

## **APPENDICES**

**Inreach:** *A Choreographic Process of Transversality*

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## **TABLE OF CONTENTS**

|                                                   |           |
|---------------------------------------------------|-----------|
| LIST OF FIGURES                                   | 3         |
| <b>GLOSSARY</b>                                   | <b>7</b>  |
| OCCUPATION                                        | 8         |
| OCCUPATIONAL DIFFERENCE                           | 8         |
| OCCUPYING POLITICS I                              | 9         |
| OCCUPYING POLITICS II                             | 10        |
| OCCUPATIONAL COMMUNITY/CITIZENSHIP                | 11        |
| INREACH                                           | 12        |
| EDUCATION AND OUTREACH                            | 13        |
| FOILING                                           | 13        |
| FREEDOM                                           | 13        |
| CONSTRAINT                                        | 14        |
| DIALECTIC                                         | 15        |
| DIALOGIC                                          | 15        |
| PARRHESIA                                         | 15        |
| PHRONESIS                                         | 16        |
| PARODY                                            | 16        |
| LYRIC                                             | 17        |
| GLOSSARY CITATIONS                                | 18        |
| <b>VISUAL ESSAYS TO ACCOMPANY THESIS CHAPTERS</b> | <b>19</b> |
| CHAPTER ONE                                       | 20        |
| CHAPTER TWO                                       | 22        |
| CHAPTER THREE                                     | 27        |
| CHAPTER FOUR                                      | 38        |
| CHAPTER FIVE                                      | 43        |
| CHAPTER SIX                                       | 54        |
| CHAPTER SEVEN                                     | 69        |
| CHAPTER EIGHT                                     | 72        |
| LINKS TO VIDEO ESSAYS                             | 76        |
| LINK TO FIELD-JOURNAL                             | 77        |
| FIELD-NOTEBOOK SAMPLES                            | 78        |
| A SAMPLE OF PROPOSALS WRITTEN WITH CTVR           | 83        |

## **List of Figures**

|                                                                                                                                                                |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 1 CTVRs Headquarters, Dunlop Oriel House, Dublin.....                                                                                                   | 20 |
| Figure 2 On the threshold of CTVRs PhD Lab, Dunlop Oriel House. ....                                                                                           | 21 |
| Figure 3 Infographics for CTVR Funding Review 2010 – developed by the author with CTVR Oct-Nov<br>2010. ....                                                   | 22 |
| Figure 4 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov<br>2010.....                                                    | 22 |
| Figure 5 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov<br>2010.....                                                    | 23 |
| Figure 6 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov<br>2010.....                                                    | 23 |
| Figure 7 The Design for Change proposal written by CTVR for the SFI Funding Review 2010.....                                                                   | 24 |
| Figure 8 CTVRs Design for Change proposal - project overview - as part of SFI Funding Review 2010.<br>.....                                                    | 25 |
| Figure 9 A screen-grab from an online version of A Communications Primer (1953) by Ray and Charles<br>Eames.....                                               | 26 |
| Figure 10 A screen-grab from an online version of A Communications Primer (1953) by Ray and Charles<br>Eames.....                                              | 26 |
| Figure 11 CTVR Phase One [2004-2010] - Green Booklet, c. 2007.....                                                                                             | 27 |
| Figure 12 Excerpt from the Green Booklet on 'What we do', CTVR Phase One, c. 2007.....                                                                         | 28 |
| Figure 13 Excerpt from the Green Booklet on 'Outreach', CTVR Phase One, c. 2007.....                                                                           | 29 |
| Figure 14 The front cover of CTVRs Design for Change proposal, 2010.....                                                                                       | 30 |
| Figure 15 An excerpt from the Design for Change proposal on Value to Ireland.....                                                                              | 31 |
| Figure 16 An excerpt from CTVRs Design for Change proposal on Value to Ireland.....                                                                            | 32 |
| Figure 17 An excerpt from CTVRs Design for Change proposal on Workpackage E.....                                                                               | 33 |
| Figure 18 An excerpt from the Design for Change proposal on Education and Outreach/Communicating<br>Communications. ....                                       | 34 |
| Figure 19 An excerpt from CTVRs Design for Change proposal on Education and<br>Outreach/Communicating Communications.....                                      | 35 |
| Figure 20 A rough sketch drawn by L.D. from memory of B.C.'s diagram which inspired CTVRs logo.<br>.....                                                       | 36 |
| Figure 21 A replica of Kandinsky's painting hanging in Dunlop Oriel House. The 'logo' and echo of B.C.'s<br>diagram is visible in the bottom right corner..... | 37 |

|                                                                                                                                                                           |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 22 The plaque which once accompanied Kandinsky's painting, reclaimed from storage, placed on the author's filing cabinet in the PhD. Lab, Dunlop Oriel House. .... | 37 |
| Figure 23 An image of the postcard invitation to CTVRs screening of A Communications Primer (1953), Dublin, Feb. 2011 .....                                               | 38 |
| Figure 24 A view of Prof. Hugh Campbell presenting an illustrated lecture on the Eameses work, Science Gallery, Feb. 2011. ....                                           | 38 |
| Figure 25 An image of the postcard invitation to CTVRs second screening of A Communications Primer(1953), Cork, May 2011.....                                             | 39 |
| Figure 26 An excerpt of the agenda for CTVRs Plenary 2011, featuring the Communicating Science workshop. ....                                                             | 39 |
| Figure 27 A text written post-Plenary coming to terms with the 'emotional load' of the Communicating Science workshop. ....                                               | 40 |
| Figure 28 A rough sketch of the publicity and score for Room 3.17, in correspondence with G.V.41                                                                          |    |
| Figure 29 An experiment set up for testing signals in movement, with the use of a toy train, devised by J.T.....                                                          | 43 |
| Figure 30 A view into the Test-Bed at Dunlop Oriel House prior to renovation in 2012 – 2013..                                                                             | 43 |
| Figure 31 A view on Room 3.17 in April 2011, shortly after the author moved in there. ....                                                                                | 44 |
| Figure 32 An Architectural Plan of the 3rd Floor of Dunlop Oriel House, indicating the location of Room 3.17.....                                                         | 45 |
| Figure 33 A screen-grab from an online version of the Eameses film Blacktop (1952) .....                                                                                  | 45 |
| Figure 34 A screen-grab from an online version of the Eameses film Blacktop (1952). ....                                                                                  | 46 |
| Figure 35 An antenna from the Antenna & High Frequency Research Centre, CTVR/DIT. ....                                                                                    | 46 |
| Figure 36 A screen-grab from The Path of an Object, a video-essay on the process of Sarah Browne. ....                                                                    | 47 |
| Figure 37 A screen-grab from The Path of an Object, a video-essay on the process of Sarah Browne. ....                                                                    | 47 |
| Figure 38 A sample worksheet from the Genealogies; Frameworks for Exchange workshop by Alex Martinis Roe. ....                                                            | 48 |
| Figure 39 An early sketch for the The Art of Antennas proposal, written by L.D.....                                                                                       | 49 |
| Figure 40 A view of Room 3.17 prepared and prior to the first experimental dialogue.....                                                                                  | 50 |
| Figure 41 A view of the make-shift photographic studio down the corridor from Room 3.17. ....                                                                             | 50 |
| Figure 42 A view of the genetic algorithm antenna gif projected in Room 3.17. ....                                                                                        | 51 |
| Figure 43 A view of the filming apparatus in use during the Room 3.17 experiment - this shot is mid-experiment, an interval between encounters. ....                      | 51 |

|                                                                                                                                                   |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 44 A contribute to Room 3.17 made by C.G. – The Waterfall is an intuition of future network research and design. ....                      | 52 |
| Figure 45 A contribute to Room 3.17 made by T.F. – A parodic simile: The Taoiseach's phone and the Popes speech.....                              | 53 |
| Figure 46 A graphic to accompany the Filling the White spaces workshop information materials..                                                    | 54 |
| Figure 47 A member of the audience reads the agenda of the Filling the White Spaces workshop – L.D. and T.F. convene the distance.....            | 54 |
| Figure 48 Prof. Misha Dohler speaking at CTVR, January 2013.....                                                                                  | 55 |
| Figure 49 A scan from Ludwig von Bertalanffy's General System Theory featuring the phrase on the 'Verbal Model'. ....                             | 55 |
| Figure 50 Scan of the Certificate Awarded to the author on the occasion of the inaugural Ludwig von Bertalanffy Young Scientist Award, 2012. .... | 56 |
| Figure 51 Scan of Ludwig von Bertalanffy Young Scientist Award Certificate, 2012. ....                                                            | 56 |
| Figure 52 Email responses made by CTVRs researchers to the question of the Verbal Model. ....                                                     | 59 |
| Figure 53 An image accompanying the announcement for Pat McCabes Writing Course.....                                                              | 60 |
| Figure 54 A view from The Writing Workshop, hosted at P.S. 1, New York, New York. ....                                                            | 61 |
| Figure 55 A graphic for the HACKRONYM writing workshop as part of OpenHere, 2012.....                                                             | 61 |
| Figure 56 A Popcorn word-web generated through the HACKRONYM workshop.....                                                                        | 62 |
| Figure 57 The HACKRONYM writing workshop underway as part of OpenHere at Science Gallery, 2012. ....                                              | 62 |
| Figure 58 The seminar room at Dunlop Oriel House configured for the first Engineering Fictions session, 29.01.13. ....                            | 63 |
| Figure 59 A popcorn exercise on a Napkin from the first E.F. session. ....                                                                        | 64 |
| Figure 60 An overhead view of a popcorn exercise in action during an E.F. session. ....                                                           | 65 |
| Figure 61 A screen-grab from the Cognitive Radio E.F. session posted on engineeringfictions.wordpress.com .....                                   | 66 |
| Figure 62 The score for John Cage's Imaginary Landscape No. 4 discussed by L.D. during her catalysis of E.F. ....                                 | 66 |
| Figure 63 A screen-grab from the E.F. blog featuring L.W.s session CAGE.....                                                                      | 67 |
| Figure 64 A view from the E.F. session catalyzed by L.W. – CAGE – this is during the writing section. ....                                        | 68 |
| Figure 65 A view from E.F. session catalyzed by L.W. - CAGE - this is during the writing section.                                                 | 68 |
| Figure 66 A contribute to Room 3.17 by P.S. - a colander - in conversation with an antenna. ....                                                  | 69 |
| Figure 67 A sketch from the Field-Notebooks visualizing the filmmaking process in Room 3.17....                                                   | 69 |
| Figure 68 Contributes to Room 3.17.....                                                                                                           | 70 |

|                                                                                                                                             |    |
|---------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 69 Contributes to Room 3.17 .....                                                                                                    | 70 |
| Figure 70 Contributes to Room 3.17. ....                                                                                                    | 71 |
| Figure 71 Contributes to Room 3.17 made during dialogue and filming by participant observers...                                             | 71 |
| Figure 72 Stickers designed by CTVR for sharing during public events. ....                                                                  | 72 |
| Figure 73 artifacts from CTVRs Postcards from the Near Future experiment.....                                                               | 72 |
| Figure 74 A workshop catalyzing the Postcards from the Near Future experiment, led by S.mG. 2013<br>.....                                   | 73 |
| Figure 75 Postcards from the Near Future, installed at CTVRs Showcase 2013.....                                                             | 73 |
| Figure 76 Engineering Fictions continues into 2014 at CTVR.....                                                                             | 74 |
| Figure 77 2014 An Engineering Fictions session catalyzed by artist D.mN. ....                                                               | 74 |
| Figure 78 Developing plans for a Grey Space within Dunlop Oriel House, 2014.....                                                            | 75 |
| Figure 79 Work by artist Seoidín O'Sullivan and architect Karol O'Mahony - extending towards a seating<br>system for CTVRs grey space. .... | 75 |

## **GLOSSARY**

The language developed over the course of the research process is significant of the ‘*embodied criticality*’ of the artistic research practice. The words and phrases making up this glossary can be understood as “*the way we give name to the nameless so it can be thought.*” (Lorde 1993: 37) These names and concepts emerged from insights afforded by the confluence of artistic and engineering research practices through CTVR. These are partial descriptions are provisional, inviting further thought, contextualisation and extension.

## **occupation**

The formative concern of the artistic research practice, prior to the work begun with CTVR during this PhD research, involved storying a nuanced understanding of *occupation*. Through embodied research and improvised engagements across various sites, places, and histories, and with various people, this word came to have a triangulated and ambivalent meaning for the author:

- to keep ones mind/body diverted, to pass the time... e.g.: to daydream, to prevaricate, and to permit the mind and bodily sensations wander...
- to work at something - profession, vocation or labour; e.g.: woodworker, programmer, lawyer, teacher, service-worker...
- to take hold of some territory, some space, some time, to seize possession of, to take ownership of... e.g.: *The British Empire's colonisation of Ireland*.

Or; to dwell, to take shelter, e.g.: *As within a house*:

*'Transcending our memories of all the houses in which we have found shelter, above and beyond all the houses we have dreamed we lived in, can we isolate an intimate, concrete essence that would be a justification of the uncommon value of all our images of protected intimacy?' (Bachelard 1994 [1964]:3)*

Keeping these meanings of occupation simultaneously in mind provided an aesthetic imaginarium from which to act and choreograph movement in the world. Artistic action and research happens through an interweaving of daydreaming, vocational power (skills, education, principles, imagination, craft) and an acknowledgement of the persistent lived tension between *possessing* and *dwelling*. *Occupation* thus becomes the conceptual 'red thread' running through experimental story-telling and involves the artistic research practice deeply in a lived politics of representation.

## **occupational difference**

The prehension of *occupational difference* emerged in recognition of acts of 'smuggling': artistic research practice was *smuggled* into the domain of telecommunications research by CTVR, and was 'hidden-in-plain-sight' under a claim (*communicating communications*) of CTVR's *Education and Outreach*. Irit Rogoff theorises smuggling as a mode of 'embodied criticality'. As trespass, it advocates a different ontology: "...'*a living things out*', which has a hugely transformative power, as opposed to *pronouncing on things*. In the duration of this activity, in the actual inhabitation, a shift might occur that we generate through the modalities of that occupation rather than through a judgement upon it." (Rogoff 2013 [2006])

Since circa 2011, this action of *smuggling* has become a "*fundamental principle*" of the research organisation CTVR, albeit a relatively clandestine one. This action is understood as pragmatic and lyrical. It acknowledges the real and present capacity for traditions of funding and research to change and adapt to alternative models of practice and difference. As an effect of the operations of 'smuggling', *occupational difference* was coined to enlarge a growing interest

in developing inter- and trans- disciplinary collaboration and cooperation across the academe, business, government and industry. This language, couched as it is in the patriarchal traditions of the University, typically excludes and/or ignores practices and work outside of and beyond these sectors, for example self-organised communities and individuals working through the arts. The term acknowledges that the prefixes 'inter', 'multi', 'cross' and 'trans' are poor descriptors for the embodied, communicative, social, political and intellectual work required to "*take our differences and make them strengths*". *occupational difference* is a concept that attempts to address this linguistic elision, holding it to account by calling attention to possibilities of making space with and for each other. This is work acted out at the level of *participant observation* and *correspondence* from within the machinations of the knowledge economy; it enacts "*a performative disruption that does not produce itself as conflict*"(Rogoff 2013 [2006]).

*occupational difference* was thus a concept formed through and with CTVR as a way to *name* and *think* the conditions of art research practice within a techno-scientific domain. The name sought resonance with feminist and queer theories of difference. The concept took hold as a *principle of action* for the artistic research practice: *to learn with, by and from each other, without knowing, and without needing to know, each other's languages, ontological assumptions and/or epistemic frameworks; without attempting to deliberately change or assimilate each others ways of knowing and being in the world; but to activate a dimension of political possibility in-between ourselves; despite ourselves and our doubts; our privileging of competition; our habits of possession; and our bizarre dismissal of love and intimacy.* The artistic research practice in this case was such that it refused to explain, but only to enact, to rehearse, to show, to dialogue, to story. The reasoning for this? "*It is learning how to take our differences and make them strengths. For the master's tools will never dismantle the master's house*" (Lorde 1993).<sup>1</sup>

There is an ambivalent desire for occupational diversity, which means that the tensions of occupational difference must be acknowledged and resources must be developed to learn from and work with difference.

## ***occupying politics I***

For Hannah Arendt, politics is "*a space of appearances... wherever men [people] live together in a community*". (Arendt, Essays) For Jacques Rancière, "*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). *occupying politics* refers implicitly to conditions of *occupational difference*. *occupying* refers to the subjective action and mediation of unfolding *situated knowledges* of a person, as she engages with the

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<sup>1</sup> The implications of this decision are myriad and dangerous; the risk was to rely on the other to listen, to receive what was shared. While it is true that there was a hermeneutical asymmetry at work between the artistic and engineering occupations, this served to exacerbate a more fundamental problem: the capacity to listen and "*to take our differences and make them strengths*" in the process of communication.



world through work (employed or unemployed); through discourse (with self and with others); through her historical and territorial *situation and location* within that world through time.

If 'smuggling', in this case, is a mode by which *occupational difference* comes into relation, then the 'artist' and her 'actions' in the world of the research organisation constitutes a kind of *contraband*. Following Rogoff then, the question of *occupying politics* becomes: (a) "how do critical subjectivities intersect with *contraband* and what new forms of critical empowerment come out of this?; and (b) "whether smuggling enables communication?" (Rogoff 2013 [2006]) Rogoff seeks to couple *smuggling* with contemporary practices of *participant observation* or 'fieldwork', such that "we can conceive and materialize a new theory of mobility". This 'mobility' is imagined as a fluency of *occupational difference*.

*occupying politics* means negotiating the freight of identity that comes with 'occupation' as work-and-place-in-the-world, while permitting its other affordances to breathe; such as storying, listening, imagining, daydreaming, relating, etc. This understanding of *occupying politics* is predicated on the way in which the artistic research practice came to operate within the domain of telecommunications engineering as a mode of choreography; setting in motion 'convections' within the research organisation through 'experiments'.

*occupying politics* is necessarily bound by prevailing conceptions of freedom and politics, and one of the challenges of such practices is to find ways to interrupt and question these assumptions. If *occupational difference* is thought as constitutive of an experimental counter-public realm, a political space, then *occupying politics* is a way of inhabiting the freedoms afforded by this space. *occupying politics* is an attentional process, which in the context of the academe, moves from a process of *embodied criticality* and *situated knowledges*, towards *critique*; storying the "underlying assumptions that might allow something to appear as a convincing logic" (Rogoff 2013 [2006]) Thus *occupying politics* seeks to develop a dialectic through sustaining and enriching dialogic conditions of political space.

The dialectic actions (writing the *Design for Change* research agenda) leading to the development of conditions of *occupational difference* within CTVR enacted an *occupying politics* within the occupational domain of engineering. Such actions inhabit and exploit the interstitial freedoms afforded under existing conditions of academic-industry based research.

## ***occupying politics II***

*Occupying Politics* is the name given to contemporary conditions which (a) sustain a fictive, causal relation between freedom and politics, as opposed to recognizing their interdependence, and (b) sustain a reductive conception and mapping of "power to instrumentality" and "of freedom to mastery" (Arendt 2000, Winnubst 2006). *Occupying Politics* imagine that politics is generative of freedom, whereas "the faculty of freedom itself" involves "the sheer capacity to begin, which animates and inspires all human activities and is the hidden source of production of all great and beautiful things." (Arendt 2000) This logic of causality is

perhaps why occupations such as art and engineering are so often assumed to be nonpolitical. But, Hannah Arendt argues that *“Because the source of freedom remains present even when political life has become petrified and political action impotent to interrupt automatic processes, freedom can so easily be mistaken for an essentially nonpolitical phenomenon; in such circumstances, freedom is not experienced as a mode of being with its own kind of ‘virtue’ and virtuosity, but as a supreme gift which only man, of all earthly creatures, seems to have received, of which we can find traces and signs in almost all his activities, but which, nevertheless, develops fully only when action has created its own worldly space where it can come out of hiding, as it were, and make its appearance.”*(Arendt 2000: 458) Freedom, however is an act of beginning that performs regardless of whether there is a theatre or space wherein it may appear. To think of freedom as an effect of political space is to misunderstand both. *Occupying Politics*, in the words of Audre Lorde, are *“living structures defined by profit, by linear power, by institutional dehumanization”*. These are the structures that deny the survival of feeling. To counter the structures and forces of *Occupying Politics* is not to invent new ideas: *“For there are no new ideas. There are only new ways of making them felt...”* (Lorde 1993: 39) *Occupying Politics* would deny the rationality of feeling. *occupying politics* would embrace and catalyse the rationality of feeling, to open out spaces where freedom and politics may appear. Hence, *“new ways of understanding ourselves”* so that we can act, that we will act.

### **occupational community/citizenship**

In a discussion developed during one of the *Engineering Fictions* sessions, the subject of ‘corporate community’ arose: *“It was L.d.S. who brought it up actually. He used to work with IBM in the early 90’s. He said it was true that IBM workers identified with each other, and with IBM as a whole, as their family. It was work and play and think and create and eat and drink all in one go, all in one place. It was a harbour for everything. Or a cage, depending upon your disposition. And he said that he sees that Google is modeled on this the same. They are the IBM of the 21<sup>st</sup> century. And I wondered what we [CTVR] were? Was the same kind of community building at work? No! the E.F. people declared. So perhaps not.”* (Foley 2014-2015) Economist Guy Standing refers to this as ‘corporate citizenship’: *“Take Google as a quintessential example. Applicant employees are judged by their perceived ‘Googliness’, possessing a set of characteristics indicating a predisposition to labour hard in a collaborative way... employees are provided with free breakfast, lunch, dinner, and transport, as well as an on-site laundry service, hairdressing, and even massage. Offices are decorated with ‘fun objects’ in primary colours and giant bean-bags lend a sense of informality. In return, employees are expected to work long hours, although engineers are allowed 20 per cent of their time on the job to pursue ‘projects’.”*(Standing 2009: 250) It is in contrast and counter to such labour practices, and broader economic and labour structures, that Standing develops the idea of occupational community towards a conception of occupational citizenship. According to Standing, *“an occupational community embeds work in a context of association, with standards of self-discipline, civic friendship, and character, in conflict with pressures for efficiency. There is a tension between the solidarity of an occupational community and that of a family structure. Just as the family can create subordination and stratification so can occupational communities. We thus need a set of overlapping communities to balance rent seeking, hierarchies and incestuous*

controls.”(Standing 2009: 33) Corporate citizenship, according to Standing, reinforces the commodification of labour. Occupational citizenship would seek to reconfigure this arrangement: “As far as vocation is concerned, we may be experiencing an intellectual equivalent of the Renaissance, a realization that our work should not be set by some *deus ex machina*, be it a boss, an awesome technology embodied in massive buildings or machines, or some monolithic agent of the state”(Standing 2009: 252). There is a striking resemblance between Standing’s description of occupational community in the way The Eames Office organised itself (Demetrios 2001). The concept of ‘occupational citizenship’ is also being theorised and enacted through contemporary art research practices, such as those developed by Celine Condorelli, where ‘friendship’ becomes a model for action and work (Condorelli 2009, Condorelli 2014). As an economist, Standing does not develop a discussion of difference, except partially in relation to class distinctions of work. However, his analysis opens up scope for thinking through the value and urgency of experimenting, imagining and thinking how to organise ‘living together’ through *occupational difference* as framed within this research.

## ***inreach***

This word developed by thinking through the experienced limitations of Outreach as a model of social and political communication in the context of CTVR. *Inreach* began as a way of naming the ‘*embodied criticality*’ catalysed through the act of ‘*smuggling*’ within CTVR. This name gives purpose to the felt orientations of needs unanswered within the research organisation. The aspiration of *inreach*, the principle of its action, is collective self-awareness, listening and *correspondence: the process by which lives answer to one another in an ongoing and open-ended way*. *Inreach* seeks to assert the central importance of listening, feeling and attentionality as inherently *rational* to human political and social life, and as fundamental to occupational life, as triangulated within this thesis. It is a complex and ongoing process, and is non-teleological. Such processes have by and large become utterly *strange* to the everyday working lives of those in the techno-scientific, bureaucratic, and technocratic domains. *Inreach* is a process that has sought to redress this.

The European Commission has recently supported an initiative called *The Onlife Manifesto*, which focuses on “*Rethinking public spaces in the digital transition*” and “*Being human in a hyperconnected era*”. The manifesto calls for the protection and cherishing of “*humans attentional capabilities*”: “*In the digital economy, attention is approached as a commodity to be exchanged on the market place, or to be channeled in work processes. But this instrumental approach to attention neglects the social and political dimension of it, i.e., the fact that the ability and the right to focus our own attention is a critical and necessary condition for autonomy, responsibility, reflexivity, plurality, engaged presence, and a sense of meaning*” (The Onlife Initiative 2015) *Inreach* is a process that seeks to foster cooperation. As Richard Sennett reminds us, cooperation “*becomes an earned experience rather than just thoughtless sharing*” (Sennett 2013: 13). *Inreach* is a process that enacts experimentation and communication, following a principle of listening and keeping in mind the agonistic possibilities of freedom.

