Taking on the network: making space for the identity play of networked publics

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Author's Declaration

This thesis represents partial submission for the degree of Doctor of Philosophy at the Royal College of Art. I confirm that the work presented here is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

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Abstract

This thesis is positioned in the field of communication design research and seeks to critically examine the practice and potential of identity play by digitally networked publics. It defines identity play as entailing a form of identity design practiced by participating publics themselves. The research contributes an understanding of the role of the designer in the entangled networks of digital public space by treating identity design agencies as co-produced with audiences and materials. The thesis locates identity play as part of a productive tradition of anonymous pseudonymity practices. It challenges design assumptions of anonymity as a contemporary privacy problem and of identity as detached and preexisting. The thesis elucidates an intra-active interpretation of identity design as on-going processes of collectively re-making network apparatuses and identity phenomena, moving beyond the limits of centralising and commercial models. It constructs the designer-researcher's role in making space for identity play through *taking on the network*.

The Creative Exchange (CX) – a UK Arts & Humanities Research Council Knowledge Exchange Hub – provided the space to collaborate and research with diverse consortia of designer-researcher participants and their networked audiences to explore the possibilities of digital public space. The methodology employed by the thesis is grounded theory research through design underpinned by a "diffractive" research stance, with theory and practice read iteratively through each other. I have collected and critically analysed data using "design conversations" with materials, participants and audiences, through multiple projects and prototypes, bounded by the CX Hub and its activities over five years.

The thesis constructs three prototype design patterns to make space for the identity play of networked publics from my practice as a designer-researcher: *Sticking together*, *Fashioning our own belongings* and *Taking on the network*. Each pattern produces an intersection of practices of identity design, networked public participation and design research. The design pattern of *Sticking together* offers ways of using assemblage to create anonymity and reputation. It calls for and requires the solidarity of collective assembly and ways to make identity play commonplace. *Fashioning our own belongings* investigates possessions as embodied networked apparatuses of identity, and audience relations as belonging. This design pattern grasps network function and fosters pseudonymity (dis)ownership. *Taking on the network* is formulated as a performance of inversion by publics through the resistance of the carnivalesque and the responsibility of infrastructural inversions. *Taking on the network* provides the overarching framework for the design patterns to take on the functions and models of cloud infrastructures.

These findings demonstrate how identity design by publics requires active forms of network literacy that comprehend the network intra-actively, and that it is possible to take on the network by contesting cloud identity apparatuses and models. The design patterns make space for the identity play that, importantly, enables critical and creative anonymity practices to take place. The research offers identity play as a public critical infrastructure with benefits for the resilience and creativity of networked publics. It lends support to designers to reconfigure their part in identity design.

The original contributions to knowledge are: (1) prototype design patterns for making space for the identity play of networked publics; (2) an articulation of the design space for identity play; (3) a diffractive form of design pattern that entails multiple intersecting practices; and (4) an intra-active interpretation of the discipline of identity design.

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Dedication

In memory of Rob Oliver.

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Chapter 1 – Introduction

Identity design is about creating and sustaining new reputations and audiences, but it is equally about exclusion, about exclusivity, and keeping new identities separate from the entangled reputations of existing bodies. The study of identity design is often dominated by discussions of individual commercial design agencies and trust marks. This thesis also understands identity design in terms of the power that anonymity affords for creating new reputations, and of who has access to that design agency.[1] There are vast disparities and exclusions in who can design identities – that is, who has access to the infrastructures and apparatuses required to negotiate new reputations, roles and audiences with which to communicate.[2] Metahaven describe identity design as "both a visual practice and a modality of governance [...] There is much more to branding than a logo or style. It is a manifestation of power" (van der Velden, Kruk, and Vishmidt 2010, 451). When a group like the Yes Men apologised on TV and the internet for the Bhopal disaster using a fake identity 'on behalf' of Dow Chemical (Graff 2004) they made visible connections of accountability into the opaque *private* anonymity of shareholders, tax apparatuses and powerful influence normally hidden by the Dow brand reputation. Yet anonymity has also been part of more open, creatively productive, *public traditions* that make space for experimentation and critique.

Anonymity is defined in chapter 2 and is understood as a relational not an individual property. Anonymity is an aspect of an ongoing process of pseudonymity, creating reputations and audiences, through relations and exclusions, over time. Each anonymous communication is the possibility of a longer performance of pseudonymous reputation with a larger audience. When Elena Ferrante, Satoshi Nakamoto or Banksy anonymously began the creative design and performance of their pseudonymous identities in public, they were claiming power to enact boundaries, negotiating new audience relations that hold authorial

1 The ways this thesis uses identity design, in relation to dominant notions about the practice and field of *identity design*, can be found in the identity design section at the beginning of chapter 2.

2 Access to pseudonymous authorship for critique is heavily curtailed, as seen with recent pro-science US Twitter accounts (Emerson 2017; Grugq 2017). Meanwhile, national bodies and powerful companies and billionaires can create deceptive identities and opaque anonymity, through apparatuses including identity theft, tax avoidance infrastructures and super-injunctions (Evans 2017; Roth 2018; Garside and Osborne 2018; Falciani 2015; Martinson 2016).

and character reputations separate.[3] The boundary making agencies of anonymous pseudonymity make the contesting of new identity designs possible. However, the power to make names is largely the preserve of dominant commercial and governmental bodies, and the identity design agencies that work for them. The anonymous identity *traditions* (North 2003) found in widespread, openly creative, early-online pseudonymity (Turkle 1995) have been pushed to the sidelines and subcultures of the internet (Knuttila 2011; Coleman 2014) by increasingly centralised single sign-on authentication. Meanwhile, highly regulated identity spaces like social media sites are still unable to resist the troll- and bot-army political machinations of deceptive identity fabrications by opaque and powerful military-industrial actors (Phillips 2018). Disgraced corporations can disguise themselves and their shareholders through re-branding identity design and shell company anonymity (Metahaven 2011). Meanwhile, the argument that online communication tied to a 'real name' reputation brings greater civility or authenticity (Zimmer 2010) is being tested to extremes by a post-Putin and post-Trump style politics (Waisbord, Tucker, and Lichtenheld 2018).

This thesis considers the role of designer-researchers in making identity creation by publics possible. It sets out how giving a public the agency to design new identities for themselves requires allowing them the possibility to resist totalitarian identity regulation, take responsibility for identity infrastructure, and build collective events and spaces for developing literacies in identity creativity. Having the agency to produce new phenomena of identity design requires taking on the dominant apparatuses of identity design. The broad body of research upon which this thesis is based comes to frame such identity design by a public themselves as identity play. Here play is a matter of negotiating belonging, collective transgression, and practising active creativity and so identity play is a matter of responsibility, resistance and iterative, material-discursive action.[4]

In theoretical terms, this thesis contests a centralised, commercial model dominant in identity design and cloud networks, by articulating the intersection of responsibility,

3 Elena Ferrante is a contemporary novelist nom de plume, Satoshi Nakamoto is the pseudonym under which the Bitcoin protocol was first published and publicised, and Banksy is a prolific street artist tag.

4 My use of the concept of "material-discursive" follows Barad (2007) in denoting an inseparable entanglement of materiality and discourse in how phenomena come to matter, as discussed further in the *material-discursive understanding* section of chapter 2.

resistance and material-discursive action required for the possibility of identity design within and by networked publics. It sets out how designer-researchers can make space for this identity design through prototype patterns of identity play in which publics *take on the network*.

Methodologically, I have collected and analysed my design project-based research data using a grounded theory approach in which I have conducted a constant-comparative analysis of ongoing, situated conversations with practitioners in my fieldsite of the consortia of the Creative Exchange Hub (see below). My thesis follows a typical grounded theory framework: three analytic chapters synthesised from excerpts of my conversations and field notes are framed by an overarching concept and preceded by a literature review that emerged out of the research analysis process and methodology. However, where much grounded theory research uses transcripts of written and spoken conversations as data, my design research follows the methods of research *through* design in treating projects as made up of material-discursive *design conversations*. The analytic chapters are constructed from the synthesis and analysis of both text and non-text excerpts of my design projects. I have presented the resulting theoretical concepts in these analytic chapters in the form of *prototype design patterns*.[5]

The Creative Exchange Hub

The Creative Exchange Hub (CX) – funded by the UK Arts and Humanities Research Council (AHRC) – was established as a four-year programme for exploring design-led knowledge exchange through collaborative projects with industry, cultural organisations and a consortium of academic institutions (led by Lancaster University with Newcastle University and the Royal College of Art).

The projects are sited within the context of a number of companies, arts organisations, and a consortium of 'arts and humanities' academic researchers who brought their own cultures of design practice and research. The CX set out to explore the disparate organisations and

5 I define prototype design patterns in the *grounded theory research through design* section of chapter 3. Design patterns are a familiar form of design research output that take the shape of patterns for usable design action with examples (Alexander, Ishikawa, and Silverstein 1977; Gamma et al. 1994; Bayle et al. 1998). This thesis (re)interprets design patterns through notions of diffraction patterns and a diffractive methodology as set out by Barad (2007).

messy (Schön 1983; Law 2004) social systems, technical infrastructures and methods needed for making digital public spaces. It formed around proposals for new types of knowledge exchange and funding between academic and non-academic organisations in which methods and agendas can be understood as being "generated out of dialogue between reflective researchers and practitioner-researchers" (Schön 1983, 324). The CX proposed a form of what Frayling (2015, 2:38) calls “design-led inter-disciplinarity” constituted through a format of successive events leading to short collaborative design projects looking at questions of how to make digital public space. This framework set out a series of overlapping projects, events and collaborations as the primary basis of my research. It assumes an emergent process of collaborative project development, with open-ended objectives and themes.

The CX was developed through three main stages: (1) a scoping study with potential organisational and academic partners through semi-structured interviews and concept mapping exercises; (2) developing teams and projects through a series of one-day CX Lab events (RCUK ‘sandpit’ format (Giles 2004)); and (3) a shift in focus to doctoral researcher-led project development introducing “slower, more organic and more reflective” methods that involved designing “customised KE [knowledge exchange] tools to suit different research and innovation contexts” (CX 2016, 8–9) and following theoretical leads and deeper connections with partners. The specific methods, tools, sites and publics were shaped through emergent design consultation events and project building exercises that I argue represent a reflective practice of negotiated design-research conversations (Schön 1983).

