appendices – Chapter 7 – for Images.

situations correctly”, and that it is a kind of *craft* and guess-work guided by a ‘*readiness of mind*’ (Aristotle and Crisp 2000: xxiv).

The sample dialogue between C.G. and J.F. enacts a “*process of deliberation that produces a relational awareness*” (Pappas and Cowling 2003: 211). It is clear from the transcript of the dialogue, that each interlocutor is attempting to develop and understanding of each other, themselves, and their situation together. “*Any authentic conversation,*” argue Pappas and Cowling, “*will always find itself already situated in a context that reflects and responds to the history and current conditions of the community within which the dialogue emerges*” (Pappas and Cowling 2003:211).

The dialogue with C.G. shows how he was struck by the ironic message of the ‘*Pope-as-Antenna*’ contribute. In light of this parodic visual and textual composition, he felt compelled to engage *differently* with *Room 3.17*, doubting the significance of his own contribute by comparison. He was unable to attend to the richness of his own idea, believing that it was somehow too literal “*to see if it was possible to have some kind of antenna which doesn’t have a defined shape*”. This comparative reading of the ‘*Pope-as-Antenna*’ contribute against his own is subtly competitive, suggestive of the normative mode of argumentative and dialectic communication at work within CTVR. The display of contributes within *Room 3.17* was perceived as one of competition: who would present the best example of an Antenna? However, the persistence of a doubtful tone in the conversation with C.G. suggests that a more nuanced learning experience was unfolding.

Under conditions of extreme occupational difference, such as those framed by the *Room 3.17* experiment, the question of hermeneutical injustice arises. Hermeneutical injustice, according to Miranda Fricker, comes about when “*a gap in collective interpretive resources puts someone at an unfair disadvantage, when it comes to making sense of their social experiences*” (Fricker 2007)³⁰³. C.G. perceived the parodic function of the *Pope-as-Antenna* contribute; it challenged a dominant ideology while undermining a mystical conception of communication as reified and sacred. C.G.

³⁰³ Further analysis needs to be done to relate Fricker’s concept of Hermeneutic (In)justice to conditions and experiences of occupational difference. This will be discussed further in Chapter 8. From the author’s perspective, at times it seemed as though the artistic research practice was compromised by an *hermeneutical injustice*, whereby the knowledge generated through her research practice was not sufficiently legible due to the hermeneutic habits of engineering and scientific occupations. Whether this was ‘unfair’ or just ‘unfortunate’ depends upon one’s theoretical standpoint, and at this point in time the author is still too close to the experience to be able to reflect critically upon it. A functionalist standpoint, such as described by Lynch (1989) would perhaps not consider it a case of *unfairness*. But a neo-Marxist perspective would perhaps beg to differ. Again, this will not be sufficiently analysed within this thesis, but it certainly opens up orientations for further and necessary research.

wished that he could have read or interpreted the invitation to *Room 3.17* differently, and presented something more critical and challenging. The subtle, yet pervasive, habit of argumentative dialectic within CTVR generates conditions for hermeneutical injustice, particularly when the research culture is shifting into more diverse kinds of occupational difference, e.g. artistic research in contiguity with engineering research.

The dialogic developed with C.G. through *Room 3.17* offers insight into the spiralling and elliptical nature of an on-the-spot dialogic reading of the 'Pope-as-Antenna' contribute. The spontaneous reading of the parody of the *Pope-as-Antenna* contribute between C.G. and J.F. had an immediate effect compelling further engagement with the topic, but from a more critical and ironic standpoint³⁰⁴. The response to the parodic contribute caused a double-take, a recursivity within the participant observer to look again, to think again, to speak again. The choreographic object of the antenna thus activated an '*internally-persuasive discourse*' that became legible through the collective space of research, one that was critical of '*authoritative discourses*', in this case, of Church and State³⁰⁵.

C.G.'s engagement with the *Room 3.17* experiment demonstrated an interest in further developing dialogic processes within CTVR. The curiosity expressed by C.G. as to how the encounter with artistic research practices might begin to change the way engineering researchers think and communicate, suggests a latent belief that occupations shape the way people perceive and engage with the world around them and develop an understanding of their place in it.

What became clear as unexpected through the dialogue was that open-questioning and criticality was possible, visible and thus *sharable* within the research community of CTVR. *Room 3.17* therefore acts an internal context, a counter-public space, whereby the research community can come to perceive itself *differently*. The argument being made here is that the *parodic* contribute cuts through the simultaneity and visual/textual noise of *Room 3.17*. It acts as a *punctum* from within the surround that troubles and intrigues the process of participant observation,

³⁰⁴ It could be valuable to develop critical hermeneutic practices within the context of engineering, which might open out the possibilities of phronesis in negotiating occupational difference and building occupational citizenship.

³⁰⁵ This really is worthy of a deeper analysis, but it exceeds the scope of the point being made here. The author hopes that the reader will spend a moment to read the image and to consider how its parodic effects, the kinds of criticality it posits, and the significance of this in the context of a post-colonial, catholic, nation state. (See Appendices – Chapter 7)

augmenting the dialogic process and inviting a more critical, less passive reading of *Room 3.17*³⁰⁶. *Parody* insinuates that something is at stake.

If, as Linda Hutcheon argues, “*postmodern parody is both deconstructively critical and constructively creative, paradoxically making us aware of both the limits and powers of representation – in any medium*” (Hutcheon 1985), then the *Antenna-Dunce-Cap* contribute also becomes legible as parody. It taunts the participant observers of *Room 3.17* to qualify themselves as knowledgeable on the topic of antennas or else assume the costume of the *antenna-dunce-cap*³⁰⁷. This contribute evokes a hegemony of an ‘authoritative discourse’, while simultaneously presenting a learning state of naivety and ignorance.

The *antenna-dunce-cap* critically and humorously deconstructs an automatic practice of relying upon Google’s Image Search algorithms when seeking out visuals. The participant observer, S.mG., who contributed the *antenna-dunce-cap* to *Room 3.17* explained that he wanted to make a representation that was *not* based on ‘Google image search’ but based upon a search of his own knowledge and memory. In this ‘self-search’ S.mG. explains: “*I wasn’t given concrete antenna facts. I was given these names, with associations with... anything. And so, I tried to find names that I could associate with weird things; so the idea of the ‘di-pole’ [a type of antenna] being Scot and his men at the South Pole, dying. And the Yagi Array [a type of antenna] being an array of Yagi’s head [an image of the designer of the array antenna repeated]...*”³⁰⁸

The *antenna-dunce-cap* thus calls into question the predominance of ‘*authoritative discourse*’ based upon automatic encyclopaedic knowledge, rather than dynamic and embodied knowing, by raising a question concerning the experience of ignorance. This contribute calls into question habits of automatic representation so familiar to users of internet search algorithms. The nuance of this parody would not have been tangible had it not been for the framework of the dialogic process: thinking and conversing through the contribute, in an embodied way, through conversation and

³⁰⁶ Roland Barthes developed the idea of the *punctum* in his writing on Photography. The *punctum* is the “*element which rises from the scene, shoots out of it like an arrow, and pierces me.*” It is a ‘*partial object*’ within a scene that ‘*pricks*’ the perceiver. Like a pin prick to the finger, it is not harmful per se, but it may produce a fright, a reaction, a sudden flash of sensory awareness. Barthes suggests that the *punctum* generates a “*blind field*”. The *blind field* is that which involves the perceiver in the life beyond the surround of a scene or the frame of a photograph, as Barthes writes: “*Robert Wilson, endowed with an unlocatable punctum, is someone I want to meet*”. The Blind Field can be related to the workings of the Hidden Curriculum. The *punctum* of the Hidden Curriculum, in this case is the *pope-as-antenna* contribute.

³⁰⁷ Please see Appendices, Chapter 7 for images.

³⁰⁸ The *Antenna-Dunce-Cap* was a sculptural contribute made by Séamas McGettrick. The quote is from a recording of the dialogic developed through *Room 3.17* in December 2012.

the 'reflective awareness' facilitated by the filming process. Dialogic communication permits a reception of nuance. Therefore, dialogic communications offer valuable ways to deconstruct or trouble binaries and dualisms that serve to splinter and sunder communicative processes so necessary to community life.

The final parodic contribute was an image of an antenna mast, based in a woodland and disguised as a tree. The image was taken by one of the participant observers, A.mK., a visiting professor from Virginia Tech. This image epitomizes a parody of the 'hidden-in-plain-sight' trick made famous through Edgar Allan Poe's story *The Purloined Letter*, where the object that is sought is "protected from discovery precisely by being on public display"³⁰⁹ (Kracauer 1998 [1930]: 5). The photograph, by "*wresting it from anonymity and naming it*" places the antenna-mast in "*a two-fold light*" (Ibid). The technology calls more attention to itself as a tall, exotic pine amidst a deciduous woodland than it would if it remained un-cloaked. In this context it is an absurd and hilarious disguise.

The image, when installed in *Room 3.17* acted as a parody of the invisibility of telecommunications engineering. It was often matter-of-factly remarked by CTVR's engineering researchers that the only way users of I.C.T.s and mobile technology would begin to care about the work or labour involved in such infrastructures would be if they collapsed. The work and labour involved in the production of I.C.T. engineering is felt to be as invisible and ethereal as the electromagnetic spectrum upon which such infrastructures increasingly depend.

The ambition for *Room 3.17* was to create a context where learning dispositions of CTVR's workers could come into proximity and touch. The aim was to draw out aspects of CTVR's hidden curriculum, while at the same time collaboratively improvising a hidden curriculum to communicate communications.

The author intuited a need to develop a broader 'hermeneutic consciousness' within the domain of engineering research, in the context of CTVR, a research centre that was cultivating more diverse research conditions of occupational difference. What becomes articulated communally through the *Room 3.17* experiment is an orientation towards occupational self-understanding. This suggests an undercurrent of attention towards "*communication that resists privileging autonomous reason over emotion and social interaction*" (Pappas and Cowling 2003: 203).

³⁰⁹ For obvious reasons this resonated with the author, though at the time of the encounter the sympathy with this contribute was not fully understood, as the author had not considered herself as part of a 'hidden-in-plain-sight' curriculum within CTVR.

7.3.6 *Occupying politics through Room 3.17*

The phrase '*occupying politics*' is both an action and a condition of action. It is a hypothetical concept, coined for the purposes of making sense of the experience of occupational difference. A person can be described as *occupying politics* who is corresponding deliberatively with others, making public space collectively through the enactment of a kind of occupational freedom³¹⁰. The participant observers of *Room 3.17* were *occupying politics* through the dialogic process open up by the experiment.

The coining of this phrase is an attempt to name and begin to generate an understanding of the condition of politics within CTVR. The claim articulated within the *Design for Change* proposal to 'communicate communications' was indicative of an aspect of CTVR's occupying politics. The phrase occupying politics is used as a way to question the politics of communicating communications, and thereby to understand better the occupying politics at work through the inreach experiments.

CTVR's Director smuggled artistic research into the context of academic engineering research. This specific aspect of CTVR's politics is one that invites and accommodates occupational difference that exceeds the traditional disciplinary boundaries of engineering. Smuggling is a "performative disruption that does not produce itself as conflict" (Rogoff 2013 [2006]). This mode of occupying politics is seen to be elaborating within CTVR through the actions of CTVR's Director L.D. and subsequently through the processes of inreach. This mode of occupying politics is concerned with how communication can be enabled within CTVR. Inreach, as both a concept and methodology, catalyses possibilities for communication within CTVR and also, importantly, offers a way of capturing and reading the ways that CTVR's workers "intersect with contraband" (artistic research) and develop other forms of critical empowerment (see Table 5 – Waves of Transversality).

³¹⁰ The concept of occupational freedom is propounded by Guy Standing (2009) in relation to the idea of Occupational Citizenship, which follows on from the 'industrial citizenship' outlined by Polanyi in his seminal work 'The Great Transformation'. Standing's central claim is that "twenty-first century 'modernization' should be defined in terms of the extent to which people can define themselves not by ethnicity, 'caste' or religion but by their sense of 'occupation'", and he notes that "many people have never had a chance to pursue an occupation; others have been obliged to pursue one that they would not have chosen themselves". Standing acknowledges his thesis as a 'mild utopianism', that propounds a vision of the 'Good Society': "It would be egalitarian in some sense, and give a high priority to what Aristotle called civic friendship and conviviality. It would not be one in which the state set out to create mass happiness or constant euphoria. Work would consist largely of self-chosen activity, with individuals in control of their development, in a community of kindred spirits with enough checks and balances to limit exploitation and oppression of the vulnerable by the powerful, and to avoid stifling conformity. We would wonder how work should be organized, or rather how it could be both organized and not organized, achieving a fine balance between disciplined activity and creative freedom." (Standing 2009: viii)

Developing a fuller understanding of why CTVR's Director was enacting an occupying politics of smuggling is beyond the scope of this thesis. However, it is possible to speculate that such intuitive and sustained actions are made in critical response to a normative politics, an Occupying Politics or Status Quo politics, that tends to flatten out what is discussed in this thesis as occupational difference. To clarify here, the phrase Occupying Politics can be understood as signified by '*norms and nouns*', while occupying politics are signified by '*vocations and verbs*'. These modes of politics are not at all mutually exclusive, they are deeply imbricated and consequently they trouble each other. Suffice it to say that occupying politics is not an either/or practice. It necessarily demands attention to both plurality and specificity.

Economist Guy Standing argues that a common normative or Occupying politics in western societies is that of 'libertarian paternalism'. This mode of politics "takes the view that political and corporate bodies should guide less well-informed citizens and steer their attitudes and behaviour in ways that contribute to their own long-term well-being" (Standing 2009). Philosopher Charles Taylor, thinking through Alexis de Tocqueville, refers to paternalism as a 'soft despotism': "*It will not be a tyranny of terror and oppression as in the old days. The government will be mild and paternalistic. It may even keep democratic forms, with periodic elections. But in fact, everything will be run by an 'immense tutelary power', over which people will have little control*" (Taylor 1991:9). In resistance of such paternalising and patriarchal structures, Standing argues that "*New forms of occupational community, networks and associations could offer a structure that would guard against the paternalists*" (Ibid). With such theories in mind, it is quite possible to imagine CTVR as aspirant of becoming a research culture that enables occupational community and communication, the coexistence and creative co-adaptation of differing knowledge traditions (Turnbull 2005). It is thus possible to say that CTVR's claim to 'communicate communications' is significant of this aspiration.

The experiment of *Room 3.17* intuitively queries the occupational imaginary of CTVR. The correspondence between J.F. and C.G. offers a partial insight into how occupying politics can begin play out within the context of *Room 3.17* within the context of CTVR³¹¹. It is clear that J.F. is modelling her own political and social ethos and aspirations when she says of *Room 3.17*: "*the point was to make it a group space*"³¹². She is also coming to terms with the fact that she will no-longer have a space that

³¹¹ The structural arrangement of the experiment within CTVR echo's Gregory Bateson concept of the context-of-contexts. It also resonates with Marilyn Strathern's argument, expounded by Donna Haraway, that '*it matters what worlds world worlds*'.

³¹² The author's sense of politics is informed by her occupational imaginary as one involved in aesthetic practices.

suits her occupationally, she is aware that she will be moving to a very different environment and she is anxious about this change³¹³. So the experiment is a way for her to ask a question of the research community: *What kind of community is this? Can I co-habit with you? What do you think?*³¹⁴

The anxiety produced under conditions occupational difference is at once disclosed and addressed within the experiment. Structurally, there is an asymmetry in the research conditions, with engineering researchers far out numbering any other discipline. The inreach experiments are a way for the author to mobilise artistic research as a broader practice within CTVR by drawing out a community of interest. Those from CTVR who contribute to the inreach experiments become agents of artistic research, just as the author becomes an agent of engineering research. The fact that so many people from CTVR engaged with the inreach experiments is already affirmatively answering the author's implicit questions.

The difference of artistic research practice begins to be assimilated by the occupational research community through the occupying politics *Room 3.17* and in the process a strange kind of 'leisure' space begins opening up. The processes of artistic research opens up an opportunity for the engineering researchers to participate in "complementary activities".³¹⁵ This is what Guy Standing calls *work-for-leisure*, which is "the work needed to enable a person to participate in social activities around employment, including work needed to participate as a citizen. The Greeks saw this as the most vital work of a citizen" (Standing 2009).

While the experiment of *Room 3.17* offers CTVR researchers a momentary space of *work-for-leisure*, this same research space is more complicated for the author. For her, it is at once *labour-for-labour* (done for income); *work-for-labour* (done so as to perform labour satisfactorily and may be essential to maintain contact with occupational work); and *work-for leisure* (Standing 2009). While for the *participant observers* the experiment was at times embraced as play, it was not play for the author³¹⁶.

³¹³ The author had started out working from the PhD lab and found it disruptive and noisy, unsuited to her particular artistic research practice.

³¹⁴ Artist Sarah Browne's process is legible here.

³¹⁵ These activities are broadly understood more as 'distractions' from normal research rather than complementary. It remains a challenge to articulate and spell out the ways in which occupational difference can enable complementary thinking and counterpoint actions. Articulating the difficulties and tensions of occupational difference, as well as its benefits, will remain a necessary part of the practice and its occupying politics.

³¹⁶ This will be discussed further in Chapter 8.

These distinctions are important because they begin to loosen out the tensions at work under conditions of occupational difference. (Particularly where art as an occupation is conceived weakly or naively; for example, primarily as a *beautifying* activity.³¹⁷) Rancière suggests that “*having a particular ‘occupation’... determines the ability or inability to take charge of what is common to the community; it defines what is visible or not in a common space, endowed with a common language, etc. There is thus an ‘aesthetics’ at the core of politics*”. Room 3.17 can be understood as an experimental framework for *occupying politics* on the basis that “*Politics revolves around what is seen and what can be said about it, around who has the ability to see and the talent to speak, around the properties of spaces and the possibilities of time*” (Ranciere 2007 [2000]: 13).

Arguably, Room 3.17 becomes a space of *leisure* for the *participant observers*. It seems to be intentionally so, by the way J.F. repeats for C.G. to take his time, to spend time, to inhabit the space, to attune and build up an attentional relationship with the space. C.G. in turn opens up a dialogic process, he hears an open invitation to think-out-loud about the experience he is having through Room 3.17 and to speak honestly. His questioning resonates with J.F.’s. Just as she hoped to come into touch with how the research community of CTVR would respond to the artistic research process, C.G. is interested to know “*how do they (engineering researchers) think?*” when they “*move to art?*” C.G. acknowledges that there is “*never really [a] chance to talk about this*”. There is an implication here, that for C.G. at least, a community emerges through *more than* labour-for-labour.