## **Education and Outreach**

Within centres of excellence funded through the Science Foundation Ireland, programmes of Education and Outreach, more recently renamed as *Education and Public Engagement*, develop and structure activities which include student placements, lab tours, web-based mentoring programmes, games/videos/competitions, school visits/workshops and so on. The focus of this work is to inform young people and prospective students of STEM subjects about the scope and possibilities of these fields and disciplines. As an increasingly promotional activity, Education and Outreach responds to the demands of the *Knowledge Economy*.

## **foiling**

*“A foil, as I will work to show you, is an other who is not committed to the rules and truths of the dominant world-view, the dominant know-how and know-what of a culture. But the foil is committed to their own particular world-view, their own know-how and know-what. They are skilled in their own discipline, discourse and craft. But they have no allegiance to the dominant world, and they resist allegiance or subsumption to this world, even as they appreciate and respect its culture and its expertise. The foil is a boundary subject. She works within boundaries. Grey spaces of knowing and being. In this case the foils are subjects from the knowing worlds of art and engineering. They are foils of each other. And as foils they are also friends.” [15.02.15] (Foley 2014-2015)*

The excerpt from the Field-Journal demonstrates an instance in the process of coming to conceptualise and understand the act of a foil. *Foiling* is a way of relating towards self and other in processes of cooperation and collaboration. It is an attentionality that supports *unlearning*, which means “working critically back through one’s history, prejudices, and learned, but now seemingly instinctual responses...” (Spivak 1996). While foiling offers “only a partial perspective” it is 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) Foiling can be understood as a “quality of light by which we scrutinize our lives”, an steady practice of listening and speaking freely of what has been heard. *Foiling* as a disciplined attentionality and ‘embodied criticality’ resonates with Audre Lorde’s proclamation: “I am who I am, doing what I came to do, acting upon you like a drug or a chisel to remind you of your me-ness, as I discover you in myself.” (Lorde 1993: 11) Foiling is recorded in the field-notes as follows: “I got some further insight into J.K.’s work today. And into my own. The foil at work. I can see myself through you. I can think myself through you.” It is a discipline that attenuates and wavers – Lorde’s quote above registers a *healthy* intensity of *foiling*. *Foiling* depends upon freedom and the space of appearances constitutive of politics.

## **freedom**

The artistic research practice generative of this thesis was conscious of a tension between agency and constraint from the moment of agreement to work within a domain inviting occupational difference. The tension between freedom and constraint has been persistent. Thinking through Hannah Arendt’s political theory of freedom has helped to clarify the

interdependence between freedom and politics, and has thus helped to affirm the subtle agonism experienced through the research process. There is a difficulty in conceiving of freedom as constrained by politics; the challenge is “to conceive of freedom down different rails of experience” In this research, an effort is made to think generally by expanding the meaning of a now familiar and freighted word ‘occupation’. The principle of freedom within this research is queer: “To queer things is to transform them, in ways we cannot anticipate: to queer is to foil anticipation and it’s temporality of a future-anterior”. Which is as Arendt says, a ‘miracle’: “Every act, seen from the perspective not of the agent but of the process in whose framework it occurs and whose automatism it interrupts, is a ‘miracle’ – that is, something which could not be expected.”(Arendt 2000: 458) Performing ‘miracles’ might be along parallel rails as ‘queering freedom’. Virtuosity has been described by Arendt as a form of politics. Choreographer Jonathan Burrows writes, “Virtuosity is just another way to help the audience to care what happens next.”(Burrows 2010: 76)

## **constraint**

One of the earliest insights into CTVR and the world of telecommunications was through an aphoristic warning of the dangers of intensive research: *When you have a hammer, all you see are nails*. This aphorism was telling of an individualistic approach to developing knowledge, suggestive of a lone figure, beyond a political community of others that might interject in such rampant and indiscriminate hammering. The quintessential modernist scientific epistemological subject. This aphorism appealed to the *logic of the limit* that would “excavate how classical liberalism presents a hollow concept of freedom”. Drawing upon the thinking of Foucault and Bataille, Shannon Winnubst argues that “such notions of freedom as the transgression of boundaries or liberation from constraint only enmesh us further in the very systems of domination we seek to resist.” (Winnubst 2006) However, as per Arendt’s understanding of the interdependence of freedom and politics, *constraint* acts as a *foil*, it is a co-efficient of this interdependence. *Constraints* command action, whether they are complied with, or transgressed, or...approached differently. CTVR’s interest in the Eameses was augmented by their understanding of the design process as, on the one hand, “the ability of the designer to recognize as many of the constraints as possible”, (the area of interest to the designer; the area of interest to the client; the area of interest to society as a whole), and, on the other, a “willingness and enthusiasm for working within these constraints”. Otherwise, a design process would not be engaged with unless it was recognised as an authentic and relevant problem. (Demetrios 2001: 168-69)

*“It’s pretty simple really. It all began with an unexpected invitation. A call, I suppose. Perhaps I have a tendency to respond the way a musician would, you can’t leave the call hanging. You’ve got to play along somehow. It’s worth the risk... no, it’s worth the trust. You can feel it accumulating the minute you perceive. The moment you perceive. It was a call. True and simple. Laced with ulterior motives? Maybe. These worlds are complex. They meet and get muddy. Like pigs in shit. But then, you need to put the shit in order and see what can be done with it. And for that, you need to clarify. You need to*

*make transparent what's going on. De-mystify, some might call it. Tell it like it is. Phenomenology others might call it. I call it trust. This is not blind faith. Some people might think of trust like some kind of pseudo religious state, a transcendental moment of higher consciousness. It's more simple than that. A lot less convoluted. That's for sure. What is it then? Call and Response? Proximities of Difference. People, different by nature, by form, in proximity and needing one another, when they're not wanting one another. Difference. Keeps the world going round somehow. I'm supposed to put this shit together into some kind of thesis. A big academic text that's supposed to look like an engineering manuscript. Statement - Evidence. I'm meant to say: This thesis presents x and gives reasons for it's existence in the first place. I don't even really know the formula I have to say. I don't. I've never been much good with formulae. I like simple constraints. Limits. To exercise the spirit and the perceptions."*  
[18.10.13] (Foley 2012-2014)

### **dialectic**

This is understood in a practical, more so than philosophical, way in this research. Following Richard Sennett, *"In dialectic, as we learned in school, the verbal play of opposites should gradually build up to a synthesis; dialectic starts in Aristotle's observation in the Politics that 'though we may use the same words, we cannot say we are speaking of the same things'; the aim is to come eventually to a common understanding. Skill in practicing dialectic lies in detecting what might establish that common ground".*(Sennett 2013: 18) In this research, a principle of inefficiency and postponement of the dialectic is in operation, in order to allow a dialogic to develop. The dialectic is sought through the dialogic experience.

### **dialogic**

Again, Richard Sennett offers a succinct translation of the dialogic as a name for a discussion without resolution: *"Though no shared agreements may be reached, through the process of exchange people may become more aware of their own views and expand their understanding of one another."*(Sennett 2013: 19) Within processes of dialogism or dialogic, *"Everything means, is understood, as part of a greater whole – there is a constant interaction between meanings, all of which have the potential of conditioning others. Which will affect the other, how it will do so and in what degree is what is actually settled in the moment of utterance."* Dialogic, for Bakhtin, is understood as the *"characteristic epistemological mode of a world dominated by heteroglossia"*, where heteroglossia is understood as the *"base condition governing the operation of meaning in any utterance. It is that which insures the primacy of context over text."*(Bakhtin 2004 (1981): 426-28)

### **parrhesia**

The term *parrhesia* is often translated as 'free speech', but it is also used to refer to the idea of truth-telling, specifically in a situation where the speaker stands to lose something or risk themselves. Strengthening capacities for *parrhesia* and voice, both as process and value (Couldry 2010), are imperative to situations of *occupational difference*, and essential to supporting processes of attentionality and correspondence (Ingold 2007, Ingold 2015), in alliance with those of intentionality and dialectic. Foucault's understanding of *parrhesia*

understand that *truth* is a kind of *situated knowledge*: “I believe too much in truth not to suppose that there are different truths and different ways of speaking the truth... we can demand of those who govern us a certain truth as to their ultimate aims, the general choices of their tactics, and a number of particular points in their programs: this is the *parrhesia* (free speech) of the governed, who can and must question those who govern them in the name of the knowledge, the experience they have, of what those who govern do.” At a time increasingly advocating for self-organization, there has never been a greater need for the truth-teller, the *parrhesiastes*, to make these demands of the self, but only in the (paradoxically) protective space of the polis; not in the isolating cell of the enlightenment figure of rationality. Hence, truth-telling and practices of unlearning must become friendly forces.

## ***phronesis***

This concept emerged through studying the work of Charles and Ray Eames, and comparing to the artistic research practice of the author, and to her experience of artists making work cooperatively and/or collaboratively with others (individuals/groups/communities/organisations/institutions/ etc.), by way of ‘*embodied criticality*’. *Phronesis* acts a conceptual heuristic for *inreach*. *Phronesis* is understood as an inherently political activity, it involves deliberation within a particular always-changing and situation. It is understood in this thesis as a process and mode of acquiring self-knowledge, as a political and social living creature, particularly through communicative action in the world. The concept speaks to the Eames ethos of design and CTVR’s ethos of design. On the one hand, the Eames’ ethos of design was framed by an understanding of constraint as a context for the appearance of freedom. The Eames focus was upon first paying attention to the situation of the design problem in order to “recognise as many of the constraints as possible” (Demetrios 2001). This reflects Aristotle’s understanding of *phronesis* as “less a capacity to apply rules than an ability to see situations correctly” (Aristotle and Crisp 2000). For the Eames, the design situation was determined by their own interest, by their ‘clients’ interest and by the ‘concerns of society as a whole’. Each of these had to overlap in some way in order for the Eames to accept a design problem, otherwise they would refuse. In order to address the needs of their ‘clients’, CTVR has been attempting to follow a principle of *Design with Change in Mind*. The relentless teleology of such a principle puts tremendous strain upon the research agenda, hence the organisations move to foster attentionality around the interests of researchers and the concerns of society as a whole. *Phronesis* was understood as a heuristic concept that could support the logic of *inreach*. Attending to the ways of being in the world accommodated through the action of *Phronesis* is relevant to sustaining processes of transversality.

## ***parody***

The understanding of parody developed in this thesis is drawn from the work of Linda Hutcheon. Parody does not refer to the trivializing wit or ridiculing of popular culture in the 18<sup>th</sup> century. Parody changes with time, use and context. As Hutcheon explains, “As a form of ironic representation, parody is doubly coded in political terms: it both legitimizes and subverts that which it parodies.” Though she is thinking parody through the work of artists and writers, her

theory of parody is relevant within the engineering context too. She writes, “*Some male artists have used parody to investigate their own complicity in... apparatuses of representation, while still trying to find a space for criticism...*” In the context of CTVR, parody has been employed intuitively as a way of investigating complicity in apparatuses of representation. There is scope to open this up further, through ‘embodied criticality’ within the space of engineering. Within this thesis, parody is legible as a device that “*contests our humanist assumptions about... originality and uniqueness and our capitalist notions of ownership and property.*”(Hutcheon 2002 [1989]: 89-90) Moreover, however, it is understood as a ‘mood’ or ‘humour’ of transversality at work within the research organisation CTVR at particular moments.

## **lyric**

As with Parody, Lyric is understood as a ‘mood’ or ‘humour’ of transversality within CTVR at different moments of the *inreach* experiments. Before proposing what lyric means in the context of this research, a brief note on ‘humour’ by Umberto Eco: “*Humour does not pretend, like carnival, to lead us beyond our own limits. It gives us the feeling, or better, the picture of the structure of our own limits. It is never off limits, it undermines limits from inside. It does not fish for an impossible freedom, yet it is a true movement of freedom. Humour does not promise us liberation: on the contrary, it warns us about the impossibility of global liberation, reminding us of the presence of a law that we no longer have reason to obey. In doing so it undermines the law. It mask us feel the uneasiness of living under a law – any law.*” In this sense, the humour of lyric relates to (but is not the same as) the “romantic way of being-with-technology” outlined by philosopher Carl Mitchum as characterised by “*a pluralism of ideas that constitutes a critical uneasiness*”. Mitchum proposes that the critical uneasiness of romanticism, “*it’s internal ambivalences, its bipolar attempt to steer a middle course between premodern skepticism and Enlightenment optimism*”, is what renders it inadequate as “*a truly viable way of life*”. Lyric is conceptualised as a quality of the communicative practice between art and engineering. The attunement in-between these occupations is acknowledged as a crisis of self-representation. Theodore Adorno writes, “*Today, when individual expression... seems shaken to its very core in the crisis of the individual, the collective undercurrent in the lyric surfaces in the most diverse places: first merely as the ferment of individual expression and then perhaps also an anticipation of a situation that transcends mere individuality, in a positive way.*”(Adorno 1991)

***The greatest thing we can do is organise and make space for each other.***



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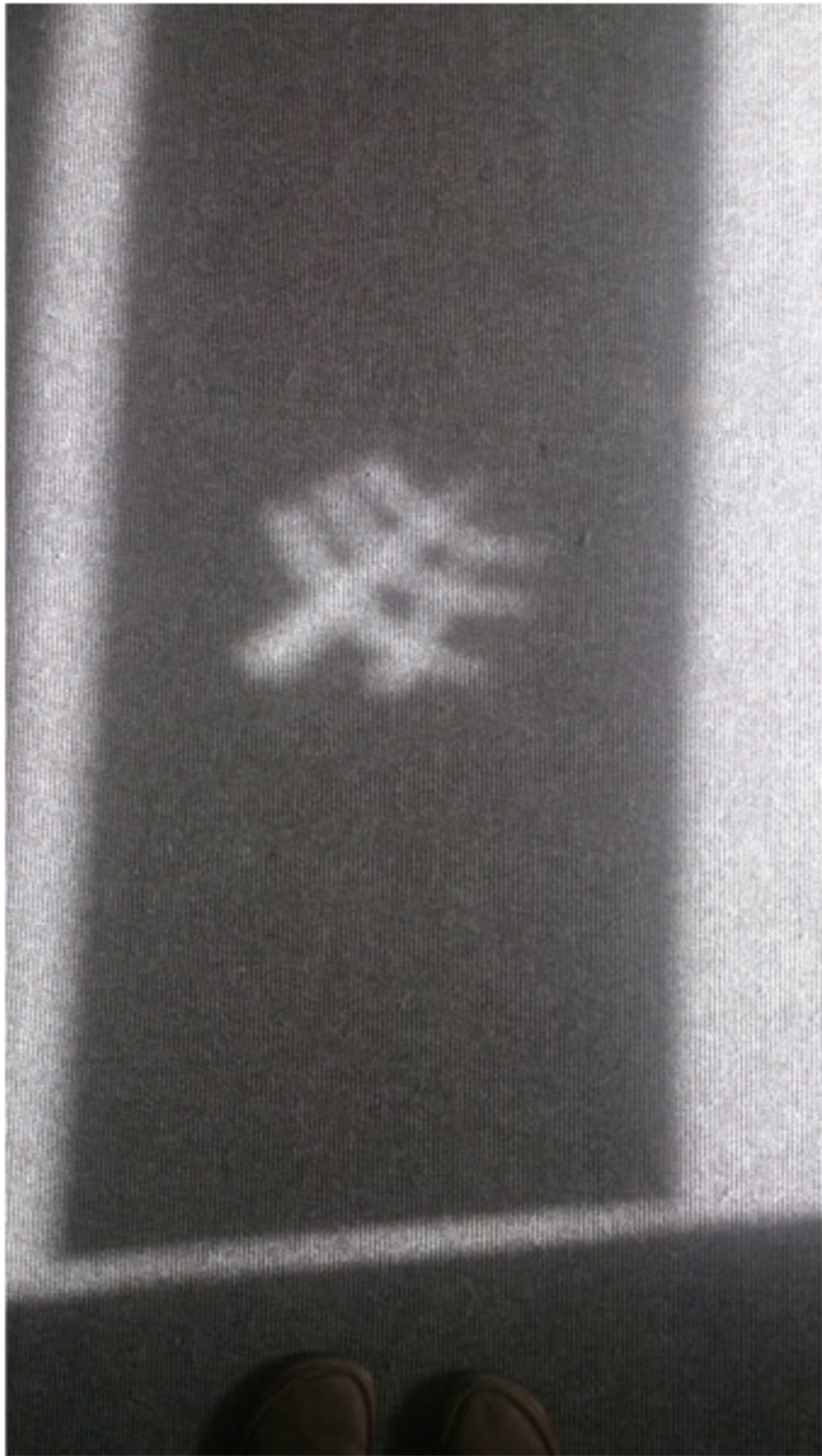
## **VISUAL ESSAYS TO ACCOMPANY THESIS CHAPTERS**

Each Chapter is dealt with separately. Images are captioned, listed and where necessary cross-referenced within the body of the thesis. Additional images are included in the visual essays for each Chapter where appropriate, to extend a sense of the materiality and conditions of the research and research environment of CTVR. [The intention is to extend this visual and cross-reference process in the near future, by developing a score for *inreach* to date.]

## Chapter One



*Figure 1 CTVR's Headquarters, Dunlop Oriel House, Dublin.*



*Figure 2 On the threshold of CTVRs PhD Lab, Dunlop Oriel House.*

## Chapter Two

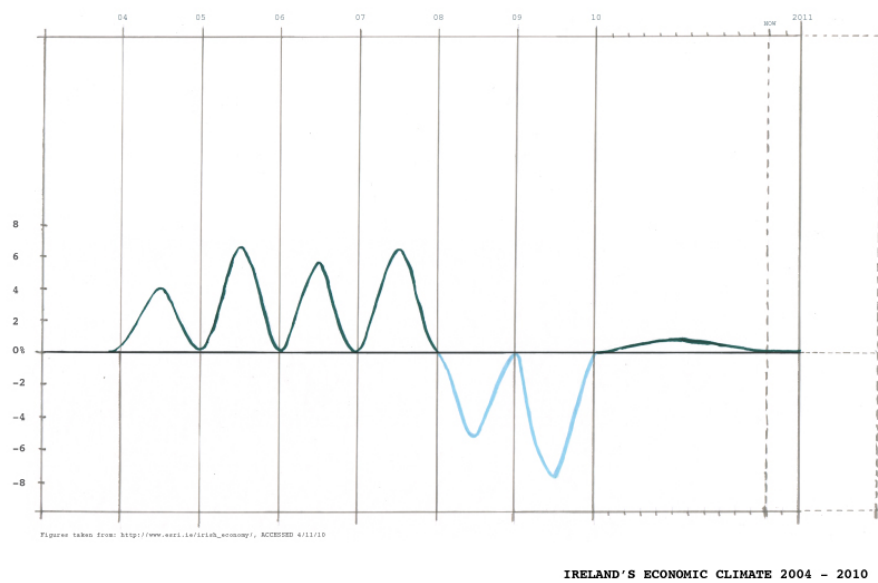


Figure 3 Infographics for CTVR Funding Review 2010 – developed by the author with CTVR Oct-Nov 2010.

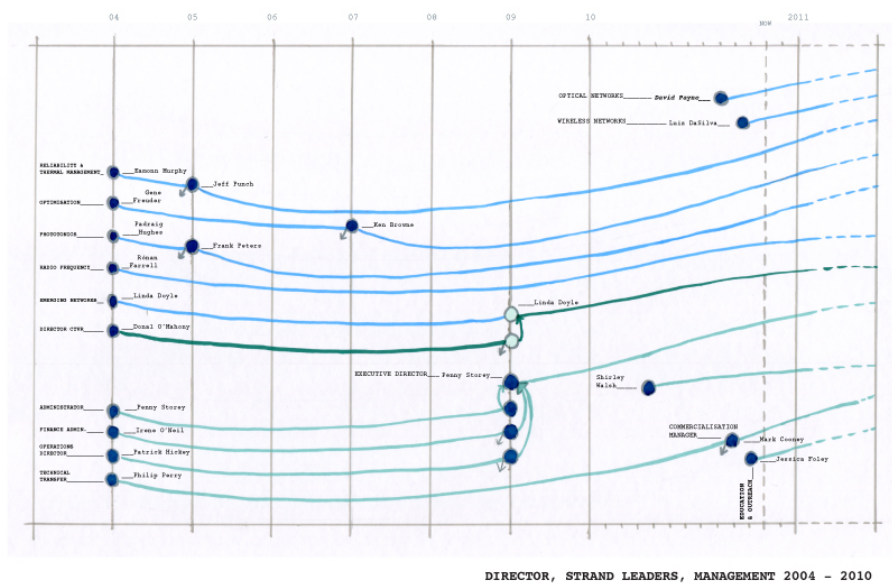
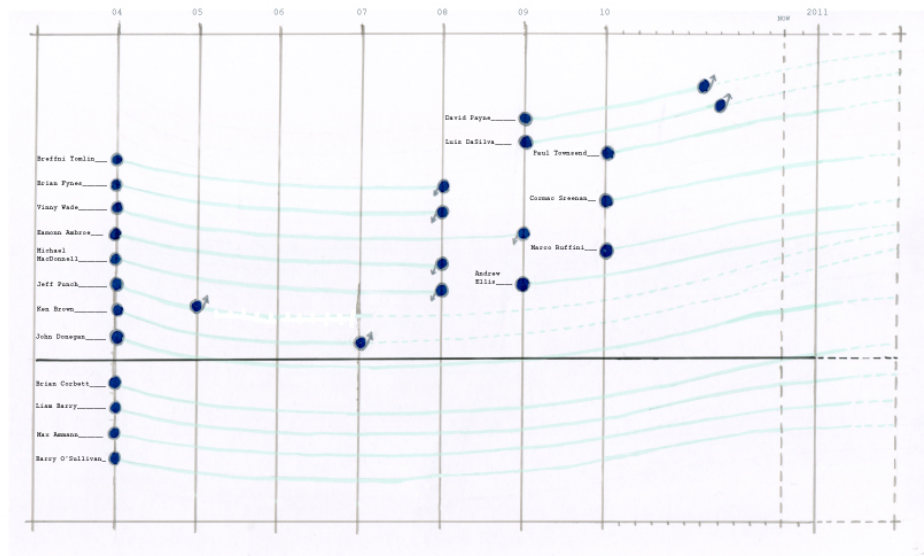


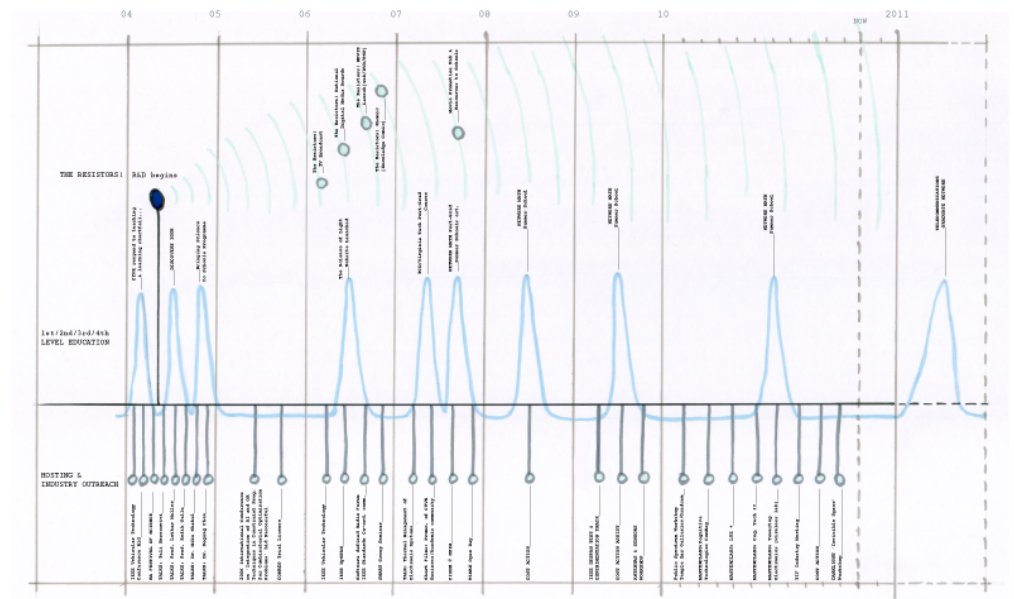
Figure 4 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov 2010





CORE RESEARCHERS 2004 - 2010

Figure 5 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov 2010



EDUCATION & OUTREACH 2004 - 2010

Figure 6 Infographics for CTVR Funding Review 2010 - developed by the author with CTVR Oct-Nov 2010

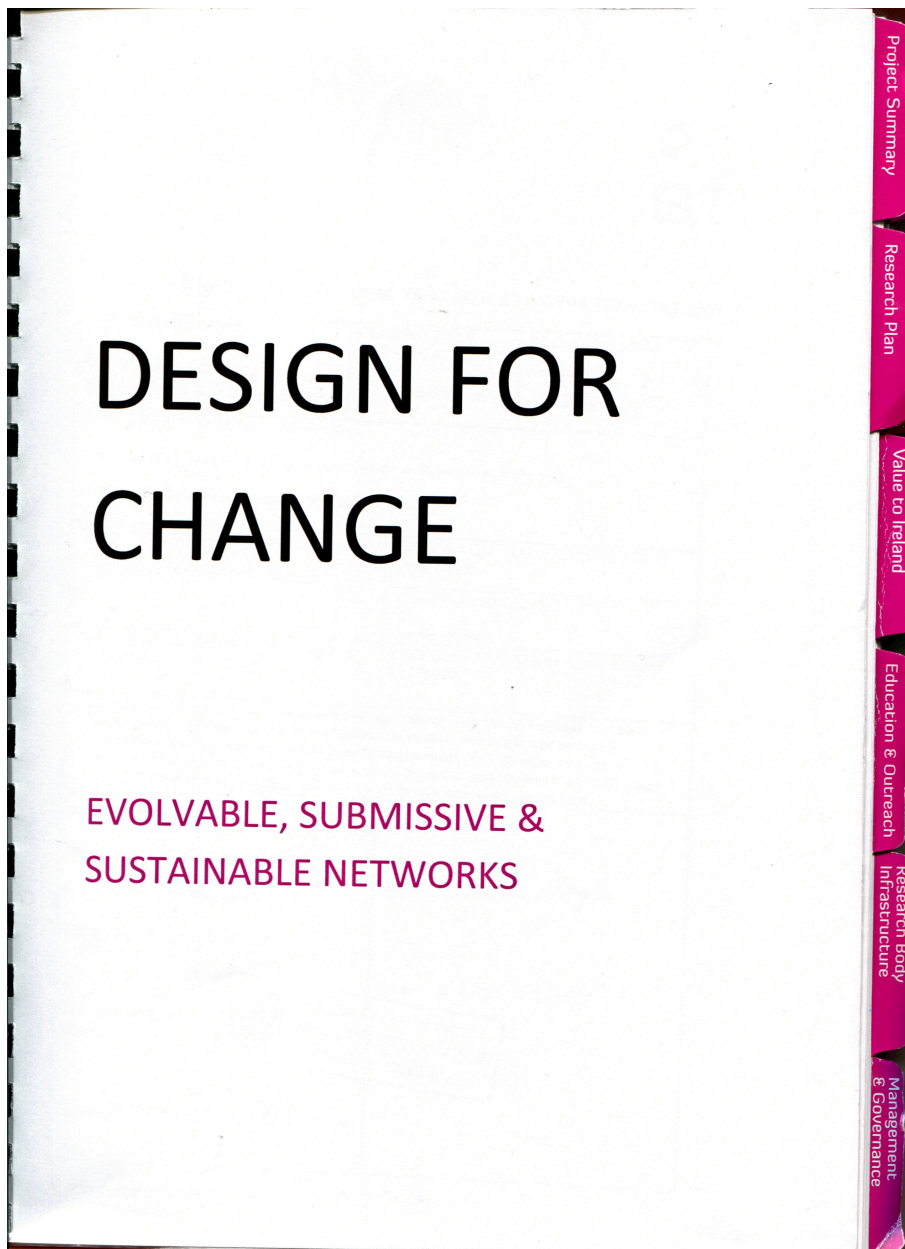


Figure 7 The Design for Change proposal written by CTVR for the SFI Funding Review 2010.