Each CX-approved project consisted of at least one doctoral researcher, organisation partner and academic partner formulated around a proposal citing specific design objectives. Some projects took on a specific prototype goal, others were more open-ended explorations. Each project contained and developed specific design research methods and tools.

The CX Hub doctoral setting offered a unique space within which to design and research, as it sought to foster inter-disciplinary and inter-organisational approaches (Dalton, Simmons, and Triggs 2017). As a researcher who has always been inspired by the creativity

produced by inter-disciplinarity, I found the opportunity to engage with others in this diverse rich community exciting, and set out to find ways to draw on my own inter-disciplinarity of working across design, physics, art and media technology. The experience of allowing ideas to emerge from participation in iterative design conversations with participants, materials and audiences has in many ways proved to be a much more challenging research journey than a traditional one. It reconfigured my identity as an agential designer-researcher.[6] It also led me to develop an inter-disciplinary methodology, synthesising grounded theory and research through design.

Research inquiry

The CX defined an initial field site of study in imagining and making digital public space in evolving knowledge exchange consortia. My initial research interests questioned how to design for identity telepresence in terms of identity *interfaces* and puppeteered *characters*. I imagined robotic daemons, aesthetic masks and identity metaphors as the key outputs of my inquiries. However, as I followed the theoretical leads of my design conversations, I began to realise that giving people agencies of identity design, required *making space* for the identity play of anonymous pseudonymity to happen. My research focus shifted to how to design the spaces – situations, publics and structures – conducive to pseudonymity culture and practice and to question my role as a designer (and researcher). I have thus come to ask questions of making space for identity design that emphasise the co-constitution of agencies of identity design with and within networked publics themselves. This has led to two research questions: (1) how to explore identity design practiced by networked publics themselves?; and (2) how to make space for networked publics to design identities?

I have explored these questions through design conversations, returning to review literature where I trace historical contexts, and review and define terms of identity design, anonymous pseudonymity, networked publics and design research to identify the conditions and challenges of public apparatuses of identity design. As I have formulated theoretical contributions to these questions and identified gaps, the central research

6 The word "agential" denotes an emphasis on understanding mutually co-constituted agencies. See the *agential identity* and *material-discursive understanding* sections of chapter 2 for a discussion of my use of Barad's (2007) neologisms of "agential realism", "intra-action", "onto-epistemology" and "material-discursive".

question emerged: (3) what design patterns can make space for the identity play of networked publics?

The CX proposed exploring notions of public space through a process of conducting design-research projects that imply enacting change in the world. I have taken a position as a situated designer-researcher engaging collaboratively and reflectively with participants in research through design conversations. Digital public space as an area of study suggests exploration through both network technologies and social systems.[7] This thesis focuses on the plurality of networked publics. Research through a series of design projects has illuminated the processes and actions of *making space* rather than ideas of 'fixed' spaces in use. Following an iterative grounded theory research through design approach, I have explored what come to be understood as prototype design patterns through a collaborative, situated and action-focused stance.

Identity within digital public space

The framing of the CX as an investigation into *digital public space*, and the role that identity plays within it, was developed through research at the BBC. At the launch event for the CX, Tony Ageh, then Controller of Archive Development at the BBC, described his vision for digital public space as "bottom up rather than top down" (Ageh 2012, 10) infrastructure with potential for the UK's combined public national archives to be empowered and made accessible through processes of networking and digitisation. What I took from the talk was the importance of the traditions of public commons on which the CX was building, in his use of the language of "egalitarianism" (Ageh 2012, 6), "public domain" (Ageh 2012, 11) and "access to a common" (Ageh 2012, 7) to describe a BBC strategy for developing new digital public space in collaboration with other public cultural institutions and archives. He argued that such a space should "decentralise rather than control" and "must be based on the principles of openness and shared development rather than proprietary and closed systems" (Ageh 2012, 10). For me Ageh's call was clear: "We need to take a stand" (Ageh 2012, 9).

The call to *take on the network* – to "take a stand" (Ageh 2012, 9) and "re-decentralise the Web" (Van Kleek, Smith, et al. 2015, 1155) – is a call to action that I identified as emerging from

7 Or, more precisely, the entangled inseparability and boundary making of network technologies and social systems.

across my CX participants. Throughout my fieldwork, participants employed the language of publics taking on roles in public networked identity construction:

> This project seeks to explore the question of how digital communal space may be woven in a new Web, where people own and control their data and their interactions with others. (Walk in the Park$_{p.319}$ proposal document)

The call to take hold and re-distribute network agencies reoccured as a driving pragmatic and commercial concern within the CX consortia.[8]

Ageh saw the BBC's digital public space project not only as an archive and library of media, but also as a space containing and fostering identity construction and agency over personal data (through audiences' trails of use and in the personal information captured through the production processes of the BBC). He envisioned spaces for creative communication and critique through repurposing and (commercially and non-commercially) remixing resources of public archives, upholding principles of universal access, anonymity and empowerment – essential characteristics of the BBC public remit and inherent in traditional broadcast technologies. This remit tradition framed digital public space in resistance to encroaching closed and proprietary digital systems and a politics of ideological austerity. Ageh described a 'digital age' shift to predominantly accessing culture through internet connectivity in terms of apparatuses of identity authentication and control:

> Access is controlled by a wide array of intermediaries. It's often conditional and mostly charged for. […] And even then there is no guarantee that your specific combination of hardware, software, ISP, identity assurance provider, user tariff, geographic location, record of previous behaviour or future credit rating will permit you to share your photos, download that song, send a video to your friend whether they're in Bolton or Buenos Aires. […] In addition to the complexity of accessing material, something else has fundamentally changed too, especially since the advent of Web 2.0. – The machines are watching us more than we are watching them. […] Until the digital age, viewing and listening were largely unrecorded activities mainly within the control of the individual. Anonymity and serendipity were features not bugs! (2012, 8–9)

Ageh's definition is founded in, and champions, the idea of grass-roots development and production of a digital public space building on concepts like public domain and commons infrastructure. He defined digital public space as places in which people have the agency to be creative, to be expressive, and to express meaningful critique, and for there to be a balance between public and private uses (including commercial uses) of information. He

8 That is, taking on the network emerged first as a key requirement of digital public space design, rather than just as an ethical matter of democratic principle, public commons and social justice.

balanced that with a call for people to have meaningful control over their desires and rights to their personal information and their data. I saw two key elements of identity design emerging in what it means to design and be making public space – reputation and anonymity. Ageh's strategy is a balance between, on the one hand, personal, systemic, structural and institutional reputation and, on the other, being able to manage forms of anonymity, to retain some sort of personal ownership (or distance) over the things that one says, does and communicates.

I felt an element of urgency in Ageh's talk. It was the midst of the development of the idea within the BBC of creating a digital public space as the next step in its remit. But this urgency also reflected the move from a web that had celebrated a decentralised and egalitarian structure, towards a series of layers of authentication and control of access through needing to log-in and to identify oneself to a set of centralised network structures or authorities.[9] Ageh's call is a call for collective action to take on some responsibility in making and sustaining this digital public space, in protecting and enabling the commons that he is describing and resisting the alternatives. The existing publicly-owned BBC *commons* and universal *anonymity* of access in broadcasting act as a foundation for that model.

There is a move in his call, from centralised walled garden networks towards sustaining broader collaboration between a range of organisations and audiences and towards network control in the hands of publics of users of the digital public spaces themselves.[10] What I identify in this thesis is that *taking on* – taking a stand from the bottom-up – is a resistance to centralising structures through distributed networks of organisations, institutions and communities, and following that direction further, directly into the hands of publics and audiences. Questions of making digital public space lead us to consider the responsibilities, rights and actions of publics taking on the construction of this public space and, likewise, who is excluded from this process.

The launch of the CX, and Ageh's vision, mark a point at which a growing movement came

9 This includes the BBC of course, which also acts as an identity authority.

10 Ageh calls for a commons that can be "used, repurposed, remixed" (Ageh 2012, 18), but also for an empowerment of individual identity data privacy "by you from the bottom – up" (Ageh 2012, 17)

to prominence calling for "re-decentralisation" of the web.[11] Ideas of redistribution, in making digital public space and sustaining networked identity apparatuses, fit within a longer conversation. The empowerment of audiences to become part of apparatuses of production and distribution has been a central tenet in discussing networks and the web for decades, ranging from "pro-sumers" (Toffler 1980) to "smart mobs" (Rheingold 2007) to "participatory cultures" (Jenkins, Ito, and boyd 2015). My aim here is to draw out the ways in which taking on the network can become design patterns of *identity design* in particular.

Thesis outline

This thesis consists of eight chapters. The next chapter presents the literature review, drawing together identity design, anonymous pseudonymity, networked publics and design research. *Chapter 3* provides the methodology for the research, setting out a grounded theory research through design approach within a diffractive stance. *Chapter 4* introduces the data analysis for the thesis and the overarching construct of taking on the network. *Chapters 5*, *6* and *7* report on separate but linked concepts that come to be understood as prototype design patterns: (1) sticking together; (2) fashioning our own belongings; and (3) taking on the network. The pattern of taking on the network introduced in *Chapter 4* is returned to in *Chapter 7* and draws together the other two design patterns to discuss how publics 'do' identity play across these three prototype design patterns as forms of resistance, responsibility and comprehension, and practices of inversion, conceptualised through a superposition of literatures of carnivalesque inversion and infrastructural inversion. Finally, *Chapter 8* pulls together these findings and critically outlines the theoretical and methodological contributions of the research, and how they may be used.

11 These include redecentralize.org, who's co-founder Francis Irving we interviewed for Data is Political$_{p.298}$ about his work to build more distributed public accountability, and Tim Berners-Lee, who extended his earlier MIT Decentralized Information Group research (Mansour et al. 2016) into re-decentralisation research with participants in the Walk in the Park$_{p.319}$ project (Van Kleek, Smith, et al. 2015). While ***re****-decentralisation* could create a sense of a struggle already lost, Berners-Lee emphasises "continually 're-decentralising' the web" (Berners-Lee 2014), what Saper frames as "participatory decentralization" (dj readies 2012).

Chapter 2 – Literature review

This chapter draws together varied literatures to understand identity design, networked publics and design-research practices as collective and socio-technical processes and what the thesis will come to describe as co-constituted and material-discursive action. It defines terms and traces the historical contexts of *identity design by networked publics* through identity and anonymous pseudonymity, networked publics, and design, to identify the conditions and challenges of making public identity design apparatuses and phenomena.