If there is an *Occupying Politics*, a normative politics, of CTVR it is partially legible in C.G.’s observation: “*basically we stick to our topics, of what we are dealing with everyday. And we probably don’t have the chance to talk about other things*”. C.G. is oriented towards an implicit idea of *occupational community*. This seemingly natural inclination in him is impeded by the structures of the research environment which do not include “*work-for-leisure*” as part of the everyday. C.G.’s participant observation thus reveals a latent *occupying politics*, summonsed through Room 3.17., that is arguably one aspiring towards ‘*occupational community*’. He anticipates speaking with his fellow

³¹⁷ One of the participant observers inquires of the experiment: “*So, what’s the connection with Art? Do you want to make the Antenna’s look better?*” The illocution of this question was not stereotype per se. It was a disclosure of not knowing what art involves and how it works as a relational process in the world. It was a disclosure of the limits of this participant observers experience of art as a beautifying occupation. Art was not considered to be an inherently political activity, as Rancière would suggest. This question was also posed in a semi-mocking way during the experiment. The epistemic limits of this individual participant observer in this case attempted to disguise itself in a kind of argumentative dialectic. This tone was countered by the author with an authentic dialogic disclosure: “*Not really, no. It’s not about aestheticizing anything or making anything beautiful, it’s really more about, maybe, how can we make our thinking clearer around something that we share, like, communication...*”

researchers and finding “*how they think*” when they have the “stimulation” of artistic research processes. He is curious to know how the placement of artistic research practice within the PhD Lab might influence or catalyse engineering research. Further to this C.G. is seen to enact a ‘dialogic imagination’, an attentionality toward “*novel-time*” where “*the present is oriented toward the future*” (Bakhtin 2004 (1981):426). This suggests that *work-for-leisure* is significant of a dialogic imagination and foundational to Standing’s concept of *occupational community*³¹⁸.

A number of insights emerge through a close reading of the dialogue between C.G. and J.F., relating to the multi-faceted concept of *occupying politics*. The engineer’s occupation is seen to be in service to an occupying, or normative, politics of commodification. As C.G. suggests: “*If you propose something that cannot be built basically your job is kind of pointless... If you propose something which is not real, it’s a kind of fanta-science...*” The ‘real’ is here defined as a commodity, a useful product, that is nominally exclusive of the work of imagination. The occupational imaginary of engineering expressed here is pragmatic, conservative and hyper-commodified. C.G. however aspires to “*go a bit higher, and not to be limited by our reality*”. C.G. subtly articulates his own occupational imaginary as different to a norm. Through the dialogic situation of *Room 3.17* C.G. begins to enact an *occupying politics* of his own.

C.G. suggests there is an insularity within technological occupations. Within engineering, he suggests that there is a tendency to imagine silos of ‘technically minded’ people and ‘non-technically minded’ people. C.G. recognises this as a weakness in the occupational imaginary of engineering: “*I think one of the main limits of... technical subjects, it’s just... they try to keep the topics for themselves... they are not able to make it understandable to other people.*”³¹⁹ This has a negative effect on technical discourse in general. The paucity of dialogic discourse within technical occupations becomes reflected in public discourse through an absurd proliferation of stereotypes³²⁰. This stifles the occupational imaginary of engineering, continuing the

³¹⁸ Standing suggests that “*Within occupational communities, the distinction between work and leisure is sometimes blurred, perhaps a defining aspect of work as ‘decommodified’ activity. Almost imperceptibly, chosen leisure pursuits are linked with work if one has a vocation and a sense of craftsmanship, a point brought out beautifully in an early study of a ‘low’ occupational community, the carnival, in which this blurring was evidence (Bryant 1972).*” (Standing 2009: 19) This helps to reveal two things: firstly, the Eameses were interested to develop an occupational community through the Eames Office. For them, the model was the Carnival. Secondly, CTVR were interested to develop an occupational community, and for them, the model was the Eameses. The answer to the question, *How can we Communicate Communications?* might be: *by establishing conditions and structures for occupational community.*

³¹⁹ This comment is applicable to artistic research as much as it is to technological research.

³²⁰ A prime example is the popular TV show, *Big Bang Theory*.

use of stereotypes rather than opening up a fresh internally persuasive discourse through embodied criticality and phronesis.

It is clear that C.G.'s capacity to listen attentionally within *Room 3.17* enables the dialogue to unfold. It is clear that C.G. acts as a foil to J.F., and thus alters the coefficient of transversality at work in-between them. She becomes drawn into a thoughtful dialogue with him that is legible as reciprocation: "*Reciprocation obtains when people are able to recognise one another's speech as it is meant to be taken*" (Fiumara 1995: 127). The decision to focus on this particular conversation between J.F. and C.G. was not taken lightly. This conversation does not stand as a 'representation' of all the others. It offers a good insight to the dialogic situation of *Room 3.17*, and is chosen for the specific way that it affirmed the possibility of an occupying politics of occupational difference within CTVR. It was through this specific dialogue that the possibility of and need for further dialogic processes interdependent with dialectic processes was affirmed for the author.

7.3.7 Summary

Bringing contributes to *Room 3.17* was a way of telling a story *about, with and through* the *estrangement* generated through the choreographic object of the antenna. *Room 3.17* accommodated an elastic and choreographic mode of storytelling, through objects, installation, filmmaking, contemplation and conversation. Thus, it afforded an alternative paradigm of communication within the research organisation. In general, the language of the research centre adheres to what Mieke Bal calls "*referential, encyclopaedic description*" focused upon the objective of conveying knowledge, and which often takes the form of an argumentative or competitive dialectic communication³²¹.

It has been argued that the research environment of CTVR was hierarchical, with 'authoritative discourse' habitually, and often casually, privileged over and inflecting the 'internally-persuasive discourse' of the research community. The poetic goal of *Room 3.17* was to gather together material to inform the writing and making of a book on *The Art of Antennas*. The implicit aim of *Room 3.17* was to reproduce dialogic processes through the authority of the dialectic of a poetic goal. This implicit aim was conceptualised as a nascent process of inreach, choreographing convection in-

³²¹ Even on break times in the kitchen, the typical conversational style was argumentative dialectic communication, and the typical leisure activity has been foosball. Many of the leisure activities undertaken have a competitive edge. Since Spring 2015, however, screenings of Science and Technology Television programs from the late 20th century have been hosted in the Seminar Room by one of the PhD researchers, B.G.; the series CONNECTIONS by James Burke, and Karl Sagan's COSMOS.

between dialectic and dialogic processes within a community of occupational difference.

The ‘smuggling’ of artistic research practices within the domain of engineering research practices is suggestive of an intuition that “*the special contribution of an inchoate philosophical culture could help us to rethink the terms of an interepistemic debate by creatively providing ever new metaphoric instruments*” (Fiumara 1995: 3). The words of CTVR’s Director circulated to CTVR’s community via email suggested that *Room 3.17* could open up “*new ways of understanding ourselves*”, a language resonant with the action and ethic of phronesis.

Room 3.17 can thus be understood as an apparatus, a making ready of inreach and its attendant processes of foiling. The antenna, as a topic of common yet un-equally shared concern, is leveraged through artistic device of estrangement. Parody becomes legible through some of the contributes to *Room 3.17*. As a critical mode of engaging with the world, the contributes to *Room 3.17* suggest an underlying composite philosophy of technology, derived from Ancient Skepticism, Enlightenment Optimism and Romantic Uneasiness (Mitchum 1994).

The dialogic process of *Room 3.17* offers insight to an occupying politics within CTVR productive of occupational difference. Such politics seem aspirant of what Guy Standing outlines as occupational community. This is in contrast to an occupational discourse habituated towards learning dispositions which encourage people “*to be docile and obedient, to value competition over cooperation, to stifle... creative impulses*” (Martin 1976: 136). *Room 3.17* affirmed the presence and possibility of a dialogic imaginary within CTVR. This nascent ‘internally persuasive discourse’ was legible as a complementary and critical foil to authoritative discourses. It was this basis that the inreach experiments were continued and extended.

7.4 Reading Engineering Fictions

7.4.1 Introduction

As the second inreach experiment, *Engineering Fictions* had a ripple effect within the research organisation over time³²². The focus of this thesis is upon how inreach came

³²² A number of self-organising experiments were catalysed by CTVR researchers Séamas McGettrick (S.MG.) and Jacek Kibilda (J.K.), prompted by both *Engineering Fictions* and the CTVR Plenary Showcase introduced in the previous chapter. S.MG. catalyses an experiment called *Postcards from the Near Future* (PFTNF) and J.K. catalyses an experiment called *Green-graphs and IRIS* (GGI). Both of these experiments are dialogically developed in collaboration with the author from about April to September 2013. Please see Chapter 8 for more details.

about and what its initial affects were within CTVR. In this section, therefore, an attempt to make sense of *Engineering Fictions* is made by asking (a) what traces of transversality are legible within the E.F. forum; (b) what hidden curricula become legible through the experimental writings; and (c) what kind of lived political consciousness becomes legible through experience of the E.F. forum? As in section 7.3, the theoretical distillery serves the analysis both of inreach as a concept and methodology, and of the individual experiments as structural agents of inreach. This section continues to build up an analysis of inreach, clarifying its artistic processes and devices and the ways in which it develops as collective action. The purpose here is to expose insights on inreach and to consider what it means for CTVR to support a diversification of occupational difference as vital to its research culture.

7.4.2 *Engineering Fictions as apparatus...*

The *Room 3.17* experiment initiated a prototypical process of inreach within CTVR. This was a choreographic process shaped by learning through trial and error informed by an intuitive practice of phronesis. The responses and contributions to *Room 3.17* encouraged the author to embrace the possibility of fostering ‘new ways of understanding ourselves.’ This was an expression made by CTVR’s Director of her understanding of *Room 3.17*’s function.

The purpose of *Room 3.17* was to act as a foil for engineering research. The space of artistic research became a foil for engineering research, a moment of estrangement that began to draw out the qualities of engineering through experimental communication. The question spurring the development of a second inreach experiment was that of sustaining a reciprocal process of foiling within CTVR.

Foiling became understood as an essential concept and method for inreach. The conditions of occupational difference being fostered by CTVR called for social structures that could produce ‘interanimating relations’ (Bakhtin 1981) or processes of foiling. Inreach was a prototypical process responding to this call.

The conditions of occupational difference within CTVR involved an asymmetry of power relations and expectation between artistic research and engineering research. The research context of CTVR was obviously more strongly oriented towards engineering research. Nonetheless, the occupation of artistic research was perceived as owning a certain status that “*preserves the idea that the artist is a superior being, able to penetrate the veils of mystification that otherwise confuse and disorient the hapless modern subject*” (Kester 2004: 88).

Foiling is a process that enables a de-privileging of what Grant Kester calls the “orthopaedic orientation” assigned to artistic occupations. Likewise, foiling means drawing closer the lived practices of the engineer at a time when such occupations are losing “*the benefits of one of mankind’s greatest tools – experience*” (Petroski 1992: 220). Foiling involves reclaiming objectivity and coming to embodied terms with what it means to develop and represent knowledge under conditions of occupational difference. Such processes are urgent at time when both the university and industry seek to render disciplinary boundaries more porous. Foiling actions are both tools and a processes of inreach.

Foiling involves enacting language with others through dialogical processes, without a ‘common language’ and amidst a world of difference. Foiling means being in the thick of ‘*call and response*’ actions within a specific context or situation in time. Foiling necessitates listening and being heard (Fiumara 1990). The second inreach experiment, *Engineering Fictions*, can be understood as a foiling apparatus – at once a tool and a process. As such, it requires feminist ethico-political practices of participant observation (Haraway 1988, Ingold 2014). Foiling involves attuning to and listening to one’s environment. It involves reading as practice. This practice is understood as “*an experience of responsibility*” that “*happens when we cannot apply the rules*”; i.e. phronesis; an experience that comes with “*the removal of grounds, the withdrawal of the rules or the knowledge on which we might rely to make our decisions for us*” (Keenan 1997: 1). Foiling was intuited as a process that could support ways of ‘adjusting the blinkers’ of communication within CTVR.

In the late 1980s, Donna Haraway reclaimed the word ‘vision’ in order to develop a “*doctrine of embodied objectivity that accommodates paradoxical and critical feminist science projects: Feminist objectivity means quite simply situated knowledges*” (Haraway 1988). Foiling was a name, devised through a poetry of naming (Lorde 1993, Ingold 2003) and given to the experience and action of attempting to develop situated knowledges within CTVR.

The inreach experiments were thus foiling apparatuses that supported ongoing attempts to develop a feminist objectivity within CTVR. Foiling was conceived as a process that “*allows us to become answerable for what we learn how to see*” (Haraway 1988). Foiling involves paying attention to ethical, political and epistemological relations within limited and bounded locations, while attending to extra-contextual relations. While the process of foiling offers “*only a partial perspective*” it this partiality that demands response-ability and potentially enables “*specificity and difference and the*

loving care people might take to learn how to see faithfully from another's point of view, even when the other is our own machine" (Haraway 1988).

In this sense, foiling attempts also to catalyse processes of unlearning. This is the potential it offers as an ethical relation to the other, a way of developing ethical communication. The phrase "*unlearning one's privilege as one's loss*" was developed by Gayatri Chakravorty Spivak. Unlearning can be understood as a process of "*working critically back through one's history, prejudices, and learned, but now seemingly instinctual, responses...*" – To unlearn learning, means to unlearn the privilege of education and instead "*to do our homework, to work hard at gaining some knowledge of the others who occupy those spaces most closed to our privileged view. On the other hand, it means attempting to speak to those others in such a way that they might take us seriously and, most important of all, be able to answer back*" (Spivak 1996).

Engineering Fictions acted as a support structure (Condorelli 2009) that could enable process of unlearning to take place within CTVR through the dialogic situation of an experimental writing workshop. The experiment can be understood as a framework to support processes of foiling and unlearning, as well as processes of creative exchange and thought amongst CTVR's workers.

Engineering Fictions was an on going, serial experiment. Continuity was vital to this experiment, because of its poetic goal to make space for dialogic encounter and communication within CTVR. While *Room 3.17* was a once off experiment, *Engineering Fictions* was continually being shaped and reshaped. Each session informed the next in some way, and the core structure and purpose of the experiment was teased out improvisationally and recursively over time. The experiment continues to articulate itself and is gradually becoming codified through a process of accretion and counterpoint.

In a conversation between J.K. and the author an attempt was made between them to articulate an understanding of *Engineering Fictions*. A record of this conversation was made in the Field-Journal. The first-person voice is that of the author:

"I say that I see Engineering Fictions as a model for condensing epistemologies in a way that does not force anyone to switch their epistemological position, but which enables a kind of fitness or awareness of there being simultaneously differing epistemological paradigms at work and that this shapes how we converse, how we correspond, how we engage, how we encounter each other and knowledge in the world, of the world.

I say that I think EF is a model that supports the possibility of Apperception - that is, where a perceptive being, through interaction and engagement with other perceptive beings, produces a mental process by which they make sense of an idea by assimilating it to the body of ideas he or she already possesses - now, this leads to problems of conflation and translation - but if this is made tangible, through the medium of EF, then there is a possibility that the conflations and translations will be either productive and more or less accurate or sympathetic to the meaning of the idea and the epistemological frame work from which it emerged.

Of course, I'm writing this all now, when I spoke to Jacek my answer, I merely tried to explain what I mean by apperception - but the point is that I'm proposing EF as a model, or perhaps in Deweyian terms as a medium for expression. I asked Jacek what his take on the sessions was. And it was encouraging what he said. He put it all much more simply. He said he thought that EF offered people an opportunity to be creative. (I take for granted probably that I am in a creative mode most of the time). He said he likes to "drown in the ideas" and then put the bits back together in some way - to order and arrange the information in a way that is personally meaningful, that is expressive" (Foley 2014-2015).

Political theorist Jodi Dean says that “one of the most exciting things that we can do now is actually engage in experiments in reimagining how to reorganise ourselves” (Martinis Roe 2012). While Dean is speaking at the political level of Nation States, *Engineering Fictions* is addressing the very possibility of thinking and organising differently within the context of CTVR, a research centre cultivating occupational difference. What is considered valuable, according to J.K., is the opportunity “to be creative”. This judgement was echoed on other occasions in the field-notes by various CTVR workers.

As was shown in Chapter 6, the author read L.D.’s apostrophe: “*I can’t believe no one started a fight and defended spectrum research?*” as a signal to begin *Engineering Fictions*. It affirmed her intuition to host a non-confrontational agonistic forum within CTVR by extending her existing artistic practice and experience of experimental writing. In her proposal to CTVR, the author suggested that the forum would support writing through a “*a friendly kind of unpredictable mutiny*”. In other words, the forum would become an apparatus of foiling.

<i>The apparatus of Engineering Fictions</i>	
Tools	Methods
Seed/Concept	Conversation and audio-visual aids.
Writing	The use of constraints or rules to guide a writing experiment in response/counterpoint to the seed.
Catalyst and Host	Foiling – a practice of ethical relation, curiosity and creativity.

Counter-public	Claiming a space of appearance for the forum – in this case, the Seminar Room. Thus the counter-public re-claims a traditional space of appearance (dialectic communication) for dialogic communication.
Email	Drawing out the counter-public – using CTVR’s mailing list to seed and model alternative modes of communication and inquiry at work.

Table 5 *The apparatus of Engineering Fictions*

7.4.3 What kind of ‘topic’ is Engineering Fictions?

The name *Engineering Fictions* is infused with various signifiers that remain open. As with the names ‘inreach’ and ‘occupational difference’ it was coined through the artistic research practice, a process of embodied criticality. When read dispassionately, as if a kind of ‘logo’ or ‘brand’ for a service or experience, it seems to simply indicate what will happen in the sessions: that ‘fictions’ will be ‘engineered’. But, on the other hand, the name implies a kind of disclosure of dissimulation. It suggests that within the space and time of the session *fictions of engineering*, or *fictions about engineering*, will be presented or demystified in some way.

Thinking the name through the theoretical distillery, specifically the set of theories relating to the occupying politics of engineering, *Engineering Fictions* becomes legible as a compound of two perspectives within a broad discourse of *philosophy of technology*: (1) *Engineering philosophy of Technology*; and (2) *Hermeneutic philosophy of technology*. The first perspective begins with a “justification or analysis of the nature of technology itself” and “seeks to explain both the nonhuman and the human worlds in technological terms” (Mitchum 1994). The second perspective marks the attempt of “religion, poetry, and philosophy to bring non- or transtechnological perspectives to bear on interpreting the meaning of technology” (Ibid: 39). In order to show how these two perspectives are legible through *Engineering Fictions* a very brief account of each will be given.