## Project Summary

In CTVR we focus on designing telecommunication networks for the future. We live in a time of unprecedented change. Traffic on our telecommunication networks has grown exponentially in the last decade. Many of the services and applications that exist now were not even imagined a few years ago. Though we can extrapolate some trends and make educated guesses, we cannot predict exactly what lies ahead. Hence the fundamental question we ask in CTVR 2 is how do we design telecommunication networks to deal with the rapidly changing world in which we live.

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.

Our approach is based on creating optical and wireless networks with three distinctive properties. We propose that to design for change, we must design networks that are evolvable, submissive and sustainable. Networks that are evolvable will not quickly become the next legacy networks as there will be smooth paths to future generations. Networks that are submissive will not be restricted by any one particular model of resource ownership and hence not limited by our current understanding of business models. Networks that are sustainable will have a persistent awareness of resource constraints such as manpower, energy, space, bandwidth, processing capabilities, storage etc. This awareness will be used to guide the design and the operation of these networks.

We build on the strong foundations of CTVR 1. In particular we build on the cutting-edge research we have carried out in photonics integration, photonic devices, cognitive radio, antennas and RF systems, reliability and optimisation. For CTVR 2 we bring additional expertise at the network architecture and networking level. We will design and evolve the fundamental optical and wireless technologies with evolvability, submissiveness and sustainability in mind. Through our work, we will map the complex relationships between the network architecture, the technologies deployed in the architecture and the ability of the network to withstand and embrace change. We have identified significant opportunities for cross-fertilisation of ideas across the optical and wireless domains that can enhance the flexibility of the networks we are creating. We will continue our ethos of theorise, simulate and build and hence convert concept to working prototype to showcase our advances. In addition, we consider policy and regulatory issues as these will be enablers of much of the technologies we create.

We bring together researchers from Trinity College Dublin (TCD), Dublin Institute of Technology (DIT), National University of Ireland Maynooth (NUIM), University of Limerick (UL), University College Cork (UCC) including the Tyndall Institute, and Dublin City University (DCU). We add to this mix a group of dedicated industry partners namely Alcatel-Lucent, Xilinx, Intune Networks, Socowave, eircom/Meteor and M/A Com and NXP. Our partners bring an indepth understanding of the challenges that face the telecommunications world and many commercial insights.

We remain fully committed to technology transfer and to seeking out opportunities for commercialisation as we have successfully been doing in CTVR 1, in particular pursuing further opportunities for licensing and spinouts. We will create human capital for a sector that is of key importance to Ireland, i.e. the telecommunications sector. We will reach out beyond our core partners to the wider commercial world through our specialised masterclasses and workshops. We will use the results of our research for the benefit of Ireland especially in the context of broadband infrastructure for the country. We will continue to build on the richly evolving ecosystem of telecommunications research in Ireland as well as collaborate internationally with leading academic institutions and other industry partners.

Figure 8 CTVRs Design for Change proposal - project overview - as part of SFI Funding Review 2010.



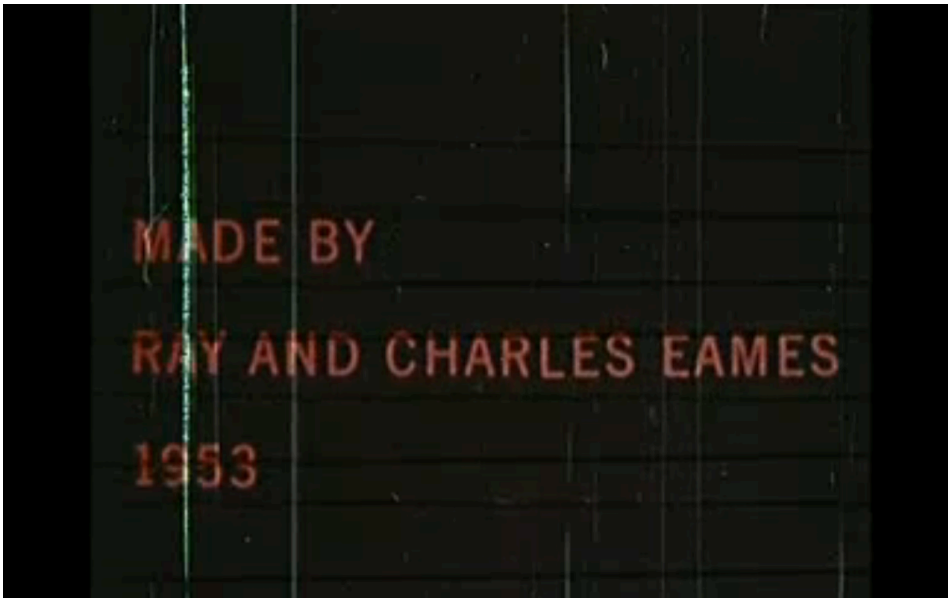


Figure 9 A screen-grab from an online version of *A Communications Primer* (1953) by Ray and Charles Eames.



Figure 10 A screen-grab from an online version of *A Communications Primer* (1953) by Ray and Charles Eames.

### Chapter Three



Figure 11 CTVR Phase One [2004-2010] - Green Booklet, c. 2007.



## The things we do

CTVR's principal goal is to engage in world-leading, breakthrough research in areas in the domain of telecommunications, with particular emphasis on the economic context and value-chain impact of that research.

Scientific and technical excellence is paramount and CTVR demonstrates this primarily through publications in top quality international journals and conferences and through patents.

The Centre maintains strong links with industry to inspire and guide its research activities, to work together on problems identified and also to act as a path to market for its research output.

CTVR is committed to achieving the commercial exploitation of its research output to the benefit of its industrial and academic partners and to the Irish economy. It will achieve this through its major industrial partners, through licencing and through the formation of spin-out companies.

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. 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.



### Industrial Partners

Alcatel Lucent  
Xilinx

### Academic Partners

Trinity College Dublin  
Dublin Institute of Technology  
NUI Maynooth  
University of Limerick  
University College Cork  
University College Dublin

1

### CTVR is a unique set of Partnerships

*it is a place 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.*



Alcatel-Lucent



Figure 12 Excerpt from the Green Booklet on 'What we do', CTVR Phase One, c. 2007

## Outreach

CTVR researchers are making a positive impact on the Irish third and fourth level research environment in many different ways. Each of our research themes regularly has seminars and public lectures given by visiting faculty and industry collaborators. Our activities have fed into the curriculum design of courses at MSc level and have allowed our undergraduate students to engage in very interesting summer internships and final year projects. Graduate students have undergone extended lab placements at the facilities of our industry partners with movement also in the reverse direction.

We have also reached out to students at 2nd level to assist with the national effort being made to interest more school children in studying the maths and science subjects that will be essential if they are to become the researchers of tomorrow. Through the use of technical expertise within our universities and the creative skills of companies like Metadigita and Rumble Studios, we have produced a six-part animation series for TV broadcast aimed at 8-11 year old children. *The Resistors* tells the story of four children living in a post-apocalyptic Ireland of the future who defeat the bad guys through their knowledge of science. The series has been broadcast on national television and is backed up by [www.theresistors.com](http://www.theresistors.com) - a website that has the TV show heroes performing science experiments from the school curriculum in very entertaining ways. The website won an Irish Digital media award in 2007 and many follow-up activities are planned.



[www.theresistors.com](http://www.theresistors.com) - winner of the 2007 digital media award for e-learning

Figure 13 Excerpt from the Green Booklet on 'Outreach', CTVR Phase One, c. 2007.

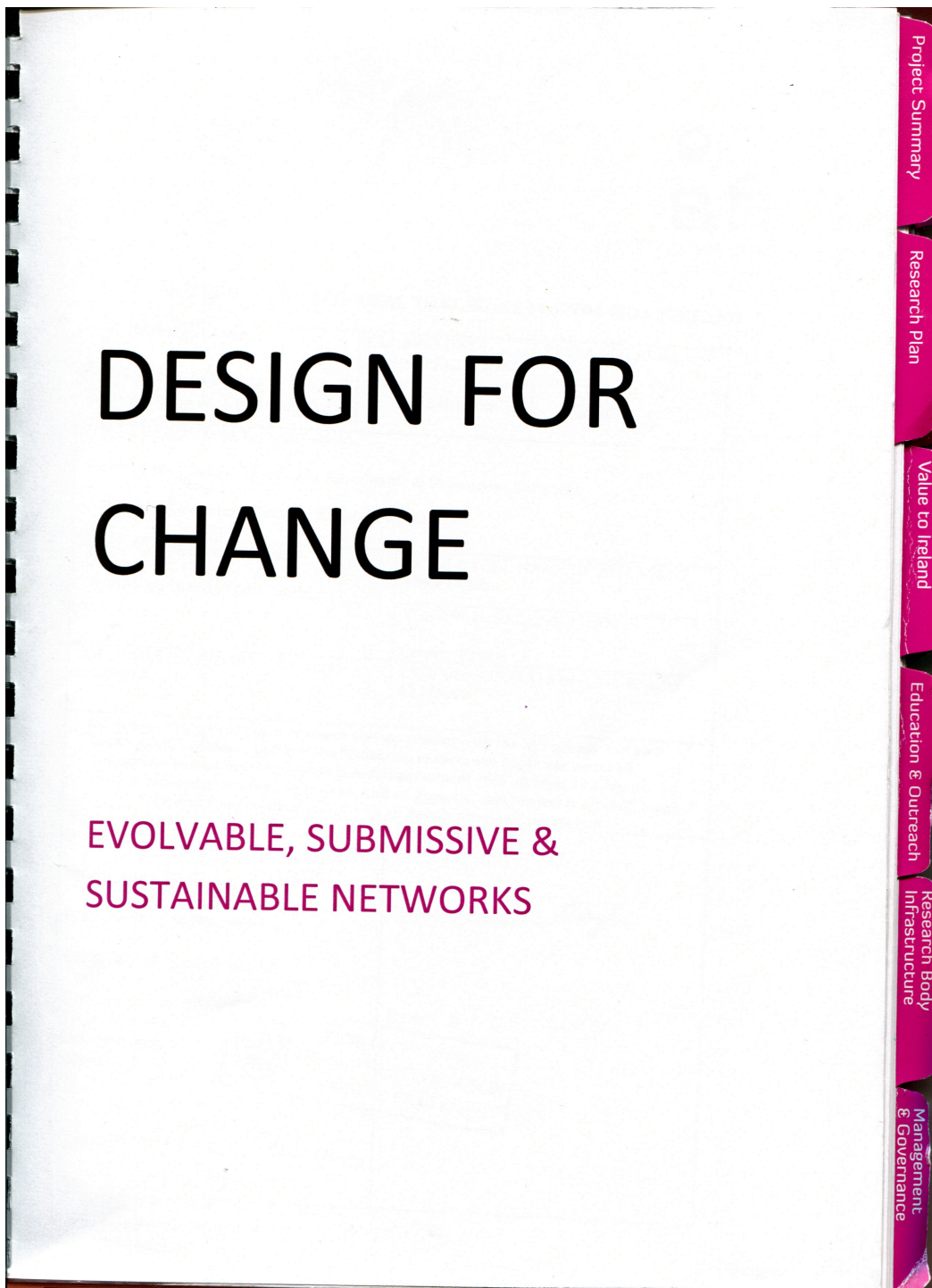


Figure 14 The front cover of CTVRs Design for Change proposal, 2010.



## Value to Ireland

### 2.1 Introduction

CTVR is focused on a key industry sector in Ireland, namely telecommunications. It has built critical research mass in this sector. It has well developed and deep collaborations with industry on important telecommunications-related problems. It carries out leading-edge research and contributes to Ireland's international reputation. It provides a key educational focus at third and fourth level as well as providing educational opportunities for industry. It places significant focus on technology transfer and commercialisation and fully embraces an ethos of innovation. In the following sections, value to Ireland will be argued in terms of CTVR's achievements to date and the anticipated impact of its proposed research programme, specifically, CTVR's relevance to Ireland's telecommunications sector, and its impact on its industry partners.

### 2.2 Focusing on a Sector of Key Importance to Ireland

ICT and telecommunications in particular is a sector of key importance to Ireland. Ireland's ICT industry, through both manufacturing and services, currently employs more than 80,000 people in over 5,000 enterprises, and contributes €50 billion in Irish exports annually. Value added in the ICT sector, at €14.6 billion, accounts for 16% of Ireland's gross value added (GVA) in industry and services. The industry has suffered job losses during the recession but the percentage decline (7% 2008-2009) has been less severe than most other areas of the economy. The telecommunications sector of the ICT industry is particularly vibrant, with many multinational enterprises operating in Ireland - companies such as Alcatel-Lucent, Xilinx, Ericsson, Analog Devices, Nortel Networks, Arris, MA/com, Harris Wireless and Option Wireless. There is also a range of indigenous companies in sub-sectors of specific relevance to CTVR: optical networks (Intune Networks), photonics devices (Firecomms, Eblana), wireless solutions (Benetel, Sigtec, Altobridge, Lake Communications) and antenna devices (Socowave, Stella Doradus, Taoglas, Alpha Wireless). In the all-island context, Northern Ireland's telecommunications sector, with an employment of more than 10,000, is home to: BT, Openwave, Conexant, BroadSoft, Intelliden, mFormation, Flextronics Design, Aepona, Mobile Cohesion and Asidua. In short, the telecommunications sector is a strong contributor to the economy: Overall network and service revenues at the end of December 2009 were almost €974 million for the quarter. Moreover, telecommunications services are a key enabler for other businesses in the broader ICT industry.

#### 2.2.1 Building Critical Mass

To build critical mass in the telecommunications sector, CTVR has brought together wireless and optical telecommunications expertise from six different institutions in Ireland - Trinity College Dublin (TCD), Dublin Institute of Technology (DIT), National University of Ireland Maynooth (NUIM), University of Limerick (UL), University College Cork (UCC) including the Tyndall Institute, and Dublin City University (DCU). We have turned a group of individual researchers into a collaborative team. We have added to our ranks since the initial team was formed. Dr. Andrew Ellis & Prof. Paul Townsend (Tyndall) and Prof. Cormac Sreenan (UCC) brought expertise in photonic systems, access networks and wireless and optical networking. Most

Figure 15 An excerpt from the Design for Change proposal on Value to Ireland.

this we were able to attract top conferences to Ireland for the first time. These conferences included IEEE DySPAN, IEEE VTC, the SDR Forum, and leading conferences in AI/OR, and thermal management. In the case of IEEE DySPAN - the world's leading conference in Dynamic Spectrum - we worked with IDA Ireland to promote Ireland as a place to invest for companies involved in dynamic spectrum. We will continue to attract these types of conferences as well as enhancing our international leadership position in key areas of our proposed research agenda.

\* Dynamic Spectrum \*

## 2.2.4 Carrying out Research that Directly Impacts Ireland

Our research tackles important problems in the telecommunications area and hence our research will be of benefit to the telecommunications sector in general. However there are also aspects of our research that have a very direct benefit to Ireland. For example, the work we do on optical networking includes Ireland as a case study. Figure 1.5 in Chapter 1 shows some early results of a network solution suited to Ireland. The data that eircom/Meteor will supply as part of CTVR 2 will allow us to take this research much further, and in doing so, we will be able to tailor solutions for Ireland and make specific predictions and recommendations for networks here. This will feed into the internal decision-making process in eircom and help inform the choices they make. It is well understood that broadband infrastructure is vital for the economic survival of a country and Ireland has traditionally been a poor performer in this field. CTVR has the potential to change this situation through ensuring the choices that are made for the future are ones that support evolvable, submissive and sustainable networks and hence have a lasting impact. As eircom say in their letter of support, 'If the work carried out within CTVR enabled a cost saving of 5%, this could represent a saving of €130 million.' This is based on costing a future fibre network for Ireland.

18  
Broadband

Our research can also have a significant impact on Ireland from a policy perspective. In CTVR we believe that it is important to feed the outcomes of our research into policy. We retain strong linkages with the communications regulator, ComReg, and have worked with the Department of Communications on policy related issues. In the coming year, we will be leading an initiative to develop what we term a Digital Ireland policy document. This initiative resulted from discussions with a group known as the Telecommunications Industry Forum (TIF) and other telecommunications bodies. CTVR is well placed to contribute at this national strategic level. As a final example, our recent workshop on LTE+ opened a debate around whether an advanced cellular wireless testbed should be built in Ireland. CTVR, together with a range of partners, are currently exploring this opportunity. Though ultimately the push must come from industry, we see ourselves as the catalyst in this endeavour.

policy making

## 2.2.5 Bringing Further Funding to Ireland

Our critical mass has also allowed us to successfully leverage non-exchequer funding, predominantly from FP7 EU Framework Programmes. For example, we have currently two major projects in the area of cognitive radio. CogEU (2010-2012) focuses on cognitive radio systems which exploit the TV white spaces. CREW (2010-2015) is building an open federated testbed for spectrum sensing and cognitive radio. In addition, we have built upon our research activity to forge other industrial partnerships, the University of Limerick's funded research projects with Nokia-Siemens Networks on reliability and thermal topics being an example. At the time of writing, a number of other proposals that leverage non-exchequer funding are ongoing. We are seeking funding directly through Google research call. We have submitted an Erasmus Mundus application and a number of other proposals are in preparation, including a proposal to the European Space Agency.

15

## 2.3 Creating Commercial Value

Centres like CTVR play a key role in creating a strong high-tech sector in Ireland, specifically through an ability to focus on leading-edge challenges over a medium-term timeframe. Critically, our industry links allow

Budget

CVs

Industry Partners

Grants

Education & Outreach

Research Body Infrastructure

Management & Governance

Figure 16 An excerpt from CTVRs Design for Change proposal on Value to Ireland.



Prof. Paul Townsend

**Industry Involvement** - ALL PARTNERS Task E1 is a major part of the CTVR 2 proposal. It is the task in which the CTVR team sets all of its work in context. The task has a number of distinctive foci.

Firstly it provides a forum for discussing the technology advances we make from a network architecture perspective. To make this forum work all of the researchers will have to articulate the advances they make in terms everyone understands. CTVR is a multidisciplinary entity and making communication between different research teams clear and understandable is an important part of our mission.

Secondly task E1 provides a forum for analysis. Via this task we will map the complex relationships between the network architecture, the technologies deployed in the architecture and the ability of the network to withstand and embrace change. We will develop a set of metrics that best suit the analysis. So for example we will better understand the variables that should feature on the x and y axes in Figure 1.1. There will be obvious metrics that we can call on (such as power consumption, bandwidth used, cost etc.) but we may need to explore new metrics to capture how evolvable and submissive our networks are. In terms of sustainability there is a wide body of existing research to draw on and this body of research will be processed in task E1 and fed into our discussions. In our analysis we will also develop the 'what if' scenarios. A number of these have already been identified. For example, 'what if all data was stored centrally?' versus 'what if all data is at the edges?' A second example that was discussed earlier, 'what if there is no privileged point of connection for any user?' Our industry partners will play a vital role here in providing scenarios that have commercial relevance. We will draw on the tools developed in WPA to aid in this process. The optimisation techniques developed in WPA will allow us to evaluate different scenarios systematically. The consequences of our submissive mindset will be explored. And opportunities for feeding into regulatory and policy debate identified.

We will also 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 visualisation techniques that communicate our findings. The field of infographics<sup>19</sup> is particularly relevant here. For example we are inspired by the work of Edward Tufte<sup>20</sup> or Nicholas Felton<sup>21</sup> and a range of interactive multimedia visualisation techniques. Note that 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 as described in Chapter 3.

Task E1 also provides a framework for further identifying opportunities for cross-fertilisation of techniques and ideas across the optical/wireless domains. To date we have identified opportunities relating to manipulation of OFDM waveforms, use of game theory and leveraging of the same reconfigurable platforms and techniques that are relevant in both domains but there will be more opportunities.

Task E1 provides an oversight and coordination point for all of the demonstrator work that takes place in CTVR 2. Many of the demonstrators, as described in section 1.4.4, couple outputs from different tasks and draw on external resources. Task E1 affords us the opportunity to collectively evaluate progress and refocus demonstrators as necessary. Task E1 also provides a focus point for feeding into the research programme as a whole. It is through our analyses here we will better understand what is working at what is not. Finally we note that the output of E1 needs to be disseminated more broadly than within CTVR and hence we plan a series of events for this purpose. For example the other CSETs shown in Figure 1.4, namely DERI and Clarity could potentially feed into the processes here. Our events will also have an international focus.

**Key Deliverables for Task D3:** (i) yearly white papers that bring together the collective findings of the group ;(ii) a coherent demonstrator programme; (iii) well-articulated policy and regulatory statements and (iv) a programme of events for disseminating our ideas and encouraging national and international input.

<sup>19</sup>The Guardian uses infographics particularly well. See <http://www.guardian.co.uk/news/datablog>

<sup>20</sup><http://www.edwardtufte.com/tufte/>

<sup>21</sup>See <http://felton.com/> for some examples of graphics in use.

Figure 17 An excerpt from CTVRs Design for Change proposal on Workpackage E.



## Education & Outreach

### 3.1 Introduction

Education and outreach is an important part of the CTVR programme. CTVR has a history of being innovative in how we approach outreach. In CTVR 1 our principal focus was the creation of an animated adventure series for television. The series - The Resistors! - was aligned to the science curriculum being taught in schools and specifically aimed at students between the ages of 11 and 14. It featured characters whose knowledge of science and maths allowed them to outsmart an enemy in a post-apocalyptic Ireland. The Resistors! was screened in the run-up to Christmas 2007 and at its peak captured 14% of the audience in the target range. In CTVR 2 we continue this innovative approach in a programme we call Communicating Communications. We also bring two other new initiatives to the table. The first is based on a round a series of CTVR master classes and the second involves working with other CSETs to build relationships with decision-makers and leaders in Ireland. In addition we continue to interact at a local level in the wider educational landscape. And we focus on specific education initiatives that are highly relevant to postdoctoral researchers in CTVR and further afield.

### 3.2 Communicating Communications

In 1953, Charles and Ray Eames made a film called A Communications Primer. The Eameses were designers with a distinctively modern understanding and were influenced by the 1948 paper by Claude Shannon on Information Theory as well as work of Von Neumann and others. The short 23-minute film displays an incredible understanding of key concepts in the telecommunication world<sup>1</sup>. For example while (multiple output multiple input) MIMO systems did not exist in 1953, there is an interesting discussion of sending two rather than one signal to reinforce a message that can be mapped to modern communication systems. Despite embracing such complex ideas, the film reaches out to a wide audience and communicates in terms that non-scientists and non-technologists understand. In fact IBM was so impressed with the film that they hired Ray & Charles Eames over the next 20 years to act as consultants for a number of technology exhibitions - in other words, for their outreach programmes.