Networked publics are defined by boyd[12] (2010, 41) as "publics that are restructured by networked technologies" (2010, 41), "both in the spatial sense and in the sense of an imagined community" (2014, 9). Following boyd's (2010) definition in relation to literatures setting out and developing a Habermasian notion of public space (Habermas 1991; Calhoun 1992) and her descriptions of the characteristics of digital networks, I read these through Barad's (2007) understanding of the network as a topological matter, to encompass our experiences of the internet, the centralising cloud models and digital network infrastructures.[13] The thesis develops an understanding of network publics in terms of iterative reconfiguring of network connectivities over time and space through belonging and exclusion.

The thesis examines what identity design means when undertaken by publics themselves and what it entails. Identity design is a process of initiating and sustaining an identity separate from the designer's own. Identity here is considered as a socially constructed and a performative process. Design, additionally, signifies an explicit creative authorial intent and

12 Social media and technology theorist danah boyd applies a lower-case convention for writing her name to the identity apparatuses of academia. In general, in keeping with a study of identity design and pseudonymity agencies this thesis tries to use the naming intentions of those cited. As such, it follows the approach taken by compilers of early pseudonym catalogues, in which no convention was uniformly applied, with 'legal' names listed for some authors and pseudonyms for others (North 2003).

13 Topology emphasises relational connectivity and the entanglements that constitute networked time, space and matter, as discussed further in the *network topology dynamics* section of chapter 2. As Barad (2017a, 118) notes: “entanglements call into question the geometrical notions of scale and proximity; topology with its focus on issues of connectivity and boundary becomes a more apt analytical tool. It’s not that scale doesn’t matter; the point is that it isn’t simply given and that what appears far apart might actually be as close as the object in question, indeed, it may be an inseparable part of it”.

agency. The thesis recognises that although identity design is often assumed to be solely the domain of professional commercial designers, the public is always involved in processes of identity design, in how exclusive reputation is formed and sustained, and how character is understood. I treat identity design practiced within and by public audiences themselves as part of a tradition of anonymous pseudonymity cultures.

This chapter starts from the premise that identity design practiced by publics is an intentional and creative form of identity performativity agency. It conceptualises identity as performative construction, ongoing process, relational, and negotiated collective action. Barad's (2007) *agential* performative understandings of identity phenomena and identity apparatuses as constituted through *material-discursive intra-action* are presented as analytical windows through which this thesis pursues a contemporary understanding of how social construction frameworks can more explicitly deal with the material aspects of how identity is constructed, in the network.[14]

The chapter considers the relationship between identity design and identity play. Identity design is traditionally situated within graphic design, visual communication, the school of communication and within design. Identity design by publics pushes back on the assumptions of centralised, commercial identity, and considers that design has always entailed much wider networks of practice (Triggs 1998), while recognising its place within "the limits of design" (Suchman 2011). In trying to make space for publics to engage in identity design themselves, I explore the question of whether that is better described as *identity play* (Turkle 1995). 'Identity play' accepts that designed identity does not always need a single intentional creator and that an anonymous indeterminacy is productive for creative agency. Turkle's study of early internet identity play, and Barad's take on identity phenomena in networked spaces, together provide useful analytical framings that can be brought to identity design.

14 Barad (2007) contrasts *intra*-action with inter-action to emphasise that all elements, actions, agencies and relations are constituted from within each phenomenon and conceptual understanding rather than assuming static, pre-existing individuals somehow outside of a situated conceptual apparatus. For identity design, this usefully attends to how identities and identity apparatuses are entangled and co-constitute each other. A fuller discussion of the implications of an intra-active interpretation can be found later in this chapter in the *agential identity* section, and the broader intra-active stance I have taken in reading together the literatures discussed as a whole can be found in the concluding *material-discursive understanding* section of the chapter.

Identity design

Identity design is a well-established term for "the creation of the symbolic or outward face" of "corporate identities" (Shaughnessy 2013, para. 12), particularly through “trust marks” (Shaughnessy 2013, para. 14) or even fictitious people (Hardie 2014). Commercial identity design is an iterative process attempting to manipulate reputation, character and audiences, in relation to other marketplace identities, regulatory practices, mediating technologies, national and international publics, and constraints on resources (Brook, Shaughnessy, and Schrauwen 2014). Designers seek to differentiate reputation and to fashion belonging, often through exclusivity and other forms of boundary making. Identity design is engaged in on-going processes of shaping corporate bodies, audiences and meaning.

Graphic designer and critic Adrian Shaughnessy (2013) argues that “identity design” should be reserved specifically to describe the work of designers and design agencies in developing a signature logo, typographic style and graphic architecture within a brand. However, beyond this dominant notion, the role of designing identity has always been broader than the mere shaping of graphic signs and involved more actors than the "'heroic' figure […] of an individual designer or design organisation" (Triggs 1998, 43). Identity design encompasses corporate identity architecture and the disciplinary apparatuses of making and following identity design guidelines (Brook, Shaughnessy, and Schrauwen 2014; Shaughnessy and Brook 2014). Therefore, identity design has always been about collectively negotiating identity – exclusivity, belonging, reputation, recognition, audiences and authentic communication – and about reconfiguring corporate bodies by designing specific apparatuses of identity and audience observation. Lloyd offers a definition of the work of corporate identity design as a continual embodied negotiation that "constitutes" the corporate body (in Brook, Shaughnessy, and Schrauwen 2014, 38).

Identity design, like all design (Balsamo 2011), can only be understood within a context of socio-technical construction: or, more precisely, design is a material-discursive phenomena that co-constitutes a "social, political, economic, natural, cultural, technological, and scientific" (Barad 2007, 232–3) context of creation, production and use. And identity design, like all identity (Lawler 2014), cannot be understood as an individual fixed role, reputation or

face, but rather an ongoing iterative performance that negotiates and contests collective relationships of reputation, belonging and what comes to matter (Barad 2007). Identity design is always political in how reputations, organisations and audiences are differentiated and made intelligible at the exclusion of others.

The definition of design used here includes on-going processes of contestation, rather than bounding it to specific design objects, designer roles or design agencies alone.[15] Identity design is more than a question of epistemology, about increasing (identity) recognition or (audience) reach: rather, it is inherently ontological, conceiving all bodies – corporate, civic, organisational, human, non-human, and so on – as iteratively produced within specific situated relations of interaction or, more precisely, *intra*-action (Barad 2007).[16]

There is a trend in identity design towards iterative public engagement, particularly given the increasing pace of connectivity in networked social media and generative interfaces (Nes and Hughes 2013). Networked identity design has increasingly extended advertising models of audience manipulation and labour (such as visible brand loyalty in fashion, or word-of-mouth advertising networks), to include explicit forms of public participation, such as brand building in social networks (Jenkins 2014).

There now exists the persuasion potential of hyper-targeted advertising (Metahaven and Bratton 2011), individual tracking and profiling, and algorithmic interface redesign "A/B testing" (Christian 2012). Where identity designers have historically had to talk to their (broadcast) audiences 'in public' as a whole, recent profiling models of social media and computationally generated advertising techniques have allowed a different identity design to be presented to each hyper-targeted demographic, or even each individual user. In the near future, personalised cloud platforms, smart assistants, and augmented and virtual reality all allow for algorithmically-generated individualised brand identity relationships. Already customer service identities, for example, can be tailored from a mix of low cost automated scripts transitioning to outsource customer support or more attentive and experienced customer service employees 'seamlessly' (Bogost 2018).

15 This thesis draws on literature that invites designers to explicitly adopt a contestational design stance, and a broader understanding of all design activities, and the audiences they serve, as political and contested (Hirsch 2008; Hirsch 2016). I discuss contestational design in more detail in the *intra-active contestational prototyping* section of chapter 3.

16 See the *agential identity* and *material-discursive understanding* sections of this chapter.

We can critically read definitions of identity design as a question of what role a designer plays in the constitution of audiences, reputation and character. Design agencies are built collectively, with audiences and other hidden labour. As Triggs (1998, 44) notes:

> it is important to remember that the history of design is *not* a history of great individuals. What is required now is a careful consideration of the role of the "other" in the history of the profession: women, ethnic minorities, the anonymous, the alternative and the everyday.

Furthermore, identity design is as much a history of reconfiguring non-commercial bodies as it is of commercial activity. A definition of identity design that tries to artificially separate out design in service to only advertising, commercial and national bodies misses the way that design has always been a broader negotiation with audiences, communities and reputation.[17]

This research addresses how to make space for identity design by networked publics, as a form of redistributed and contestational identity performativity. Redistributed identity design can be thought of as collective processes of enacting situated agencies of reputation and authentication, distributing greater possibilities for creative identity design to publics or audiences themselves.

Identity design co-constitutes marks and boundaries of reputation, audience and exclusivity, reconfiguring audiences and identities together. It produces specific material-discursive arrangements and audiences of belonging at the exclusion of others. Publics and identities are co-constituted. Understanding identity design as the enacting of "boundaries, properties, meanings, and patterns of marks on bodies" (Barad 2007, 140) – from the classical design concepts of "trust marks" (Shaughnessy 2013) on "corporate bodies" (Wolff Olins 1996) – means attending to familiar critical identity studies questions of which marks come to matter, and for whom (see Barad 2014b, 185 for a re-membering of these familiar questions and their "inherited legacy-to-come").

17 Design has a history of charismatic power tracing back through the branding of fame and wealth, totalitarian governance, war propaganda, guild trademarks, religious iconography, royal heraldry, ritual symbols, commercial and religious writing practices, and totemic objects (Brook, Shaughnessy, and Schrauwen 2014; Shaughnessy and Brook 2014). However, design has an equally important history in democracy, social justice movement building, popular support for political reform, protest iconography, underground pop culture and graffiti (Martin 1996; Poynor 2009).