Ernst Kapp (1808-1896) was the originator of the term ‘philosophy of technology’. He adapted his philosophy from Hegel’s master/slave dialectic: “The master, to affirm his dignity and free himself from the physical environment, demands that the slave supply his needs. To do this the slaves must undertake technological work, and through work realise their own inherent dignity, independent of the oppression by other human beings. Slaves can transform the world, which is thus less noble than they are. From such realization comes the drive for technological progress that can free the slave too from the physical environment and create the idea of a new society of free and equal citizens” (Ibid). Kapp’s

philosophy of technology, developed through a theory of “inner-colonization,” precedes the work of cultural theorists such as Marshall McLuhan, and resonates with the poetry of Velimir Khlebnikov³²³. For Kapp, tools and weapons are theorized as ‘organ projections’.³²⁴ For example, the bent finger becomes a hook; the hollow of the hand, a bowl. Kapp argues that “*in the tool the human continually produces itself*”, noting however that the “*intrinsic relations that arises between tools and organs... is more one of unconscious discovery than of conscious invention*” (Mitchum 1994: 24).

Kapp’s originary philosophy of technology “*strongly projects the technological way of looking at the world into a variety of traditionally nontechnological domains*” and harbours a kind of ambiguity. The Engineering philosophy of technology could be called a “*technological philosophy*”, in that “*it uses technological criteria and paradigms to question and to judge other aspects of human affairs, and thus deepen or extend technological consciousness*” (Mitchum 1994).

The second perspective, *hermeneutic philosophy of technology*, attempts to develop insights into the *meaning* of technology and its relationship to the “*transtechnical: art and literature, ethics and politics, religion*” (Mitchum 1994: 63). This philosophy intends to take technology seriously as a theme for reflection. It attempts to think through technology by bringing “*nontechnical criteria to bear on the questioning of technology*” (*Ibid*). The phrase *Engineering Fictions* can thus be understood as prehension of a substantial tension within the history of the philosophy of technology³²⁵.

³²³ Carl Mitchum elaborates that Kapp’s adaptation of the Hegelian dialectic of master/slave “called for the ‘colonization’ and transformation” of the physical environment and the political environment. The aim of technology is to overcome our dependence on “raw nature: “*This requires the colonization of space (through agriculture, mining, architecture, civil engineering, etc.) and of time (through systems of communication, from language to telegraph). The latter, in its perfected form, would constitute a ‘universal telegraphics’ linking world languages, semiotics, and inventions into a global transfiguration of the earth and a truly human habitat. But this is possible only when the external colonization of the natural environment is complemented by an inner colonization of the human environment*”. (Mitchum 1994: 23) It is a testament to the power of the combination of philosophy and engineering that this comes across pretty much as a contemporary description of the planet earth.

There is more than a curious correspondence here between the coining of the term ‘inreach’ and Kapp’s phrase ‘inner-colonization’. ‘Inreach’ was coined out of humiliation, anger and frustration. The failure of the ‘Communicating Science’ workshop had a deep effect upon the author, but it was inarticulable, save through the language of ‘inreach’. This becoming-minor language. Read against the philosophy of technology imagined by Kapp, *inreach* can stand up as a reclamation of the inner-colonization of the ‘human environment’.

³²⁴ The early Field-Notebooks make descriptions of the ‘The Organon Theatre’ as a ‘cinema of scientific thought’ based on Aristotle. Followed by open questions such as “Can art be explained scientifically? And would this explanation be art?” and drawings denoting advertisements for “*The Pill of Understanding*”. The Note-books at this time show the ongoing dissolution of ground, as the worlds of science, technology and art destabilize and dissimulate each other.

³²⁵ The polemical debate catalysed by C.P. Snow’s essay ‘The Two Cultures’ develops an argument that the humanities should become literate in the sciences, in the same way the sciences are literate in the humanities. It’s not a straightforward polemic, but it raises lots of

Engineering Fictions sets the 'stage' (prepares 'a salon'; makes ready a 'kitchen'; opens up the 'rambling house') for debate, but it does so by employing rules derived through dialogic within a forum that attempts to structure itself in counterpoint to an imagined axiom of equality. In other words, *Engineering Fictions* is structured according to an assumption of difference and the singularity of its contributors, its counter-public citizens. The implicit politics of this forum will be discussed a little further on in section 7.4.6.

While *Engineering Fictions* pulls at a tension within the discourse of philosophy of technology, the name also acts as a parodic pun on the genre *Science Fiction*³²⁶. It suggests itself as nested within a hierarchy of cultural value. Science Fiction continues to be broadly perceived as a minor genre of literature in popular discourse. As a phrase, *Engineering Fictions* suggests itself as a minor genre of Science Fiction. The experiment itself, then, acts as a parody of hierarchy of occupational value that is tangible within both literature and science: Engineering is to Science what Science Fiction is to Literature.

The experiment *Engineering Fictions* involves the making (or becoming; or inventing) of a "*minor literature*", which is not to say that it comes out of a "*minor language; it is rather that which a minority constructs within a major language*". The concept of a "*minor literature*" comes from the philosophy of Deleuze & Guattari through their reading of the literature of Franz Kafka (2003 [1986]). They propose that "*the first characteristic of minor literature in any case is that in it language is affected with a high coefficient of deterritorialization*" (2003: 17). The second characteristic of a minor literatures, they explain, is that "*everything in them is political... its cramped space forces each individual intrigue to connect immediately to politics.*" And the third characteristic of minor literatures is that "*in it everything takes on a collective value*". Deleuze & Guattari argue that "*The three characteristics of minor literature are the deterritorialization of language, the connection of the individual to a political immediacy, and the collective assemblage of enunciation*" (Deleuze and Guattari 2003 [1986]). As a 'topic', *Engineering Fictions* becomes legible as an experiment "*to create a becoming-minor*" of language within CTVR.

interesting insights about the public discourse on Science and Humanities research and practice in the 20th century, and offers an interesting foil to the celebrations of these worlds colliding and intermingling in the 21st century (Snow 1961).

³²⁶ This resonates too with the feminist objectivity of Donna Haraway, and the move in her work through SF: Science Fiction, Speculative Fabulation, So Far...

From the urgent perspective of artistic research, involving the development of embodied criticality and feminist objectivity, however, *Engineering Fictions* was a pragmatic way for the author to survive and potentially flourish under extreme conditions of occupational difference. From a feminist epistemological perspective, the author's practice of compressing names (e.g. occupational difference and inreach) itself constitutes a mode of 'minor poetry' (Lorde 1993). *Engineering Fictions* thus holds open the space of appearance for a minor poetry of occupational difference to become articulated within CTVR.

In the process of artistic research, the name created a space for minor poetry and called into question conditions of political benumbment³²⁷. The name and concept of *Engineering Fictions*, while it was coined through embodied criticality, therefore it was immanently critical and political. In his writing on the radical choreography and performances of Jeremiah Day and Simone Forti, the author Fred Dewey argues that "*We have barely begun to face up to the rise of fiction and unreality in our era, and with this, the absence of any real politics and culture that can help us. We tend to think of fiction as existing in books or films or in the mind, as mental phenomenon. One of the hardest unlearned lessons of the 20th century, however, is the extent to which fiction and unreality have migrated into the heart of organization and have replaced and destroyed appearance*" (Dewey 2009: 82).

Traces of such unreality and fictions have been partially evidenced within this research in the figure of the model, a frequently ambivalent co-efficient of technocratic power. The author's decontextualisation and re-use of Ludwig von Bertalanffy's phrase that "*a verbal model is better than no model at all*" as an act of digital parrhesia was a way for her to feel out the affordances and possibilities of occupational difference through email correspondence. From the moment of this correspondence within CTVR's mailing list, and building upon the correspondences catalysed through *Room 3.17*, the author was empowered to further open and enact spaces of appearance within CTVR for poetry and politics.

Engineering Fictions was enacted as a space of appearance to support the "*revelatory distillation of experience, not the sterile word play that, too often, the white fathers distorted the word poetry to mean – in order to cover a desperate wish for imagination without insight*" (Lorde 1993: 37). Very often, *Engineering Fictions* did not accomplish the 'revelatory distillation of experience'; tending instead towards the curious and little

³²⁷ The compound of 'engineering' and 'fictions' seeks not to make one occupational domain accountable over the other – it is a relation of mutual complicity.

known spaces of ‘uncreative writing’; but when it did it was tangible, though non-verbal. Very often the space collapsed under the weight and tradition of ‘the white fathers’ distortions and the habits of zero-sum protocol.

The name of *Engineering Fictions* was in itself a powerful topic, and opened a way to call into appearance the challenge of resisting benumbment by summoning into action the voices and bodies of those who might seek to enact a relevant and meaningful politics, from within the agonistic space of occupational difference within CTVR.

7.4.4 *Tracing transversality and its coefficients through Engineering Fictions*

The transversality at work within CTVR is legible in the *Cognitive Radio* session of E.F. catalysed by L.D. Designing a radio that is “so cognitive it gets bored” is a subtle satire, though it is disguised as “academic folly”. Inspired by the score *Radio Music* by John Cage, L.D. imagines “*our cognitive radios getting bored and deciding to collectively perform a John Cage piece for their own amusement and subsequently possibly composing something themselves as they get braver*”. Substitute the word ‘radio-researchers’ for ‘cognitive radios’ and there is an indication here of how L.D. imagines adjusting the ‘co-efficients of transversality’ within the research organisation.

The ‘boredom’ of the ‘cognitive radios’ becomes legible as an allegory of status quo of spectrum licensing and management as a predominantly proprietary regime, thus inhibiting the possibility for developing such technology according to a paradigm of situated knowledges as outlined by Haraway (1988).

In this allegory, the ‘radio-researchers’ are like the ‘bad workers’ in Jacques Rancière’s *The Night of the Proletariat*. These were French working people, during the 1830’s and 40’s, who lived out their political consciousness collectively by reading, writing, and talking together, forming ‘friendship circles’, as Avery F. Gordon explains: “*They worked – they were plumbers and cobblers and tailors and bakers and the men who emptied the sewers. They met at night, often staying up all night, drinking and talking and writing... they were developing and modelling a way of living that was designed to abolish the divisions between mental and manual labour and between productive and unproductive work that are organic to capitalist work relations*” (Condorelli 2014).

These were working people who disidentified with their labour. They were bored with work. The ‘bad workers’ are allegories of the ‘bad/bored radios’, and vice-versa. Imagine it: L.D.’s ‘bad radios’ decide to perform a John Cage score. The technology is personified. The radios make leisure time for themselves collectively so that they can

think and enact their worlds differently. They perform scores and what's more, they enjoy it. They become braver. They begin to compose their own scores.

Meanwhile, CTVR's 'radio-researchers' began to attend an 'in-house' experimental writing workshop. There is a purposeful coincidence of content and platform here. The content of the workshop absorbs the purpose of the platform. This resonates with L.D.'s conviction that politics is baked, embedded into technologies as they are made. For the author running *Engineering Fictions* within CTVR was a prototypical liberation technology, and it was also a way of surviving within CTVR.

Its purpose was not to advocate for situated knowledges but to enact them experimentally in a committed and open-ended way. *Engineering Fictions* was a platform for finding out what situated knowledges might look like within CTVR. This research context was informed by a social imaginary of "scientific and technological, late-industrial, militarized, racist, and male-dominant societies" (Haraway 1988), conditioned by a vague conceptualisation of freedom as 'negative liberty'³²⁸, and to a politics contaminated by an "underlying assumption... that markets and consumerist principles are universally applicable because they appeal to all (self-interested) human beings regardless of their social context" (Steger and Roy 2010).

³²⁸ Guy Standing argues that "progressives have suffered from a failure of imagination on the great issues of equality and freedom. For too long, they have been fearful of freedom, seeing it as an entry point to ideas of 'free-markets' and individualism associated with inequality. They have had an image of Isaiah Berlin's negative liberty, the absence of constraints" (Berlin [1958] 1969). The concept of negative liberty is not intuitive. Isaiah Berlin himself has to make corrections to his thinking. His original thought was; "For if to be free – negatively – is simply not to be prevented by other persons from doing whatever one wishes, then one of the ways of attaining such freedom is by extinguishing one's wishes." But Berlin acknowledges that "If degrees of freedom were a function of the satisfaction of desires, I could increase freedom as effectively by eliminating desires as by satisfying them: I could render men (including myself) free by conditioning them into losing the original desires which I have decided not to satisfy. Instead of resisting or removing the pressures that bear down on upon me, I can 'internalise' them." (It is possible here to recognise the movement of inreach as a lyrical parody of this 'internalization' of negative liberty). This sense of freedom is a 'Stoic' one and "must be distinguished from the freedom or liberty which the oppressor, or the oppressive institutionalised practice, curtails or destroys." Citing the work of Robert Waelder, Berlin elaborates this distinction: "He speaks of the remoulding of the superego into 'internalising' external pressures, and draws an illuminating distinction between authoritarianism, which entails obedience to authority without acceptance of its orders and claims, and totalitarianism, which entails in addition inner conformity to the system imposed by the dictator; hence totalitarian insistence on education and indoctrination as opposed to mere outward obedience, a sinister process with which we have become all too familiar. There is, of course, all the difference in the world between assimilating the rules of reason, as advocated by Stoicism, and those of an irrational movement or arbitrary dictatorship. But the psychological machinery is similar" (Berlin 2002[1969]). It is arguable whether fostering occupational difference within CTVR through artistic practices was a stoical move to shift the paradigm of 'rationality'. If 'rationality' can be delineated by art then would submitting to this reason lead to an altogether a more peaceable sort of freedom? Certainly, this is not an either/or question.

Engineering Fictions was devised, through an accretive and critical artistic process, as an apparatus of foiling. Its unscripted function was to experiment with ways of ‘adjusting the blinkers’ on modes of communication within CTVR to accommodate a conception of situated knowledges. Some lines of inquiry travel onwards from the *Room 3.17* experiment into *Engineering Fictions*. In the following sub-sections, a brief account of these lines of inquiry are traced and partially theorised to compose an impression of situated knowledges developing through the *inreach* experiments.

7.4.4.1 Mood – *The Parable of the Cognitive Radio’s*

Engineering Fictions was an open experiment. Anyone within the research centre, and anyone whom CTVR’s researchers might have wished to invite along, were welcome to contribute. In a gesture to this effect, the door to the seminar room remained partially open and any publicizing emails within CTVR always contained the invitation to bring other interested or curious people along. Therefore, there was always a sense of potential interruption.

The mood of the E.F. sessions can be described broadly as a subjunctive one. Richard Sennett explains: “*The subjunctive mood is most at home in the dialogical domain, that world of talk which makes an open social space, where discussion can take an unforeseen direction*” (Sennett 2013: 23). Such a mood involves “*practising indirection*” and can permit the experience of “*a kind of sociable pleasure: being with other people... without forcing ourselves into the mould of being like them*” (Sennett 2013: 23). However, the mood of E.F. can be described as partially subjunctive, because it was located within a paradigm of dialectic communication and reasoning typically aiming at synthesis and shared understanding.

The *Engineering Fictions* sessions were publicized through the CTVR mailing list. At the recommendation of C.G. the author began to ‘publicize’ the sessions vocally within the PhD Lab, to remind people and welcome them to contribute. On one such occasion in April 2013, an insight was developed through conversation with one of the visiting researchers (an artist and art educator) in the PhD Lab and retold through the Field-Journal³²⁹ The author was inviting people in the PhD lab to come along to the session. Afterwards, she reflected on one interaction:

³²⁹ M.B. was carrying out her PhD research at another University in the city. L.D. offered M. a place to work as she had no permanent research space accessible to her through her own University. M. was not the only ‘external’ scholar to be offered a place to work within CTVR. L.D. often joked that she like to ‘collect strays’. This gesture, however, is legible as a practical ethic of *situated knowleges* in action, allowing for worlds of knowing and making to come into touch with each other; a cultivation of *occupational difference*.

"I said it to M.B. too about the Engineering Fictions then, and she felt that she couldn't go along because 'it would be all technology'. People don't read their emails. They don't read what I write. This is a problem. People do not read. They do not digest.

Anyway, I think I might have twisted her arm to come. I explained a little of what it is about. And she said 'so it's about language really'? And it's true that it is. It's about language and how and when we use it. And how or whether we acknowledge interpretations of that language. And how or whether we understand how context shapes language.

I do need to toughen up. I really do need to celebrate more the possibilities of this research. A mood can take you too far the wrong way. Moody. But then M.B. said that she liked how I was able to stay with uncertainty, to stay with 'not-knowing'. She asked whether this was a part of my research, and I said that yes it was but I wasn't sure how exactly... That engineering fictions is a way for me to grapple with language and how it functions within a site of occupational difference, not from a scientific or linguistic science perspective but from the perspective of an artist, a writer, working out of this site.

This is all in response to the initial call - it is the designer in me - responding to the brief, but rather trying to negotiate the brief as I go along. So that the brief itself changes through the preparation of the problem. M.B. gave me a quote from the poet John Keats who was writing to his brother and described his 'negative capability', that is 'the willingness to embrace uncertainty, live with mystery and make peace with ambiguity'. Is that what I am doing? Is that what is the prerequisite to the discipline of occupational difference?" (Foley 2012-2014)

The field-notes are filled with entries by the author that demonstrate how she enacts and develops an 'internally persuasive rhetoric' as she comes into touch and negotiation with the traditionally 'authoritative discourses' of science, technology and the academe. These entries offer some insight into the expressed perceptions of others about artistic research practice. Such insights demonstrate explicit assumptions that the experiments will be inaccessible because of their technological 'content', while revealing also more implicit assumptions that technology is inaccessible or exclusive to occupants of other ways of knowing and making³³⁰.

There is a dynamic, yet prevailing, mood permeating the Field-Notebooks, the Field-Journal and the Experiments; an oscillation between parody (or sometimes a deadpan humour), and lyric. This movement is parsed as the mobilization of

³³⁰ Such perceptions echo C.G.'s observation that technological disciplines tend to keep to themselves, or assume that others will not understand or care to understand.

transversality³³¹. The archival materials generated through the process of making the experiments forms a record of this movement, compositing a trace that moves in-between parody and lyric. So, the question becomes whether *Parody* and *Lyric* can be usefully abstracted as ‘co-efficients’ of transversality? The following passages attempt to get at the affects of such ‘moody’ movements.