Figure 3.1: Stills from the Eameses Film

\* *A Communications Primer* provides the inspiration for the outreach programme for CTVR 2. The programme

<sup>1</sup>See [http://www.archive.org/details/communications\\_primer](http://www.archive.org/details/communications_primer)

Figure 18 An excerpt from the Design for Change proposal on Education and Outreach/Communicating Communications.



Find speakers  
Residents to speak  
in this  
event

will begin with an event in the Science Gallery<sup>2</sup> in Trinity College<sup>2</sup> which focuses on the processes the Eameses used to understand complex ideas in communications and the techniques they used to convey their ideas. This will mark the beginning of a period over which we will 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. We have already identified a group of artists who will be involved in this work. The artists will spend time with the engineers and scientists and co-develop the vignettes.

The YouTube approach uses video but we will also use stills. For this we have been inspired by Dan Roam's 'back of napkin' approach (see <http://www.thebackofthenapkin.com/>). Dan did a series called *Healthcare on Napkins* to explain the complexity of the Healthcare System in the USA during the healthcare reform debates in 2009/10. The series of slides are written as if drawn on the back of a napkin in a way that one friend might explain to the other over coffee. They are extremely effective modes of communication. Dan's visual explanation of American health care was selected by Business Week as 'The World's Best Presentation of 2009'. We are planning a series of these ourselves. The first is 'Cognitive Radio on Napkins'. In this case instead of designing the napkins ourselves, we will ask key international figures in cognitive radio to contribute.

\* Any other focus?

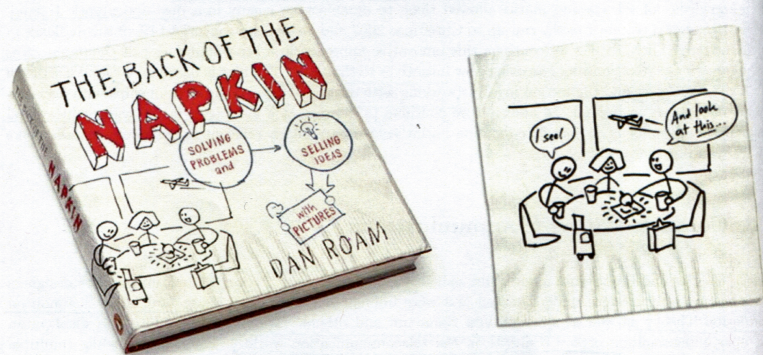


Figure 3.2: Napkins are the way to go!

Following the cognitive radio series we plan to do a series on optical networking and photonics topics. This also relates to task E1 as described in Chapter 1 as it is about the effective articulation and communication of ideas beyond the boundaries of one discipline.

### 3.3 A Programme of CTVR Master Classes

CTVR has seven formal industry partners, a wider set of industry collaborators who interact on a bilateral basis with different CTVR researchers, as well as a wider range of industries and others with whom we are in contact. Over the past year we have identified a need to hold specialised events or master classes for industry and indeed for other academics.

<sup>2</sup> [www.sciencegallery.com](http://www.sciencegallery.com) - quoting from their website 'The 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 collide'.

Figure 19 An excerpt from CTVRs Design for Change proposal on Education and Outreach/Communicating Communications.



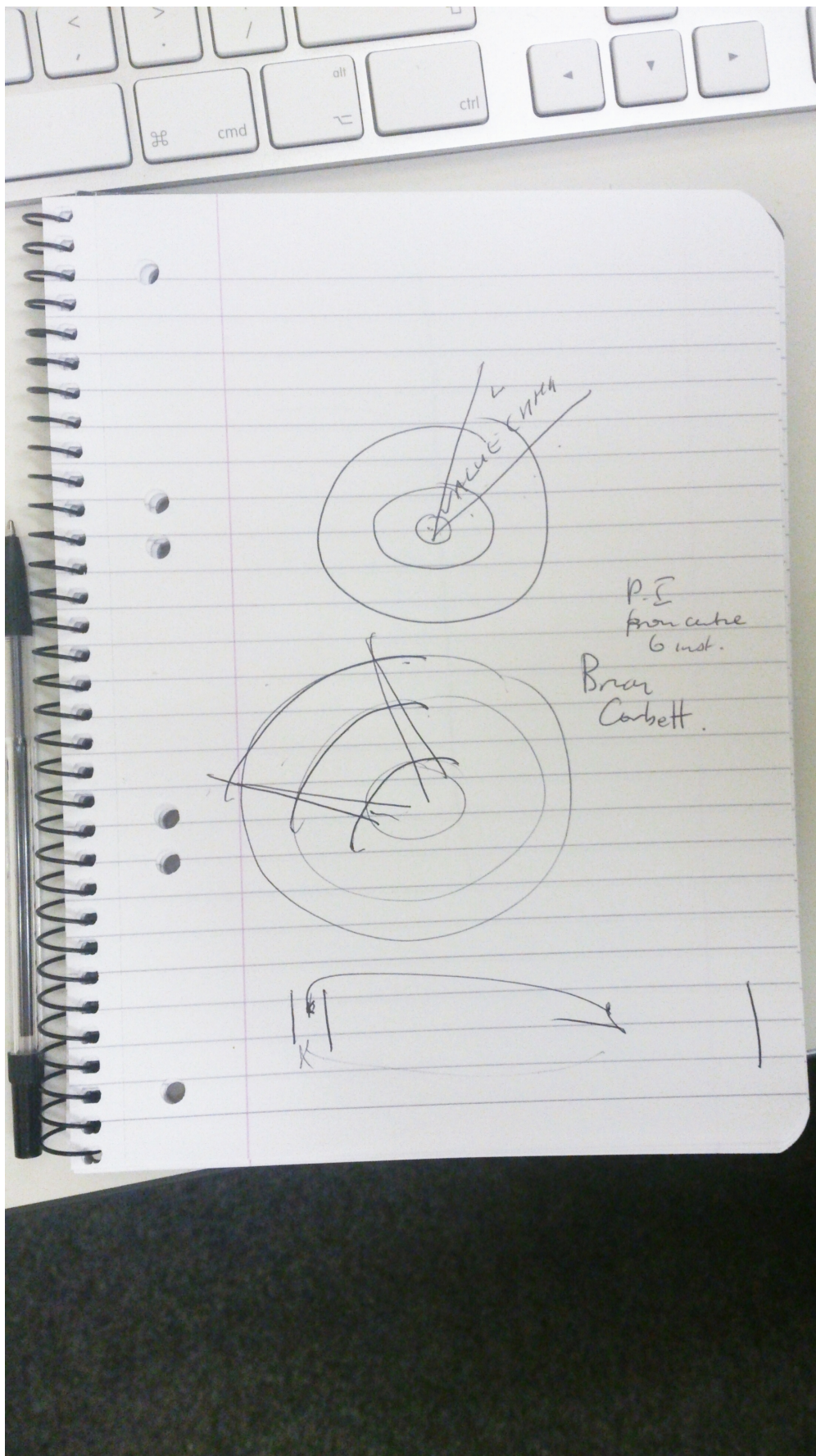


Figure 20 A rough sketch drawn by L.D. from memory of B.C.'s diagram which inspired CTVRs logo.





Figure 21 A replica of Kandinsky's painting hanging in Dunlop Oriel House. The 'logo' and echo of B.C.'s diagram is visible in the bottom right corner.

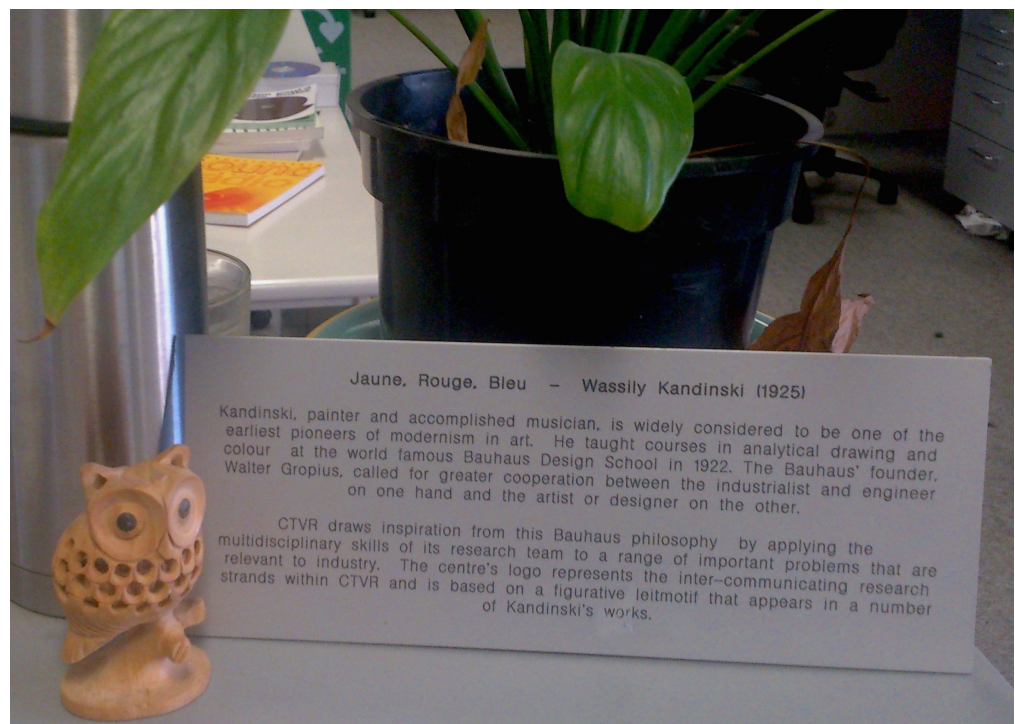


Figure 22 The plaque which once accompanied Kandinsky's painting, reclaimed from storage, placed on the author's filing cabinet in the PhD. Lab, Dunlop Oriel House.

## Chapter Four

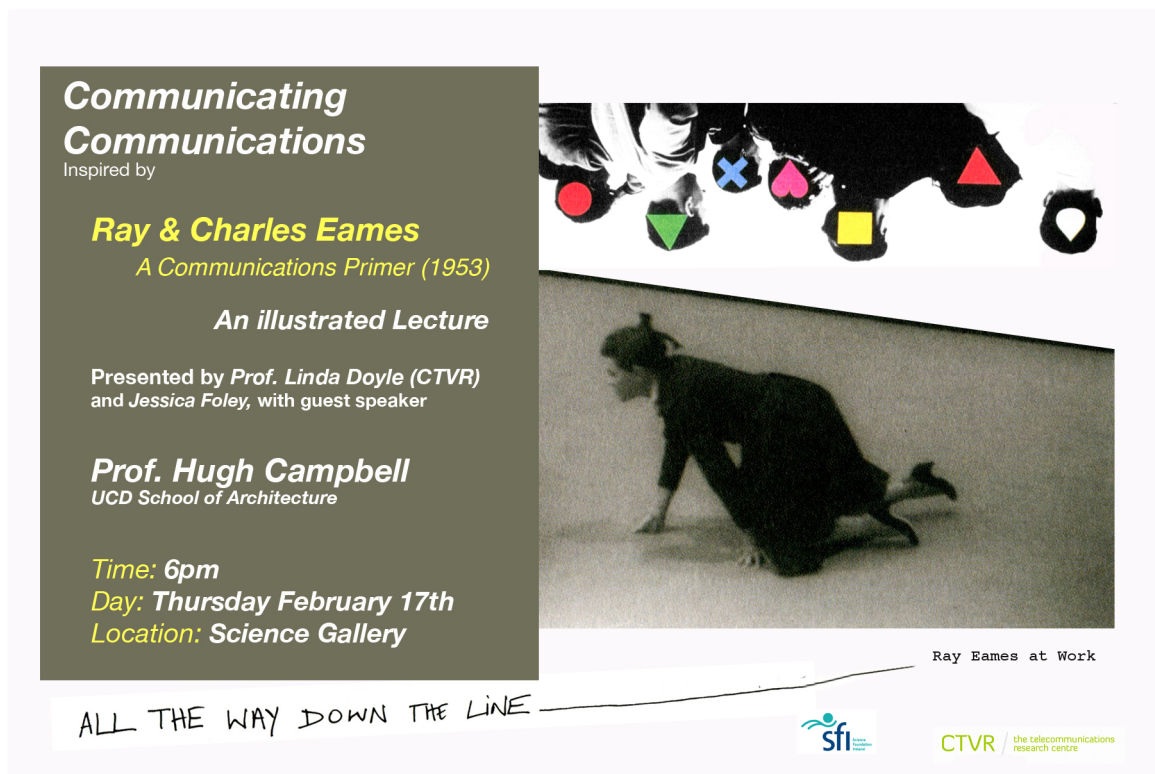


Figure 23 An image of the postcard invitation to CTVRs screening of *A Communications Primer* (1953), Dublin, Feb. 2011



Figure 24 A view of Prof. Hugh Campbell presenting an illustrated lecture on the Eameses' work, Science Gallery, Feb. 2011.



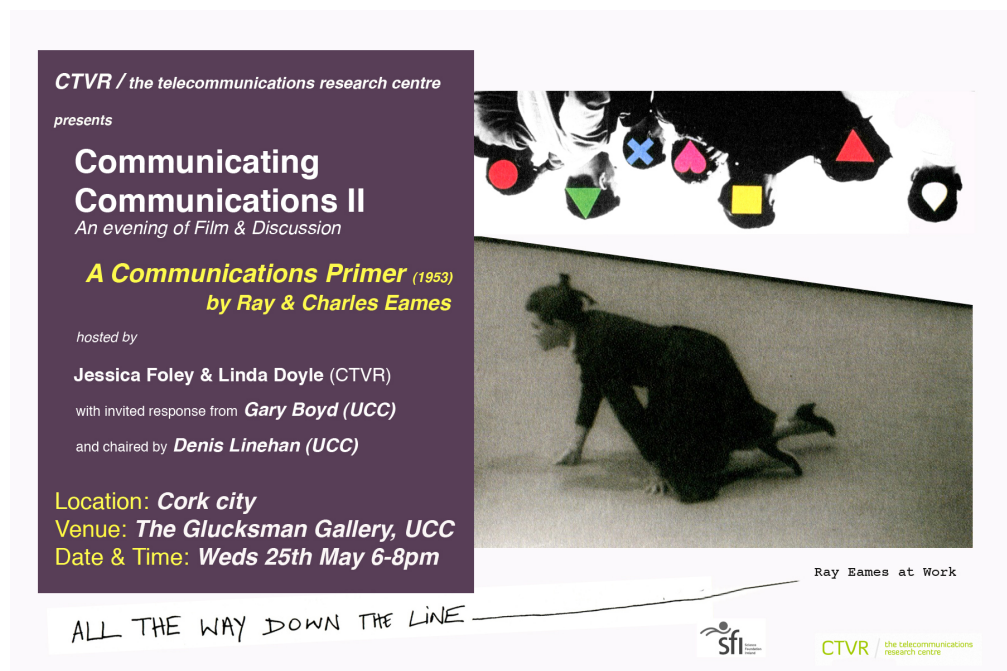


Figure 25 An image of the postcard invitation to CTVRs second screening of *A Communications Primer* (1953), Cork, May 2011.

|                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                              |                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The principle objective of the CTVR Plenary meeting is to set out details of the short –to- medium term research objectives. Everyone should attend the work session appropriate to their discipline. Anyone who is not scheduled to a work session has is the option of participating in a workshop to develop communication skills for high-level scientists or taking a tour of the Tyndall facility. |                                                                                                                              |                                                                                                                                                                                                    |
| 14.00- 15.30                                                                                                                                                                                                                                                                                                                                                                                             | <b>Session 1</b><br><br><u>Wireless Technologies:</u> Tasks B1, B3 & B4<br><u>Optical Technologies:</u> Tasks C1, C2, C3, C4 | <b>Communicating Science</b><br><br>Workshop with Jessica Foley exploring alternative ways of communicating scientific ideas                                                                       |
| 15.30 – 17.00                                                                                                                                                                                                                                                                                                                                                                                            | <b>Session 2</b><br><br><u>Wireless Networks:</u> Task A2<br><u>Optical Networking:</u> Task A1                              | <b>Communicating Science</b><br>Workshop with Jessica Foley exploring alternative ways of communicating scientific ideas<br>OR<br><b>Tour of Tyndall</b> – meet at CTVR registration desk at 15.45 |

Figure 26 An excerpt of the agenda for CTVRs Plenary 2011, featuring the *Communicating Science* workshop.

"You're a fraud!"

My eyes are ~~elsewhere~~  
Lapping the conference table.  
The horrible ovalness of it  
and the everybody's  
~~stuck~~ <sup>stuck</sup> ~~adherent~~ to it's curvature,  
~~and my~~ <sup>love</sup> pathetic body  
on the end of it,  
a limp sacrifice  
to intelligence.

Despearately grey blue.

Office blinds  
and false ceilings  
and chipped ceramic mugs  
and bacterial dishcloths.

I speak again!  
(Audacity hold your tongue!)

Nodding motions.  
Disgust escapes  
somebody's lips  
slaps  
across the table  
at me...

...~~It's not such a terrible~~ thwack.

Everybody swallows  
a throat lump  
at the same moment  
and the atmosphere  
turns a greener shade  
of grey blue,  
and the day gets older,  
and the light gets less.

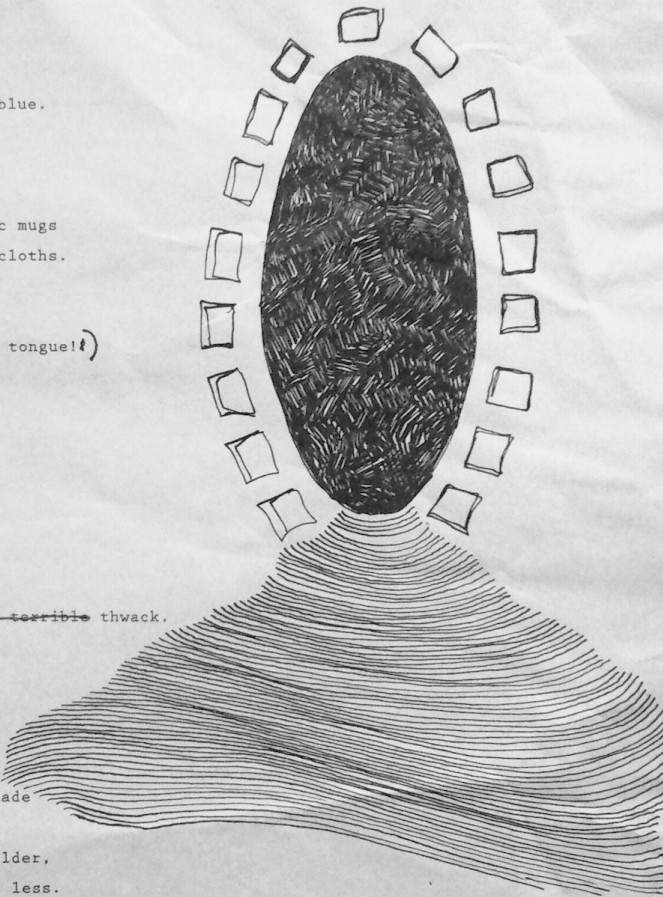
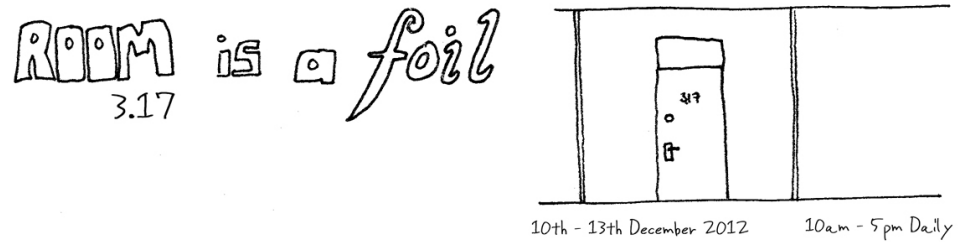


Figure 27 A text written post-Plenary coming to terms with the 'emotional load' of the Communicating Science workshop.



You are invited to become a participant observer, seeking a deeper understanding of the world of... Antennas.

Figure 28 A rough sketch of the publicity and score for Room 3.17, in correspondence with G.W.

Participant Observer (PO) books their time slot via the Doodle Poll.

PO arrives at the Hallway to Room 3.17 where Jessica &/or Gail greet them.

PO is led down the corridor to the lobby room overlooking Westland Row.

There is a table set up for taking a Still Photographic Image of the Object/Text/Image which PO has brought with them. If the PO does not bring any visible thing we simply take a picture of the White Space.

Gail &/or Jessica chat with PO.

"Thanks for coming along! We're just going to give you a sense first of all, of what's about to happen. We're going to take a photograph of what you've brought in relation to the topic of Antennas. Then one of us will bring you to Room 3.17 where we're going to have a short chat of the Object/Image/Text you've brought with you. How does that sound? Do you have any questions at this point?"

Gail/Jessica brings PO to the Room once the Object/Image/Text has been taken.

"Welcome to Room 3.17. Feel free to have a look around, but you'll get a chance to be by yourself here in a few moments." (If PO seems comfortable to look around a bit and make comments, allow that to happen. Chat. Try to stay relaxed. There isn't anything in particular you are trying to find out exactly, you're just giving space for conversation to emerge... the topic of Antennas is set, it is at play. PO may just head straight for the Chair, so sit down with them, and get comfortable. You can now explain that we are recording the conversations, only so long as PO is comfortable with that. Explain also that the room is mic'ed for ambient sound... only explain this if you feel PO is confused or worried. You don't need to give information unless it seems necessary... otherwise PO is working things out in their own way.)

"Thanks for coming and sharing your Antenna related paraphernalia with us! Can you tell me a little bit about what you have brought with you, and why you decided to bring this particular thing with you?"

(Tease out the conversation, but only do so as long as it remains comfortable, you do not have to force anything. A 5-10 min chat is quite a long time! \*\*\*We'll work out the Technical side of how we'll record next week\*\*\*)

"Would you be comfortable leaving your object in the Room? Temporarily, just until the end of the Week? There's tape here, pins, blue tack... or you can place it somewhere. You can decide where the Object might fit in, where it belongs so-to-speak. And please

feel free to move other things around, you can put the object wherever you feel it settles best. Or wherever you feel it sticks out best! It's up to you."

"I'm going to leave you in the Room for 10 mins or so, to have a good look around, relax, get a feel for the place, and to place your object. But there's one more thing I'd like you to do... and that is to make a short film, only 15-30sec long, with this Super 8 camera. And I'm going to show you How to use it, technically, but it's up to you to decide what to film. How does that sound?"

(Be reassuring about this process, invite PO to ask questions. Allay any fears they have of 'not being artistic' – remind them of how much they are literate in watching moving images... why shouldn't they try out making some! \*\*\*We can go through the technical script for this bit next week\*\*\* Basically we want them to film whatever is of interest to them... and that may be nothing... so they'll have to figure out how to best represent that.)

"So this is how the camera works, x, y, z... I'll leave you now for a few minutes to place your object and have a good look around... I'll come back then and go through the camera with you again, and if you've any questions you can ask me, if you have an idea for a shot or anything I can give some advice. We can check focus etc. Is that okay? Alright, I'll leave you for 10 mins, get relaxed, make yourself at home!"

(You go back in after 10mins. Go through the camera again, answer any questions. Don't ask anything about what they want to portray unless they have a specific question for you on how to shoot it. You are a facilitator and a technical guide. Leave the room again for a few mins, then come back, ask how they got on, help them complete the task if they had any trouble and escort them out of the room. In the lobby space offer them the opportunity to give any feedback or thoughts, but encourage them to reflect upon the experience and to meet in the Seminar Room on the Thursday for Mince Pies and Mulled Wine and a decompressed chat about it all.)

That's about all I can think of in a first Draft. Please feel free to add and subtract to this document Gail! We'll work out our language as we go.

Thanks a million!

Jess



## Chapter Five



Figure 29 An experiment set up for testing signals in movement, with the use of a toy train, devised by J.T.

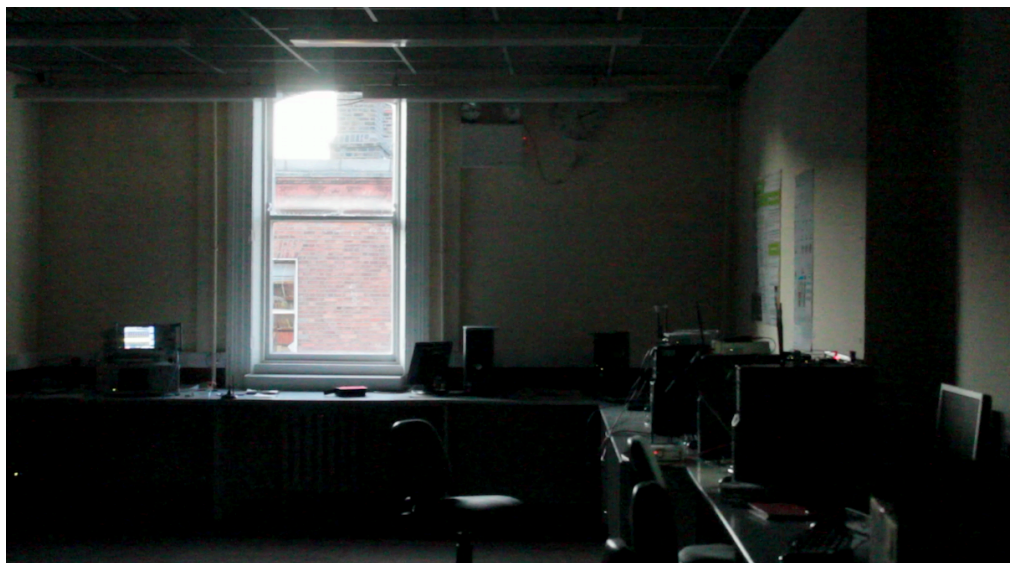


Figure 30 A view into the Test-Bed at Dunlop Oriel House prior to renovation in 2012 – 2013.