Identity

This thesis is about identity design in public and by publics themselves. In considering the ways in which a public can have space to design identities, identity needs to be understood as intentional creative action but also contested collective negotiation. Here, Karen Barad's (2007; 2015; [2012] 2017) *agential realist* understanding of identity allows for a drawing together of various performative accounts of networked identity as enacting belonging and exclusion, creating reputation, and playing roles. Important to this thesis are several differing accounts of identity as performative that have been applied to studies of digital public space (Haraway 2004; Turkle 1995; Barad 2007; boyd 2014; Donath 2014). What combines them is a shared model of identity as something that is contextually situated, multifaceted and performatively enacted – an ongoing, iterative collective negotiation of boundaries and roles of belonging and reputation. Within this context key notions to explore are: role and reputation, power and agency, and the socio-technical apparatuses that discipline and constitute identity practices in digital public space. These accounts of networked identity have productive similarities and differences in their understandings of performance and agency. Barad (2007, 90) invites and demonstrates a "diffractive" approach to reading together theories of performativity and agency.[18] To do this, extending Barad's "agential" (2007, 132) account[19] diffractively to include additional important strands of networked identity study, this thesis takes the encompassing definition of identity Lawler (2014, 7) proposes:

> I use the term 'identity' in a wide-ranging and inclusive way to mean both its public manifestations – which might be called 'roles' or identity categories – *and* the more personal, ambivalent, reflective and reflexive sense that people have of who they are. I do this so as to avoid *reducing* identity to categories of gender, race, nation, class, sexuality, etc., with which it is often associated. While, clearly, such categories are important both individually and collectively, they cannot in any way account for the complexity of identity as it is lived.

18 Diffraction attends to patterns of differences that matter. The diffraction patterns of two superimposed ripples on a pond are familiar (Barad 2007, 28), as are the resulting patterns of construction and deconstruction we see in the iridescent diffraction patterns of light reflected from both surfaces of a thin film of oil on a wet road, or the rainbow colours in a pigeon's feathers. Barad (2007) carefully extends a quantum physics understanding of superposition and diffraction patterns, including the famous two-slit diffraction experiments, to advocate a diffractive method for superimposing or reading literatures through each other, constructively and deconstructively, and attending to the differences that matter. See the *diffractive practitioner* section of chapter 3.

19 As we will see, an agential realist account of identity performativity seeks to move beyond a debate of either material or discursive emphasis, to instead attend simultaneously to how an intersection, or superposition, of material-discursive agencies come to matter. See the *agential identity* and *material-discursive understanding* sections for further discussion.

Both Lawler and Barad's understanding of identity draw on critical social theorists to questions assumptions of fixity, representationalism, individualism, and uniformity, instead conceptualising identity as performative, situated, iterative, co-constituted enactments of belonging and exclusion (Barad 2007, 107). Through reviewing the relevant literature, this chapter seeks to generate an analytical framework that establishes identity and therefore identity design in this broader yet productively critical way.[20]

Common sense identity

A "common sense" (D'Andrade 1987) view of an internal, consistent, already existing self and social role influentially shapes how networked identity is conceptualised (Donath 2006). A Cartesian model of identity is reflected in design assumptions and models of social network companies like Facebook and Google in their attempts to enforce "Real Name" policies (Facebook Help Center 2014; Google+ 2014). Both platforms have demanded use of a legal name as identifier and argued that a consistent database of all output under this monolithic 'public figure' helps to encourage authenticity and "integrity" (Zimmer 2010, para. 3). Conceptualising identity as a distinct coherent and consistent consciousness accessible through the attitudes expressed gives rise to an expectation that an individual is most authentic when they are able to 'be themselves' across every context. This is often reflected in legal and technical definitions of identity that assume a preexisting and fixed individually determinate person (Solove 2006).

Social construction of identity

Theorists of networked identity – including Meyrowitz (1985), Haraway (2004), Turkle (1995), Donath (1999; 2014), Nissenbaum (1999; 2015), Star (2009), Pfitzmann and Hansen (2010), boyd (2014; Jenkins, Ito, and boyd 2015; Marwick and boyd 2018) and Barad (2007; 2014a) – question individualistic assumptions of identity, following a wider theoretical turn to situated, social construction of identity.

An understanding of identity as produced through social relations and processes of reflexivity can be traced from the pragmatist traditions of Mead through Strauss and

20 Barad (2014b, 186–7) differentiates the criticality of a diffractive methodology from "(some forms of) critique", saying "whereas critique operates in a mode of disclosure, exposure and demystification […] a diffractive methodology seeks to work constructively and deconstructively (not destructively) in making new patterns of understanding-becoming". I return to discussions of critical design in the *critical reflective research practice* section of chapter 3.

Goffman (see Lawler 2014 for an overview). This form of symbolic interactionist, and later social constructivist, stance on identity acknowledges the production of the subject through "kinship, language, the unconscious, cognitive structures of the mind, or economic, social and political structures of society" (Barad 2007, 45).

Of particular relevance for this research on networked identity are notions of identity performance, relations of belonging and insights into audience context from the symbolic interactionist/social constructivist literatures.

Identity performance

Goffman (1956) uses the language of a multi-staged drama to frame each person as an actor, identifying roles to perform depending on the stage setting of a situation, the cues of the other actors and the response of the audience. He sets out how public presentation of self can be understood in terms of being in a process with other participants of trying to define the *situation* they are in and the *roles* they play. This forms the basis for an understanding of self as multifaceted and negotiated in context.

Goffman (1956) explicitly uses notions of stage-craft as an extended metaphor. The construction of identity is framed as front and back stage performances, including unintentional signals "given off", situated in contexts with socially understood roles, although the "backstage" self is not considered more 'real' (Lawler 2014).

Goffman considers performance as a reciprocal relationship positioning his notion of audience as both "observers" and "co-participants":

> A 'performance' may be defined as all the activity of a given participant on a given occasion which serves to influence in any way any of the other participants. (1956, 18)

This is identity expressed as negotiated and contested facets defined by the situations in which they are performed. The contesting of demands and expectations act to shape situations, relationships and roles. These are also shaped by well-established or fixed guises and settings that Goffman (1956, 17) terms "fronts" from which actors can select roles to perform seen in terms of a "working consensus" built from expectations of role stereotypes and social conventions (1956, 14). Performed identity is dependent on a continuous interplay of strategies of claimed roles and tact to avoid explicit conflict of proposed definitions.

Charmaz, however, points out that Goffman's form of performativity is also shaped by his preconceptions of "an individualistic, competitive, strategic, and hierarchical model of human nature" (Charmaz 2006a, 67).

Goffman's (1956; 1966) pre-digital studies highlight how physical space and architecture act to limit the juxtaposition of situational contexts. Somebody adopting a role to suit one situation can be confident that they will not suddenly be viewable in another. Technology that connects different times and places acts to extend the reach and implications of a given situation which complicates social negotiations of tact.

Performative identity

A further understanding of identity as performative can be traced via J. L. Austin, through Derrida, to Butler and her development of performative identity in terms of the constitution of discursive power theorised by Foucault (see Barad 2007; and Lawler 2014 for an overview). Here identity performativity emphasises *doing*. For Butler, a facet of identity like gender "ought not to be conceived as a noun or a substantial thing or a static cultural marker, but rather as an incessant and repeated action of some sort" ([1990] 1999, 143). Butler uses performativity to understand identity as coming into being through ongoing interaction. Lawler (2014) in reviewing these critical social theories of performative identity argues that they "have not simply highlighted issues of identity: they have problematized identity" (Lawler 2014, 3).

Critical social theorists have questioned both assumptions of external *and* internal consistency (Bruner 1986), describing identity as discursively negotiated into being through self-reflexive contexts of use and contestations of power including performativity, sedimented memory, exclusion and belonging (Barad 2007). Butler (1997a, 160) describes the performance of identity, applied to identity design in the focus of this thesis, as "not a singular act used by an already established subject, but one of the powerful and insidious ways in which subjects are called into social being from diffuse social quarters, inaugurated into sociality by a variety of diffuse and powerful interpellations".

Identity management

Identity agency is a significant area of study from a technical and infrastructural stance of

networked identity management (Hansen et al. 2004). Much research into privacy-enhancing identity management implicitly models identity as a permanent individual attribute with distinct binary states of belonging and membership authentication. However, Pfitzmann and Hansen (2010) emphasise how it is a socially constructed and experienced process. They reject a virtual/physical dualism, and instead treat all personas[21] as constructed:

> we do not use the notions physical world vs. virtual world nor physical person vs. virtual person … The distinction between physical and digital is only of secondary importance and the structure of the terminology should reflect this fundamental fact. (Pfitzmann and Hansen 2010, 32–33)

They do however acknowledge that there are differences "with a physical body" (Pfitzmann and Hansen 2010, 33) in forms of accountability and discipline between "physical entities, which cannot be duplicated easily, or digital entities, which can" (Pfitzmann and Hansen 2010, 33). However, as Meyrowitz (1985) observes, if audiences have exclusively known a personality through the medium of electronic communication, their experiences and interactions can persist, even after death, through ongoing performances, audiences and public image. Celebrity public identities are often managed by dedicated communication staff and branding agencies.

Identity signatures

Identity and identification apparatuses – that is, technologies of observation, authentication, belonging and exclusion – act to emphasise the material and seemingly permanent and inseparable in questions of identity.

The identity apparatus of a corporate body, such as a fingerprint reader on a mobile phone, grants access through a physical attribute of the human body that is largely unique (and still considered cumbersome to fake (Matsumoto et al. 2002)). Other *signatures* of identity, such as writing stylometrics, suggest a more closely intertwined relationship between physical, biological, social and neurological factors and the expression of these across multiple identity performances. The apparent success of writing style analysis (Stamatatos 2009) suggests long-standing if not permanently sedimented identifiers can be computationally linked to a notion of persistent self (see, for example, Narayanan and Felten 2014; Vezzani,

21 This thesis follows a stylistic convention (Donath 1999) of spelling 'personas' and 'forums' in their more colloquial but commonly used online forms.

Baltieri, and Cucchiara 2013; Patel et al. 2016; Narayanan et al. 2012). This can also imply an understanding in which some underlying, 'true' self appears to underpin and influence all of an author's identity designs despite attempts at anonymity. Nissenbaum (1999) succinctly describes the norms of networked authentication, storage and processing to observe that:

> protecting anonymity today amounts to more than merely withholding a name. It means withholding the information or constellation of information it now takes to get at, or get to, a person. (Nissenbaum 1999, 142)

As a form of authentication (and authenticity), identity is a distinctive process of reproducible signatures that can accrue reputation and social agency, but is also related to material constraints of physical bodies. Where you live, your privilege status, and how you connect to the network shape whether you can use digital technologies that foster identity design but also whether authentication apparatuses extend to your daily life. Furthermore, mobile, seamless and wearable computing devices are transforming architecturally and socially separated spaces into network authenticated ones (Donath 2014; Mitchell 1995).