If, as in Linda Hutcheon’s definition, parody is “*imitation with critical difference*” (Hutcheon 1985), then the ‘bored radios’ of L.D.’s parable can be read as a parody of hegemonic spectrum management policies and infrastructures that inhibit the cognitive radios from “reaching their potential”. The critical difference here is that these radios can collectively read art. The Lyrical aspect then, emerges when Linda suggests that subsequently the radios might continue their ‘amusements’, “*possibly composing something themselves as they get braver*”. A brief explication: Lyric emerged as a genre roughly around the same time as writing was invented: “*among the literary games, [lyric] is usually counted closest to song, and successful songs are soon enough attributed to no one signer*” (Smith 2007). (In which case, Lyric’s contemporary cousin might be open-source software.) The poet Eavan Boland thinks of lyric as articulating “*the human need for self-expression under the stress of a struggle for existence*”³³² (Condorelli 2014) while Theodore Adorno’s thesis is “*that the lyric work is always the subjective expression of a social antagonism*” (Adorno 1991: 49). Within L.D.’s cognitive radio parable lyric is *at work* but without becoming fixed into an expression or representation of lyric. This parable is models a process of lyric, one that aligns with a feminist epistemology of situated knowledges and a critical use of humour.

The parable of the ‘bored radios’ demonstrates parody and lyric at work, producing an ambivalent style of thinking and communicating. The context of composition of this radio parable is important to the reading developed here. CTVR was a telecommunications research centre operating in-between academic and industrial systems and cultures. The parable of the John-Cage-riffing-cognitive-radios serves to index tensions within CTVR as it struggles to sustain and augment research autonomy across institutional domains of education and industry³³³.

Parody and Lyric can be understood as affective styles of communication that act as co-efficient of transversality within CTVR. Parody appears to be employed as a tool

³³¹ The Field-Journals (particularly 2013/14) attempt to track and theorize this movement. There is copious rich material for analysis that would, with more time, render a more succinct story of the theories presented within this thesis.

³³² Boland’s personal coming to terms with lyric was through the image of a caged bird; this image resonates strongly with Louise Ward and Tim Forde’s discussion of Cognitive Radio.

³³³ L.D.’s presentation to the *Cognitive Radio* symposium (May 2013)

that can catalyse reflexive thinking, while Lyric appears to be employed as a way of thinking towards an horizon of self-organising possibility within a research culture dominated by bureaucracy and procedure.

Gestures of parody within CTVR draw attention towards contradictions, double-standards or paradoxes at work at large within a broader culture (e.g. the *pope-as-antenna* contribute to *Room 3.17*), while lyric gestures can be read as an individual working to understand and/or resist social antagonism's at work within the collective of the research culture³³⁴. Gestures of parody and lyric within CTVR can be understood as modes of reflexivity and inventive, self-organising resistance at the level of thought and idea, which begin to take form through the inreach experiments, i.e. through the contributes to *Room 3.17* or through the texts produced during *Engineering Fictions*.

7.4.4.2 Technical Esperanto, Minor Languages and Uncreative Writing

Early in the research process, the poetry of Velimir Khlebnikov was explored. His poetry struggled to develop a number-language in a desire to deterritorialise and reterritorialise language that had become totalitarian and violent. *Engineering Fictions* sought to facilitate a space for the deterritorialisation and reterritorialisation of language; for the voicing of poetry and pun.

Within the forum of E.F. concepts and abstractions (seeds) were exposed through dialogic communication with CTVR's workers. Catalysed through the forum of E.F. these concepts and abstractions became open to the apperception of those contributing to the dialogic situation. Apperception refers to the mental process through which a person begins to make sense of an idea/concept/abstraction by assimilating it to their experience and the body of ideas she already has in store. Processes of apperception support lyrical logic and rationality.

The tool most often employed to loosen the possibility of apperception during the *Engineering Fictions* session were word-games or language-games, referred to as 'constraints'. Very often these tools were improvised during the session, or just prior to the session, by the host and the catalyst. The purpose of the constraints was to

³³⁴ This pattern of parody and lyric are traceable throughout the experiments, particularly during the 'second wave' of transversality that pushes out from Plenary 2013. Unfortunately it is beyond the scope and space of this thesis to incorporate a full analysis of these experiments, Postcards from the Near Future, Green-graphs and IRIS, and Grey Space, but the intention will be to extend and combine the analysis of the first and second waves of transversality within the organisation, contextualised within a broader social, political and economic context.

buoy a creative process of thinking and writing. Each contributor could work with or against the constraints to produce a dialogic response to the seed of the session.

The constraint takes on a collective value that is characteristic of a ‘minor language’ at work. The constraint supports the individual to be herself within the collective: “*if the writer is in the margins or completely outside his or her fragile community, this situation allows the writer all the more the possibility to express another possible community and to forge the means for another consciousness and another sensibility*” (Deleuze and Guattari 2003 [1986]:17).

In the context of CTVR, constraints were particularly valued and useful. Engineering researchers were comfortable with tight constraints and clearly defined parameters. The constraint was familiar to people who had received an engineering education, and who had become used to task-driven research.

To think with Deleuze and Guattari a little more here, it can be said that the apparatus of E.F. supported the beginning of a *minor language* within and against the grain of a major one. In the sense of beginning or natality, the forum enabled a quality of freedom. The major language in this situation was the *Technical Esperanto* of academic and industrial engineering research. In their analysis of Kafka’s literature and their theory of ‘minor languages’, Deleuze and Guattari pose the question: *How many people today live in a language that is not their own?*

Many of the PhD researchers within CTVR speak English as a second language, at least. Many of the researchers could not speak in their native tongue about the technical work they are involved with because there are no translations. Carl Mitchum argues that in such globalized research conditions “*Technical terminology becomes a kind of Esperanto of the emerging world technoculture*”. A senior researcher within CTVR acknowledged that *Engineering Fictions* was engaging with this problem. During a session in season two, in response to a seed catalysed by artist D.mN. called ‘The Archivist’s Memory’, the following exchange was recorded after the session in the Field-Journal:

“L.dS. said that he felt it [engineering fictions] was a good thing. He recognizes a problem amongst students, doctoral students and post-docs alike, particularly those whose first language is not English, but not exclusively those. He said that they encounter language, the English language, in a very particular way – it is often very poorly written, the arguments very clunkily cobbled together, and not the best model for new language acquirers to follow. There are no opportunities for other styles of language use to be introduced. And it is limiting. In his writing, L.dS. wrote that the new technology

that D.mN. was proposing we think about, the telepathic operating system, “changed the way I organise my thoughts and therefore changed who I am”³³⁵.

Philosopher Carl Mitchum corroborates L.dS.’s concerns: “*Technical Esperanto is seen as a language without roots in a particular time or place, a kind of free-floating post cultural means not of poetry but of minimal communication. Aspects of the human are obscured or diminished*” (Mitchum 1994: 64). The apparatus of *Engineering Fictions* enabled this problem to become manifest within CTVR and, additionally, it served to respond actively to this problem through artistic research.³³⁶

Technical Esperanto is recognised not only within the Philosophies of Technology. There is a nascent field of literature called *uncreative writing* that embraces the ‘minimal communication’ of Technical Esperanto in an age of digital information and communication infrastructures. *Uncreative Writing* is understood by Kenneth Goldsmith as “the art of managing information and representing it as writing”. He sees it as “a bridge, connecting the human-driven innovations of twentieth-century literature with the technology-soaked robopoetics of the twenty-first” (Goldsmith 2011).³³⁷

Particularly during the sessions catalysed by engineering researchers, approaches to writing were similar to the uncreative mode of Goldsmith. In a sense, these sessions tended to gamify writing. It worth noting that game theory plays a significant role in many engineering researchers working in communications technology. As one contributor to E.F. observed, engineering research “requires that you apply a strict logic continuously. You must explain and justify why A connects with B for example. You must make the connection explicit. Whereas, *Engineering Fictions*, allows you to make connections in another way, not in a linear or logical way, but in a lateral way...” (Foley 2012-2014)[24.05.13] The constraint-based writing games developed during some of the *Engineering Fictions* sessions served to open up lines of thought and inquiry. Other

³³⁵ This is a really profound inversion of Descartes philosophy, Cogito Ergo Sum, I think therefore I am. Is L.dS. saying something here like: *I organise my thoughts, therefore I am*? This is an extremely powerful idea, and it suggests a very political orientation towards action and thought. It demonstrates not a break between body and mind, but an intrinsic intertwining between them. So yes, this undoes Descartes, inverts it,

³³⁶ Towards the end of February 2015 a rich correspondence developed between the author and another PhD researcher E.dP. on the problem of ‘Plastic Words’, and the way in which words have become hollowed out or too fluid, their meanings too slippery to rely upon. This will be reflected on in Chapter 9, but suffice it to say that this appears to be a problem of non-realism and irreality.

³³⁷ There is a rich ground here for exploring Philosophy of Technology and Histories of Communication through frameworks such as *Engineering Fictions* and nascent genre’s of *Uncreative Writing*.

contributors observed that the ‘uncreative’ practice of writing tended to reduce its ‘profundity’, flattening it out somewhat.

The ethical problem that ‘aspects of the human are obscured or diminished’ by the predominance of *Technical Esperanto* would seem particularly relevant for occupations contributing to the engineering of infrastructures. Such workers both maintain technological infrastructures even as they attempt to keep them apace with consumer demands for speed³³⁸. Infrastructures generally tend towards invisibility and can be easily taken for granted by those who benefit from them, those who consume them and even those who produce them³³⁹. The genre of *uncreative writing* and the movements of *minor languages*, and *minor poetry*, act in resistance to such invisibility. Engineering Fictions opened up space for experimental learning states, or curiosity, to enlarge. The gamification of writing, or the development of uncreative writing, enabled engineering researchers and artistic researchers to invent parameters and rules that parodied the stricter logic of daily work in CTVR.³⁴⁰ This second inreach experiment structured a space of appearances for tensions in between language, information and meaning to come into explicit relation, if only for a moment and for a small number of people, through the ‘rambling house’ of CTVR.

7.4.4.3 Summary of Mood and Minor Languages

The recurrence of the gestural moods of parody and lyric throughout the experiments is legible as a trace of a political will in force. In the Field-Journal, lyric is

³³⁸ By the summer of 2013 the strain of the ideology of speed begins to show within the Field-Journal: “I have become self-involved but in an exterior sort of way. Through my work - I am selfish in my work - but not in a nourishing way. I give myself no time to assimilate, to humour, to laugh. I give my self no time to catch my breath. And I find that my own needs as an individual self come directly into conflict with a core motivation for CTVR - to make everything go faster. To make the Internet go faster, to make our phones go faster, to make our mouths and finger tips and visual processors go faster. And I feel I cannot keep up. And I feel that I do not want to keep up.” 8th August 2013 Foley, J. (2014). Field-Journal: *Transcriptions*. unpublished (online), CTVR.

³³⁹ Alison Powell’s account of Community Wireless Networks in Canada, and Montreal in particular, illustrates how collectives are working to make the invisible visible in an effort to “draw attention to both the increasing consolidation of Wi-Fi ownership, but also to the technology’s potential to reinforce local community, culture and practice.” Such practices, advocated by CTVR in many ways, but particularly in the experiment with The Mobile Commons, can be understood as ways “of reconfiguring relationships between individuals, communities, and communication networks in order to reaffirm the importance of local culture amidst global flows of communication”(Powell 2010) The same is true of those who work to maintain and ‘innovate’ these infrastructures. The parody of the *Antenna-as-a-Tree* contribute to *Room 3.17* was the first indication of the psychic and psychological impact of *infrastructural work* as inherently hidden-in-plain-sight.

³⁴⁰ It was difficult to maintain a practice of minor poetry against this tendency towards gamification. The ‘popcorn’ exercise seemed to harbour the right balance of free-writing and constrained writing.

recognised as a force, but parody remains under-theorised, somewhat difficult to name. It is recognised as 'humour'.

S.MG.'s guide for 'Parenting a Cognitive Radio' parodies Fordism: *"Your radio can be anything you want it to be. The only stipulation is that it cannot be cognitive..."* Through Engineering Fictions S.MG is given license to satirize paternalistic/patriarchal norms. S. MG's text is legible as a nascent critique of education and patriarchy:

"Unlike a cognitive human baby, who learns from mistakes, your bouncing baby cognitive radio should only learn from what it is told. It must not under any circumstances end up like a human brain in a radio. It must be a 1984 human. It must follow the rules."

At a later moment in the Field-Journal, the author makes an account of a conversation with S.MG. that helps to draw out this implicit critique during a later experiment (PFTNF: second wave transversality; see Table 6):

"He (S.MG) spoke about his own motivations as a PhD student. He always saw education as a means to an end. He wanted to get a PhD. That was the end he was aiming for, and education was the way to do that. He followed the system, played by the rules. He attained a PhD knowing that his research would never come to fruition. It was impossible he said. It was 'cool' and exciting, but he could see very early on that it would have no practical or discernible impact upon the world. He knew this very early on he said. But he realised that the only person who would be injured by his not completing his research would be him. It wouldn't matter to any one else. So he completed. Attained his PhD. Now he is a Postdoc and a Lecturer. And he said he recognizes in the Lab below, where I am with the other students, that they have the same single mindedness about their research. They are getting the job done. It is a means to an end. But the end becomes another means to another end. A cycle of attainment. Always deferring your 'good work' for when you become a postdoc, or when you become a lecturer, or when you become a professor or a professor emeritus. This is what he talked to me about. These concerns are real. He said that he shouldn't be frustrated really, in light of what he knows about being an engineering PhD. There is no thought for the wider world. Not really. Not in the system at least" (Foley 2012-2014) [8.08.13].

There are multiple occasions in the Field-Journal where the limitations of the education system are taken into account and accepted. Through the process of enacting inreach within CTVR the author came to understand the individualistic

approach to education as an effect of benumbment³⁴¹. S.MG was ready to resist this approach, in spite of having gone through it himself. The ongoing presence of gestures of parody and lyric through out the inreach process is somewhat heartening. It suggests a struggle against the finality and torpor of benumbment.

In the Field-Journal and Notebooks the dynamic affective movements of parody and lyric within CTVR is theorised as '*The Peradventure Spectrum*'. The etymology of the word Peradventure is contradictory. Like the word 'occupation', it holds many different meanings. Peradventure's meanings, etymologically, range between *Doubt* and *Possibility*. The author rationalised that parody was significant of doubt, and that lyric was significant of possibility. She imagined that whenever these extremes were brought into relation with each other they began to temper the other, establishing a kind of relational meta-stability. It was this mode of relation that the inreach experiments sought to bring about. This relational meta-stability is another way of expressing Guattari's concept of the process of transversality.

The *inreach* process might be understood as a choreography across the extreme registers of the peradventure spectrum. This spectrum was itself tempered and conditioned by the variables of place, time, people, and so on. Thus, transversality and its co-efficients became legible through the moody gestures of parody and lyric drawn out through the constraints of each inreach experiment. In the case of *Engineering Fictions*, parody and lyric was rendered through the minor language and literature catalysed through the political space and time of the dialogic situation.

7.4.5 Tracing CTVR's Hidden Curriculum through Engineering Fictions

Rambling or Céilíng is a largely rural custom in Ireland that involves neighbours visiting each other to share stories, music, information, news, food and drink and occupying time together through cultural and social activities. A Rambling House is the home of people who are happy to leave their door open to neighbours and

³⁴¹ In one of the E.F. sessions involving a discussion of the potential future embodiment of communications technology, the following was noted in the Field-Journal: "L. said that if we had such a software in our minds, such that allowed us to think videos and drawings and so on into being, then maybe he would become an artist - because he would like to be - but he says he is too lazy. But if the technology would enable him. He could be an artist." This was not expressed as a joke or with irony. It was a straightforward thought. Such thinking expresses benumbment. Gemma Corradi Fiumara argues that "Proper hearing might be able to make us aware of the undertow dragging us towards benumbment and, in so doing, offer us a better position from which to avoid falling into one of many forms of torpor... It is a passion to which only the most radical listening can react, since it is, precisely, the only approach capable of detecting - hearing - it" (Fiumara 1995).

strangers alike, people who welcome visiting and enjoy occupying time in the company of others.

Dunlop Oriel House, the headquarters of CTVR, seemed to take on a similar cultural function in Dublin, welcoming associations with other cultural groups and individuals, particularly those relating to cross-overs between art, technology and design. CTVR also provided space for 'stray' researchers from other universities to work, in an unofficial and informal way. In this way, CTVR's HQ supported and accommodated associate researchers in a happenstance, ad hoc and unprescribed way. The implicit assumption, much like the ethos of the Rambling House, was that a mix of both neighbourly and strange presences would bring a variety and diversity of energy, information, knowledge and intensity of relations to the research culture. CTVR's hidden curriculum finds its heritage through the idiom of the rambling house, a communal infrastructure that both fosters and values occupational difference.

Valuing and fostering occupational difference means valuing voice, a significant challenge at time when institutions have "*grown used to ways of organizing things that ignore voice, that assume voice does not matter*" (Couldry 2010). Nick Couldry theorises voice as the capacity people have to narrate their experience and give an account of themselves to others. Any rambling house operates on an understanding of the value of voice not as a one-way transmission but as a process. Voice is as much about narrating, speaking one's truth, as it is about receiving, mattering and abiding in community. In the context of CTVR, voice is not explicitly valued in such a way. Communication is largely bureaucratic and teleological, reduced to the 'minor communication' of task-driven research. (The way in which the author was persuaded to write in third person testifies to this trouble.) So, what is at stake for CTVR as it seeks to cultivate occupational difference under conditions where voice is not valued as such? What is at stake are possibilities for cultivating 'new ways of understanding ourselves', as L.D. expressed, and new ways of organizing research practices, imperatives and cultures. Nick Couldry elaborates:

"Treating voice as a value means discriminating in favour of ways of organizing human life and resources that, through their choices, put the value of voice into practice, by respecting the multiple interlinked processes of voice and sustaining them, not undermining or denying them. Treating voice as a value means discriminating against frameworks of social economic and political organization that deny or undermine voice.... Valuing voice then involves particular attention to the conditions under which voice as a process is effective, and how broader forms of organization may subtly undermine or devalue voice as a process. This

reflexive concern with the conditions for voice as a process, including those that involve its devaluing, means that ‘voice’, as used here, is a value about values or what philosophers sometimes call a ‘second order’ value” (Couldry 2010: 25).