Figure 31 A view on Room 3.17 in April 2011, shortly after the author moved in there.



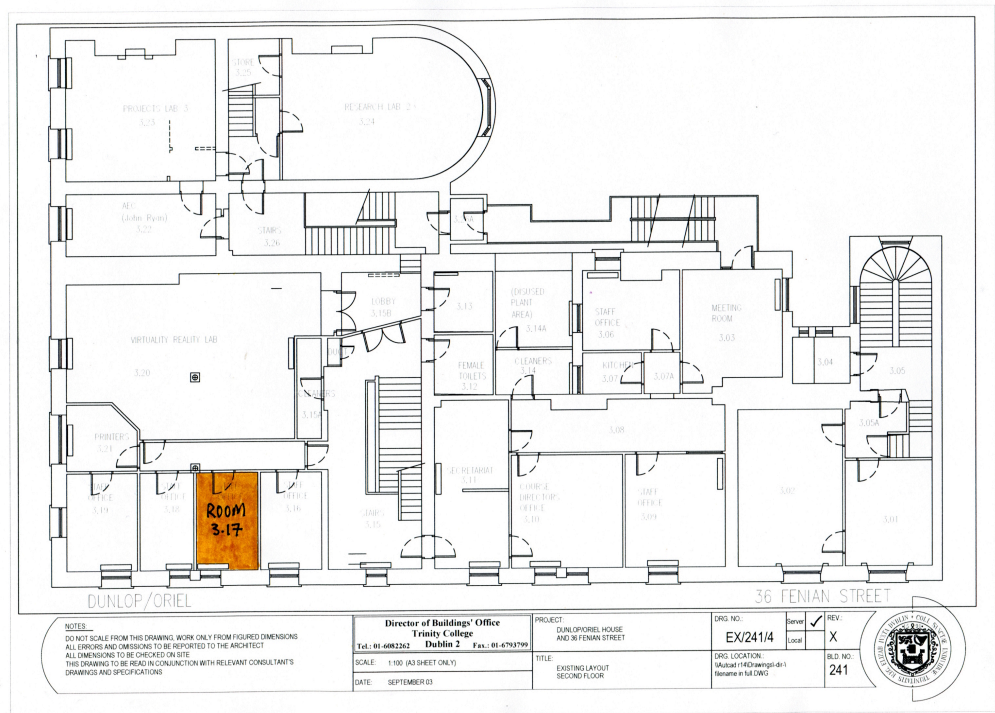


Figure 32 An Architectural Plan of the 3rd Floor of Dunlop Oriel House, indicating the location of Room 3.17.



Figure 33 A screen-grab from an online version of the Eameses' film Blacktop (1952)



Figure 34 A screen-grab from an online version of the Emeses' film *Blacktop* (1952).

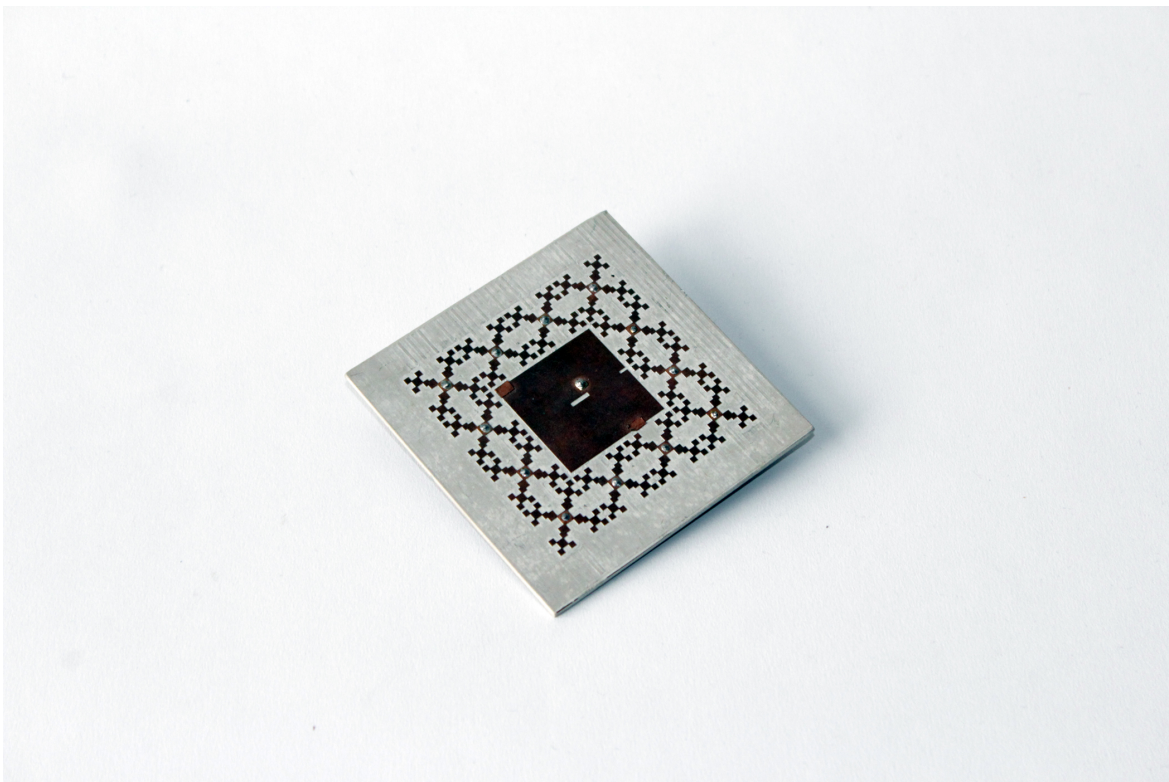


Figure 35 An antenna from the Antenna & High Frequency Research Centre, CTVR/DIT.





Figure 36 A screen-grab from *The Path of an Object*, a video-essay on the process of Sarah Browne.



Figure 37 A screen-grab from *The Path of an Object*, a video-essay on the process of Sarah Browne.

Chantalle 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  
@ something because it might  
ruin your own ideas by making  
them seem unoriginal. I find that  
 happens to me a lot.

Name: Colette Fahy  
 authorial genealogies  
 date: 27.04.11

Figure 38 A sample worksheet from the Genealogies; Frameworks for Exchange workshop by Alex Martinis Roe.

2

<sup>2</sup>This image was sourced through the artists website: <http://www.alexmartinisroe.com/Genealogies-Frameworks-for-Exchange> [Accessed 29. 09. 15]

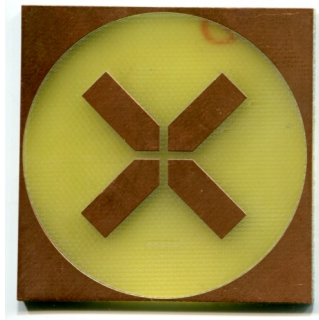
Antennas look like simple bits of metal and yet perform a most complex operation in the communication process. They essentially capture the oscillations generated by the radio transmit circuitry and unleash these oscillations into the ether so that the oscillations can travel over distances to the receiver. And at the receiver the reverse process takes place as the oscillating wave is recaptured and directed into the radio circuit so that the information that was embedded in the oscillations can be extracted and reconstituted as voice or text or image or video.



The design of an antenna is both a mathematical process and an art. Complex analysis, using mathematical techniques such as finite element analysis can be carried out to understand how an antenna will perform – how it will radiate the oscillations outwards or suck the waves back in. Sophisticated measurements in special chambers that dampen other oscillations can allow the

antenna radiation pattern to be captured. Yet through-out this process there is an element of intuition and guess-work that involves an understanding of shape and space. It comes from the art of making, the art of fabrication and it comes over time spent. It cannot be embodied in an equation. It can be used to find the right starting point in the design process, know when to gently shove in the middle and to make the right adjustment and the end. It is about maths, about craft, about art, about skill, about luck.

The Art of Antennas will explore the science, the engineering, the poetic and the aesthetic of the antenna. It does not aim to provide a reduced or simplistic understanding. In fact it aims to go beyond the traditional scientific material that is available by the very fact it embraces more.



The Art of Antennas will look at a range of different antenna types and through working with the makers, the crafts people, 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.

*Figure 39 An early sketch for The Art of Antennas proposal, written by L.D.*





Figure 40 A view of Room 3.17 prepared and prior to the first experimental dialogue.



Figure 41 A view of the make-shift photographic studio down the corridor from Room 3.17.

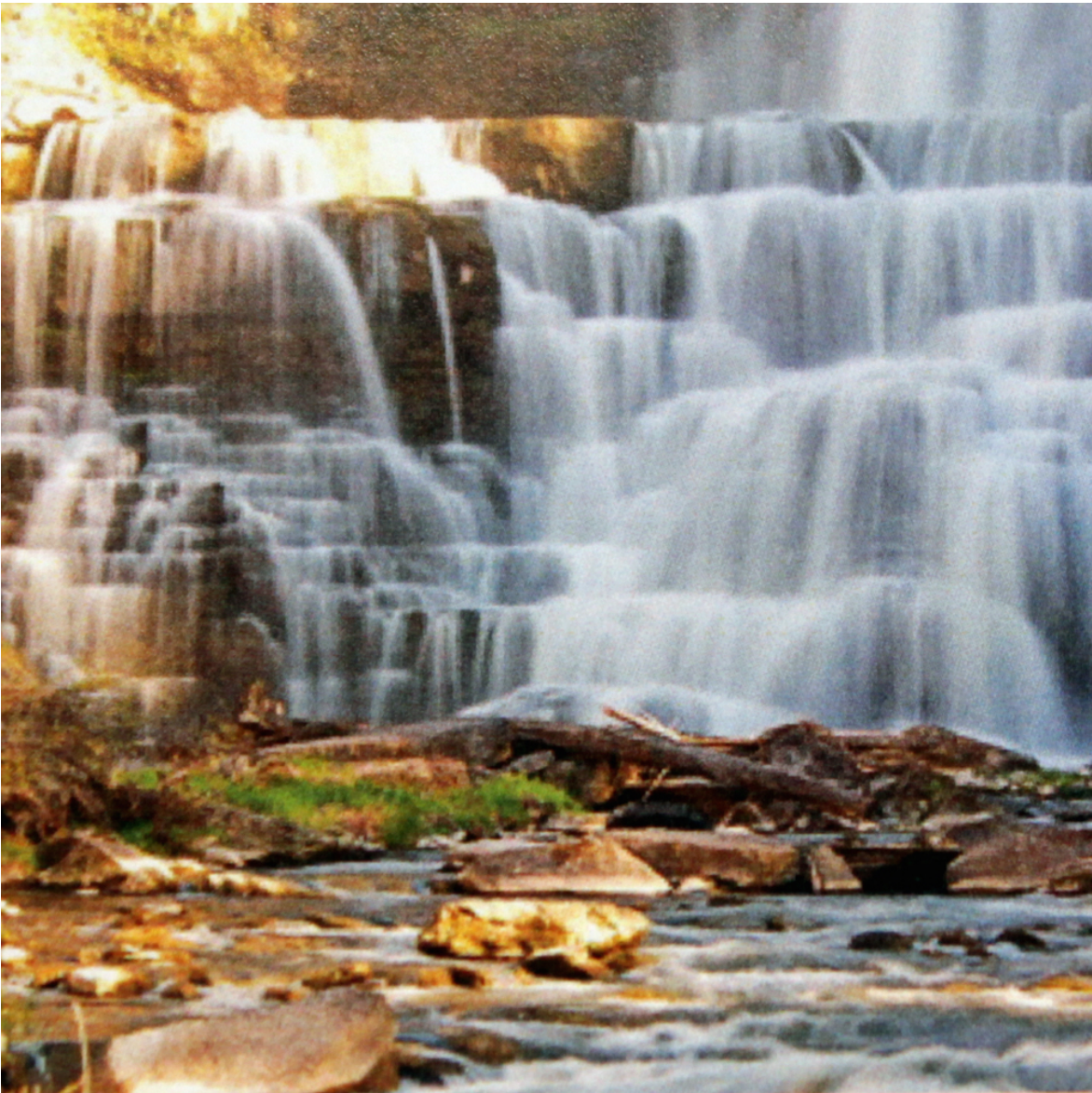




Figure 42 A view of the genetic algorithm antenna gif projected in Room 3.17.



Figure 43 A view of the filming apparatus in use during the Room 3.17 experiment - this shot is mid-experiment, an interval between encounters.



*Figure 44 A contribute to Room 3.17 made by C.G. – The Waterfall is an intuition of future network research and design.*



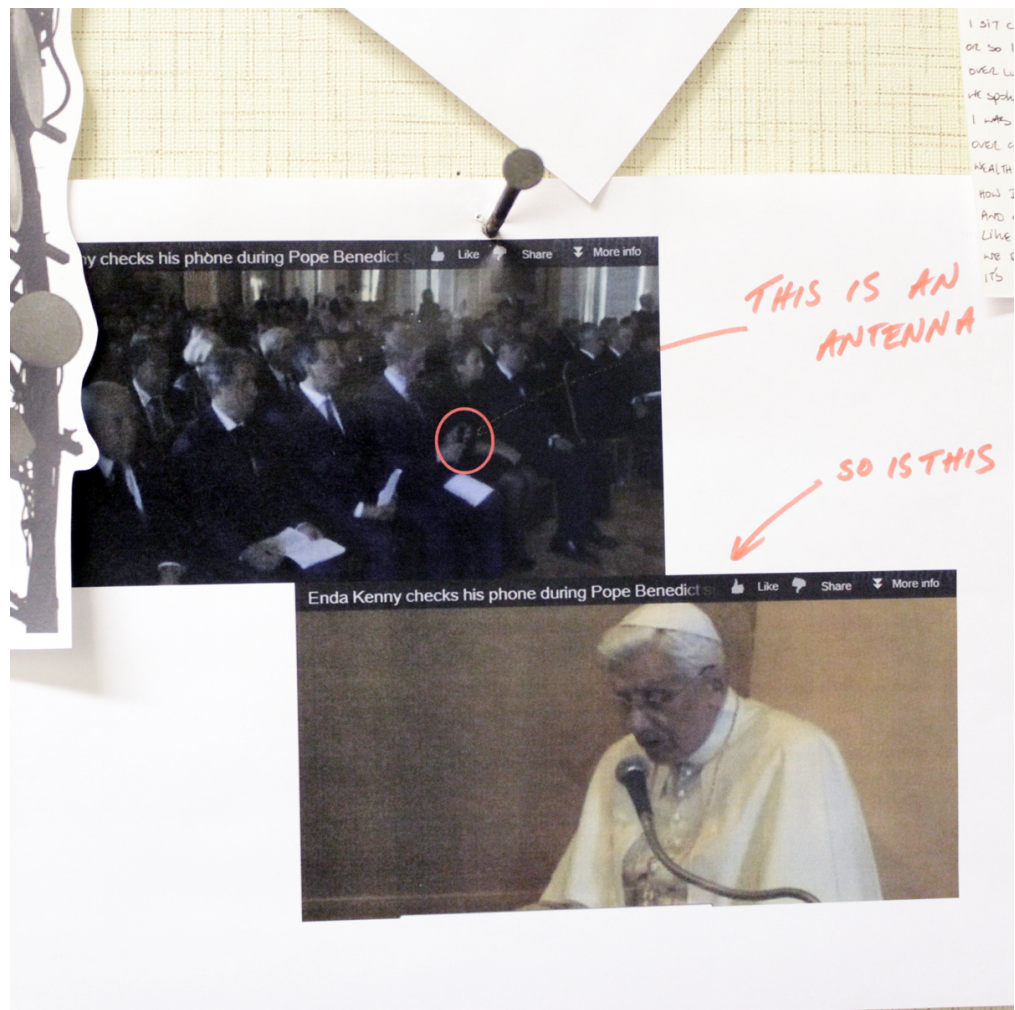


Figure 45 A contribute to Room 3.17 made by T.F. – A parodic simile: The Taoiseach's phone and the Popes speech.

## Chapter Six

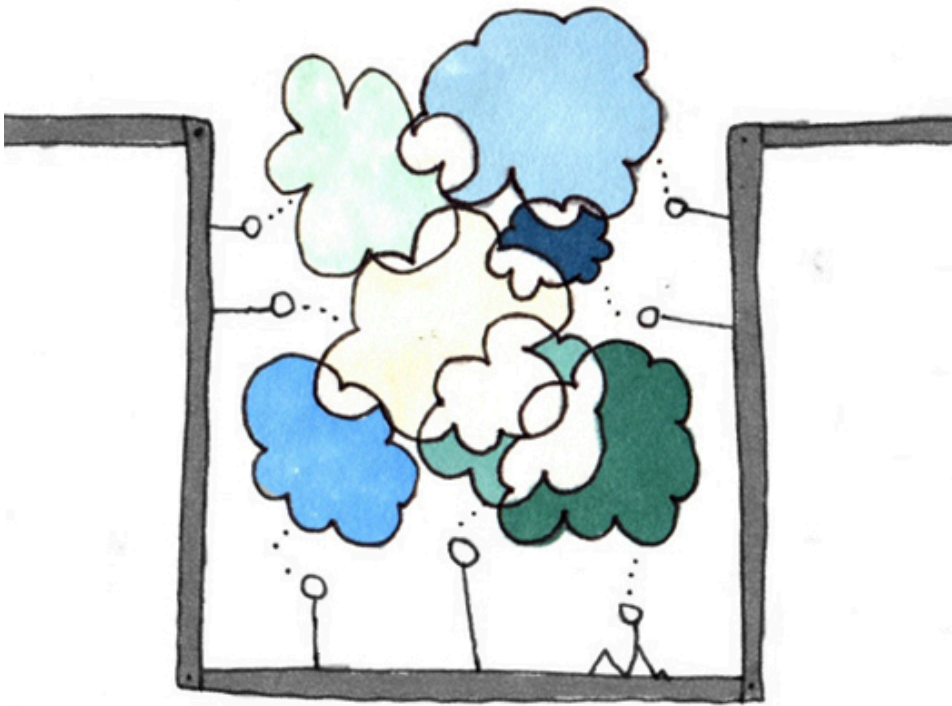


Figure 46 A graphic to accompany the Filling the White spaces workshop information materials.



Figure 47 A member of the audience reads the agenda of the Filling the White Spaces workshop – L.D. and T.F. convene the distance.



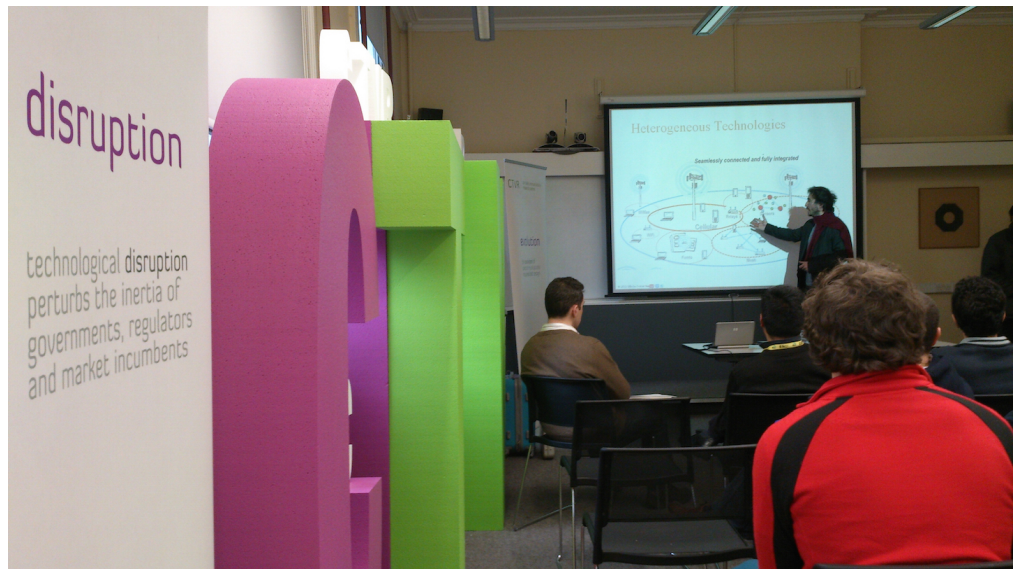


Figure 48 Prof. Misha Dohler speaking at CTVR, January 2013.

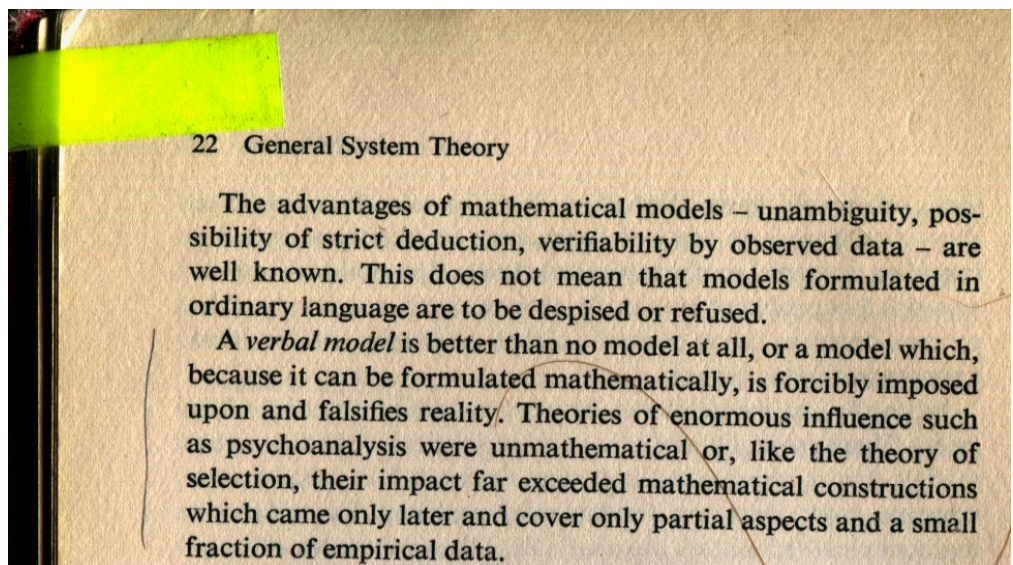


Figure 49 A scan from Ludwig von Bertalanffy's *General System Theory* featuring the phrase on the 'Verbal Model'.



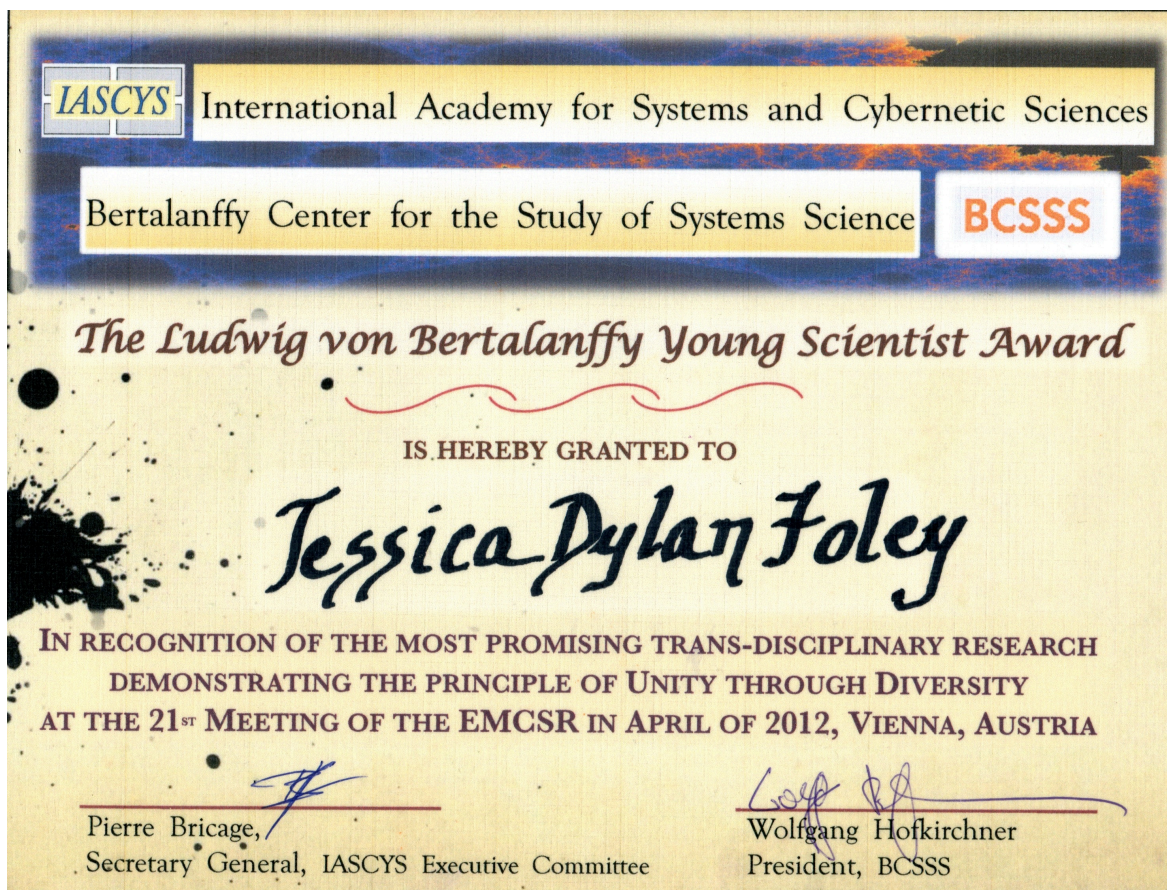


Figure 50 Scan of the Certificate Awarded to the author on the occasion of the inaugural Ludwig von Bertalanffy Young Scientist Award, 2012.