Agential identity

A framing which views identity as socially constructed can lack sufficient attention to material aspects of networked identification, control and reputation. Barad (2007) traces ontological and epistomological questions of performing identity to try to take account of "the interdependence of material and conceptual constraints and exclusions" (Barad 2007, 195).

Barad seeks to take account of the ways notions of agency, history and power shape the ongoing production of situated identity through performativity, but also explicitly include the role materiality performs in these phenomena. She questions any special role of human representation in the production of the phenomena. She follows poststructuralist accounts of agency that decentre the human, ascribing importance to non-human actors within accounts of how identity is materially produced. Furthermore, she questions assumptions of agency as a given property of individual entities.

Barad introduces a philosophy-physics that understands concepts and phenomena of identity as inherently material-discursive: that is, the boundary making configurations of identity are constituted through iterative processes encompassing and producing human

and non-human agencies. Barad's agential realist onto-epistemology reconfigures notions of identity and self. She extends an understanding of performative roles as situationally defined facets of self to one where bodies and self come to matter out of actions encompassing and emerging from within the context and interaction as a whole – what she calls *intra-action*. Barad argues for "the primary ontological unit to be *phenomena*, rather than independent objects with inherent boundaries and properties" (Barad 2007, 333). Phenomena like identity are understood in terms of intra-action, with agencies emerging through and producing the material-discursive elements involved:

> what we commonly take to be individual entities are not separate determinately bounded and propertied objects, but rather are (entangled "parts of") phenomena (material-discursive intra-actions) that extend across (what we commonly take to be separate places and moments in) space and time (where the notions of "material" and "discursive" and the relationship between them are unmoored from their anti/humanist foundations and reworked). […] *Intra-actions cut things together-apart (as one movement). Identity is a phenomenal matter; it is not an individual affair. Identity is multiple within itself; or rather, identity is diffracted through itself – identity is diffraction/différance/differing/deferring/differentiating.* (Barad 2012a, 32)

Reading Barad's definition in relation to identity design, intra-action decentres the role of 'the individual' designer and identity design, and acknowledges non-human agencies, whilst not denying that these enacted boundaries matter. Phenomena like identity or designer are meaningful only as part of a particular arrangement of socio-material apparatus, and the cuts made between apparatus and phenomenon. For Barad identity is an entangled superposition of possibilities (and exclusions) that are iteratively enacted and renegotiated into being. Identity performance constitutes a context and its actors through and from within this intra-action. Identities are multiple, situated and iteratively becoming, yet sedimented through particular reproducible ways of agentially assembling the identity apparatuses that determine specific (more-than-just-)human agencies.

Networked performative identity

In her studies of networked identity, boyd (2014) and her collaborators (including Baym and boyd 2012; Ellison and boyd 2013; Jenkins, Ito, and boyd 2015; Marwick and boyd 2018) understand identity as performative in Goffman's dramaturgical terms and situate this in increasingly connected social spaces (Meyrowitz 1985). boyd's (2010) positioning of performative identity construction within networked publics gives attention to aspects of

belonging, reputation, agency, and communication, including tact and 'backstage' interactions.

Online identity can also operate within very structured bureaucracies, such as national and organisational authentication, and in networked systems, a proliferation of boundaries programmed to prevent access without forms of civic or commercial authentication or social verification (Caplan and boyd 2016). Haraway (2004) questions the boundaries of self and identity, and uses the role of networked identity apparatuses to discuss new possibilities of identity and agency. Turkle (1995) frames early networked identity play in the decoupling and entangling of the physical and digital:

> where the self is multiple and constructed by language, […] where people and machines are in a new relation to each other, indeed can be mistaken for each other. (Turkle 1995, 17)

She develops notions of identity play that “admit multiplicity and flexibility" and "acknowledge the constructed nature of reality, self and other” (Turkle 1995, 261) in which:

> We are encouraged to think of ourselves as fluid, emergent, decentralized, multiplicitous, flexible, and ever in process. (Turkle 1995, 263–4)

boyd (2014) questions the degree to which utopian visions of the early web are useful for understanding the lived experiences of online identity. In challenging what she perceives as unrealistic fantasies of virtual reality and escape from everyday social situations, boyd (2008; 2014) draws on Sundén's (2003, 188) alternative "cyborgfeminist perspective that problematizes every separation of the imaginary from the political, and does so in a sense that does not erase the material from the virtual”.

Both boyd and Sundén seek to engage with identity without separating it from the political or material contexts of the network. Yet simultaneously, boyd's emphasis leaves under represented – or even normalises – the creeping tendency towards a totalitarian cloud identity authentication apparatus, and loss of potential for the constructive and deconstructive identity play found in abundance just a decade earlier.

Barad's (2007) agential realism allows an interpretation of both Turkle's identity play and boyd's networked identity through a theory of performative agency that takes seriously the power and exclusions enacted by the material and discursive together, whilst also emphasising possibilities for social justice and "new patterns of understanding-becoming"

(Barad 2014b, 187). Barad (2007) offers an account of post-humanist (post-cyborg) bodies[22] that resists a framing of virtual identity as separate. She takes identity not as somehow already stable and distinct but as entangled within the network.

Identity design as intentional identity performativity

Identity design can be thought of as a creative, intentional, experimental aspect of identity performativity. The act of identity presentation is always partly a creative process of constructing self-concept and identity. Identity design is potentially empowering persona-audience relationship in which the material-discursive co-constitution of identity takes place with greater awareness of the agential cuts, exclusions and possibilities enacted.

Turkle's (1995) study of the early web as noted earlier in this chapter described the public identity design of anonymous pseudonymity in terms of identity play. She studied how spaces like early online roleplay-focused MUDs – an acronym for Multi-User Dungeon[23] – can contribute to exploring multifaceted experiences and performances of designed identities. Turkle uses the early experiences of role playing performances of new identity roles online to question the inseparability of authors and their identity designs:

> Play has always been an important aspect of our individual efforts to build identity. The psychoanalyst Erik Erikson called play a 'toy situation' that allows us to 'reveal and commit' ourselves 'in its unreality.' (Turkle 1995, 184)

Turkle (1995, 186) brings together psychoanalytic accounts of "identity play in cyberspace" and traditional performative role-play analogies with her interpretation of identity as the playful design work of digital bricolage (Turkle and Papert 1991) along with "more mundane" (Turkle 1995, 208) contexts of social interaction in which facets of everyday life identity are reconstructed online. She describes identity play "from a viewpoint that assumes a conventional distinction between a constructed persona and the real self" (Turkle 1995, 185) with some "slippages", which are "places where persona and self merge" (Turkle 1995, 185–6). Turkle positions most identity construction as bound up in negotiations with social norms

22 I take 'post' to mean 'more than merely', in keeping with a reading that encompasses "myriad temporalities and spatialities and myriad intra-active entities-in-assemblages—including the more-than-human, other-than-human, inhuman, and human-as-humus" (Haraway 2015, 160).

23 The nomenclature of subterranean adventure carried through to more general audiences from the influence of Colossal Cave Adventure – an early digital pothole cave exploration game – as well as fantasy Dungeons & Dragons role play and the storytelling software experiments it inspired (Boellstorff 2008).

and hierarchies. In the design decisions and emerging spaces of the early web, Turkle shows how identity play functions in spaces in which more experimental persona creations are not bound by performer's existing reputations and roles:

> From their earliest days, MUDs have been evocative objects for thinking about virtuality and accountability. (1995, 249)

Turkle is describing playful identity creation that can serve exploratory functions such as forms of "escape" or "resistance" (Turkle 1995, 241) (or some combination of the two).

While Turkle locates her discussion of identity play – and the socio-technical construction of identity – in the literature of psychoanalysis and technology pedagogy research, and within the framework of poststructuralist Freudian and Lacanian literatures, this thesis follows boyd (2008; 2014) in complicating Turkle's psychoanalytic framing and questioning views of identity that can be defined as a crisis of fragmentation (or in clear developmental phases).

Turkle (1995) identifies anonymous pseudonymity in the identity play she describes, in which designed personas are held distinct from their authors. For her, identity play is creative experimentation with roles, reputations and hierarchies. Identity play happens in spaces where new roles, characteristics and identities can be constructed unlinked from some of the hegemonic constrictions of existing civic identities. Turkle describes identity play in terms of the space to actively construct identities (if only for a short while or in a small community), but equally about rule and social norm making, as a negotiation of trust and new reputations. Identity play is not, therefore, a nihilistic anonymous space without accountability or constraint. Nor is it (just) role play in the sense of adopting only established or prescribed roles. I describe anonymous pseudonymity in relation to identity design, and the identity play it entails.

Anonymous pseudonymity

Donath (2014) gives a social media and design understanding of pseudonymity. She relates pseudonymity to both social norms of identity performance and status, and the interface design that shapes experiences of online identity (Donath 1999). Pseudonymity is shaped by cultures of use and technologies of communication. Pseudonymity disassociates an author's

existing reputations from a persona reputation through social convention alone or through technological systems of anonymity sustained by social convention. Similarly, anonymity is socio-technical in its production.

An individualistic and technologically deterministic view of anonymous pseudonymity[24] can miss the ways in which the identity design of anonymity and reputation are always co-constituted and negotiated within publics. Social constructivist and socially situated stances help to articulate the ways in which anonymous pseudonymity is socially and politically produced.

In some cases, a pseudonym is initiated by an author, in others an audience (or collector or publisher) ascribes a pseudonym to a growing reputation. In all cases, the reputation of a pseudonym is negotiated with an audience. Pseudonyms can work as tokens of identification and access to audiences (Chaum 1981) as well as reputational constructs of a sense of character and trust (Donath 1999). The sustainability of a pseudonym is co-constituted with networked audiences in multiple ways, such as through a means of reply, a tone-of-voice, a character name, distribution of a cryptographic key and signature, or reoccurring communication pattern (Dalton 2013; Renaud, Volkamer, and Renkema-Padmos 2014).

Pseudonymity therefore is not so much about the choosing of a name but the making of a name for a character through contested communication. Even the seemingly private act of choosing a pseudonymous handle is inherently related to a public, as an author is considering the expectations of their (imagined) audiences, as well as drawing on available social discourses, stereotypes and roles for their pseudonym to potentially occupy.