CTVR’s hidden curriculum of smuggling enacts the organisation differently performing it into a kind of rambling house. Thus, CTVR begins a process of valuing occupational difference and of valuing processes of voice. This becomes expressed succinctly by L.D. during the third session *Engineering Fictions*. The session was catalysed by S.MG with the seed of ‘Limits’. CTVR’s Director produced a piece of text that serves as a personal valuing of voice. She articulates a personal need for dialogic processes of imagination and community through occupational difference:

“My imagination is limited. It needs another person. It does not work on its own. It needs a spark – an ignition. It can’t function without some other. A new set of vocabulary from some other, a new set of images from some other, to unlock things and point to possibilities. This is a fundamental principle for me now. I could not be a researcher on my own. And I am less and less able to be a researcher within the limited vocabulary of my own discipline. Already tonight there are new words to work with.”

L.D. articulates a desire to deterritorialise the language of engineering research and management (Technical Esperanto) through the reterritorialising possibilities of other occupational languages and vocabularies. The writing exercises of the *E.F.* forum, often involving co-writing or group writing through the exchange and distribution of texts in the making, enable what Guattari calls a “collective assemblage of enunciation”. The becoming-minor of language is enabled through the forum. In the process both voice and occupational difference becomes valued. Thus, CTVR begins developing and advocating a different rationality, different learning states, that can orient political and social action towards deliberative processes of commoning and organizing resources under conditions of occupational difference. This is CTVR’s hidden curriculum at work, echoed in the ancient tradition of the rambling house.

There is also a nascent philosophising of technology seen to be at work within the *E.F.* forum, one that challenges the taken-for-granted humanism and the engineering philosophy of technology propounded by Kapp and others. This challenge is balanced out by the structure of *Engineering Fictions*. It is a diplomatic structure that draws out multiple perspectives and voices. For example, in his text in response to the Cognitive Radio session, C.G. asks are we trying to prove something to ourselves?

Are we trying to replicate ourselves through technology in a kind of Frankensteinian manner? Or are we trying to prove to ourselves that nothing can be more capable than human beings? Are we trying to falsify ourselves in order to validate ourselves?

Through Engineering Fictions CTVRs hidden curriculum is catalysed. Through this curriculum voice is rendered valuable, just as occupational difference is. The forum of E.F. enables voices to speak dialogically, an un-normal practice within the research culture of engineering at CTVR. It is through the affirmative action of CTVRs hidden curriculum of occupational difference that it becomes possible to sense the prevailing curriculum as traditional, utilitarian and bureaucratic. The relationship between the education system and the free-market system of industry are implicated in one another, often with the effect that the latter influences the former instrumentally. The structure of E.F. and the dialogic processes it enables, makes a space and time available for CTVR's workers to think and act differently, and importantly to begin articulating and imagining existing and future conditions for engineering research.

7.4.6 *Occupying Politics through Engineering Fictions*

Artist L.W.'s catalysis of *Engineering Fictions* demonstrated the radical potential of the forum to support the enunciation of individual voice in correspondence with a collective in the pronouncement of political will and action. In this session, the space feels distinctively political as there are many strangers gathered to be involved, to listen, to write and to speak. The writing that is produced, as tracings of thought, become voice when read aloud. These texts are thus, like Judith Butler's 'speech acts', voicings. They constitute a nascent political field.

There is much that is striking in L.W.'s analysis of the technology called Cognitive Radio. Of particular interest is the way in which she draws an analogy between her world of artistic research and practice and the worlds of engineering researchers T.F. and L.D. In this session L.W. corresponds with J.F., T.F. and L.D. by re-presenting her experience of encountering the world of *Cognitive Radio* engineering through conversation some weeks before. In her catalysis of the seed 'CAGE', L.W. is engaging in a complex act of representation through storytelling.

Gayatri Chakravorty Spivak's nuanced understanding of representation as both proxy and portrait resonates throughout the *CAGE* session. Spivak understands representation as a 'complicity' between representation as *Vertretung*, proxy, and representation as *Darstellung*, portrait. A proxy representation involves 'treading in another's shoes'. This is what 'parliamentary representation' involves. But proxy

representation, whether of a parliamentary kind, or of a more general practice such as in *E.F.* in this example, is never ‘simply’ *vertretung*. There is always an element of portrayal, *Darstellung*, at work too, as Spivak explains: “...the thing to remember is that in the act of representing politically, you actually represent yourself and your constituency in the portrait sense, as well...” (Spivak 1990: 108).

The collapsing of these two meanings of representation can lead to a “fundamentalist mistake: assuming that always imagined and negotiated constituencies based on unstable identifications have literal referents: ‘the workers’, ‘the women’, ‘the word’. But there is no *Vertretung* without *Darstellung*, without dissimulation; the two terms are locked into complicity with one another” (Spivak 1996: 6).

This negotiation becomes particularly tricky under asymmetrical conditions of occupational difference, where many varied and diverse positions and identifications come into play. L.W. negotiates this in the text she wrote in response to the radioalcabira.com broadcast on *Cognitive Radio*. The *Engineering Fictions* session becomes both a resonance and condensation chamber for L.W.’s analogy making a partial connection between the world of an artistic subject and the world of cognitive radio. The cognitive radio and the artist are grouped as part of a constituency of what could be described as ‘self-organising intelligences’.

L.W. represents the cognitive radio’s through the *E.F.* forum simultaneously as *Vertretung* and *Darstellung*. She writes: “we don’t need to have those really straight lines, we will be able to figure out what the interference tolerance is and we will be able to figure out how to respect you... you can respect me and we can all get along happily” (Ibid). On this understanding, the constituency to which both the cognitive radios and artists might belong could otherwise be called *counter-patriarchal*. The correspondence between the aspirations for cognitive radio technology and the aspirations for artistic practice are nuanced: “break[ing] away from the cage” of a prescriptive and deterministic dominator culture, on the one hand; establishing zones of autonomy and protection from a society that no longer acknowledges, let alone permits, alternative “models for artistic production/living, collaborating with people from different disciplines... therapists, engineers, programmers, writers, etc.”, on the other.

In re-presenting her *participant observation* of a dialogic of occupational difference through the radioalcabira.com broadcast, L.W. subtly exposes to the *E.F.* forum an emergent political constituency of artists and engineers. But far from representing a consensus in-between them, L.W. opens up an agonistic dialogue within the forum,

challenging the technological power of engineering in over-determining distributed human communication:

Who decides how the world should behave... will there be regulations for cognitive radios? Is a cognitive radio just a different form of broadcasting/self-organisation... self-labour... find your own place to broadcast if there is a space free... what happens if there is no available space for the cognitive radio... when all the parking spaces are full?

L.W. goes to the heart of a blind-spot in cognitive radio engineering research: the question of freedom. She wants to acknowledge and discuss collectively, through occupational difference, the co-efficient nature of technology: the way a cage might be both a protection and a prison.

This same line of questioning is heard tentatively within C.G.'s writing on Cognitive Radio, and both call for a political engagement with the philosophy of technology. L.W. asks *"In the reality of our daily lives, what happens when our cages are open? When someone breaks into your cage or when you share your cage with others?"* What L.W. is bringing to the forum of E.F., through her careful participant observation in dialogue with CTVR's researchers, are political questions of vulnerability, responsibility, and 'open' community.

More fundamentally, then, what is called into question are *visions* of what communication represents in the everyday of social situations. Against an ingrained traditional view of communication as either technical accomplishment or therapeutic experience, John Durham Peters proposes that *"A cheerful sense of the weirdness of all attempts at communication offers a far saner way to think and live. The achievements that technical and therapeutic talk usually ascribes to 'communication' – understanding, cooperation, community, love – are genuine human goods. Even information exchange is indispensable, in this place. But the attainment of communicative goods can never be easy or formulaic; so much depends on dumb luck, personality, place, and time"* (Durham Peters 1999: 30).

C.G.'s E.F. session on *Misunderstanding* propounds such a *"cheerful sense of the weirdness of all attempts at communication"*, playfully evoking 'Murphy' as the meddlesome, trickster-spirit of communication failures. There remains, however, an ambivalence in C.G.'s assessment that *"we just need to work harder"* that suggests the research agenda of attaining *"the perfect channel for the perfect communication"* is

beyond his own political agency. Once again, visions of freedom are called into question. Durham Peters argues that “Whatever ‘communication’ might mean, it is more fundamentally a political and ethical problem than a semantic one... In renouncing the dream of ‘communication’ I am not saying that the urge to connect is bad; rather, I mean that the dream itself inhibits the hard work of connection” (Durham Peters 1999:30).

The hard work of connection is what *Engineering Fictions* sought to support, particularly under conditions of research that provide myriad slipways into states of benumbent. The Field-Journal represents the problem astutely enough:

“I realise that I have been here so long all my thoughts are now feelings and I can no longer present them clearly – I need to make them thoughts again, these feelings. And maybe feelings are just disguised thoughts anyway?”

This diffusion of thoughts into feelings is significant of benumbment by way of non-conscious habits of dialectic, familiar to culture’s “*hierarchised by a logos that knows how to speak but not how to listen*” (Fiumara 1990: 85). The author describes an inability to think her own experience.

The catalysis structured through the *E.F.* sessions keeps the author, and potentially other contributors, alive to her own inner-listening, to her own *internally persuasive discourse*. By valuing the voice of CTVR’s workers (author included) the seeds of *Engineering Fictions* remain relatively close to the living political consciousness of the organisation. There is a strategy in this too, an acknowledgement that “*there is, in fact, little sense of responsibility involved in the dispensing of communications which may be ultimately benumbing*” (Fiumara 1990). This strategy actually begins to convect outwards from *Engineering Fictions*, as other catalysts within the research centre begin to mimic, adapt and extend the choreographic process of inreach. (See Table 6 Chapter 8)

7.4.6.1 *Engineering Fictions convects inreach...*

This will be discussed further in Chapter 8, but it is worth mentioning here because it connects with the ideas of minor literature mentioned earlier. In early 2014 a senior researcher with CTVR, L.dS. begins a weekly internal e-mail newsletter, that seeks to inform the organisation of its own good work, and also to model what quality looks like for PhD students, for example where researchers should be publishing, what they should be aiming for, and “*in a tiny way, a little bit of recognition as well...*” (Foley 2014). An underlying intention of these circulars was to redress a

lack of recognition within the research space for the work being undertaken, but which might not necessarily reach its intended goal:

“I believe we don’t do enough, that there are things that cost you nothing, right, but they have a lot of value to people, so feeling recognised is one of them” (Ibid).

L.dS’s tone of voice in making this statement was somewhat dismissive, suggesting that such valuing is by no means a common or acknowledged practice within the occupational domain of engineering research. Nonetheless, the circulars naturally develop over the weeks into a parody of the newsletter (“they are boring, right, by nature” L.dS.) into the early summer time of 2014. The example below is provided in order to inform the reader of how inreach processes began to fork into new directions, forming new choreographies of communication within CTVR.

THIS WEEK AT CTVR... [27th February 2014 – internal email circular]

In celebration of Baby Harper and Baby Smyth, a CTVR bed-time story...

Once upon a time, there was a faraway kingdom ruled by the fair Lady Linda and her council, the valiant Sir Tim, the brave Sir Luiz, and Sir Jacek The Healthy. They decreed that, thereafter, spectrum should have no bounds and neither should networks have borders. And so it was announced in the scrolls of the Proceedings of the IEEE (DOI: 10.1109/JPROC.2014.2302743). Peace then reigned.

But soon the red and blue armies marched on the kingdom, threatening to undo the new flexible spectrum and infrastructure sharing regime. The soldiers advanced arm in arm, goose-stepping in a rigid and unnatural manner. And a long moonless night fell.

There lived in the kingdom, however, wizard apprentice Francisco, notorious for once having single-handedly plunged the entire palace into complete darkness. He worked with old master Nicola and the brave Sir Luiz to survey methods to communicate opportunistically using the radar, TV, and cellular bands. News spread throughout the land, as part of the quarterly IEEE Communications Surveys and Tutorials (preprint available upon request).

Armed with dynamic and flexible modes of communication, the people of the kingdom defeated the evil blue and red soldiers, who were banished forever. And all lived happily ever after, never running out of research funding.

The levity of the email foils the gravity and significance of the life and research achievements of CTVR’s workers, but gives a compelling insight into a living political

consciousness at work within the research organisation. While 'Networks without Borders' is a name for an area of research relating to spectrum policy and management, and thus related to the development of cognitive radio technology, the way in which it is married with 'Spectrum should have no bounds' sets up a parody of negative liberty, demonstrating an awareness of the paradox of freedom.

The mention of 'red and blue armies' also positions CTVR as a renegade "*creature of the middle*", inadvertently disclosing itself as a co-efficient of transversality at macro scale within the domain of telecommunications engineering and research. Finally, the idea of a happy ending parodies an entire tradition in Western philosophical thinking, at least since Descartes. While this is a very superficial analysis, it registers at least as a potent affirmation of inreach as a political and ethical process within the research organisation. While the broader political and economic context of telecommunications research is only glimpsed at through the participant observation of the artistic research practice, the work at hand here is in reclaiming and invoking "*the value of voice to challenge, even identify, such rules as voice-denying.*" While inreach as a choreographic process of transversality supports creative dialogic communications within CTVR, it does not accommodate a thorough examination of the macro political conditions at work upon CTVR and its community. Undoubtedly, the dominator culture informing research practices within CTVR is a western complex of patriarchy, colonialism, scientific and white supremacy.

Many aspects of contemporary western techno scientific culture seeds benumbent "*that deflects us blinding from listening to our 'inner world' [and] does not even permit us to see whether we are the initiators of anything*" (Fiumara 1990: 89). The dominator politics occupying CTVR glimpsed through the kaleidoscopes of the inreach experiments demonstrate a resistance to patriarchal organisation by invoking counter-movements of voice, internally persuasive discourses, dialogic processes of communication. What was intuitively being reached for through CTVR's hidden curriculum of smuggling, and indeed of inreach, was the formation of an (anti-patriarchal) occupational community of difference.

7.5 Summary

In this Chapter an analysis was made of the inreach experiments *Room 3.17* and *Engineering Fictions*. The former was part of a first wave of transversality within CTVR, and was shown to catalyse a second wave of transversality through the experiment *Engineering Fictions*. In turn, *Engineering Fictions* was shown to be catalytic

of further experimental communicative practices in confluence with the CTVR Showcase competition.

Engineering Fictions, can thus be said to have provided conditions for spontaneous self-organised communicative experiment, perhaps best illustrated by the (non-competitive e-newsletter) 'This Week @ CTVR...' which sought to recognise significant achievements of CTVR's workers (life and/or academic), while storying best-practice in the field of telecommunications research and indicating a standard for research.

The inreach experiments were discussed in terms of their operation as apparatuses of inreach, and as structuring of dialogic situations around a topic. Inreach was stressed to be both a concept and a process of experimental and creative communication within CTVR.

Room 3.17 was shown to hold a space of appearance through which ethical relations and communication could be enacted through occupational difference. *Room 3.17* was an experiment which enabled the development of dialogic by way of the poetic goal of a dialectic, a novel (*The Art of Antennas*). It introduced in a more formal and public way to the research organisation an already existing reality of occupational difference, and enlarged through a kind of mimesis a dimension of transversality within CTVR. The dialectic-dialogic choreography of the experiment; developing conversation through the contributes and enabling 'reflective awareness' through a filming process modelled on the idea of phronesis in the work of the Eameses and CTVR; was found to over all to be supportive and indeed constitutive of participant observation and embodied criticality amongst contributors.

Through the contributes to *Room 3.17* a critical mood of parody was understood as a nascent hybrid of an engineering-hermeneutic philosophy of technology. The response to *Room 3.17* overall suggested a more widespread interest in fostering and supporting occupational difference and a continuity of communication within the research organisation. A nascent politics of occupational difference was traced through the experiment, where the boundaries of work and leisure became inverted depending upon one's occupational position (artist researcher, engineering researcher, administrator, manager, etc.). One persons work-for-labour was another's work-for-leisure. This difference was highlighted as an important quality and challenge asserted through occupational difference. Another important highlight was the question of the freedom of engineering research, as raised through the

dialogic situation of *Room 3.17*, and a distortion of ‘reality’ and ‘fanta-science’ became palpable through the conversation with C.G.

The *Engineering Fictions* experiment was shown to be an apparatus of foiling, a process of ethico-politically conscious dialogic communication inviting the processes and epistemologies of participant observation, phronesis and feminist objectivity. The principle of the experiment was to develop a more ethical way of knowing and living together. The ‘topic’ of *Engineering Fictions* revealed itself through a poetry of naming³⁴². While many rich and valuable interpretations of the name were made, the authentic action of giving a name to the namelessness of experience demonstrated a principle of voicing truth in a space of appearance; developing *parrhesia* through a space of appearance.

Engineering Fictions was also shown to have catalysed a dimension of transversality by enabling a “redistribution of storytelling authority” within the research organisation (Durham Peters 1999: 30). Parody and lyric were shown to articulate a mood or affect of transversality working through the inreach experiments. CTVRs hidden curriculum involved thickening occupational difference, by way of amplifying CTVR as a kind of ‘rambling house’. Finally, the occupying politics of occupational difference began to present through the storying of representations and the philosophical questioning of the volition of technological development and organisation. *Engineering Fictions* was shown to have activated a culture of minor literature within CTVR, manifesting in the ‘This Week @ CTVR...’ e-newsletter.

The inreach experiments have been shown to structure and facilitate dialogic under conditions of an authoritative discourse and habit of privileging traditional modes and forms of dialectic. The process of inreach catalyses different ways of communicating within CTVR in ways that are meaningful and relevant (albeit tangentially) to the research centre, and yet supportive of people in seeking and speaking their own truth.

The choreographic process of the inreach experiments allies with research practices of participant observation, the philosophy of phronesis and the feminist epistemology of situated knowledges and embodied criticality (smuggling). The experiments open out processes of communication in-between the occupations of engineering already

³⁴² The discussion of this in Chapter 6 should be kept in mind. However, the analysis in this chapter sought to get at how *Engineering Fictions* might have been interpreted by others outside of the choreographic process. So there is an attempt to read the experiment from another perspective in this chapter, through the theoretical distillery.

at work within CTVR, and in-between occupations of art and engineering research that are accreting through CTVR. While the reading developed in this Chapter is in no way exhaustive, it demonstrates how the theoretical distillery can open out the meaning of the inreach experiments, and demonstrates the efficacy of inreach in promoting transversality within CTVR.