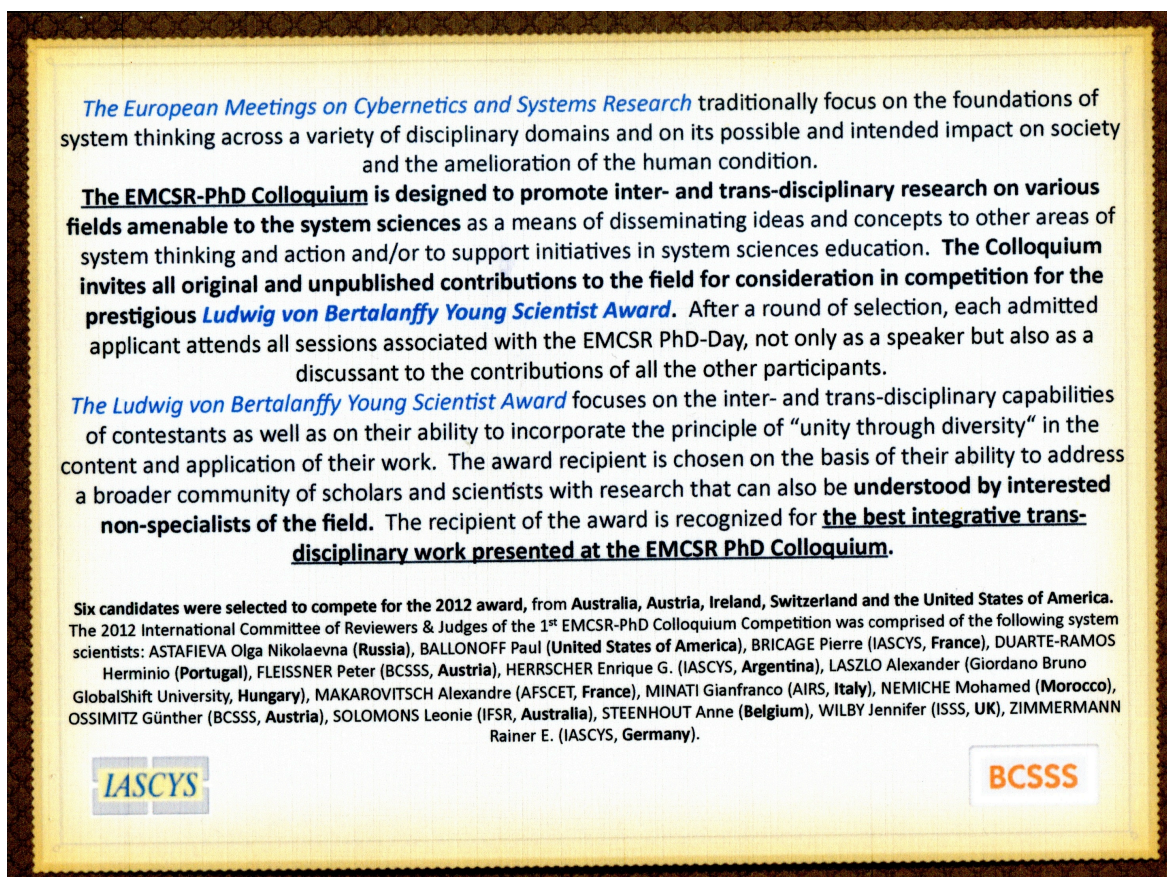


Figure 51 Scan of Ludwig von Bertalanffy Young Scientist Award Certificate, 2012.

**Email Responses from CTVR researchers to the Question on the ‘Verbal Model’.**

|      | <i>Do you agree with this statement?</i>                    | <i>Do you disagree with this statement?</i> | <i>Do you have any thoughts or comments to make in relation to this statement from a professional point of view?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------|-------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (R1) | I agree with this statement.                                |                                             | <p>A caveat:</p> <p>“A model that can be mathematically formulated sometimes falsifies reality to a degree, but it is negligible.”</p> <p>Ergo;</p> <p>“which would make that [mathematical] model better than a verbal model”.</p> <p>[Judgment: Explicit bias – maths is best.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (R2) | I agree with the first part of this statement.              |                                             | <p>“As long as the verbal model comes from observation and analysis, and at the very least is consistent with measurements and experimentations.”</p> <p>Dispute:</p> <p>“to say that a mathematical model is ‘forced’ upon reality and falsifies it”</p> <p>Point of Clarification:</p> <p>“Mathematics is just a language with the added benefit of being less ambiguous and more universal than any verbal language.</p> <p>A verbal model can help you understand something; a mathematical model does that too, but in a way that can be easily proved right or wrong, AND gives you quantitative information on what you can expect.</p> <p>But there is no forcing whatsoever, maths are not imposed from the heavens on the system, it’s actually the other way around – you derive mathematical formulas that are in accordance with what you are observing and you hold them acceptable (a limited truth, one might say) until proved wrong.</p> <p>Furthermore, I doubt that any scientist in his right mind would argue that mathematical models are the exact representation of the systems they describe. Formulas are to the system what maps are to the territory; they are a tool, and a good one too, but they always imply simplifications, approximations, etc.”</p> <p>[Judgment: neutral – complex]</p> |
| R3   | “Yes – anything is better than nothing or the wrong thing.” |                                             | <p>Point of Clarification:</p> <p>“The phrase ‘verbal model’ suggests that we have a model – just one that cannot be cast in numbers”</p> <p>Suspicion:</p> <p>“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.</p> <p>Quoting from Lord Kelvin:</p> <p><i>In physical science the first essential step in the direction of learning any subject is to find principles of numerical reckoning and practicable methods for measuring some quality connected with it. I often say that when you can 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; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter</i></p>                                                                                                                                                                                                                                                                                                                                             |

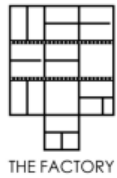


|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                       | <p>may be.”</p> <p>[Judgment: Implicit bias: Mathematical Models are Better than Verbal Models.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| R4 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>“That’s a very weirdly worded sentence.”</p> <p>Conscious of rhetoric</p>                                                                                                                                          | <p>Doubt:</p> <p>“What is he trying to say?<br/>Is he trying to say that mathematical simplifications of real situations are good or bad? I’ve a feeling that he’s trying to say one or the other but I could be completely off.”</p> <p>[Judgment: Conscious of a dominant bias of binary thinking. Ambiguity is difficult to handle. Curious.]</p> <p>Additional: This researcher sends on a link to a Coursera module on ‘Model Thinking’.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| R5 | I agree that verbal models are better than no model at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>“The second part of the statement is a little too radical; I also think the choice of words (‘falsify’, ‘forcibly’, ‘imposed’) is meant to sway the reader towards his argument.”</p> <p>Conscious of rhetoric</p> | <p>Point of Clarification:</p> <p>“Mathematical models can be indispensable, even if they somewhat oversimplify reality.</p> <p>A good model will simplify the real problem just enough so that you end up with a tractable mathematical formulation of the problem but not so much that you will lose any insight it may provide into the engineering or analysis of the system”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| R6 | “I’d say that in general I agree.”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                       | <p>“A common sense model built upon words/everyday language, is probably the first step to model a certain system/problem.<br/>Normal language helps us to figure out what a problem/system is, pros/cons, trade-offs etc.<br/>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 mathematically modeling comes last.”</p> <p>Formula:<br/>(1) Verbal Model → (2) Technical Model → (3) Mathematical Model</p> <p>“Actually I think of it as a loop, where one can go back and forth between (1), (2), and (3), according to the need and according to how performing the models we come up with in describing the reality and/or helping us to reach certain design goals.”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| R7 | <p>“It is very difficult for me to take a hard stance on this quote as I feel it is somewhat of a ‘six of these half dozen of those’ situation. My gut reaction however is that I basically agree in theory but in practice feel that things are more nuanced.”</p> <p>BY THE END OF THE RESPONSE:</p> <p>“Bringing my rambling thoughts back to the quote I think I would say that I totally agree that ‘A Verbal model is better than no model at all’.</p> <p>I also think that a verbal model brings a new level of insight, ingenuity and depth to models that ‘falsify</p> |                                                                                                                                                                                                                       | <p>Points of Clarification:</p> <p>“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.<br/>But saying that, if the theory is incorrect/imprecise we do need to keep that in mind when we use it.</p> <p>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.”</p> <p>“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.</p> <p>A mathematical proof can often only be formulated in a single way. I think this ‘less precise’ form of theory may allow ingenuity in its proof, either by mathematical means or by thought experiments. This is something that is much more difficult to do with mathematical proofs.”</p> |



|    |                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>reality’.</p> <p>At the same time I think that mathematical models are also needed and even models that are closed (falsify reality) do have some value to them in our very complicated world.”</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <p>“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.”</p> <p>“I am sure that you have gotten all sorts of answers with this quote because it is such a big issue. It would be interesting to debate this issue out among the group to see if we could come to a common consensus.”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| R8 |                                                                                                                                                                                                        | <p>“My instinctive reaction to the statement, and answer to (a) was to think I didn’t agree with it. Because it’s a wild generalisation. And implies that there’s something constricting and false about mathematics.”</p> <p>“The statement is cheating”</p> <p>“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.”</p> <p>“A Verbal Model has the comfort of the implicit ‘that’s not what I meant, you silly thing’.”</p> <p>“I also think 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] is forcibly imposed upon and falsifies reality’.</p> <p>Which is pretty damned stark, and says to me the author thinks <i>all</i> 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.”</p> | <p>“There is something wrong with forcing a model on reality of course... but the problem isn’t with mathematical models, but with people forcing them on things inaccurately, in ignorance or nefariously.”</p> <p>“It’s also much easier to ‘prove’ or at least indicate that a mathematical model falsifies reality. But that’s not least because truth and falsehood in the purest form are mathematical concepts.”</p> <p>“Mathematical models by their very nature expose themselves to much more rigorous scrutiny, and to a much higher standard. They ‘put themselves out there’ so to speak, prepared to be stricken down, and in the knowledge that doing so might be easy – one needs only find one exception.”</p> <p>“To say [mathematical models] are not representative at all draws a rather large question as to how it is we’ve then managed to use them to make anything work!”</p> <p>“Do explain yourself when the secret’s safe to be let out!”</p> |

Figure 52 Email responses made by CTVRs researchers to the question of the Verbal Model.



**New Creative Writing Course**  
**with PAT McCABE**



*Figure 53 An image accompanying the announcement for Pat McCabe's Writing Course*



Figure 54 A view from *The Writing Workshop*, hosted at P.S. 1, New York, New York.



Figure 55 A graphic for the *HACKRONYM* writing workshop as part of *Openhere*, 2012.



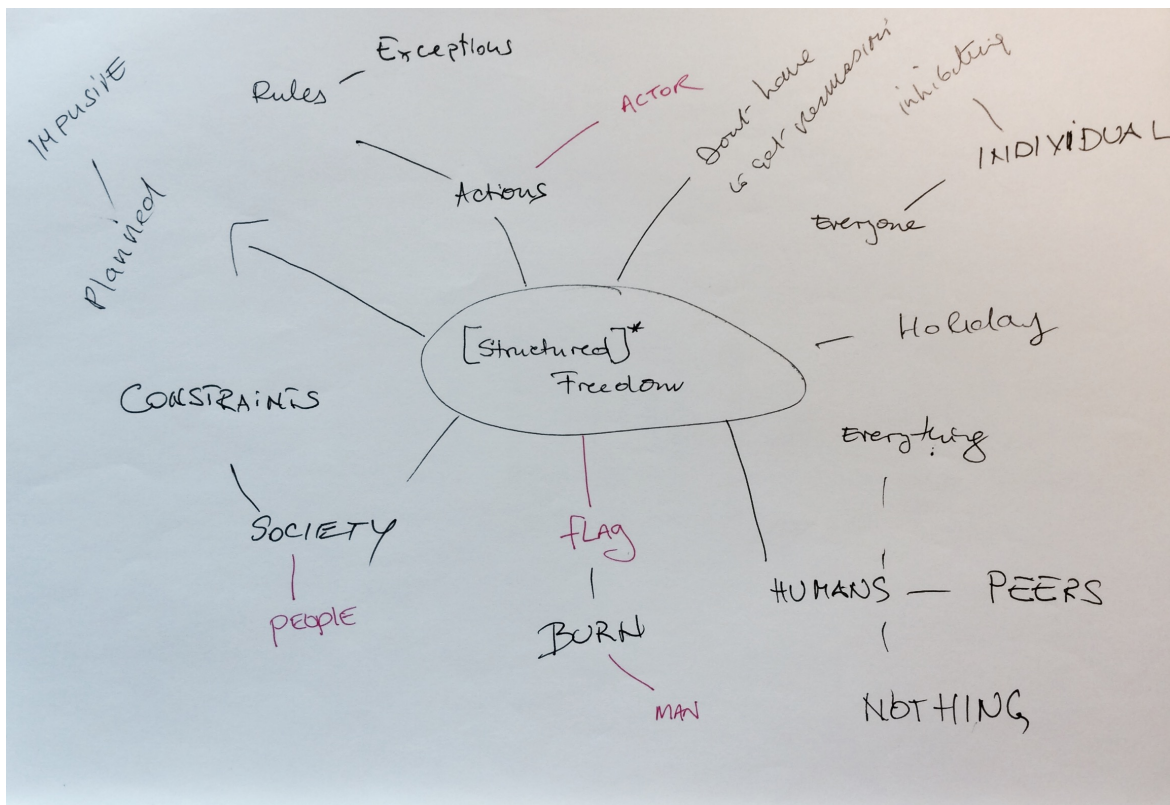


Figure 56 A Popcorn word-web generated through the HACKRONYM workshop.



Figure 57 The HACKRONYM writing workshop underway as part of Openhere at Science Gallery, 2012.



Figure 58 The seminar room at Dunlop Oriel House configured for the first Engineering Fictions session, 29.01.13.

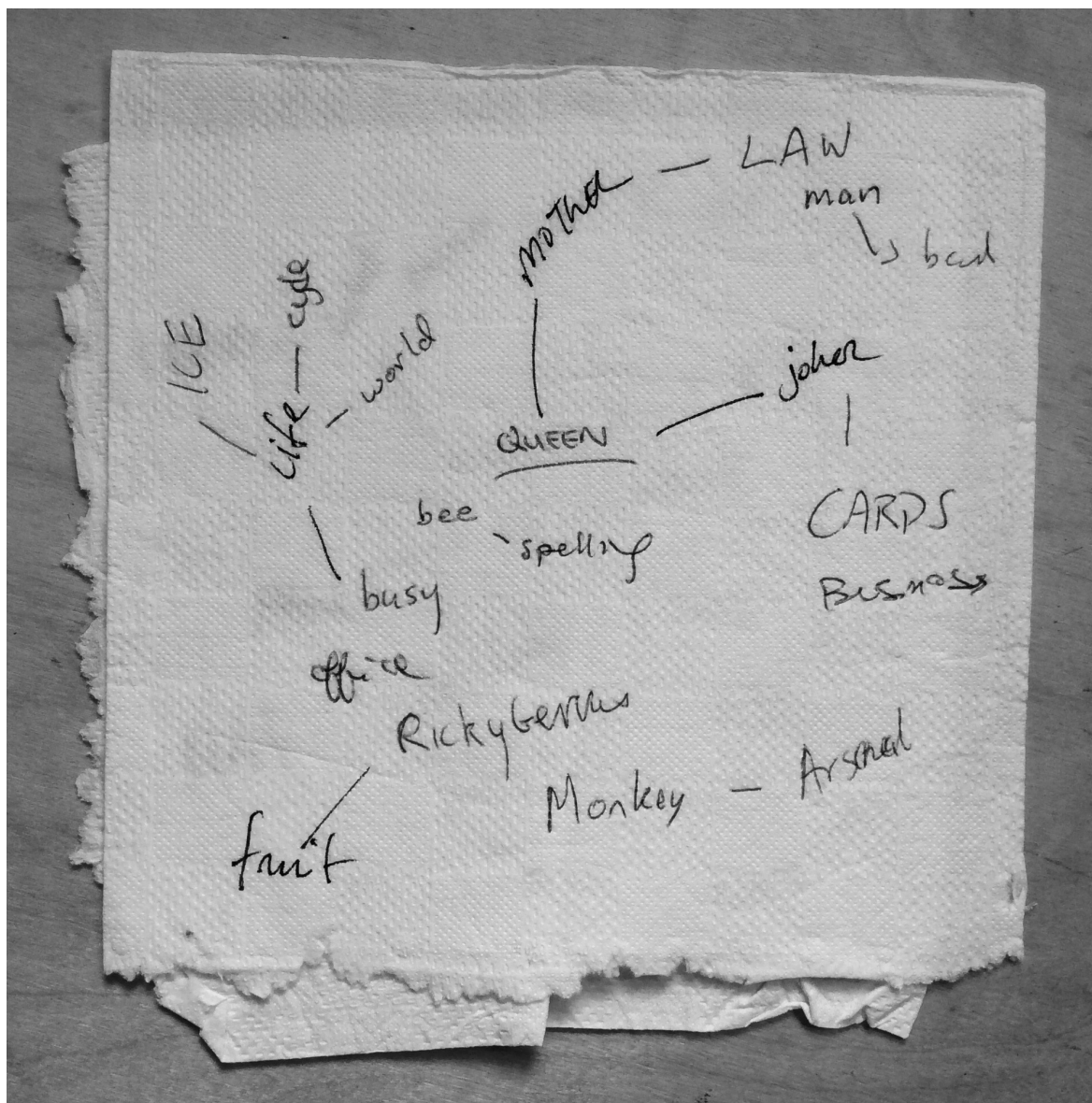


Figure 59 A popcorn exercise on a Napkin from the first E.F. session.





*Figure 60 An overhead view of a popcorn exercise in action during an E.F. session.*



Tuesday 12th February 6-7.30pm



The next *Engineering Fictions* will take up the theme of **Cognitive Radio**, and will be catalyzed 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 a 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 Brown which she made as part of a workshop she ran at the Ikon Gallery in Birmingham.

The session will take place at CTVR, Dunlop Oriol House, in the Seminar Room. As usual please bring along with you whatever writing materials you prefer to use. Tea, coffee and a treat will be provided.

Figure 61 A screen-grab from the Cognitive Radio E.F. session posted on [engineeringfictions.wordpress.com](http://engineeringfictions.wordpress.com)

**LINDA:** I think all of these topics and many more make for good thoughts on World Radio Day!

Part A OF RADIO MUSIC to be played alone or in combination with parts B-D. To 1 sections (I-IV) to be programmed by the player with or without silence between sections, the 4 to take place within a total time-length of 6 minutes. Duration of individual tunings free. Each tuning to be expressed by maximum amplitude. A indicates "silence" obtained by reducing amplitude approximately to zero. Before beginning to play, turn radio on with amplitude near zero.

| (I cont.) | (IV cont.) |     |
|-----------|------------|-----|
| 105       | 107        | 91  |
| 125       | 69         | 116 |
| 55        | 107        | 69  |
| 91        | 56         | 124 |
| 60        | 125        | 97  |
| 69        | 120        | 91  |
| 76        | 55         | 156 |
| 112       | 56         | 55  |
| 56        | 125        | 155 |
| 86        | 69         | 128 |
| 73        | 84         | 138 |
| 127       | 120        | 107 |
| 73        | 111        | 99  |
| 148       | 76         | 99  |
| 76        | 1V         | 153 |
| 109       | 99         | 63  |
| 63        | 59         |     |
| 67        |            |     |
| 91        |            |     |
| 86        |            |     |
| 73        |            |     |

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(<http://ledoyle.files.wordpress.com/2013/02/johncagescore.jpg>)

From → Art, Cognitive Radio

Figure 62 The score for John Cage's *Imaginary Landscape No. 4* discussed by L.D. during her catalysis of E.F.

ENGINEERING

*Fictions*

jessicafoleywriting@

May 12, 2013

0

Edit

Tuesday 14th May – CAGE with Louise Ward – 5-6.30pm

@ CTVR

I'm delighted to welcome artist **Louise Ward** to CTVR for this weeks *Engineering Fictions*, to catalyze discussion and writing around the idea: **CAGE**.



The idea for this Engineering Fictions session arose through a recent discussion of 'cognitive radio' between myself, Linda (Doyle), Tim (Forde) and Louise, which was broadcast online ([www.radioalcabira.com](http://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. Louise will tease her sense of this out with us through conversation and writing this Tuesday.

**A bit about Louise:**

As an artist, Louise'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 performances.

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!

Figure 63 A screen-grab from the E.F. blog featuring L.W.'s session CAGE.





Figure 64 A view from the E.F. session catalyzed by L.W. – CAGE – this is during the writing section.



Figure 65 A view from E.F. session catalyzed by L.W. - CAGE - this is during the writing section.



## Chapter Seven



Figure 66 A contribute to Room 3.17 by P.S. - a colander - in conversation with an antenna.

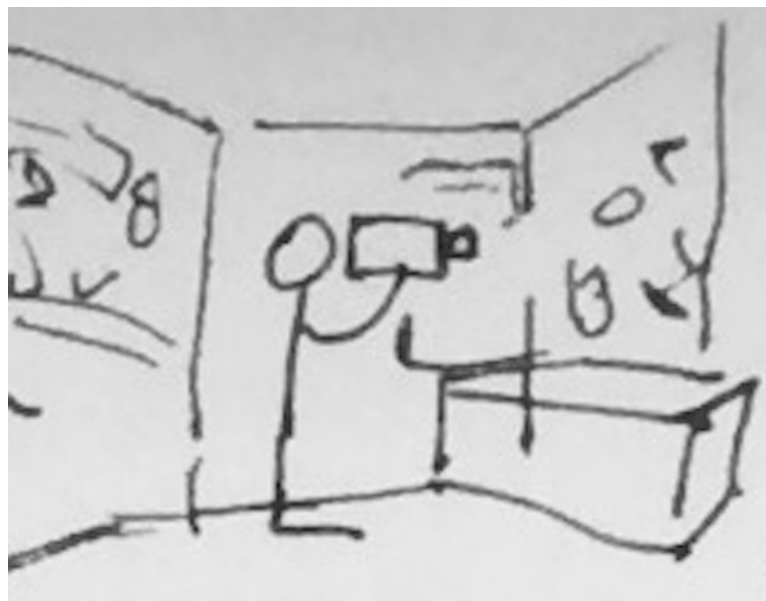


Figure 67 A sketch from the Field-Notebooks visualizing the filmmaking process in Room 3.17.



Figure 68 Contributes to Room 3.17.