Reputation is defined as face, or standing, performatively negotiated within social contexts (and shaped by embodied sedimented signals of the performer), and sustained through iterative working consensus of roles, position and character (Donath 2014, 186). The reputation of a pseudonym is also a way of describing the audiences it has reached, constructed or co-constituted, iteratively, over time and space (Pfitzmann and Hansen 2010, 25). Developing a new persona reputation through everyday interaction requires an author

24 See, for example, the ISO IS 15408 definitions (Pfitzmann and Hansen 2010), and North's (2003) critique of techno-determinist accounts of anonymity history.

to adopt the position of an unknown stranger even in the context of a familiar audience and is often a slow negotiation of performativity and influence. Historically pseudonym authors have often drawn on forms of character construction that can quickly build persona for an audience to recognise. Stereotype roles and characters can serve as a short cut that authors and audiences can use to more quickly share and develop an understanding of a new persona (Taylor 1991).

There is an interplay between reputation and anonymity – between the construction of audiences through the accountability and trust of reputation, and the agency to do so afforded by functioning anonymity. Without the disassociation and playful permission of pseudonymity, constructing reputation is bound up in the categories and roles that are sustained by hegemonic hierarchies of society and the gatekeeping functions of authenticated access.

Anonymous communication technologies serve as the primary form of agency of untraceable disassociation – control over indeterminacy – between authors and their pseudonymous reputations.[25] Socio-political pseudonymity conventions (such as stage names and performance spaces (Brennan and Pettit 2004), regnal names and military cadre *nom de guerre*, or the complex machinations of multinational wealth management and tax avoidance shell identity bureaucracies) can sometimes effectively dissociate the reputations of a performer and their known pseudonym in the minds of an audience by limiting access to an exclusive performer class and para-social relationships (Meyrowitz 1985). Obscurity may also produce a sense of authorial anonymity, while failing to actually prevent subsequent identification should an obscure persona later gain an audience.

Anonymous pseudonymity cultures

Pseudonymity is a practice of designing identity. The study of anonymous pseudonymity cultures – in which the identity design of new persona reputations by audiences themselves is commonplace within ongoing public discourses – represent the most significant

25 I discuss anonymity in relation to agency and indeterminacy in the *anonymity* section of this chapter, below. Barad emphasises the differences between ontological indeterminacy and (mere) epistemological uncertainty. She notes the constitutive possibilities of indeterminacy, and that resolving some indeterminacies "always entails constitutive exclusions (that which must remain indeterminate)" (Barad 2012b, 7).

literatures on distributed identity design practices. The various disciplines of anonymity and pseudonymity research and practice are therefore highly relevant to this design research study.

Pseudonyms are intentionally created communicative identities that are disassociated from their authors – that is, they are unlinked or indeterminate – that through persistent use establish an ongoing social reputation with audiences. Pseudonymity requires the agency to maintain a distance and ambiguity between author and persona. Anonymous pseudonyms are *distinct reputation-audience relations* sustained by the interplay between anonymity that keeps them unlinked from each other, and reputation (accountability, familiarity and trust) that allows for identity to be built over time (Donath 1999).

This next section traces how anonymous pseudonymity can be understood as a superposition of both: access to the indeterminacy of an anonymous crowd; and creative control over relations of audience-reputation belonging. I will identify the importance of seeing identity design as part of a *tradition* of anonymous pseudonymity cultures before returning to some key definitions from the literatures on anonymity and pseudonymity.

Key shifts in anonymous pseudonymity culture

Here I describe rich, anonymous pseudonymity cultures that have often been identified between more stable periods of media and communication, at socio-technical transitions, such as the emergence of print publishing, telegraph newspaper networks and internet chat. While not determined by new networks of telecommunication and authentication, it is these topological changes in "material spaces and conventions" (North 2003, 58) between all those involved in authorship and audiences that together can make space for anonymous pseudonymity.[26]

Historical anonymous pseudonymity is often presented as determined by distinct communication technology, such as the printing press, and dictated solely by individual authors. More recent scholarship suggests a more complex intersection of technological and social agencies in the ongoing production of an anonymous pseudonymity culture (Ezell 2003; North 2003; Johnson 2011; Griffin 2014; Deseriis 2015; Starner and Traister 2016).

26 I return to Barad's (2007) intra-active emphasis on topology in relation to networks later in this chapter in the *network topology dynamics* section.

North (2003) offers an analysis of the functions and forms anonymity can take. She sets out a nuanced understanding of naming and anonymity as historically situated, socially and materially constructed, and contested over time, drawing on a particularly productive period of anonymity culture that coincides with the establishment and uptake of printing press technologies and norms in early modern Europe. North identifies an ongoing and shifting set of anonymity norms and practices, shaped by technical innovation and shifting social fashions and political negotiations. For example, she describes the 'Martinist' religious debates of Early Modern England in which anonymous pseudonyms contested identities, arguments and audiences through access to 'illegal' printing presses and pamphlet publishers. Authors portrayed their own use of anonymity as legitimate, while simultaneously demonising the anonymity of opponents. Anonymous pseudonymity provided moments of relatively empowered communication, audience building and resistance, in a political climate in which harsh retribution and executions were a real threat. North describes anonymity culture and function as emerging through both ongoing co-construction of productive *ambiguity*, and appropriation of existing *conventions*, not as a distinct boundary between socio-technical epochs, but more complex, ongoing shifts in practice. Anonymity emerges through "the dispersal of responsibility by blurring the lines between one individual's work and another's" so that "when attribution had more than one agent, the resulting ambiguity often begot anonymity, even in the midst of naming" (North 2003, 58).

The interplay of ambiguity and convention – agencies of indeterminacy and claims on belonging – that North identifies reoccur throughout periods of rich anonymous pseudonymity culture. It is only through the technical or cultural production of constraints on (expressive) identifying information given off by the face, voice and body, combined with the possibilities of reputation-audience creation, that anonymous pseudonymity forms become socially accepted and creatively possible. Anonymous pseudonymity is contingent on agencies of materiality and discourse. The histories of periods of relative abundance or scarcity in anonymous pseudonymity are inherently material-discursive. One must consider the material agencies of the apparatuses of anonymous pseudonymity, such as the mask, cloak (Johnson 2011), printing press (North 2003; Taylor 1991), post box, telegraph (Taylor

1991), bulletin board, server database (Turkle 1995; Bachmann, Bialski, and Hansen 2017) and quantum cryptography signature (Gisin et al. 2002; Barad 2007), as much as the conventions, cultures and contexts through which they emerged.

For example, paper and literacy – initially technologies and practices of the wealthy and scribal workers – gradually became more accessible in wider societies. Those who could afford literacy and authentication-at-a-distance began to make new connections of identity and communication – new network topologies – through time, space and materials:

> Persons absent in time or place were substituted by seals, which operated as alternates for those who were absent, acting in their place. It is intriguing that personal identity came to be signified just as people began to project their authority and accountability beyond their own actual, empirical presence. It is as if absence were required for the question of identity even to become conceivable. (Bedos-Rezak 2000, 1490)

A tradition not a contemporary moral panic

The way that anonymous pseudonymity is often framed as a contemporary moral panic belies the productive, positive history of the practice. Instead the agency to design identity found in anonymous pseudonymity cultures should be taken as the study of a long tradition of rich public identity design.

Current discussions of anonymous pseudonymity are dominated by a sense of moral panic, and a tendency to frame it as unusual, exotic, recently emerging and a threat (Matias 2017; Coleman 2014). Anonymity throughout its history is often proclaimed as a "new and unprecedented moral threat" and a "contemporary crisis" of technological change (North 2003, 97–98) yet North argues that we should approach it "as a tradition" (North 2003, 98).

The social and technical shifts in anonymity use, and attempts to control it, are shaped by developments in technologies of communication and politics of agency. The popular contemporary cultural framing of encrypted anonymous pseudonymity often evokes characterisations of subcultural deviance and crisis such as the narratives of "cypherpunks" (Hughes 1993), "nym wars" (Galperin 2012), the "Anonymous movement" (Coleman 2014), the "dark web" or "darknet" (Nath and Kriechbaumer 2015), and the perceived role of anonymity in the recently publicised *fake news* and *trolling* by nation-state and billionaire-class funded algorithmic (Phillips 2018) "astroturf" lobbying (Stauber and Rampton 1995, 79). These

current *networked moral panics* (boyd 2014, 105) about the ways that persona are created and used can be understood as part of a longer history of contested access to and framing of identity design. Creative intentional authorial use of intrigue and audience building that anonymous pseudonymity offers, is set against appropriation of these tools by powerful actors who simultaneously reframe the anonymity of less powerful others in terms of morality, legitimacy and disgust.

Anonymous pseudonymity culture currently seems rare (Ciuraru 2011) and out of reach (Weaver 2013), relegated to infrequent examples of a few fiction author noms de plume and musician stage names, some social media accounts, a couple of subcultural web space usernames and street art tags, but little else. Meanwhile, as noted above, perceptions of anonymous pseudonymity are shaped by a media portrayal of the so called dark web, and also a gradual shift in fashions and technologies away from historical norms of effective networked anonymity. The majority of pseudonymity practices in this contemporary framing are recast as inherently deviant or criminal (Nath and Kriechbaumer 2015). For example, Coleman (2014), despite a skilful and detailed ethnography of the "Anonymous movement", tends to replicate a mass media portrayal of the history of digital anonymity cultures in terms of extremes of moral panic leaving little ground for discussion of the subtlety of function and more mundane uses of anonymity. Additionally in art and design practice, as well as some research cultures, the frisson of implied deviance adds a vitality to work commenting on or situated within these anonymity cultures.

The demonisation of public agencies of identity design is not new. Critics of anonymity throughout histories of anonymous pseudonymity cultures are characterised by "hyperbole and moral outrage" (North 2003, 97). In 18th century Venice for example, a widespread masking culture meant trading and socialising became possible between otherwise stratified classes, and masked women, for example, were (on occasion) able to move more freely through the otherwise claustrophobic and surveilled city architecture. Contemporary critics named these new gender and class freedoms as "the source of all disorder" (Concina 1755 in Johnson 2011, 19) and "a symptom of social decline" (Johnson 2011, 20), and yet anonymity culture thrived. A similar portrayal of extremes is also present in subsequent early print and early web anonymous pseudonymity periods, yet in each there is an ongoing

functioning possibility of productive anonymity at these times through widespread acceptability of anonymity conventions and technologies sustained by public social norms and practices.