8 Conclusions: *learning from CTVR*

8.1 Preamble

In the early phases of this research an implicit contract was made in between artistic and engineering research that each would act as a foil of the other. This tacit contract can be described as a “*relation to otherness prior to understanding*” that involved “*an ethical attentiveness to strangeness*” (Todd 2003: 9). On this basis of tacit trust established early on in the research resonance in between artistic and engineering research was amplified. This energetic yet tacit relationship has become cognized through the writing of this research as a subtle mode of dance³⁴³. In the language and thought of dance a contract is that which “*teaches [us] to read the performance, at the same time as the performance is unfolding*” (Burrows 2010: 37). The tacit contract of trust becomes “*the series of clues which teach us how to read, anticipate, recognise and be surprised by what follows*” in the dance. By and large, the movements and relationships formed in between artistic and engineering research within CTVR seemed to follow the quiet logic of dance, producing over time a continuity of relation that might otherwise be called communication.

8.1.1 Learning from...

What mattered in between J.F. and L.D. from the early phases of this research was how they could learn from and with each other in mutual support. This mutual concern placed “*vulnerability and openness at the core of relationality*” and set in motion a research process that was unpredictable (Todd 2003: 9). The research approach developed in this thesis was unorthodox for CTVR. Mapping the processes the research followed diagrammatically was difficult for the author, though this would have been useful during the supervisory process. Working with language and metaphor and spatial relations were the methods of the artistic research practice, not the mapping processes of engineering and architecture. The challenge was to retain an integrity in the research that would permit this particular artistic research practice to respond with CTVR to the problem and possibility of communicating communications.

The research approach, like inreach, focused upon living movements, practices and conditions of relation in between artistic and engineering research in the context of CTVR. It was a risk to develop artistic research practice in such a context. Firstly,

³⁴³ Yvonne Rainer argues that “*if you have people moving around and no language for it then it’s a dance*” (The Philocetes Centre 2007)

because there was a strong chance that people would not respond to the inreach experiments, and secondly, because the violence of non-recognition was ever-present in the process (Todd 2003). Within CTVR there was an extreme asymmetry of occupational difference. The discourse, language and ways of thinking within CTVR were predominantly, traditionally and expectedly those of science and engineering. The inreach experiments were established as a way of negotiating the tensions of this asymmetry by working with CTVR's workers to establish up conditions for dialogic and dialectic communication. The process of inreach subsequently, and quite organically, became the material and focus of the thesis. It could have been otherwise.

8.1.2 *Theoretical Resonance...*

Once again, it serves to reiterate that the theoretical distillery presented in Chapter 2 emerged from relational encounters and communications with and through CTVR over time. The theories were drawn out through a research correspondence with CTVR. The author's prior knowledge and experience as an artistic researcher was brought into relation with the environment of CTVR, and by feeling out the affordances of this context she began developing a situated knowledge the problem and possibility of communicating communications.

Theories that were deemed relevant to this situation were drawn from education, ecosophy, and the history and philosophy of technological politics and helped to percolate the inreach experiments, drawing out meanings and also possibilities for further research and learning. The advantage of this approach was that the theories resonated closely with the conditions and practices of relation that were being encountered and engaged with in the context of CTVR. The theoretical distillery emerged out of matters of concern manifesting in between the people who engaged with the inreach experiments. Each theory's language and concepts resonated, reinforced, disrupted and challenged each other.

For example, Kathleen Lynch's theory on 'mediators' of particularistic curricula in educational settings resonates with Guattari's "official who adjusts the blinkers" within institutions of care. In this research, these theories offered a conceptual map through which to retrace the inreach experiments, rendering them tangible as a choreographic process that supported relation and communication through occupational difference.

8.1.3 Inreach Catalyst

With this in mind, there was been a sustained effort throughout this research to “be relentlessly visible and open to critical intervention” (Haraway 1988), and this was achieved mainly by sustaining a dialogic openness with people in CTVR, admitting doubt by sharing uncertainty and ambiguity through conversation, or by simple actions of placing an image on a wall, or an object on a filing cabinet, working with the potentiality of choreographic objects and spaces in CTVR³⁴⁴.

The role of the author in this research was a complicated one, in fact, it was multiple. In the beginning, prior to enrolment as a PhD candidate with CTVR, the author was an education and outreach assistant. The work of this assistant was improvised, ad hoc, in correspondence with L.D. The collapse of the Communicating Science workshop catalysed a parody of this role through intuition and humour, whereby the author invented an imaginary profession: inreach catalyst³⁴⁵.

For the author, this invention was a way of coping with the ‘emotional load’ and intensity of the workshop collapsing. It was a way of moving on, but the concept of an inreach catalyst suggested a pathway for PhD. research, to explore through embodied criticality how differing knowledge traditions might co-exist and co-adapt within CTVR as they sought out the problems and possibilities for communicating communications.

Gradually, through reflexivity and reflection both, the inreach catalyst’s work began to develop a language for itself. The inreach catalyst learned from CTVR that there was a discontinuity in its vision for communicating communications. This vision was not widely shared, it was not a part of CTVR’s collective consciousness, and was not recognised by the collective as relevant to the research centre.

The inreach catalyst learned that this vision was a hidden curriculum for CTVR and she gradually intuited that her role consisted of “transforming the learning states of the hidden curriculum of a setting into the subject matter of a persons curriculum proper”

³⁴⁴ In the early days of writing the Field-Journal, it was shared with L.D. in the hope that this would read and enable the supervisory process to keep abreast of the correspondences and observations being opened up through the process of participant observation, and avoid the ‘tyranny of the question’. This was not successful and the Field-Journal became a private document, nonetheless available upon request.

³⁴⁵ Art critic, Julia Bryan-Wilson argues that if artists are to professionalise they should do so as “a kind of drag; humorous, parodic, and incisive” Snow, C. P. (1961). *The Two Cultures and The Scientific Revolution: The Rede Lecture 1959*. New York, Cambridge University Press.

. Bryan-Wilson proposes that to do so would open up ways to “reimagine the affiliations between collaborations and ideas of incorporation” (Ibid.). She advocates for “ironizing and making strange” conventional ways of thinking occupations and their interdependencies.

(Martin 1976). When considered through the theoretical distillery this role becomes legible as a co-efficient of transversality who becomes involved in a process of 'adjusting the blinkers' for the research community of CTVR by drawing out learning dispositions roughly sketched within the *Design for Change* proposal. These dispositions, or principles (Arendt 2000), had been manifesting over time through the language and actions of CTVR's Director and management team: sharing, trust, risk, honesty, love of parity and equality, and communication.

The role of inreach catalyst was improvised through a hybrid methodology of artistic research and participant observation with CTVR. The process of inreach demanded a sustained ethico-political engagement with the conditions of occupational difference extant and developing within CTVR.

The dispositions and material-semiotic agencies of the inreach catalyst (listening, participant observation, reflexivity, embodied criticality and reflection), were leveraged to choreograph dialogic situations within CTVR that were learned from and with CTVR. As part of this process the inreach catalyst created intervals where she could move away from these intensive relations with CTVR in order to compose and arrange theories of practice in such a way that could cope with the subtleties of relational practice. The theoretical distillery was the outcome of this more reflective process. In the Field-Notebooks it was recorded as a seasonal movement of occupying and wayfaring which can be understood through the wisdom of art educator Corita Kent's adage that "*You cannot create and analyse at the same time, they are different processes*" (Kent and Steward 1992).

Here theory is valued as resonant with and yet stilling of the reflexive dramaturgy of practice. The movements of occupying and wayfaring were not one-dimensional oscillations, they were spiralling movements of voyaging and learning within the self and amongst the collective of CTVR. The movement of occupying and wayfaring is a dance, it is a movement that is natural to an aesthetic paradigm. The inreach experiments as described within this thesis offer provisional scores or stories of the movements and processes which informed the enactment of dialogic situations within CTVR. Over time the inreach catalyst learned with CTVR how to communicate communications.

8.2 Introduction

The thesis begins at the end of almost five years living and learning with CTVR. During this time it became clear that learning how to communicate communications

was a significant challenge for CTVR. It was a challenge for the research community to learn to listen and attune to its own occupational difference. This thesis has reflected upon a choreographic process called inreach which was developed with CTVR in an effort to come to a better understanding of the affordances of this challenge. The research was motivated by the *Design for Change* proposal written by CTVR in 2010, as part of a major funding review by national funding body Science Foundation Ireland. At the beginning of 2015, as Chapter 2 has explained, a theoretical distillery was composed based upon the author's artistic research and participant observation with CTVR. This was done in order to support a critical reflection on the initial conditions of the context of research and the relational process of research.

Prehensions of L.D.'s practice of 'smuggling' evoked the educational theory of the Hidden Curriculum. The creative processes of Ray and Charles Eames, upon which the communicating communications strand of CTVR's education and outreach programme was based, was revealed the value of phronesis as an important skill in communicative processes. In turn, this concept evoked Félix Guattari's concept of transversality.

CTVR's conceptual use of language within the *Design for Change* proposal resonated as an intuitive and nascent coefficient of transversality. In the process of writing up the inreach experiments, the subjectivity of the occupation of engineering was explored through a history of engineering and philosophies of technological politics. This was done in order to enrich the analysis and translation of the experiments. These inter-relating theories were activated in chapter 3, by developing a close and contextual reading of two primary source documents of CTVR's early years, the *Green Booklet* and the *Design for Change* proposal. This reflective reading brought to light the earliest traces of transversality within CTVR by way of the hidden curriculum inscribed within the *Design for Change* proposal: *communicating communications* and *Workpackage E*. These re-readings enabled the author to affirm prehensions that CTVR were catalysing a micro politics of occupational difference by bringing aesthetic and techno scientific research paradigms into relation with each other³⁴⁶.

³⁴⁶ Occupational Difference was a prehension of practice – again, it was difficult to bring a language to it. Thinking through the *theoretical distillery* enabled the language of practice to transpose into a language of theory without breaking from its situated knowledges, or dismissing them.

In chapter 4 the choreographic process of inreach was introduced. Having recalled the initial conditions of research, by way of the theoretical distillery, it became possible to bring a cognitive language to prehensions and intuitions of practice. In this way, ethico-political principles of CTVR were retrieved as significant of trust, risk, sharing, honesty, love of equality/parity. A discontinuity between the aspiration of CTVR's management team towards communicating communications was shown to have motivated the choreographic process, with inreach being invented in critical response to the collapse of the Communicating Science workshop in Plenary 2011. In this chapter, the scores and situation of the inreach experiments *Room 3.17* and *Engineering Fictions* were recalled. In the spirit of Donna Haraway's call for situated knowledges to "*be relentlessly visible and open to critical intervention*" the choreographic score of each of the inreach experiments was retraced as carefully and honestly as possible.

In chapters 5 and 6 the choreographic process for each of the experiments was simplified as a four-fold non-teleological and inter-relating process involving the following attentional phases: attuning, sourcing, informing, imagining. Sample encounters from each of the experiments were presented. This descriptive process of retracing provides a partial analytical translation of inreach. A finer grained reading of the experiments was made by thinking with the theoretical distillery. A distillation of the inreach experiments was developed in Chapter 7.

In the following sub-sections, the main findings and observations of this research are presented and briefly discussed, albeit in a provisional way. Additionally, pathways for future work are proposed. In section 8.3 the main findings are presented as follows: (a) inreach is a choreographic process, (b) inreach facilitates and supports dialogic situations over time, and (c) these dialogic situations are catalytic of transversality. In section 8.4 the main observations of this research are presented: (a) acknowledging the limitations and possibilities of occupational difference, (b) re-imagining education and research as a dance of occupational difference, and (c) proposing an ethics of freedom within constraint as a technological politics of CTVR. In section 8.5 pathways for future work are proposed: (a) developing a score for inreach, (b) compiling *The Art of Antennas*, and (c) extending the Eameses' creative process.

8.3 Findings

In the following subsection, the main, albeit provisional, findings of the thesis are presented. These are not general findings, but specific to the author's engagement with CTVR. While this research has been carried out in a context where techno scientific research traditions value and expect generalisation, this research does not

claim to answer to such rubrics. Instead, these findings offer a provisional understanding of a process that can speak to the challenge of developing situated knowledges through non-representational practices. However, inreach can be framed in terms of its possibilities as a practice, as Anissi Perakyla argues: “*The possibility of various practices can be considered generalizable even if the practices are not actualised in similar ways across different settings*” (Perakyla 1997:329). Inreach can thus be described as a choreographic process that was supportive and catalytic of transversality within CTVR but with possibilities of translation and adaptation beyond this context. It was a process that urged contribution and communication. It was a provisional process that was open to change in relation with others within a context and over time.

8.3.1 **Inreach** – a choreographic process

Inreach was a choreographic process that opened up possibilities for relations under conditions of occupational difference within CTVR. As an iterative process, it sought to develop situated knowledges through relational encounters with researchers within the context of CTVR’s headquarters. The choreographic process was developed and sustained by an inreach catalyst (the author) in correspondence with the affordances of CTVR as a research context. It involved a four-fold process of *attuning*, *sourcing*, *informing* and *imagining*, as described in chapters 5 and 6. Inreach urged dialogic communication within the techno scientific research context of CTVR.

As a choreographic process, inreach began by mimicking, adapting and amplifying the language and attitudes of CTVR. The performative language of the *Design for Change* proposal was richly ambiguous and invited a dance of occupational difference. By this correspondence, it was learned over time that the *Design for Change* proposal was not a fixed plan to be carried out to the letter, but that it instead offered researchers a threshold of possibility that could be, to some extent, continually re-imagined in relation with the unfolding complexity of everyday research.

As a dialogic process of communication inreach followed currencies of self/other and collective. Inreach cultivated a relation of foiling amongst CTVRs researchers that encouraged a playful push and pull between research traditions and expectations. Its choreographic process invited an agonism that was buoyed by a commitment to ethico-political relations, and bolstered by a politics of friendship (Condoirelli 2014).

Inreach was a choreographic process that continually posed the question *how can we support and inform each other in our occupational difference to facilitate the enactment of a different kind of institutional score for CTVR?* (Guattari 2009 (a)) In so doing, it

demanded a becoming awareness of “one’s place in the system” by way of a simple ethico-political question that asks, *What are we doing?* (Mitchum 1994, Arendt 2000) Inreach enacted and practiced an attentiveness to this *what* as a way of catalysing the *how* of communicating communications with CTVR.

8.3.1.1 A four-fold choreographic process (*dancing the dance, telling the dance*)

Inreach was a choreographic process that emerged through a dance of occupational difference, a movement that continually shifts between enactment (dance/performativity) and telling (translation/reflection). This thesis has focused upon the telling, because dancing is just not possible in an academic text. However, the dancing is journaled in the Field-Notebooks and Field-Journal, in the archives of the experiments, and in the memories and stories of those who danced along as well. These writings are still translations, but they are closer to the action than this text.

In the Field-Notebooks the choreographic process of Inreach was outlined as a four-fold non-linear and temporal movement in the following language: *occupying*, *wayfaring*, *experimenting*, *backstitching*. These words were ways of naming a relational action with self and others within the context of CTVR.

Occupying was a name for the resonant action of observation and listening, attending to the language and practices of the people with whom the inreach catalyst worked and studied with, and learned from, in CTVR (Steyerl 2011, Castells 2012)³⁴⁷. *Wayfaring* was a process of moving through and beyond CTVR, following lines of relation spun out through conversation with others and other traditions of knowledge and research. This aspect involved making connections, associations, and bridges between occupational worlds. *Wayfaring* was a process of relating worlds and *worlding worlds* (Christov-Bakargiev 2014)³⁴⁸. *Experimenting* was a dialogic process undertaken closely with others where every conversation and encounter might be considered an experiment. It was also a process that involved developing an awareness of the different ways of knowing and ways of privileging knowledges that have been produced historically through human culture. *Experimenting* involves a

³⁴⁷ This idea resonates with struggles for social and political justice taking place across the world since 2008, the *occupy* movements (Castells 2012). It resonates too with artistic research practices that seek to trouble subjectivity, raising questions of the ways in which infrastructures of information and communications technologies serve to suppress re-singularization of human social and psychic life (Steyerl 2011). The idea resonates but it does not address or engage directly. *Occupying* works and changes according to the what and how of context. *Occupying* in this context was a correspondence with and through CTVR in relation to its proposal of *communicating communications*. For context on the idea of occupation please see the Glossary.

³⁴⁸ Donna Haraway often uses this expression in her talks, drawing it from the work of anthropologist Marilyn Strathern, and also to the fiction of Ursula K. Le Guin.

process of unlearning and risk, requiring a level of critical submissiveness to the affordances of the relational context (Spivak 1990, Todd 2003, Doyle 2010). Finally, *backstitching* was the process of critical reflection carried out through intervals in the participant observation – it afforded the reflexive process some reflection. *Backstitching* was a concept that helped to name the process of learning and unlearning that can unfold during relational processes with others within CTVR. It gave space and time to the memory and the super-ego of the relational process.

After a period of critical reflection, and with the stillness enabled through the theoretical distillery, the choreographic process was retold, through the theoretical distillery, by way of a related set of concepts: *attuning*, *sourcing*, *informing*, *imagining*. This choreographic process has been outlined in chapters 5 and 6. The difference in these concepts is that the first set were devised to support reflexivity through the experimental process of inreach, while the second set was devised to support reflexivity through the writing and distillation process. *Attuning* corresponds with *Occupying*; *Sourcing* corresponds with *Wayfaring*; *Informing* corresponds with *Experimenting*; and *Imagining* corresponds with *Backstitching*. A strong correspondence is thus retained between dancing inreach and telling inreach. This is afforded by the *theoretical distillery* and is a testament to the process of artistic research practice³⁴⁹.

8.3.1.2 *The meaning of inreach as a choreographic process*

The choreographic process of inreach set up dialogic situations through which it became possible to show CTVR its hidden curriculum. When the question was spontaneously raised during the *Room 3.17* experiment ‘*what do engineers think through art?*’ a subtle and slow process of re-singularisation was set in motion that enabled CTVR to engage the problem and possibility of communicating communications³⁵⁰.

The choreographic process of inreach opened up a way for people within CTVR to attune to their context and time in a different way. It helped to set in motion lateral and vertical looping correspondences between people and things, stories and ideas, etc. The choreographic process, for example, developed an attention towards

³⁴⁹ The choreographic process of *inreach*, as discussed here, resonates strongly with Tim Ingold’s understanding of the difference between anthropology and ethnography (Ingold 2011, 2014). While it has not been possible to elaborate on this observation, there is a scope for future work here and for artistic research practices to engage further with anthropology. Additionally, the later work of Félix Guattari, could be drawn upon further to enrich an understanding of inreach as a choreographic process of transversality. This will be discussed in Future Work.