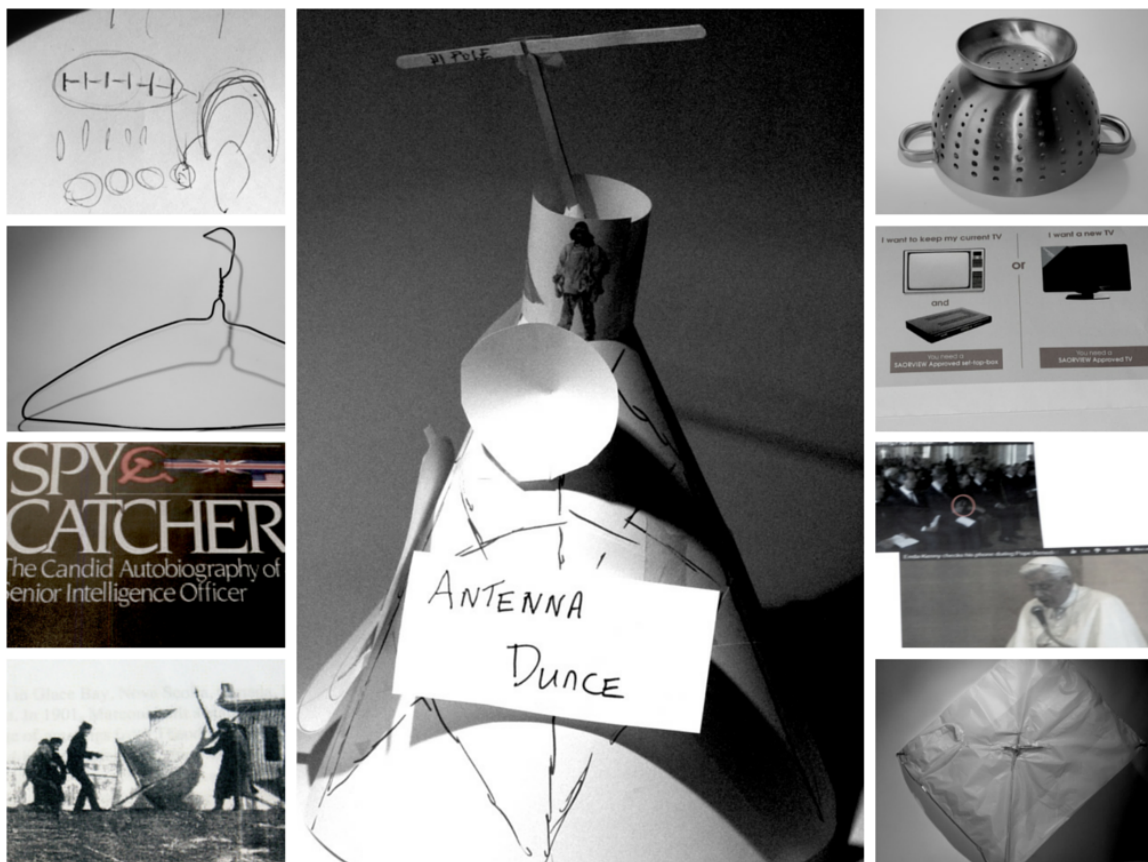


Figure 69 Contributes to Room 3.17



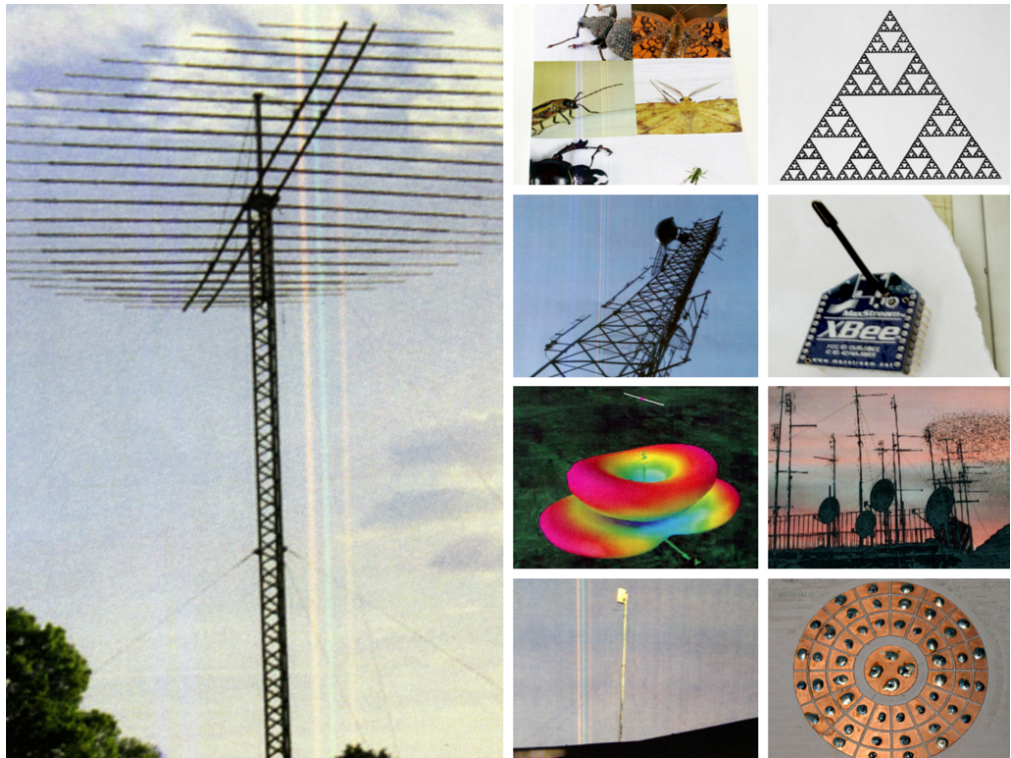


Figure 70 Contributes to Room 3.17.



Figure 71 Contributes to Room 3.17 made during dialogue and filming by participant observers.



## Chapter Eight

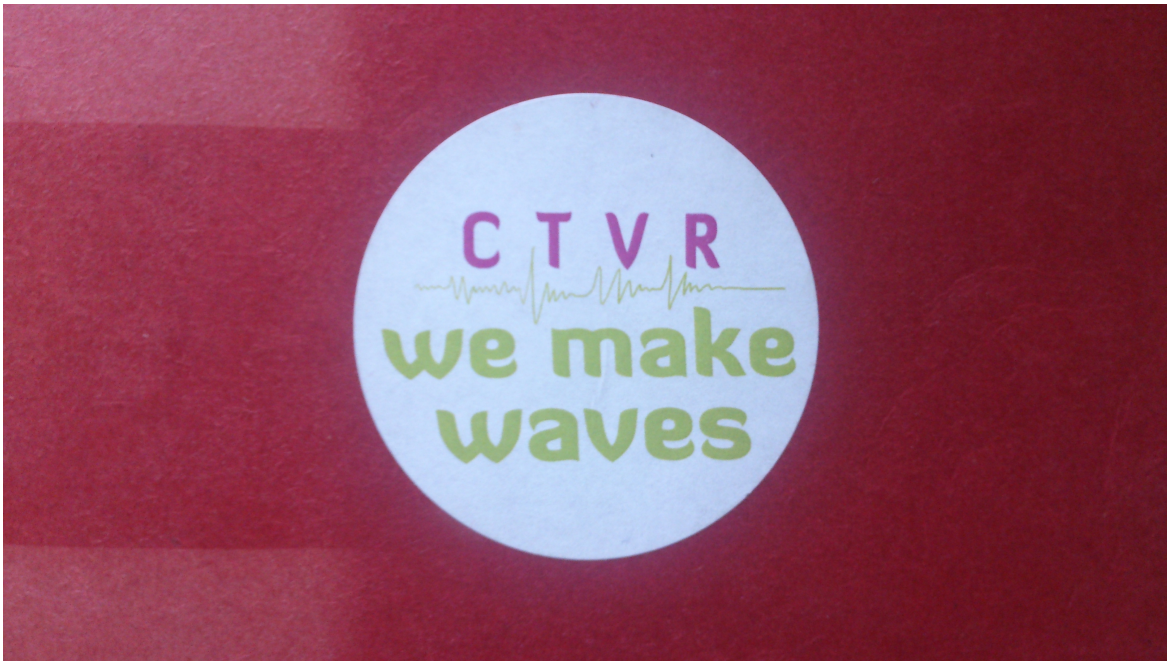


Figure 72 Stickers designed by CTVR for sharing during public events.



Figure 73 artifacts from CTVRs Postcards from the Near Future experiment





Figure 74 A workshop catalyzing the Postcards from the Near Future experiment, led by S.m.G. 2013



Figure 75 Postcards from the Near Future, installed at CTVRs Showcase 2013



Figure 76 Engineering Fictions continues into 2014 at CTVR



Figure 77 2014 An Engineering Fictions session catalyzed by artist D.mN.





Figure 78 Developing plans for a Grey Space within Dunlop Oriel House, 2014



Figure 79 Work by artist Seoidín O'Sullivan and architect Karol O'Mahony - extending towards a seating system for CTVRs grey space.

## **LINKS TO VIDEO ESSAYS**

A number of experimental videos have been made as part of this research. They are not considered to be complete 'works' – they are heuristics and resources for the *inreach* process. They have been ways of making sense of the experiments and the meaning emergent from them.

Listed here are links to three videos related directly to choreographic processes of *inreach*.

The first is a short video made after the BT Young Scientist Exhibition 2011, where CTVR posed a question to the audience: **How do you Imagine the Internet?** (See Chapter 4.2.2.)

<https://www.youtube.com/watch?v=nsDfYhd8Jl8>

The second is an introductory video to the experiment **Engineering Fictions**, made as part of the CTVR Showcase 2013 which was hosted at the Lighthouse Cinema in Dublin City. (See Chapter 8 Table 4 pg: 254)

<https://vimeo.com/140770897>

The third is a video-essay made in collaboration with J.K. about the process of collaboration in-between art and engineering. The video was presented at a conference called The Expanded Lyric, in April 2014. Again, the process of making this stop-motion animation was as a way of supporting learning and meaning making in-between occupational difference. It is in many ways a nonreciprocal process, and involves a great deal of trust. It is called:

**Green-graphs & IRIS: On the emergence of lyric within a telecommunications research lab...**

(See Chapter 8 Table 4 pg: 254)

<https://vimeo.com/89157216>

**PASSWORD:** CTVRlyric

An additional link is provided here to view the video-essay made with Sarah Browne as part of her exhibition at CAG Vancouver, Canada. (See Chapter 5.2.3.2)

<https://vimeo.com/46123323>

## **LINK TO FIELD-JOURNAL**

The Field-Journal for *inreach* consciously begins in September 2012 and is active until February 2015. For the purposes of examination only, the Field-Journal is accessible via a pass-word protected page on the authors website. Once the examination has been completed these pages will be removed once again from the face of the website.

There are two pages – Listed as “Private Pages” rather than as a Field-Journal. They were set up prior to the a deeper engagement with the language of anthropology and ethnography. This was very much a personal Journal of a research process, but it was written with an reader in mind. Initially the pages were set up as a way of making the research journey accessible to the thesis supervisor. It became an invaluable heuristic and resource for this research process.

Access to the Field-Journal and Field-Notes can be arranged with the author. Please contact [jessica.dylan.foley@gmail.com](mailto:jessica.dylan.foley@gmail.com) for further inquiries.



## **FIELD-NOTEBOOK SAMPLES**

Thinking through drawing and colouring within the Field-Notebooks was an integral part of the research process, particularly in the very early stages of research, before the *inreach* experiments got underway. For this reason, the following pages present some samples, uncaptioned, from the Field-Notebooks, to give a sense of how the choreographic process learned listen to CTVR and to think through the experience...

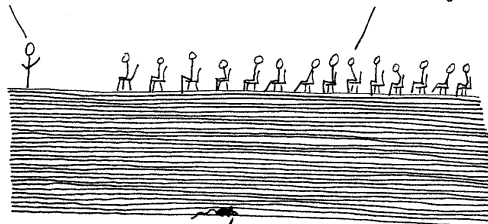
THE TENSION  
BETWEEN  
"MAKING STRANGE"  
AND  
"MAKING FAMILIAR"



TO REALLY COME TO UNDERSTAND  
SOMETHING, MUST YOU BECOME  
ABSTRACTLY CLOSE TO IT?

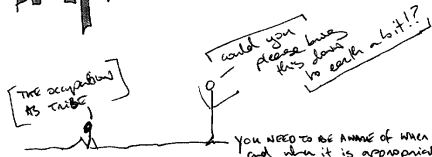
I AM THINKING  
ABOUT WHAT  
YOU DO...  
...ISN'T THAT  
A LITTLE  
STRANGE?

DON'T YOU MEAN  
YOU'RE THINKING  
ABOUT WHAT YOU  
DO BY THINKING  
THROUGH WHAT  
WE DO?



[THE PHOENIXES ARE GETTING IN THE WAY OF IT... THE  
ADDRESS IS TOWARDS OCCUPATIONS AND ROLES  
AND THE DISTANCE AND POWER RELATIONS THAT  
EMERGE, SOMEWHAT MYSTICALLY, AROUND THESE  
INHABITANT STRUCTURES AND SYSTEMS.]

HOW CAN YOU PROVE THAT PRACTICES  
SHAPE THINKING? OR IS IT THAT  
OCCUPATIONAL PRACTICES FORM  
HABITS OF THINKING... AND THAT  
MY THESIS IS EXPLORING WAYS OF  
PRACTISING THAT ENABLES  
**IMPROVISATIONAL THINKING...**



(amongst occupations)  
AND THIS IN TURN ENABLES multiplicities of knowing  
that can work together to a form — distinct  
and yet inter-related — an ecology of thought in  
practice.  
You need to be aware of when it is appropriate to collaborate or out-reach. IT is about responsibility  
and when it is appropriate to in-reach. and recognizing your effect.

**SUCH THINGS  
THAT HAVE  
LIKENESS + DIFFERENCE  
IN POTENT  
EQUIVALENCE**





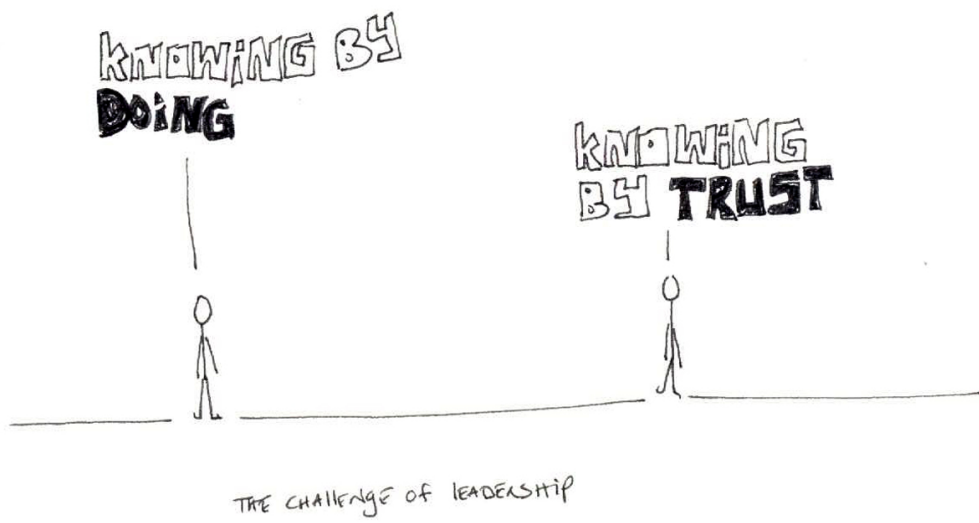
**“DESIGNED  
WITH  
CHANGE  
IN MIND”**



**“SCIENCE AIMS  
TO UNDERSTAND  
THE WORLD,  
WHEREAS  
ENGINEERING  
AIMS TO  
CHANGE IT.”**



DR. NATASHA MCCARTHY — THE ROYAL ACADEMY OF ENGINEERING



## ***A Sample of Proposals Written with CTVR***

The following proposals were developed with CTVR researchers in a bid to participate in the formal proceedings of the Dublin City of Science ESOF events in 2012. (CTVRs Openhere festival was a part of these events) These ESOF proposals include a symposium and public engagement events. Writing these proposals was formative in establishing working relationships with CTVR. These proposals were written during the Summer 2011, just prior to the beginning of this PhD research.



CTVR

PRESENTS

# A TALE OF TWO SPECTRA

CHARACTERIZING  
THE FUTURE  
OF  
*SPECTRUM*

ACT I  
GUEST STARRING

YOCHAI BENKLER  
PIERRE DE VRIES  
ELINOR OSTROM  
CHARLOTTE HESS  
RACHEL BOTSMAN  
LINDA DOYLE

**Title:**

**A Tale of Two Spectra – Characterizing the Future of Spectrum**

**ESOF 2012**

**Scientific Programme**

**Theme:** *Science & Culture*

**Session Format: OTHER: A Pseudo-Theatrical production in two Acts**

**A Tale of Two Spectra** spreads itself over two symposia sessions (4 hours total), telling a story of how spectrum as a resource came to be managed & organized as it is today (ACT I), and imagining the potential characteristics of Spectrum of the Future (ACT II). The Audience may choose to attend Act I, Act II, or both. CTVR's symposium sessions will be staged, in a similar manner to a theatrical production, featuring stage sets, lighting, costume, choreography, sound and visual aids, as appropriate.

Each *ACT* boasts a unique cast of 'actors', who play fundamental roles in their fields, relating to Social science, Commons, Law, Technology, Spectrum, Engineering, Science, and Art.

**Abstract:**

The world of telecommunications has become exponentially valuable to how Western Societies function socially and politically. Telecommunications Spectrum is a resource. Culturally speaking it *could* be considered one of the most valuable on the planet today. Like most resources that are of value, we begin to recognize their importance as they become less & less available (for example the case of Oil, and critically, *Water*).

Spectrum is becoming less & less available, but it is a resource that is not literally being exhausted, like Oil. Spectrum is a constant resource – the only thing required to keep it available is flexibility with how we use it and manage it, *as a shared resource*.

CTVR's Symposium event will engage its audience in an immersive pseudo-theatrical experience, expounding an enlightening history of spectrum as a cultural resource, how it came to be used as it is today, and importantly articulating why & how we need to change the ways we manage this resource for future use (ACT I – *Thinking the Invisible*). CTVR's symposium events will also presents a diverse ensemble of actors who give insight into the kinds of imaging methodologies and techniques that are in evolution, allowing us to experience the invisible and gain a deeper sense of illusive phenomena, from radio spectrum to the nature of commons (ACT II – *Imaging the Invisible*)

The Lecture Hall will be transformed into a simulacrum space of spectrum, a pseudo-theatre. The audience will play a key role in this dramatic representation – for example, the seating & the audience will become a simulacrum of spectrum allocation,

revealing patterns showing how it is used today (divided amongst many vested interests, from military to private companies) and how it could be managed more openly in the future. (Feargus Ó Conchúir has been approached to work with us on the choreography of the simulated spectrum seating.)

**Target Audience:** Scientists, Media, Policy Makers, Industry, General Public, Students, Artists, Designers, etc.

### **Scheduling:**

#### **Act I – *Thinking the Invisible***

The lights fade up revealing the scene: We see upon the stage a group of people in earnest discussion. Their voices fade up and become audible – we hear that they are discussing *Spectrum*... they debate how Spectrum has become rigid and immobile, how the resource has become stifled, and of the urgency for change and flexibility... various interlocutors, at different moments, take their cues and speak of their understanding of how Spectrum ‘territories’ came to be divided as they are. Their voices are augmented now & then with visualizations and short screenings that show tableau’s of the past and of the future – telling the tale of spectrum usage and management, of technological, social and cultural change and innovation, from the beginnings of Spectrum allocation to the present.

### **Timing:**

Each Speaker will be given approximately 30 mins for delivery, but there will be room for each to ask questions of the other, so there may be interruptions and divergences. (There will be a time keeper allocated to each speaker so that no one has a disproportionate amount of ‘air time’.)

There will be 30 mins approximately allocated for the audience to ask questions towards the end of the session.

Interlocutors will include 3 of the following persons (in order of preference) to engage in discussion of Spectrum as a resource – from the past to the present:

#### **Linda Doyle**

[Linda Doyle](#) is an associate professor in Trinity College, University of Dublin in the Department of Electronic & Electrical Engineering. Professor Doyle is Director of CTVR. As well as directing the Centre, Prof. Doyle manages one of the CTVR research groups and has a team 20 researchers focusing on wireless networking, cognitive radio, reconfigurable networks, dynamic spectrum access, spectrum trading and spectrum regulation. Prof. Doyle is highly active in the field of cognitive radio. She was vice-chair of IEEE DySPAN 2007 which was hosted in Dublin.



**Yochai Benkler**

Yochai Benkler is the Berkman Professor of Entrepreneurial Legal Studies at Harvard, and faculty co-director of the Berkman Center for Internet and Society. Since the 1990s he has played a part in characterizing the role of information commons and decentralized collaboration to innovation, information production, and freedom in the networked economy and society. (<http://www.benkler.org/Bio.html>)

**Rachel Botsman**

Rachel Botsman is a social innovator who writes, consults and speaks on the power of collaboration and sharing through current and emerging network technologies, including how it will transform business, consumerism and the way we live. She is the author of the influential book What's Mine is Yours: The Rise of Collaborative Consumption. TIME magazine recently called Collaborative Consumption one of the "[10 Ideas That Will Change The World](#)" (<http://www.rachelbotsman.com/>)

**Elinor Ostrom**

Ostrom is the Arthur F. Bentley Professor of Political Science in the College of Arts and Sciences and a professor in the School of Public and Environmental Affairs at Indiana University Bloomington. She is co-founder and senior research director of the Workshop in Political Theory and Policy Analysis at IU.

She is the first woman to win the Nobel Prize for Economics, which was established in 1968. She shares the award with Oliver Williamson, Edgar F. Kaiser Professor Emeritus of Business, Economics and Law at the University of California, Berkeley.

Her award recognizes her analysis of economic governance, especially the commons. (<http://newsinfo.iu.edu/news/page/normal/12185.html>)

**Pierre de Vries**

Pierre de Vries researches and advises clients on the intersection of information technology and government policy. His current projects include regulatory paradigms for the internet/web, alternative conceptual models for wireless policy, spectrum allocation in the TV white spaces, and the impact of intangibility on decision-making in the digital world.

**Charlotte Hess**

Charlotte Hess is the director of the Digital Library of the Commons and is Information Officer for the International Association for the study of Common

Property. She is an information specialist on common-pool resources (CPRs) and collective action. (<http://www.wizards-of-os.org/index.php?id=934&L=3>)

We are in negotiation with and awaiting confirmation from these eminent speakers.

### **Special Needs and Remarks:**

As this will be a theatre style session we will require full access to Audio/Visual Technologies, Sound & Lighting, Internet Access, etc. We potentially will need to be able to install certain set design elements for this production, props, etc. We will also need access to the space in advance of the session, in order to program & sculpt the AR interface to the dimensions of the space. We will need access to floor plans and room dimensions. We will need rehearsal time prior to the live event, to test cues & technology.

### **Session Organiser:**

Jessica Foley  
CTVR  
Room 3.17  
Dunlop Oriel House,  
Trinity College Dublin,  
Dublin 2,  
Ireland  
00353 87 941 4178  
[Jessica.dylan.foley@gmail.com](mailto:Jessica.dylan.foley@gmail.com)

### **Speakers**

Name: Yochai Benkler  
Gender: Male  
Age Group: Late 40's early 50's  
Discipline/Field of Expertise: Law, Technology, Internet, Commons.  
Institution/Organisation: Berkman Professor of Entrepreneurial Legal Studies at Harvard, and faculty co-director of the Berkman Center for Internet and Society.  
Country: USA  
Contact: [yochai\\_benkler@harvard.edu](mailto:yochai_benkler@harvard.edu)

Name: Linda Doyle  
Gender: Female

Age Group: late 30's, early 40's

Discipline/Field of Expertise: Telecommunications, Electronic Engineering, Cognitive Radio

Institution: CTVR, TCD

Country: Ireland

Contact: [LEDOYLE@tcd.ie](mailto:LEDOYLE@tcd.ie)

CTVR

PRESENTS

# A TALE OF TWO SPECTRA

CHARACTERIZING  
THE FUTURE  
OF  
*SPECTRUM*

ACT I

GUEST STARRING

PIERRE DE VRIES  
AARON KOBLIN  
TIMO ARNALL  
ANAB JAIN  
WILLIAM FORSYTHE  
FEARGUS Ó CONCHÚIR



**Title:**

**A Tale of Two Spectra – Characterizing the Future of Spectrum**

**ESOF 2012**

**Scientific Programme**

**Theme:** *Science & Culture*

**Session Format: OTHER: A Pseudo-Theatrical production in two Acts**

**A Tale of Two Spectra** spreads itself over two symposia sessions (4 hours total), telling a story of how spectrum as a resource came to be managed & organized as it is today (ACT I), and imagining the potential characteristics of Spectrum of the Future (ACT II). CTVR's symposium sessions will be staged, in a similar manner to a theatrical production, featuring stage sets, lighting, costume, choreography, sound and visual aids, as appropriate.

Each *ACT* boasts a unique cast of 'actors', who play fundamental roles in their fields, relating to Social science, Commons, Law, Technology, Spectrum, Engineering, Science, and Art.

**Abstract:**

The world of telecommunications has become exponentially valuable to how 'Western' Societies function socially and politically. Telecommunications Spectrum is a resource. Culturally speaking it *could* be considered one of the most valuable on the planet today. Like most resources that are of value, we begin to recognize their importance as they become less & less available (for example the case of Oil, and critically, *Water*).

Spectrum is becoming less & less available, but it is a resource that is not literally being exhausted, like Oil. Spectrum is a constant resource – the only thing required to keep it available is flexibility with how we use it and manage it, *as a shared resource*.

CTVR's Symposium event will engage its audience in an immersive pseudo-theatrical experience, expounding an enlightening history of spectrum as a cultural resource, how it came to be used as it is today, and importantly articulating why & how we need to change the ways we manage this resource for future use (ACT I – *Thinking the Invisible*). CTVR's symposium events will also present a diverse ensemble of actors who give insight into the kinds of imaging methodologies and techniques that are in evolution, allowing us to experience the invisible and gain a deeper sense of illusive phenomena, from radio spectrum to the nature of commons (ACT II – *Imaging the Invisible*)

The Lecture Hall will be transformed into a simulacrum space of spectrum, a pseudo-theatre. The audience will play a key role in this dramatic representation – for example, the seating & the audience will become a simulacrum of spectrum allocation,

revealing patterns showing how it is used today (divided amongst many vested interests, from military to private companies) and how it could be managed more openly in the future. (Feargus Ó Conchúir has been approached to work with us on the choreography of the simulated spectrum seating.)