North's observations of how some authors contested access by others to early print anonymity resonates with more recent experiences of networked anonymity:

> Their alarm bespeaks the very popularity and malleability of anonymity and suggests that one need not look far to find a different set of authors and readers with less critical interpretations of name suppression. (North 2003, 99)

A recognition that anonymous pseudonymity has long been a tradition, shaped by periods of resurgence and curtailment in anonymity culture that have often accompanied shifts in power and affordances during the emergence of new media as well as changes in social and political norms, allows for the possibility of such space for identity design through anonymous pseudonymity to be renegotiated again. This next section draws briefly on several historical periods in which anonymous pseudonymity has been common to show that such spaces can be constructed or contested, and potentially designed for again.

Masks and tokens

Identity creation has "fascinated virtually all human societies" (Twycross and Carpenter 2002, 3). Certainly forms reoccur in the widespread, sporadic, diverse histories of mask making and wearing (Pernet 1992), particularly in rituals that exercise charismatic power, festivals that include role play, and other customs (temporarily) contesting belonging, identity and authority. Beyond the social rules of performance and ritual, identity of performers is easily discovered by lifting the cloak and mask (Esser 1988). In some contexts and uses, masking and puppetry can be understood as forms of (proto-)pseudonymity, albeit limited in function and scope by the physical presence of the performer. However, it is the technologies of communication at a distance – first through representatives carrying totemic objects, then forms of inscribed object, written contracts, letters and seals, then postal networks, telegraphs and electronic telecommunication – that afford the potential for nuanced character creation sustained by the socio-technological separation between author and audience.

Masks and other concealing, decorative devices can serve both as functional anonymity and

as forms of pseudonymous reputation. Clothing and objects can enforce both physical and charismatic authority: from controlling ownership of masks and fetish objects that gain power through the cost of making or rarity of finding materials, to the technical innovations of hard to fake seals and signatures of early contracts and letters, representing authenticated communication over distance and time.

Late 17th and 18th century Venice sustained a complex public life of wearing a uniform style of mask, hat and cloak, and other conventions of potential identity ambiguity and anonymity (Johnson 2011).[27] While the social and material conventions of masking in Venice created space for anonymity, most maskers meeting knew who they were talking to. However, the commonplace tools of anonymity created a context in which people could and did go completely hidden at times too.

Oral and scribal cultures

Pseudonymity plays a clear role in charismatic persuasion and claims on legitimacy for authors and audiences, in addition to being a form of creative reputation and possible anonymity. Up until the development of portable communication media, identity fabrication and performance were tied to the physically-present performer or storyteller. Writing established methods of reliably representing identity at a distance and over time, and with it a much greater potential for pseudonymity creation. Concepts and articulation of anonymity and pseudonymity became important in northern Europe at a time in which growing reproduction and distribution produced new cultures of copying and access (Ferry 2002). Earlier writing was often unsigned because the process of duplication and distribution was in small networks in which the author was known already. However, such conventions later made space for naming ambiguity and anonymity as audiences, authors and publishers grew.

27 At its richest point as a culture of identity play, much of Venice's public life was lived through masking – with up to six months of the year given over to regular mask wearing in the city, including in cafes, theatres, casinos and other meeting places. Masked publics met in contexts of social pleasure, but also for (illicit) political discussion, trading and romance. Indeed, Johnson (2011) suggests masking emerged, in part, out of the overly constraining rigid hierarchies of stratification and surveillance of the island city. In addition, technologies – such as access to nearly identical, disposable, cheap masks from vendors across the city, combined with a gondola-dominated travel network that provided the ability to move from one part of the city to another with less easy tracking – all went together to create a very complex, rich topology of connections and constraints in which uses of anonymous pseudonyms could thrive.

North (2003) shows how scribal manuscript and coterie[28] cultures and their conventions of anonymity and pseudonymity extended and evolved from before the printing press, into a rich set of anonymous pseudonymity[29] cultures in early modern European communication:

> Whether for reasons of personal safety, social decorum, or political and rhetorical effectiveness, early modern authors and book producers manipulated anonymity in remarkably diverse ways, sometimes looking back to medieval conventions of anonymity, sometimes responding directly to the demands of print culture and Tudor-Stuart politics, and often employing age-old conventions of anonymity in unique and surprising ways. Readers found anonymity highly interpretable; its traditions, fashionability, dangers, and occasional playfulness made it a nuanced and meaningful gesture. (North 2003, 4)

European anonymous pseudonymity conventions were adopted and developed in North America – at a time of massive growth in telecommunication and revolutionary political resistance (Starr 2005) – leading to a "golden age" of newspaper pseudonymous authorship (Taylor 1991). Telegraph and postage systems in North America created a space for distributed identity performance, creative copying and assemblage. Subversive play involving both political critique and carnivalesque stereotypes emerged as a culture of authorship in North American newspapers, and were accepted as part of everyday journalistic and political life (Taylor 1991).

Electromagnetic communication first vastly increased the immediacy and reach of journalistic voices, through radio, telegraph and telephone communication at a distance, but then also contributed to a shift towards more centralised monopolies of editorial control, and a restriction on audiences through the relatively prohibitive cost of these new technologies of broadcast (Starr 2005). At the same time the storage and reproduction of signatures of voice and image gradually made the ambiguity of anonymous pseudonymity of identity less tenable.

Public telecommunication

A number of smaller do-it-yourself (DIY) and subcultural communities have re-contested a

28 An exclusive court or intellectual social group who often maintained *commonplace books* through shared authorship of collections of poetry, quotes, essays and marginalia, for themselves but also wider audiences.

29 North's (2003) studies focus on anonymity and namelessness rather than pseudonymity, with a particular emphasis on print conventions of (absent) naming and other marginalia and paratextual analysis. However, pseudonymity features throughout her considerations, and the definition of pseudonymity used in this thesis encompasses the reputation developed through absent naming she discusses.

more distributed control of communication media technologies, often marking points of resurgence in identity creativity and anonymous pseudonymity authorship. 'Hobby' AM radio, CB truck radio, mail art, fanzines, street art, and community radio (so called pirate radio) (Jenkins, Ito, and boyd 2015, 17; Chandler and Neumark 2005) have all provided spaces in which identity design is more possible and accepted.

However, it was not until the emergence of networked computer bulletin boards, conferencing and chat first in the US and Scandinavia – and the egalitarian information sharing principles of the early Web protocols in scientific communities – that we begin to see new technologies of communication at a distance in the hands of larger (relatively grass-roots) audiences themselves (Garton 2005).

As discussed, Turkle's (1995) study of early online cultures, in MUDs and other "text-based, social virtual reality" (Turkle 1995, 181) spaces[30] of email (Electronic Mail), BBS (Bulletin Board Systems), USENET (discussion forums) and IRC (Internet Relay Chat) digital telecommunication systems, describes how "people either explicitly play roles (as in MUDs) or more subtly shape their online selves" (Turkle 1995, 256). She acknowledges the agency that anonymous pseudonymity affords those in MUDs and other online forums to design new identities, emerging from the norms of role play gaming and the constraints of early network technologies.

Turkle describes how anonymous pseudonymity in MUDs emerged out of contexts of experimentation made possible by audiences connecting through networks, and shaped by the resources and constraints afforded by infrastructures and code. The limited text medium sustained by the resources of early networked computing meant Turkle and her case studies had "literally written our online personae into existence" (1995, 263) and the anonymity of the apparatus underpinning identity design was an almost inevitable part of the constraints of the network infrastructures that sustained it.

These early digital public spaces and their user audiences were growing and evolving rapidly as people programmed and negotiated the social norms, network infrastructures and

30 MUDs are "organized around the metaphor of physical space" (Turkle 1995, 182) in the history of role-play and gaming, as are the smaller-scale metaphors of shared desks, noticeboards and filing cabinets used in BBS and IRC topic themes structured discussion spaces, and in email other messaging systems.

software interfaces that helped define them.

Many spaces developed conventions of "real name" civic identity signatures or rudimentary technologies of authentication (Turkle 1995). However, frequently networked community environments were socially or technically separated from civic identities, which made space for new roles and characters to be created and experimented with. The anonymous pseudonymity that Turkle identifies in these early computer networks represented a significant minority of how online identity was authored at that time:

> In cyberspace, hundreds of thousands, perhaps already millions, of users create online personae who live in a diverse group of virtual communities where the routine formation of multiple identities undermines any notion of a real and unitary self. (Turkle 1995, 267)

It was a prominent feature of early digital public spaces made possible by networked computers. However, Turkle also noted how "the notion of the real fights back" (Turkle 1995, 267), and the possibilities of anonymous pseudonymity shift over time.

Social network sites

Early networks both encouraged numerous contexts of role-play pseudonymity and lacked resources of logging and tracking to preclude anonymity. Later networked publics can be characterised by a collapse of these distinct anonymous pseudonymity contexts through the conventions accompanying mass connectivity, storage and processing.

By the time of the studies of networked teen identity by boyd (2006; 2008; and her subsequent studies with collaborators, see for example Baym and boyd 2012), anonymous pseudonymity had become rare, almost unimaginable, in the dominant social network sites. Networked identity roles were instead bound up in increasingly centralised apparatuses of everyday social constructions of civic identity. boyd (2008) contends that Turkle's (1995, 246) observations of widespread "dizzyingly free" anonymous pseudonymity is at odds with accounts of teen identity practice:[31]

> Even if her analysis holds for those who are trying to create separate 'virtual' worlds through online engagement, the vast majority of teens are not. […] While identity play was commonplace in MUDs, the profiles that teens create in social network sites are typically tightly connected to the identity that teens embody in unmediated environments. […] While

31 It is worth noting that Turkle (1995) gives a more nuanced interpretation of the interplay between everyday identity of social reputation, and the spaces in which identity play can happen, than boyd (2008) seems to credit her with, acknowledging that constructed personas intersect with politics and concerns of the everyday.