³⁵⁰ For Guattari, a process of re-singularisation offers diverse possibilities for people to recompose their “*existential corporeality, to get out of their repetitive impasses*”. This is what the inreach experiments afforded CTVR.

choreographic objects that could urge participation and catalyse communication in more recreational or experimental ways. The choreographic process thus catalysed possibilities to “*disrupt the narcissism of liquid life*” (Mootz III and Taylor 2011).

Through the choreographic process of inreach a prehension and subsequent cognition of the moods of parody and lyric suggested an ambivalent oscillation within the research community of CTVR in relation to communicating communications. This oscillating mood suggested that there remained an uncertainty or even indifference as to whether universalistic assumptions of education and politics ought to be re-imagined. Along the way, these moods raised many doubts about CTVR’s commitment to continuous internal re-creation as inscribed in the *Design for Change* proposal. The author’s prehension and observation that the concept of freedom was broadly misunderstood or taken-as-given, and that ethico-political relations were largely ignored suggested a deeper need for choreographic processes within techno scientific contexts more generally. This will be discussed further in sections 8.6 and 8.5.

8.3.1.3 Cautions

The dependence of the choreographic process of inreach upon the capacity of ‘mediators’ and ‘officials’ as gatekeepers constituted a power relation. In this research, the power relation between J.F. and L.D. had a strong bearing upon the development of inreach within CTVR (Rainer and Halprin 1995)³⁵¹. This power-relation remained at the level of prehension and was never brought out into the

³⁵¹ For example, the shift from Education and Outreach assistant to PhD student was taken for granted as unproblematic. However, difficulties in the communicative process of supervisory sessions arose at a late stage in the process, and this can be put down to a double-bind of occupational difference mixed with personal friendship. This can be illustrated with an example from the world of dance given by Anna Halprin in conversation with Yvonne Rainer. The relationship between J.F. and L.D. resonates with Anna Halprins description of how she and two other dancers worked together: “*What happened was that we set up a problem for ourselves: let’s use each other as material, let’s see what will happen... Let’s explore who you really are in terms of me.*” Halprin and the other dancers, however, realised that because “*we know each other so well that our relationships are terribly complicated*” they needed an intermediary, a third party non-dancer, to assist in their collaboration and to support the communication and prehensions of thought and feelings. Halprin says that they chose to do this “*Partly by chance, partly by intuition. We felt that unless we began to work this way we wouldn’t be able to work together any more. We wouldn’t be able to get feedback from each other anymore.*” (Rainer and Halprin 1995). This is description resonated with the difficulty which developed in the supervisory process, after about 3 years of working together. A double-bind began to develop, whereby the dialectic habit of engineering and the dialogic habit of art could no longer listen with and to each other or speak with and to each other. Particularly on the part of J.F., her deep relational involvement with CTVR accrued an emotional load that became overbearing. While the difficulty involved was partly a normal process of transference between student and supervisor, it was exacerbated by occupational difference in a complex way, that has not yet fully been understood. An interim recommendation would be to include a process of mentorship or counselling that could support the artistic research practice along the way and remind it of its genealogies and traditions.

open (Ibid.). At times this caused significant distress and confusion for the author. The lack of a common language for what was happening in between relations of artistic and engineering research on various occasions attenuated communications and blocked the choreographic process.

The critical reflective process of revisiting initial conditions through primary source materials (e.g.: *Design for Change* proposal, and the *Green Booklet*) helped to remind the author of the genealogy of the choreographic process and the complexity of its choices, responsibilities and decisions over time. This process of re-reading helped to still confusion by distilling the experience of participant observation and the choreographic process through the theoretical distillery, enabling the author to draw out insights and importantly to accept and grow to appreciate the reality of her hybrid mode of knowledge production.

8.3.2 **Inreach** – facilitating dialogic situations

Inreach was a choreographic process that led to the structuring and facilitation of dialogic situations under conditions of occupational difference within CTVR. The inreach experiments of *Room 3.17* and *Engineering Fictions* facilitated dialogic situations. These situations in turn facilitated a space of appearance that permitted prehensions and articulations of CTVR's hidden curricula. As supportive of dialogic situations, the inreach experiments serve to structure conditions for relational encounter, listening and speaking through creative processes and tools; e.g.: *writing, filmmaking, collage, etc.* These dialogic situations were supportive of resingularisation within CTVR and were observed to be broadly enriching of the psychic and social life of the research community.

The dialogic situations served to open out connections between different ways of knowing and communicating. The dialogic situation offered “*consciousness a chance to recognize its predicaments, foreknow its capacities and rehearse its comebacks in all kinds of venturesome ways*” (Heaney 1995: 2). At times the experiments facilitated a sharing of language that was more than “*sterile word play*” and which often enabled a “*revelatory distillation of experience*” (Lorde 1993: 37). This sharing of language and meaning beyond the lexicon of techno science was recognised by CTVR as intrinsically valuable, and moreover, enabled researchers to recognise a deficiency in every-day habits of communication within CTVR³⁵².

³⁵² L.dS. embraced this challenge by writing the *this week @ ctvr...* email newsletter through the internal mailing list of CTVR. L.dS. performed a redress through writing and parody, and attempted to extend this through the enlisting of an editorial team.

8.3.2.1 *Learning from and Responding with Context*

As chapter 3 has shown, the initial conditions of the research which led to the development of inreach, were strongly characteristic of an argumentative/competitive dialectic bias, what Gemma Corradi Fiumara refers to as a “*logos that knows how to speak but not how to listen*” (Fiumara 1990: 85). Prehensions of wider research conditions informing CTVR suggested a passive acceptance of individualistic and patriarchal research practices that privileged hero-narratives of enlightenment science and art. Such conditions were considered to foster non-communicative dispositions, or what Fiumara names as benumbment.

These prehensions of initial conditions were punctured and disrupted by the strength of the conceptual language inscribed within the *Design for Change* proposal and vocalised within the everyday of CTVR’s research, particularly through L.D.: submissive thinking; performing networks into existence, design with change in mind, etc. The *Design for Change* proposal was part of a zero-sum bid for funding. With such all-or-nothing stakes, it was re-read as the collective enunciation of a parrhesiastes – a collective many-in-one who speaks their truth at risk to themselves. This action of parrhesia, as the author later came to theorise, quietly informed of the choreographic process of inreach. The dialogic situations were intuitively structured around this principle of parrhesia to enable people to be vulnerable together, to speak their truth, to listen, and to be heard.

Inreach enabled the structuring of dialogic situations (*Room 3.17; Engineering Fictions*) that could respond to a discontinuity within CTVR in relation to its aspiration of communicating communications. Attending to the discontinuity within CTVR also addressed tensions of occupational difference in between engineering research specialisms, and more broadly between aesthetic and techno scientific research paradigms.

The dialogic situations permitted this tension to be released and shared, even if only temporarily. By sharing in this tension, the norm of non-responsibility to the Other can be summonsed through prehension and intuition, and perhaps later into language. The emergent occupational difference being fostered through CTVR was made manifest in particular through *Engineering Fictions*. It became clear over time that the dialogic situations had to in some way address a listening deficiency and a dialogic deficiency within the context of Dunlop Oriel House.

8.3.2.2 *Cautions and Limitations*

What the dialogic situations of *Room 3.17* and *Engineering Fictions* were unable to support and redress sufficiently was a hermeneutic deficiency. This deficiency became

apparent only through the process of encountering and experimenting with CTVR. But it is a significant problem and will need further attention in future work. Philosopher Miranda Fricker develops a significant theory of hermeneutical injustice in her work on epistemic injustice that can be learned from to support and strengthen dialogic and hermeneutical choreographic processes, which facilitate creative as well as analytical process (Fricker 2007). Fricker argues that “hermeneutical injustice occurs...when a gap in collective interpretative resources puts someone at an unfair disadvantage when it comes to making sense of their social experiences... hermeneutical injustice is caused by structural prejudice in the economy of collective hermeneutical resources” (Fricker 2007: 1).

This argument helps to build a case for re-imagining education at a time when there is an increasing move towards trans-multi-inter-intra disciplinary research, and what is referred to in this thesis as *occupational difference*. Building a critical practice of choreographic processes and dialogic situations (inreach) within the techno scientific domain means engaging occupational difference as a metastable material-semiotic and psychic phenomenon that can render people vulnerable to violence and injustice, particularly at an unconscious level³⁵³.

8.3.3 ***Inreach*** – catalytic of transversality³⁵⁴

This thesis has found that under conditions of occupational difference (albeit asymmetrical and nascent), the choreographic processes of inreach and the structuring of dialogic situations (inreach experiments) catalysed transversality within CTVR.

The *inreach* experiments opened up possibilities for “new ways of understanding ourselves” within CTVR³⁵⁵. Occupational difference was shown to enable foiling relationships within CTVR, which involved communicative practices of mimesis and adaptation, of parody and lyric. The role of inreach catalyst supported and catalysed dialogic communications, acting variously and mimetically as both host and interruptor,³⁵⁶ friend and foil.

³⁵³ Arguably, those with training and experience working in the arts are more vulnerable to hermeneutic injustice under conditions of occupational difference within techno scientific contexts.

³⁵⁴ See Appendices: Chapter 8; page 68-71; Figs. 72-79.

³⁵⁵ This is a quote from L.D.s email to CTVR encouraging participation in the *Room 3.17* experiment.

³⁵⁶ J.F.’s cooperation and subsequent collaboration with J.K. on further *inreach* experiments led to J.K. referring to J.F. as an ‘interrupter’. This is a term from the occupations of computer science, and refers to an error in the system. J.K.’s naming of the *inreach catalyst* as an *interrupter* is a term of acknowledgement and recognition of the value of *inreach* processes within the techno scientific domain.

Through the choreographic processes and dialogic situations of inreach a dialectic began to emerge from a dialogic atmosphere in the group. The inreach experiments *Room 3.17* and *Engineering Fictions* actually led to further inreach experiments, but it was beyond the scope of this thesis to distil these. These further movements of inreach can be described in terms of *waves of transversality* within CTVR through the following Table:

First wave Transversality 2010 – 2012	Second wave Transversality 2013	Third wave Transversality 2014 (ongoing)
Communicating Communications <i>A Communications Primer and the work of Charles & Ray Eames. Screenings and Talks - Dublin & Cork.</i>	Engineering Fictions <i>Catalyst: Many and Various Foill/Host: J.F. Community: CTVR and invited others.</i> <i>A dialogic situation involving Speaking and Writing, Reading and Listening.</i>	Engineering Fictions <i>Catalyst: Many and Various Foill/Host: J.F. Community: CTVR and invited others.</i> <i>A dialogic situation involving Speaking and Writing, Reading and Listening. This season involved cooperation with TCD School of English.</i>
	CTVR Showcase Held at the Lighthouse Cinema, CTVR's Plenary 2013 was an Industry-Style Showcase of centre wide research.	The Emergence of Lyric... <i>Catalyst: J.F. & The Expanded Lyric conference. Foill: J.K.</i> <i>A video-essay making sense of the dialogic-dialect process of Green-graphs and IRIS.</i> <i>This video-essay was made as part of The Expanded Lyric conference, at the Séamas Heaney Centre, Queens University Belfast, April 2014.</i> <i>(See Appendices for Link to vimeo.)</i>
Openhere Festival <i>Catalyst: J.F., L.D. and R.oD. Foill/Host: J.F. Community: open to public</i> <i>A dialogic situation involving Speaking and Writing, Reading and Listening.</i>	Green-graphs & IRIS <i>Catalyst: J.K. & CTVR Showcase Foill: J.F.</i> <i>A dialogic-dialectic work between an artist and an engineer, creating impressions of engineering research through image and text.</i> <i>This work was presented as part of the CTVR Showcase 2013.</i>	This Week @ CTVR... <i>Catalyst: LdS.</i> <i>A weekly circular email with news and recognition of valued achievements by CTVR workers. (anything ranging from the birth of babies to the publishing of academic papers)</i> <i>The form of the circular is a parody standard academic-industry newsletters, considered to be 'boring'.</i> <i>NB: This initiative was extended to an 'editorial' team in the autumn of 2014: C.G., S.mG. and J.F. Each editor produced a newsletter which bridged the virtual and real world environments of CTVR. e.g.: C.G. made a short video and installed the 'assets' from the production in a display cabinet on the 3rd floor of Dunlop Oriel House.</i>

Room 3.17 Catalyst: J.F. Foils: L.D., G.W. and M.J., as well as the Participant Observers of CTVR. A structure to support experimental dialectic-dialogic communication within CTVR. Poetic Goal: <i>The Art of Antennas</i> – a publication on the Black Art of Antenna Design, a correspondence in-between art and engineering. (incomplete...)	Postcards from the Near Future Catalyst: S.mG. & CTVR Showcase. Foils: J.F. and L.D. A centre-wide project to imagine telecoms technology playing out in the lives of people in the near future. CTVR's workers design postcards using photomontage and drawing, with some developing writing. This work was presented as part of the CTVR Showcase 2013.	PFTNF at EDUCON Writer and Presenter: J.F. Foils: L.D. and S.mG. A paper presented at the IEEE Engineering Education Conference held annually around the world.
	Grey Space: Catalyst: J.F., C.G., N.F. Foils: Seoidin O'Sullivan and Karol O'Mahony A seating system commissioned through CTVR - Collaboratively Designed by Seoidin O'Sullivan and Karol O'Mahony with CTVR researchers and personnel (2013 – ongoing)	THE KITCHEN HANGINGS Catalyst: L.dS. and S.mG. Foils: CTVR A ritual for graduating PhD researchers on the successful defence of their thesis. A composite photomontage portrait of each graduand is designed by CTVR researchers and hung in the kitchen of Dunlop Oriel House as part of a parodic ritual of initiation into Doctorhood.

Table 6 A provisional compilation tracing waves of transversality within CTVR from 2010 to 2015

Table 6 provides a provisional overview of the kinds of activities and experiments which emerged from CTVR after the initial inreach experiments, *Room 3.17* and *Engineering Fictions*. This table shows that CTVR began to attend to the hidden curriculum of *communicating communications*, and what's more they began to imagine, extend and enact it. In this way, inreach can be said to operate as a catalytic co-efficient of transversality.

The choreographic process of inreach can be said to operate on at least two levels: (a) inreach operates at the level of the individuating subject within the collective through phronesis, and (b) through catalysing co-efficients of transversality within organisational milieu's by way of dialogic situations and choreographic processes. Inreach engaged and stimulated 'mediators,' 'gatekeepers' and the 'officials who adjust the blinkers' within CTVR's management as well as amongst the wider dispersed the collective. Inreach was therefore a collective process that required catalysts (J.F.) and gatekeepers (L.D.) to support and foil processes of internal re-creation within the research centre.

8.4 Observations

8.4.1 Blind Porcupines and Deaf Horses

One of the principle questions that was working through the research process was to ask how can we learn with and from each other without destructively exploiting

each other? Within CTVR this question was exacerbated because to 'exploit' some thing was typically understood as a mark of success. Engineering discourse often champions exploitation, but it is intended as a sign that some action or resource has been used fully and efficiently. Such language can be unhelpful and destructive, particularly where different research traditions are learning to cooperate and collaborate across difference. Within CTVR, the conditions of occupational difference were asymmetrical, with engineering research language and traditions in the majority. It remains necessary to develop sensitivity to the material-semiotic and psychic life of others, and to understand that language can act affectively, not only technically but in a visceral, physical, emotional and psychic way. What is trivial for one person could be of great significance for another, particularly in situations of occupational difference. Recalling the fable of the Porcupine and the Horses playfully put forward in Chapter 2.4.3.2, the initial conditions of this situation appear to be mutual.

But mutuality is a metastable relation. Without a concept of this in mind, a relationship can easily become one of exploitation and neglect. This is why there was such an attentiveness to unconscious and indirect or non-direct material-semiotic and psychic relations during the choreographic process of inreach, and to a practices of writing and phronesis.

Equally, the structuring of an experiment like *Engineering Fictions* was such that writing enabled a kind of parrhesia to take place. Within CTVR, if a person chose to read aloud what they had written, or to have someone else read it for them, the action of parrhesia was underway. Developing a practice of writing served an additional purpose of maintaining communicative continuity in the psychic life of CTVR.

To write creatively means to work with unconscious forces of the psyche as well as through observation and participation in the world and with others. The person who writes must be able to adjust her own blinkers as she moves from unconscious flow to craft and editorial in the intensive process of creative writing³⁵⁷. The writing practices of participant observation can be richly rewarding and could be extended further within CTVR to powerful effect. This was recognised by one researcher, J.K.,

³⁵⁷ Of course, this is also a metastable relation with the self. For example, the author, in her own efforts to understand these processes developed an aggressive 'super-ego' of the craftsperson/editor/critic. This is considered to be as a result of a occupational isolation during the final stages of research, due to a hermeneutical limit amongst her research community. Also, it became clear that the author had developed a habit of playing a supporting role rather than a demanding role seeking creative and intellectual assistance. In short, the research process served to illuminate aspects of the author's personhood that had been previously non-cognizant.

who wished to introduce a creative preamble to his own thesis as a way of introducing the reader to a philosophy of his engineering research practice. This is a skill required by the parrhesiastes, by the one who practices phronesis and it is arguably a skill demanded of any collective who seeks to work as a community of occupational difference.

As mentioned in the previous section, other ways of attending to problems of exploitation under conditions of occupational difference involve becoming more conscious of hermeneutical capacities and biases within a particular setting. For example, within CTVR there were powerful diagrammatic communication skills at work on a daily basis. These were nonetheless frequently idiosyncratic skills. One researcher, S.mG. explained that while everyone can diagram their ideas and problems, they do so in their own way. As one researcher diagrams her problem on a white-board to a group, the others in the group will each transpose that diagram into their notebooks in their own unique diagrammatic language. There is rich possibility for occupational communities to extend their endogenous communicative and thinking practices.

Meaningfully engaging with language for sharing and communicating is not a means-to-an-end 'task'. It involves a social and ethico-political assumption of occupational difference as a process. The question *how can we learn with and from each other without exploiting each other?* is a question of whether time and resources can be committed and conserved within organisations to support communication that is not only zero-sum or competitive dialectic, but which allows for open-ended and creative processes of dialogic communications that can actually open up richer possibilities for research and developing situated knowledges.