**Target Audience:** Scientists, Media, Policy Makers, Industry, General Public, Students, Artists, Designers, etc.

**Scheduling:**

**Act II – *Imaging the Invisible***

The desire to visualize or image the ‘unseen’ or the ‘invisible’ has become a compelling part of our media augmented world, particularly since the advent of electromagnetic communication systems, devices and theories. This desire is not unique to a digital world, but is rather something fundamental in human nature – a desire that roots itself in the timeless mystery of communication.

Act II of CTVRs ‘A Tale of Two Spectra’ will once again tease out the nature of our understanding of radio spectrum as a resource, questioning how it is used, how it is managed and how it might be utilized and organized in the future. This time, however, the conversation becomes partially enacted, through demonstration, performance and installation.

CTVR have invited guest speakers/demonstrators/artists from a range of fields that have splintered out from the development of sophisticated digital technologies, such as Data Visualization (Aaron Koblin), Interaction Design (Anab Jain), Internet Policy (Pierre de Vries), and including those whose expertise and techniques have grown prior to the digital age as we know it, such as those in the fields of Dance and Performance (William Forsythe, Feargas Ó Conchúir)

As part of *Act II* the story of the making of an Augmented Reality interface by CTVR researchers through *The Found Education Workshop* will be shown. The AR interface reveals the presence of telecommunications systems and activity around us, augmented by additional historical & locational information drawn from the city of Dublin. (This AR interface will be available to audience members with smart phone technology.)

**Timings:**

|          |                                                                                           |
|----------|-------------------------------------------------------------------------------------------|
| 60mins:  | 3 x Guest speaker/demonstrator/artist @ 20mins each                                       |
| 20 mins: | 1 x CTVR researchers (Ken Browne, UCC, Séamas McGettrick, TCD)                            |
| on the   | making of A.R. interface for visualizing telecommunications systems                       |
| 40 mins: | Chaired Q & A discussion with Linda Doyle & guest speakers/CTVR researchers and audience. |

**Total: 2 hours**

Interlocutors will include 3 of the following persons, plus speakers from CTVR's A.R. interface experiment, as part of *The Found Education Workshop*.

**Timo Arnall**

Timo Arnall directs films about the near future, designs interactive products, and researches emerging technologies.

Timo leads a international design research project that investigates the applications of computing technologies in products and services. His PhD project 'Making Visible' investigates the use of visual media to explain emerging technology. Timo also collaborates on visual design and filmmaking projects, and lectures in design, media and technology. (<http://www.elasticspace.com/about>)

**Aaron Koblin**

Aaron Koblin is an artist specializing in data and digital technologies.

Aaron's work takes real-world and community generated data and uses it to reflect on cultural trends and the changing relationship between humans and technology. His projects have been shown at international festivals including Ars Electronica, SIGGRAPH, OFFF, the Japan Media Arts Festival, and TED. He received the National Science foundation's first place award for science visualization and is part of the permanent collection of the Museum of Modern Art (MoMA) in New York, and the Centre Pompidou in Paris. Two of his music video collaborations have been Grammy nominated. He received his MFA in Design|Media Arts from UCLA. In 2010 Aaron was the Abramowitz Artist in Residence at MIT and currently leads the Data Arts Team in Google's Creative Lab. (<http://www.aaronkoblin.com/info.html>)

**Pierre de Vries**

Pierre de Vries researches and advises clients on the intersection of information technology and government policy. His current projects include regulatory paradigms for the internet/web, alternative conceptual models for wireless policy, spectrum allocation in the TV white spaces, and the impact of intangibility on decision-making in the digital world.

**Anab Jain**

Anab is a designer, entrepreneur, TED Fellow and founder of [Superflux](#), a multidisciplinary design company based in London, UK and Ahmedabad, India. Superflux is both a consultancy and a lab, operating in the realm of emerging technologies and experiences, for business, cultural and social purposes.

Educated in India, Vienna and London, Anab has an MA with distinction in Interaction Design from the Royal College of Art, London (2005). Since then, she has consulted on both strategic and speculative design and technology projects for clients such as Microsoft Research, Nokia, Design Council and NESTA. (<http://www.anab.in/aboutme.html>)

### **William Forsythe**

William Forsythe is recognized as one of the world's foremost choreographers. His work is acknowledged for reorienting the practice of ballet from its identification with classical repertoire to a dynamic 21st-century art form. Forsythe's deep interest in the fundamental principles of organisation has led him to produce a wide range of projects including Installations, Films, and Web based knowledge creation.

### **Fearghus Ó Conchúir**

Fearghus Ó Conchúir is an independent choreographer and dance artist. Brought up in the Ring Gaeltacht in Ireland, he completed degrees in English and European Literature at Magdalen College Oxford, before training at [London Contemporary Dance School](#).

We are awaiting confirmation from these eminent artists and practitioners.

### **Special Needs and Remarks:**

As this will be a theatre style session we will require full access to Audio/Visual Technologies, Sound & Lighting, Internet Access, etc. We potentially will need to be able to install certain set design elements for this production, props, etc. We will also need access to the space in advance of the session, in order to program & sculpt the AR interface to the dimensions of the space. We will need access to floor plans and room dimensions. We will need rehearsal time prior to the live event, to test cues & technology.

### **Session Organiser:**

Jessica Foley

CTVR

Room

3.17

Dunlop

Oriel

House,

Trinity

College

Dublin,

Dublin

2,

Ireland



00353 87 941 4178

[Jessica.dylan.foley@gmail.com](mailto:Jessica.dylan.foley@gmail.com)

### **Speakers**

Name: Yochai Benkler

Gender: Male

Age Group: Late 40's early 50's

Discipline/Field of Expertise: Law, Technology, Internet, Commons.

Institution/Organisation: Berkman Professor of Entrepreneurial Legal Studies at Harvard, and faculty co-director of the Berkman Center for Internet and Society.

Country: USA

Contact: [yochai\\_benkler@harvard.edu](mailto:yochai_benkler@harvard.edu)

Name: Linda Doyle

Gender: Female

Age Group: late 30's, early 40's

Discipline/Field of Expertise: Telecommunications, Electronic Engineering, Cognitive Radio

Institution: CTVR, TCD

Country: Ireland

Contact: [LEDOYLE@tcd.ie](mailto:LEDOYLE@tcd.ie)

## Event Details

**Event Title \*** *Communicating Communications III*

A Screening & Seminar Series inspired by the work of Ray & Charles Eames

**Event Description \*** Maximum of 300 words.

CTVR presents a screening of a film work by 20<sup>th</sup> century artist/designers Ray & Charles Eames, *A Communications Primer* (1953), which draws on the mathematical theory of communication put forward by Claude E. Shannon. CTVR presents the film in as close to a cinematic context as possible, for a general public audience, as well for people from the fields of architecture, engineering, science, art, design and film.

The Screening is augmented through discussion and responses made by key invited speakers to the film itself and the ideas it throws up, and more generally, to the innovative communicative and educational work of the Eames'. To date speakers have included *Prof. Hugh Campbell* of the UCD School of Architecture, *Prof. Linda Doyle*, Director CTVR, and *Dr. Gary Boyd*, of the UCC School of Architecture.

*Communicating Communications III* is due to be hosted at CTVR University of Limerick from the beginning of 2012, in coincidence with the ESOF/City of Science Program. This event will seek to directly engage 3<sup>rd</sup> and 4<sup>th</sup> level students and staff of various departments and schools across Limerick in a focused discussion & study of the film 'A Communications Primer' and particularly the notion posited by the Eames' that "*Communication means the responsibility of Decision, all the way down the Line*".

*Communicating Communications III* will be an event in two parts, the first being a *seminar* on 'A Communications Primer' between several groups from 3<sup>rd</sup>/4<sup>th</sup> Level Education across Limerick. The second part will involve a *public screening* of the film at an appropriate cultural venue in Limerick City (e.g.: *The Bell Table*, *Occupy Space*, *LCGA*), incorporating the critical responses (visual/audio/text/installation) from the Seminar Groups to the film & the idea that "*Communication means the Responsibility of Decision*".

Who is the intended target audience for the event? \* Please tick the appropriate boxes.

- ☐ General Public
- ☐ Young Families
- ☐ Primary Level
- ☐ Junior Cycle (Secondary Level)
- ☐ Senior Cycle (Secondary Level)
- ☐ Third Level
- ☐ Business Community
- ☐ Other:

What are the aims and objectives of the event? \* Maximum of 200 words.

This event aims to bring theories of communication and research in electronic engineering into a wider public consciousness, and to promote an understanding of the complexity of spectrum based communications systems and devices, as well as to refocus attention on the fundamental nature of human communication in an increasingly technological world.

The Eames' film becomes a catalyst for exploring how science and culture are mutually influential and interconnected. So too, it becomes a lens through which to explore our understanding of media and *forms of communication*, and how these forms subtly but importantly influence and direct the nature of our understanding and knowledge. (e.g.: "*The Medium is the Message*", Marshall McLuhan)

When will the event take place? \* If uncertain, please give an estimate.

The Seminar Group will take place in January/February 2012. The Public Screening will take place no more than a month later. (These dates are provisional, but we hope to kick this off at the beginning of the year, and to keep within these early months of the year.)

Where will the event take place? \* Please give the name of the venue if appropriate.

University of Limerick, and an appropriate public & cultural venue in Limerick City, such as The Bell Table, Occupy Space, or the Limerick City Gallery of Art.

**How many people are expected to attend the event? \*** If uncertain, please give an estimate.

Each participating 3<sup>rd</sup>/4<sup>th</sup> Level Group will contain no more than 3 participants. We expect to include no more than 5 groups - so approximately **15 people** will be respondents.

We hope to attract as wide & large an audience as possible to the Public Screening of the film and the Seminar Responses evening, so that full capacity is attained (approximately 100 to 200 people, depending on venue capacity)

**Is this a new event? \***

- ☐ No

**If "No", please provide a summary of the event history and audience feedback.**  
Maximum of 200 words.

The film was first screened at the *Science Gallery in February 2011*, with an illustrated lecture by Hugh Campbell and discussion with Linda Doyle, Jessica Foley & the audience. The response was very enthusiastic, and we had a full house. There were persons in attendance with a general interest in the Eames' and their film, as well as specific interests from the fields of science, engineering, architecture, marketing, business, design, and art.

A second screening took place at the *Glucksman in Cork in May 2011*, with an introduction by Jessica Foley followed by responses to the film from Dr. Gary Boyd (Architecture UCC), and from Prof. Linda Doyle (CTVR). These short talks were teased out through a Q & A session chaired by Denis Linehan (Social Geographer, UCC) between Linda Doyle, Jessica Foley, Gary Boyd and the Audience. Once again, the audience in attendance was diverse and full, and seating was extended to support the numbers. There were enthusiastic responses from the audience and probing questions posed in relation key concepts within the film and their relationship to contemporary theories and techniques of communications technology.

**What format will the event take? \*** Please tick the appropriate boxes.



-  Film
-  Exhibition
-  Seminar

- Which of the City of Science 2012 themes best describe the event? \*  
Please tick the appropriate boxes.

-  Science & Culture
-  Information
-  Science Education

Will this event be a recurring event? \*

- ☒ Yes

If "Yes", how is it envisaged that the event will develop over time? Maximum of 200 words.

This event has already been evolving, as a touring screening & discussion of *A Communications Primer*, acting as a catalyst for a wider & deeper discussion relating to communication and communications research, both social & technological.

We hope to continue to refine how we present the film & its ideas to people, in an effort to evolve a critical and reflective form of feedback within CTVR itself and with wider and more diverse publics, whether they be scientists, artists, or simply generally interested in theories of communication, science & engineering.

What evaluation method(s) will be used for measuring the success of the event? \*  
Maximum of 200 words.

We will continue to encourage feedback via our blog [www.communicatingcommunication.wordpress.com](http://www.communicatingcommunication.wordpress.com) and via email through [www.ctvr.ie](http://www.ctvr.ie).

In many ways, the events thus far have been mostly concerned with getting peoples attention, and raising awareness of this particular work by the Eames' and also raising awareness of the kind of research CTVR is developing. So far the events themselves, and the audience numbers they have attracted, have largely been the measure of the projects success.

However, we wish to move beyond numbers, and to encourage and facilitate dialogue and feedback - this is why we have decided to develop the *group seminar* approach with a focus on 3<sup>rd</sup>/4<sup>th</sup> level participation. We believe that this approach will help to galvanize the relationships & conversations that have already begun around CTVR's research, and the work of the Eames' and the kind of *transdisciplinary* processes which they cultivated in their working practice.

This is a longitudinal project, one that depends upon continued engagement and continued conversation. We hope to continue to promote discussion & research in this area via our blog and through the creation of social media profiles.

**What is your previous experience in the area of public engagement / event management?** \* Maximum of 200 words.

CTVR has a strong track record in public engagement, having created a TV series, *The Resistors*, and a supporting website as part of an Educational Program for Primary Schools (which has had a strong influence on the Curriculum) based upon the Animated series.  
<http://www.theresistors.com/about.htm>

Recently, CTVR has had a presence at *The Young Scientist Exhibition 2011*, having run workshops within CTVR and with Primary School children exploring '*How you Imagine the Internet*'. <http://www.ctvr.ie/Education-and-Outreach/CTVR-and-Young-Scientist> and <http://www.ctvr.ie/Education-and-Outreach/Imagining-the-Internet--->

CTVR is continually developing Industry & Research related programs such as Network Math, The aim of which is to deliver a unique and rich educational experience to 3<sup>rd</sup> and 4<sup>th</sup> level students interested in networking related research. The main strategic objective of the program is to address the skills deficit within Ireland in network mathematics.  
<http://www.ctvr.ie/Education-and-Outreach/Network-Maths>

Most recently, as mentioned above, CTVR have been developing the project *Communicating Communications*. You can learn more about this project and the past events here: <http://www.ctvr.ie/News-and-Events/News-Listing/Communicating-Communications----Inspired-by-Eames-> and here: <http://www.ctvr.ie/News-and-Events/Event-Listing/Communicating->

Communication-II---A-Screening---Dis and here:  
<http://communicatingcommunication.wordpress.com/events/>

**Do you intend to collaborate / partner with other organisations to help organise this event? \***

- ☒ Yes

**If "Yes", please provide the details of the organisation(s) and indicate the role that each will play. Maximum of 200 words.**

We intend to collaborate closely with our colleagues in UL/MIC, and to establish working relationships with other groups and institutions around Limerick, such as the Limerick School of Art & Design, and the Ralahine Centre for Utopian Studies.

We also wish to build a working relationship with cultural centres throughout the city, such as Occupy Space, The Bell Table, and Limerick City Art Gallery, amongst others.

#### **Budget Details**

**How much will the event cost to run? \* If uncertain, please give an estimate.**

Approximate costs come to 1200 euro

**Please provide a financial breakdown of the major cost items for the event. \* For example: venue-hire, promotion, etc.**

Venue: 500 euro

Refreshments: 300 euro

Publicity: 100

Refreshments during Seminar session: 100 euro +

Additional extras: 100 euro

**Will the event require partnership funding from the City of Science 2012 initiative? \***

- ☐ Yes
- ☒ No

If "Yes", please indicate the amount sought. Please give details on what the funding will be used for.

How much funding do you expect might be generated by the organising body or raised outside of this partnership funding request? \*

How did you hear about this call for proposals? Facebook, Twitter, Printed Media, ...

Multiple Sources on line, including word of mouth and through the Science Gallery.

### Declaration

I have read the terms and conditions associated with the City of Science 2012 call for public engagement programme and agree to be bound by them. \* The terms & conditions are available at <http://www.dublinscience2012.ie/calls>

-  Yes



## Event Details

**Event Title \*** *The Found Education Workshop*

Cultivating collaborative processes from theory to practice

**Event Description \*** Maximum of 300 words.

*The Found Education Workshop* will establish itself on campus at TCD over two weekends in 2012. We intend to site it *Under the Arches* at the back of the Science Gallery. The Workshop is intended to be a flexible, multi-disciplinary space for groups or individuals to come together and effectively ‘jam’ with each other. The aim is to cultivate what might lead to *transdisciplinary* praxis across fields from Science, Engineering, Art, Information, Community, Education, etc.

Extending from the Seminar Group sessions as part of *Communicating Communications III*, where several relatively disparate groups of people shared perspectives on one subject (*A Communications Primer*), *The Found Education Workshop* picks up on the Eames’ philosophy of Education as something that emerges through interest and enjoyment, rather than strictly through imposed curricula.

*The Found Education Workshop* will facilitate groups/individuals to timetable themselves to work with other groups/individuals of interest to them. E.g. Architects & communications engineers have, through CTVR’s *Communicating Communications* events, identified the value in learning from each other’s methodological approaches to design. It is this sort of practice that *The Found Education Workshop* will make time & space for.

Groups/individuals will have an allotment of time with which to engage with each other & learn from each other. They simply choose from a list of potential interlocutors and select a time that suits to meet over the weekend. The desire of participants may be to solve a particular problem, e.g.: create a smart phone App for a particular purpose, or, to find ways to understand differing terminology & language across disciplines.

Groups/Individuals booking a time allotment together will be required to complete a brief 'proposed activity' form prior to the session, and a 'report on activity' form post-session. (The 'proposed activity' could range from a very specific technical experiment, to a simple discussion over a cup of tea.)

A range of groups/individuals from across a wide spectrum of interests & disciplines (Arts, Sciences, Community, etc) will be invited to put themselves forward as participants over two weekends in 2012. This call out will happen via email, and through various websites, as well as through printed flyers.

Who is the intended target audience for the event? \* Please tick the appropriate boxes.

The Found Education Workshop is open to any individual or group wishing to engage in a collaborative learning process, where information and methodology are shared and cultivated through mutual engagement and interest.

There will be at least 2 workshops open to the public facilitated by CTVR - these workshops will engage with the idea of social capital, resource sharing and hacking (both cultural & technological!) We intend for these facilitated public workshops to feed into the *DATA Open Here* Festival, and so will align thematically with theories of the commons, open source technology, hacking and DIY culture.

We expect that a *visualization* workshop will be enabled through The Found Education Workshop between CTVR members from Cork and from Dublin (who do not often get a chance to work face to face) to explore the possibilities of developing Augmented Reality narratives of the activity of telecommunications systems through smart phone applications. The results of this workshop could potentially be repeated and developed through a public workshop (as part of DATA's festival if appropriate).

***The Future Fictions Social*** will take place on the Saturday and Sunday evening of each weekend. ***Future Fictions*** will be a sociable evening of presentations, screenings, performances and/or discussions that will welcome in a general public audience, and which will have an 'Open Mic' slot, as well as a program of speakers, film, video, music, etc.

What are the aims and objectives of the event? \* Maximum of 200 words.

The aim is to cultivate a process towards *transdisciplinary* praxis across fields from Science, Engineering, Art, Information, Community, Education, etc. The Found Education Workshop will be a site for engagement, experiment, collaboration and learning across disciplines and with a wider public.

**When will the event take place? \*** If uncertain, please give an estimate.

*The Found Education Workshop* will take place over two weekends in 2012, following on from *Communicating Communications III* in Limerick City.

Dependant upon gaining access to the venue on campus at TCD, CTVR hope to run the weekends during April and June in the weeks leading up to the ESOF Symposium in July.

**Where will the event take place? \*** Please give the name of the venue if appropriate.

CTVR plans to site *The Found Education Workshop* on campus at TCD, 'under the arches' at the back of the Science Gallery, in rooms that are a part of the Computer Science buildings. This site is particularly appropriate as 'The Arches' are not within a closed College building but accessible from the public thoroughfare through the campus. We are awaiting confirmation of access to this facility.

**How many people are expected to attend the event? \*** If uncertain, please give an estimate.

The schedule for the weekends is as follows:

|                  |                                               |                            |
|------------------|-----------------------------------------------|----------------------------|
| <b>Friday:</b>   | 4-6pm <i>workshop allotment</i>               | 6pm - 8pm                  |
|                  | <i>workshop allotment</i>                     |                            |
| <b>Saturday:</b> | 10-12pm workshop allotment                    | 12-2pm workshop allotment  |
|                  | 2-4pm workshop allotment                      | 4-6pm facilitated workshop |
|                  | 6pm - 7pm refreshments/nibbles                |                            |
|                  | 7-9pm                                         |                            |
|                  | presentations/screenings/music/performance... |                            |

**Sunday:** 12-2pm workshop allotment 2-4pm  
facilitated workshop  
4pm refreshments  
5-7pm  
presentations/screenings/music/performance...

Each workshop = 12 people (including public workshop)  $8 \times 12 = 96$   
Evening events estimate approx. 40 people  $\times 2 = 80$

*The Found Education Workshop* will welcome random footfall, and there will be a reception area where the report forms and any images/work that may emerge from workshops can be shown and discussed informally.

We would hope to get about 100 or so opportunistically turning up to see what we're about. We will cultivate an interested community through a web presence on the main CTVR site and via social networks such as Twitter, Facebook, etc.

Total audience/participants per weekend: 276 (approx)

**Is this a new event? \***

- Yes

**What format will the event take? \*** Please tick the appropriate boxes.

- Workshop
- Screenings/Presentations/Performance/Discussion
- **Which of the City of Science 2012 themes best describe the event? \***  
Please tick the appropriate boxes.
-  Science & Culture
-  Science Education

**Will this event be a recurring event? \***

- ☒ Yes

If "Yes", how is it envisaged that the event will develop over time? Maximum of 200 words.

CTVR intends that *The Found Education Workshop* would 'grow legs', and become a recurring phenomenon that acts as a space and



time where transdisciplinary praxis can emerge and grow, and where collaborative learning can be promoted and developed.

**What evaluation method(s) will be used for measuring the success of the event? \***

Maximum of 200 words.

Footfall, web stats, & numbers of participants will be a sure way of ascertaining interest. But we will also engage with qualitative methods to ascertain the success of The Found Education Workshop. We will ask participants to give feedback, either orally or verbally, during the course of the weekends, through a series of questions and through casual discussion.

This feedback will be vital to us for determining whether or not The Found Education Workshop should take place again in the future, and it will prove valuable as research material to explore the nature and possibility of transdisciplinary praxis.

**Organiser / Organising Body Details**

First Name \*

Surname \*

Daytime Telephone Number \*

Mobile Number

E-Mail Address \*

Confirm E-Mail Address \*

Organisation Name Only if applicable.

Full Postal Address \*

**What is your previous experience in the area of public engagement / event management? \* Maximum of 200 words.**

CTVR has a strong track record in public engagement, having created a TV series, *The Resistors*, and a supporting website as part of an Educational Program for Primary Schools (which has had a strong influence on the Curriculum) based upon the Animated series. <http://www.theresistors.com/about.htm>

Recently, CTVR has had a presence at *The Young Scientist Exhibition 2011*, having run workshops within CTVR and with Primary School children exploring '*How you Imagine the Internet*'. <http://www.ctvr.ie/Education->

and-Outreach/CTVR-and-Young-Scientist and  
<http://www.ctvr.ie/Education-and-Outreach/Imagining-the-Internet--->

CTVR is continually developing Industry & Research related programs such as Network Math, The aim of which is to deliver a unique and rich educational experience to 3rd and 4th level students interested in networking related research. The main strategic objective of the program is to address the skills deficit within Ireland in network mathematics.  
<http://www.ctvr.ie/Education-and-Outreach/Network-Maths>

Additionally, The Telecommunications Graduate Initiative aims to expand the skills and deepen the knowledge of telecommunications graduates across the whole island, so enhancing their work-place readiness.

Most recently, as mentioned above, CTVR have been developing the project *Communicating Communications*. You can learn more about this project and the past events here: <http://www.ctvr.ie/News-and-Events/News-Listing/Communicating-Communications----Inspired-by-Eames-> and here: <http://www.ctvr.ie/News-and-Events/Event-Listing/Communicating-Communication-II---A-Screening---Dis> and here: <http://communicatingcommunication.wordpress.com/events/>

**Do you intend to collaborate / partner with other organisations to help organise this event? \***

- ☐ Yes

**If "Yes", please provide the details of the organisation(s) and indicate the role that each will play. Maximum of 200 words.**

CTVR intends to collaborate with colleges across TCD, but also with institutions and individuals from around the country, particularly in Maynooth, Cork and Limerick where CTVR is also based. We hope to build upon our Social Capital, the natural connections and resources of our researchers, our friends, and our colleagues across the country, to draw interest and participation in the workshop.

We intend to work closely with DATA (Dublin Art & Technology Association) and to feed into the *Open Here* Festival, through our Public Workshops, and through our evening events at The Found Education Workshop.

**Budget Details**

**How much will the event cost to run? \* If uncertain, please give an estimate.**

3000 euro approximately (for two weekends)

**Please provide a financial breakdown of the major cost items for the event. \* For example: venue-hire, promotion, etc.**

Refreshments: 600 euro

Publicity: 400 euro

Guest speakers/performers/workshop facilitators external to CTVR:  
2000 euro

**Will the event require partnership funding from the City of Science 2012 initiative? \***

• ☐ No

**How did you hear about this call for proposals? Facebook, Twitter, Printed Media, ...**

Multiple Sources on line, including word of mouth and through the Science Gallery.

#### **Declaration**

I have read the terms and conditions associated with the City of Science 2012 call for public engagement programme and agree to be bound by them. \* The terms & conditions are available at <http://www.dublinscience2012.ie/calls>

• ☐

Yes