8.4.2 *Re-Imagining Education: a Dance of Occupational Difference*

A visiting engineering researcher from the U.S. attended one of the *Engineering Fictions* sessions in the summer of 2013. She remarked that she had never encountered or experienced anything like it, and that it offered a very interesting way to think about engineering research. Education has by-and-large become a means to an end process of examination, which little affords experimentation and dialogic processes required by conditions of occupational difference. There is an opportunity to redress this situation, and to begin to meet the challenge of occupational difference which places ethical demands upon each person to ask basic questions such as: *what are the privileged ways of knowing today and why? How do such privileges and biases of knowing inhibit my relationship with the world, with the other, with my community, with myself?* Educating for ethical and political action is an imperative. Re-

imagining education as a dance of occupational difference would focus upon phronesis and parrhesia.

8.4.2.1 *Phronesis (the movements in between Techne and Episteme)*

Phronesis is practice of relation and communication that empowers estrangement, improvisation and ad hocism. Re-imagining education with phronesis in mind would enable an attendance to prehensions and intuitions, drawing these out through dialogic processes and bringing a shared and performative language to them. Phronesis is a general practice that can support dialogic communication, from which meaningful dialectic can emerge.

8.4.2.2 *Parrhesia*

Parrhesia is understood as truth-telling which involves some risk to the self. It does take courage to speak one's truth. This courage must be supported and enlarged by education and practices of communication that are dialogical. *Parrhesia* through inreach took many forms, and assumed moods of parody and lyric. There are many ways to practice truth-telling. Education must afford space and time where these ways can be experimentally explored.

Raising consciousness within the occupation of engineering around representational politics is necessary. There is no facilitation of dialogic around power relations, identity, social relations, etc. This work cannot be relegated to formal education. Because there is no dialogic around questions of sexual difference, let alone occupational difference, in spaces of research and innovation, technologies are going to continue to absorb and reproduce inequalities³⁵⁸.

8.4.3 *Freedom within Constraints*

In correspondence with CTVR by way of *inreach* and everyday conversational practices, a prehension developed that CTVR's pragmatics follow an adage of *Freedom within Constraints*. For example, the *Engineering Fictions* sessions demanded a careful balancing between free-writing and constrained writing. It was a difficult balance to attain and sustain.

It has not been possible within the space of this thesis to extend this prehension through the theoretical distillery³⁵⁹. This prehension resonates with Hannah Arendt's theory of freedom as natality – that freedom is something we have, not something

³⁵⁸ This problem was recently observed by L.D. at a corporate meeting on Internet of Things technologies. The imagination of the executives as to how such technology could be used was limited by a heteronormative, white, middle-class, male assumptions of gender. This sexism was completely unconscious to the executive who was presenting.

³⁵⁹ An inreach experiment is unfolding at the time of writing which relates to this concept (Grey Space, see Table 6).

we work towards (Arendt 2000). *Freedom within Constraints* is a way of naming the namelessness of this prehension relating to freedom. CTVR's pragmatics seemed to sound a clarion call for re-singularising processes of internal re-creation that implicitly acknowledged the assumption of freedom as something already in store within the research community. The following is an attempt to bring some language to this prehension, and to propose a tentative line of inquiry for future thought.

Freedom within Constraints means acknowledging that parity or equality is a metastable relationship that requires attention and concentration of body and mind in order to be sustained. To practice such a philosophy means to be sensitive to the difference between dialogic and dialectic and to respect and support this difference. The privileging of dialectic can be destructive of dialogic processes. There must be tension and release between these modes of communication, a dance:

- We must think of our obligations to each other as a dance and that our power in relation to each other is metastable, an ongoing process of equilibrium. It will never settle. It will never fix. To imagine that it will is an illusion. And a dangerous one.
- We must learn to dance with each other – people and radios – and develop a technological ethico-politics together.
- We must learn to share language and make meaning together.
- Research conditions must enable parity – a dance is not someone pushing you to the ground – a dance is moving with, alongside and counter. There can be no parity in a zero sum game. What do we want?
- In the initial conditions of this research, there was a hidden curriculum at work – and while it is effective enough to work with the undercurrents of a hidden curriculum it is not enough to do this only for short term gains (keeping up with the dialectic of funding proposals, etc.) There must be an imaginary of long-time at work, not one that defers responsibility or action, but one that can help temper exhaustion, and help to pace the work of those who are drawing the hidden curricula of phronesis and parrhesia and situated knowledges into the curriculum proper of social and democratic life. This means looking at ways of developing collective-sufficiency, of developing alternate routes of economy and self-organisation for such practices.

8.5 Future Work

This research has generated more openings than endings, largely due to the purpose of inquiry, i.e.: to structure and support dialogic processes. The following, however, are three pathways of research and practice which can be extended and developed from this research towards the production of richer dialectic:

8.5.1 Developing an expanded score for inreach

As Table 6 has shown, the inreach experiments catalysed waves of transversality through CTVR. While the choreographic process of inreach has been well developed throughout this thesis, it has not been possible to develop a score of the experiments in a substantial way. In order to develop a score of inreach, the intention is to work with a dramaturge to develop a score, based loosely upon the methodology developed by Anne-Teresa de Keersmaecker and Bojana Cvejic (De Keersmaecker and Cvejic 2012). Together, they have developed a method and language for analysing and translating for De Keersmaecker's choreographic work. The structure and organising language of their analysis is quite general and seems to resonate with the choreographic process for inreach. Their recent collaboration on retrieving and re-presenting the choreographic scores of De Keersmaecker's dance is excellent, with a deep understanding of the various affordances and limitations of media, and offers a model that the experimental scores of inreach would aspire to³⁶⁰. An expanded score for the experiments will take as a point of departure the variables outlined by De Keersmaecker and Cvejic:

1. *Reconstructing the context of intention*
2. *Materials*
3. *Methods and Procedures*
4. *Genesis of Movements*
5. *Styles of Performance, expression and theatricality*
6. *Syntax in composing movements*
7. *Composing the Space*
8. *Dramaturgy of Intensities*

The purpose of developing an expanded score, after the fact of the experiments taking place, is (a) so that it can be better understood as a research methodology, a

³⁶⁰ Cvejic explains as follows: "The written word compensates for a precision that the spoken word sometimes lacks; the video demonstrates the movement that can't be described enough, but has to be performed. The choreographer's parole fleshes out the account with affective tones of storytelling that the text is numb to"(De Keersmaecker and Cvejic: 12).

way of opening up embodied knowledge and making knowledge and communication through dialogic situations, and (b) so that it can be understood by others who might wish to develop similar experiments to catalyse inreach like processes amongst organised groups of people. The purpose of these scores is that they would be provisional and adaptable and used with sensitivity in relation to context. In order to adapt a score, to shift and change it, to improvise with it, some experience and understanding of that context must first be developed.

8.5.2 *Sharing The Art of Antennas*

The *Room 3.17* experiment had a poetic goal to publish a text called *The Art of Antennas*. There is an archive of materials in storage, including the Super 8mm film made collectively by participant observers of *Room 3.17* and oral histories of antennas and communication more broadly. The intention of this pathway of future research is to sift through this material in collaboration with CTVR researchers and with the artists Sarah Browne and Alex Martinis Roe, to develop a film-essay based upon the experiment which will realise the poetic goal.

This process would work in resonance with the development of an expanded score for the inreach experiments described in section 1.5.1. It would also integrate learning from later inreach experiments such as *On the Emergence of Lyric within a Telecommunications Research Lab... (2014)* (See Table 6) This work would be for a general audience, with the aim of opening up the techne, episteme, and phronesis involved in the art of antenna design and use. It would also mean an important return to a dialogic process which has remained open yet inactive since 2012 and to produce a meaningful dialectic communication from this material. It would be worthwhile form of outreach for the stories of *Room 3.17* and *The Art of Antennas* to be shared and learned from more generally and enjoyed.

8.5.3 *Extending the Eameses*

The Eames have been preceptors and conceptual personae of the choreographic process of inreach. As individual characters and as a creative team, the Eameses have acted as foils of inreach. It was through studying their work that concepts of phronesis and the model as a ‘fiction of reality’ came to shape the inreach experiments.

Many of CTVR’s lead researchers used the Eameses’ work in their teaching. This line of research would develop a “rough sketch for a hypothetical course” that could read the Eameses’ work against the grain of modernity by thinking with feminist techno scientific scholarship. This interdisciplinary course would extend a different view of

the Eameses working relationship with each other and their network of creative co-workers and co-researchers. Their approach to cooperation and collaboration is distinctive and challenging. Their subtle practice of the guest/host relationship offers a foil for thinking through master/slave dialectics and patriarchal power relations, from a creative and psychic perspective rather than an exclusively political or economic one. This course could be offered to engineering and artistic researchers who are in the early stages of a collaborative research process, whether through the university system, independently or through other institutional or community structures.

The Eames Office might sometimes be compared to the apparent leisure spaces of Google and Facebook, but there is more to consider here. The Eames Office is an example of a medieval style guild, an ad hoc community working towards a goal that has never been specified. It would offer a fascinating comparison to read the Eames Office as an occupational community against the grain of contemporary occupational environments such as Google, and to meaningfully trouble the disguises and fictions at work in claims of occupational community and creative life by drawing attention to the a-political quality of such spaces of appearance. As well as looking back through scholarship on the Eameses' work, and engaging with the Eameses' archive, the work of Guy Standing (Standing 2009) and others could offer points of departure for re-thinking and extending the Eameses' work as resonant and valuable today, both for scholarship and for practices of learning.

8.6 Summary

This research process began in response to a lyrical question posed by the Director of CTVR, the national telecommunications research centre in Ireland: *How do we Communicate Communications?* This was also a very pragmatic question, posed at time when funding is at a premium across academia. CTVR had to develop a language and rhetoric to advance its research, and one way that it did so was by affiliating with the arts, by learning from artists and designers, and by supporting artists and designers to develop their research.

This thesis proposes inreach as a choreographic process that structured and facilitated dialogic situations. Inreach is a choreographic process that is supportive of co-efficients of transversality. The dialogic situations structured through inreach have been found to be catalytic of transversality within CTVR.

This research has recognised and sought to address a discontinuity between pragmatic action and ethico-political change in a techno scientific academic-industrial research context. CTVR's practice of *communicating communications* was catalysed by this research and a pattern of movements emerged through the inreach experiments that reflected the strengths and limitations of the research organisation.

The pragmatic philosophy of assuming *freedom within constraints* adopted by CTVR's management team has been drawn out as a learning disposition, a hidden curriculum. Throughout the inreach experiments it manifests as a communicative mood of parody and lyric. Parody is reflective of an inventive criticality, a political consciousness, and yet an ambivalent and dead-pan acceptance of the status quo. Lyric reflected an internal collectivist struggle to resingularise, to internally recreate in order to address the future, and thereby self-organise constraints from the inside out.

This thesis proposes that inreach was a way of choreographing a living proxy and portrait of CTVR's communicating communications programme (Spivak 1990). The inreach catalyst's role involved drawing out and amplifying hidden curricula and learning dispositions enacted by CTVR's management and showing them to the research community by making spaces of appearance and conditions for relation. These were called dialogic situations or inreach experiments. It was a complicated and complex process, improvised ad hoc in correspondence with CTVR. It involved an experimental dialogic process of learning from and with CTVR as a diverse collective of people. *inreach* was not *about* 'communicating communications'. It was an effect of interpreting *communicating communications* as a "choreographic proposition", a pragmatic aspiration towards a different kind of institutional score (Guattari 2009 (a), Manning 2013).

The inreach experiments demonstrate that transversality is not a commodity – it must be reproduced and internally recreated on an ongoing basis and in a concerted way through an atmosphere of dialogic communication. Transversality, understood as a convection of communication that resists and disrupts the impasse of vertical hierarchies and horizontal passivity, is understood as a metastable potential for relation and communication within CTVR. Transversality enabled the release and manifestation of parody and the emergence of lyric communications amongst CTVR's researchers. It has been shown to attenuate and amplify at different times.

What is hopefully made clear through this thesis, is that inreach, as a convective dialogic process of communication, was good for the social, psychic and political life of CTVR. It supported the re-singularisation of the subjectivity of researchers personally and as part of a collective. Thus, inreach can be understood as both a proxy and portrait of CTVR's imaginarium of *communicating communications* and of its pragmatic ethico-political practice of *freedom within constraints*. And while inreach was specific to CTVR in this sense, as a choreographic process of transversality the possibilities of inreach remain open.

8.7 Postscript – Continuing inreach

The question of where to locate the concept and hybrid methodology of inreach in relation to interdisciplinary scholarship and research practices remains an open one. However, an effort is made in the following sections to sketch out how this choreographic process was finding a wider context after the submission of the thesis for examination. These sections were written post-Viva.

8.7.1 New Materialism

This section seeks to contextualise how the story of inreach began translating beyond CTVR and connecting with wider scholarship and research practices. After the submission of this thesis for examination, this research became recognised by a community of interdisciplinary scholars and practitioners identified with the philosophy of New Materialism.

The relatively new field of New Materialism speaks to diffractive research practices such as those narrated in this thesis. New Materialism constellates a “*confluence of currents across the disciplines that have validated a rethinking of the relationship between humans and non-humans*” (Barrett and Bolt 2013:3). The intention within this broad and transdisciplinary field is to develop tools that can enable ways of imagining and thinking that can assist researchers and lay people alike for “*dealing with agential matter rather than (gendered) passive matter*” (Iris van der Tuin, cited in Barrett and Bolt 2013). As Rick Dolphijn and Iris van der Tuin clarify, New Materialism “*traverses and thereby rewrites thinking as a whole, leaving nothing untouched, redirecting every possible idea according to a sense of orientation*” (Dolphijn and van der Tuin 2012)

While this field of thought and practice became known to the author only towards the end of writing the thesis, it offers a rich and diverse critical community who recognise both the value and potential of inreach and its experiments as tools for attuning and developing situated knowledges within techno-scientific contexts.

The choreographic process of Inreach, developed through artistic research and participant observation, was becoming recognised as an articulation of what Rosi Braidotti calls “*situated perspectives*,” that can “*lay the pre-conditions for ethical accountability for one’s own implications with the very structures one is analysing and opposing politically*” (Ibid). By light of New Materialist discourse, it became possible to see inreach as a hybridising process of artistic and engineering research in communication with each other. Thus, inreach can be framed as a feminist practice speaking in a critical voice with the scholarship of New Materialism. It was after all a process that was oriented by “*the ways in which ‘otherness’ and ‘sameness’ interact in an asymmetrical set of power relations*” (Rosi Braidotti cited in Dolphijn and van der Tuin 2012).

Shortly after this thesis was submitted for examination the author became involved in a European COST action on New Materialism (IS1307). The author was at this time learning how to tell the story of inreach in a way that would be accessible, yet not reductive, to a diverse interdisciplinary community of scholars and practitioners. One approach being taken at the time of writing was to re-figure the mythological characters of Narcissus and Echo as a way of re-thinking the problems and possibilities afforded by occupational difference. These figures offered potential for teasing out the problems and possibilities of what can happen when people harbouring differing knowledge traditions and values come into critical relation with each other.

The author spoke on this research at the 7th Annual Conference on the New Materialisms in Warsaw in September 2016. She was also invited to speak on her research at the Annual Meeting of the American Comparative Literature Association in Utrecht, to take place in July 2017. The organisers of this workshop, led by New Materialist scholar Iris van der Tuin, recognised the author’s research practice as a mode of ‘diffractive pedagogy’. Such recognition was empowering, offering the author a strong platform to more confidently and personally narrate the contributions of inreach without the double-bind of academic protocol experienced during the PhD process of examination with CTVR.

8.7.2 Inreach as Diffractive Pedagogy

Inreach became recognised locally amongst various scholars and practitioners in Dublin. The author was invited to teach, either through lecture or workshop form, at three separate art schools in the capital since the submission of the thesis for examination (IADT, DIT and NCAD). The author’s ability to distil and catalyse

knowledge traditions in between artistic and techno scientific research was recognised as important to contemporary art education.

The inreach experiment of *Engineering Fictions* was particularly recognised by contemporary artists and curators whose practices involved research and collaboration. For example, the author was invited to develop an *Engineering Fictions* session in correspondence with Dennis McNulty's exhibition for the Liverpool Biennial 2016 at the Bluecoat gallery in Liverpool, in September 2016.

As a mode of artistic research inreach conceptually and methodologically was clearly seen as relevant to scholars and practitioners (artists, curators, educators) who sought to negotiate ways of communicating, thinking, and imagining situated knowledges as individuating subjects in particular communities and contexts. The theories of the hidden curriculum and transversality in particular spoke to educational efforts to foster ways for differing knowledge traditions to co-exist and co-operate. While *Engineering Fictions* had become a well-honed tool of such a process, the concept of inreach offered a heuristic for opening up possibilities to create context sensitive experiments to a similar effect. The interest coming from educators to this effect was edifying and encouraging.

8.7.3 OMG – an interdisciplinary research platform for CONNECT

Since the submission of this thesis for examination, CTVR had been reformed into a much larger research organisation called CONNECT. This research centre was positioned as a world leading Science Foundation Ireland Research Centre for Future Networks and Communications, funded by SFI's Research Centres Programme and the European Regional Development Fund³⁶¹. Within this larger telecommunications research centre the author was instrumental in the formation of a new interdisciplinary research group playfully called the Orthogonal Methods Group. At the time of writing, the group consisted of new PhD researchers supervised by L.D. from the fields of architecture, sonification, and artistic research as well as post-doc researchers (J.F. and R.oD.) and artist-in-residence D.mN. The OMG's provisional mission statement, at the time of writing, was as follows:

The Orthogonal Methods Group (OMG) is a research platform within CONNECT that works in critical and creative relation/tension with technology.

³⁶¹ Visit <https://connectcentre.ie/about/> for further information.

Our broad purpose is to generate knowledges, insights and alternative research orientations across disciplines that are sometimes organised and/or perceived to be mutually exclusive. We aim to share ideas, raise questions and encourage dialogue (of technology) within CONNECT and with wider publics.

We employ various methodologies according to the demands and context of inquiry, including practice-based, experimental, philosophical, processual and collaborative approaches.

The movements and knowledges of inreach, generated through the author's engagement with CTVR and the *Design for Change* proposal, greatly contributed to the formation of OMG within CONNECT. Inreach effectively advocated for interdisciplinary research across artistic and engineering research within CONNECT.

Just as inreach was responding in counterpoint to expectations of 'outreach' within techno scientific research (CTVR), OMG can be understood as a critical counterpoint and complementary engine of education and public engagement initiatives framed under the acronym 'STEAM' (Science Technology Engineering Arts Math). While such acronyms are at best well-meaning and clumsy, at worst they are reductive and misleading. They can too easily elide assumptions about constitutes and validates knowledge.

Though OMG, though only in formation at the time of writing, retains a strong inreach orientation and ethos towards creative and ethico-political communication in the context of occupational difference.

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