> some suggest that identity work through the Internet tends to involve the creation of fictional characters unconnected from embodied reality (Turkle 1995), this was not a common practice that I witnessed. (boyd 2008, 125–8)

While anonymous pseudonymity persisted somewhat in the evolution of MUDs into centrally authenticated MMORPGs (Massive Multiplayer Online Role-Playing Games) (Corneliussen and Rettberg 2008) and commercial virtual reality experiments including SecondLife (Boellstorff 2008), the growing sites of networked public space became less and less amenable to anonymous pseudonymity. Even in role-play and gaming spaces such as SecondLife and MMORPGs participants often tend to reconstruct their civic identities, roles and unified sense of self, despite the apparent freedom to create entirely new characters (Donath 2014). Donath (2014, 340) summarises this shift over the time between Turkle's studies and boyd's:

> Balance is the key […] between being part of a community and having a place to be different […] For a while, the online world helped provide this balance. For people enmeshed in tight communities, it provided a place to be separate, to take on a different persona. For those who could not find a community where they fit in, it erased the barriers of distance to bring together scattered people with common tastes and concerns, whether gay teenagers, fans of an obscure music genre, or sufferers of a rare disease. Yet in recent years the balance has been tilting toward identification, tying all activities to one's increasingly searchable real name. The virtual city is becoming the global village, where everyone "knows" everyone else, and myriad eyes watch all activity.

The potential for anonymous pseudonymity in early digital networks can partly be understood as a dynamic of disparate interest-focused groups in which "many online communities in the 90s were […] built upon people encountering one another for the first time in an online context" (Ellison and boyd 2013, 161). Compared with the early network spaces Turkle (1995) studied, the sites boyd studied are not easily divided into discrete situations in which distinct personas might be constructed:

> While online forums that are organized around topic or interests can be reasonably understood as a discrete group, networks of people connected to disparate others are not as easy to categorize. (Ellison and boyd 2013, 162)

The distance between Turkle and boyd's two accounts of how "digital bodies" (boyd 2008, 125; Turkle 1995, 231) can be constituted suggests a significant shift in the norms and structures of the networked spaces for identity design in the time between their studies. Turkle's (1995) predictions of growing anonymous pseudonymity did not foresee, nor articulate, the scale of the everyday normative pressures of social online interaction, nor the scale of the impact

of networked authentication and tracking infrastructures in reducing the occurrence of openly playful identity performance online. She did, however, acknowledge the shifting demographics (Ellison and boyd 2013, 162) of the early internet:

> When I began exploring the world of MUDs in 1992, the Internet was open to a limited group of users, chiefly academics and researchers in affiliated commercial enterprises. The MUDders were mostly middle-class college students. They chiefly spoke of using MUDs as places of play and escape, though some used MUDs to address personal difficulties. […] By late 1993, network access could easily be purchased commercially, and the number and diversity of people on the Internet had expanded dramatically. (Turkle 1995, 238)

The extent and affordability of both computers and access to the network grew dramatically, vastly increasing the number and diversity of people who could connect.[32] Consequently, over time networks have made space for some forms of interaction while also constraining others. The centralising factors of a small number of commercially successful ISPs and cheaper processing and storage costs, also made authentication and tracking more viable in this period.

The growth and then loss of spaces of anonymous pseudonymity between early virtual communities and later social network sites can be understood not only as changing constraints on the creative ambiguities of anonymity in network infrastructure, but also in relation to changing conventions with demographics and adapting business and governance models (especially the power to authenticate).

Growing numbers of internet users, and the relative diversity of their identities, produced crowds to be lost within in the thriving subcultures of the 'virtual city' that Donath (2014) describes. Later, communities that had relied on social norms (and institutional affiliations) of their smaller audiences, found 'endless September' brought new challenges of how to sustain reputation systems to hold identities that have been written into being to account (The Wizards 1996). We see a shift away from socially acceptable forms of anonymity in this period due to the loss of productive constraints on naming and identifying, through the developing infrastructures of tracking and authentication gatekeeping, and in community responses to accountability. The cost of flaming, trolling and spam, and the *network effect*

32 The fall in cost, and rise in availability, of access to first local-call telephone modem services like BBS, and then internet access particularly through the successes of AOL, that occurred around 1993 are memorialised as the "endless September" (Donath 2014, 166; Tanni, Smetnjak, and Quaranta 2014, 5; coined by Fischer 1994) in an academic frame of reference of the predominant demographic already online.

induced business monopolies (Shirky 2005) of search, email and social media shifted focus from self-determined communities, to multi-context online sites and identities.

Enclosure

The successes of Google, Microsoft and Yahoo's online email services followed by Apple's App Store and Facebook's closed commercial algorithmic personalisation around 2008 marked a growth in exclusive log-in social platforms, walled garden 'app stores' and the dominance of proprietary networking protocols, authenticated access and information monopolies attempting to construct new digital 'intellectual property rights' over 'personal data'[33] (Bratton 2015). Similarly, systems of identification and authentication are reflected in business models formed around the professionalisation and centralisation of aspects of naming and trust authorities including Domain Name Systems (DNS) and certificate authorities (CAs) (Barabas, Narula, and Zuckerman 2017). Following the success of (predominantly American) early social network sites, a number of international alternatives developed that have come to dominate particular cultures or publics, often along national, common language or timezone boundaries (including Yandex and mail.RU in Russia, and Baidu, Weibo, Tencent and Alibaba in China (Chen and Cheung 2017; Metahaven and Bratton 2011)).

Bachmann, Knecht and Wittel (2017) formulate the networked reconfiguring of identity data as "a new form of capitalist enclosure" (2017, 244), drawing on recent conceptualisations of "platform capitalism" (Srnicek 2016), "communicative capitalism" (Dean 2005) and "surveillance capitalism" (Zuboff 2015). With platform capitalism, Srnicek (2016) emphasises the monopolising power of the incumbent *network effect* to almost encompass complete economies, although Srnicek's analogy of a 'platform' intermediary is at times perhaps too suggestive of both neutrality and stability. Communicative capitalism is characterised by Dean (2005) as ever circulating online content, which appears political but ignores situated struggle and is distracted by technological fantasies of messaging in itself as meaningful contribution, as well as overestimated "global unity" (2005, 67). For Zuboff (2015),

33 I use 'walled garden' here rather than 'silo', as although the later implies the tactical or commercial value held by controlling a silo (of grain, missiles or data), it leaves little room for redistributive community models as few silos are collectively held. Instead walled gardens (in the UK particularly) invoke grand privileged enclosure of the commons, but also an equally pervasive history of re-acquisition as public parks and common land (Linebaugh 2014; Boyle 2003).

surveillance capitalism takes the form of profit-driven tracking and analysis of personal life, commodified in 'behaviour' data, as characterised by the obscured service-advertising business model of Google, and the state collaboration and outpacing of legal oversight these companies have attained – a "*coup* from above" (2015, 86) at the scale of sovereign states.

In light of the centralising identity dossiers (predicted by Chaum 1985) of cloud enclosure, it would be easy to dismiss the promise of early anonymous pseudonymity cultures as mere "fantasies about a new kind of social power" (Turkle 1995, 247) and "cyber-utopian visions" (boyd 2008, 49). However, not only was the anonymous pseudonymity culture of the time rich and productive, but what was to emerge during this playing with ideas of ownership and organisation was a period of massive growth in personal communication empowerment through the first 'era' of blogging and commenting (Rettberg 2013; Marlow 2005), as well as cementing some of the empowering ideological positions of early computer researchers within the Free Software movement (Stallman 2015). Independent blogs dwindled in relative importance by the early 2010s (Ellison and boyd 2013) as social interaction moved from decentralised hosting, comments and federated RSS interaction towards centralised Facebook, Twitter, LinkedIn and Tumblr pages. However, Free and Open Source Software has persisted to become the dominant software model underpinning much internet apparatus (Finley 2016). Likewise, networked publics have developed expectations of connectivity that still hold possibilities for political and ethical action (Jenkins et al. 2016; Srnicek 2016).

Anonymity

Anonymity is the power and agency to keep communication unlinked from an author's reputation. Anonymity is indeterminate authorial identity (Pfitzmann and Hansen 2010; North 2003). In this research, anonymity is defined in relation to the pseudonymous process of creating and sustaining reputation and audience relations. When definitions of pseudonymity are derived just from the Greek prefix and root as meaning *specious*, *false* (or even *deceptive*) *(self-)naming*, they ignore the nuances of how pseudonyms form relations of trust, character and audience. Such a false-name definition tends to treat pseudonymity narrowly as one potential feature of an anonymous communication (see for example Berki

and Jäkälä 2010). The inverse approach is to understand anonymity as one potential feature of the broader phenomenon of pseudonymity. In their collaborative review of anonymity and pseudonymity concepts used in cryptography and digital security, Pfitzmann and Hansen (2010) formulate a framework for discussing *privacy enhancing technologies* and the design and programming of networked systems. They position anonymity in relation to encryption, authentication, obfuscatory steganography, and computer users. While privacy enhancing technology research often treats anonymity as a personal privacy problem and anonymous pseudonymity as properties of individuals or guaranteed outcomes of particular software tools, Pfitzmann and Hansen are careful to highlight the co-constitutive nature of trust networks and wider "anonymity sets" (2010, 9) of potential authors in which anonymous pseudonymity becomes possible. They formulate anonymity as a dimension of pseudonymity:

> Whereas anonymity and accountability are the extremes with respect to linkability to subjects, pseudonymity is the entire field between and including these extremes. (Pfitzmann and Hansen 2010, 25)

The definition used in this thesis differs slightly since anonymity and accountability here are understood more like different dimensions rather than polar ends of a scale of pseudonymity. We can, for example, imagine an anonymous pseudonym that can be held accountable in some meaningful way within a particular context.

Furthermore, all anonymous messages can be treated as (proto-)pseudonyms in that they each have potential to develop significant reputation. A single short message is what Pfitzmann and Hansen recognise as a "one-time-use pseudonym" (2010, 26). It is therefore useful in this definition to treat an emerging tone of voice across several texts as constructing a pseudonymous form, even if no name is explicitly given. In this definition, unsigned and unnamed texts are still pseudonymous in that they carried with them a tone-of-voice or reputation that can begin to evoke a recognisable character whether developed through subsequent collection, categorisation, redistribution and publication, or with authorial intent from the start (North 2003).

There are a number of efforts to categorise pseudonymity and anonymity into further

distinct, fine-grained definitions.[34] However, for the purposes of this thesis, it is the intersecting meanings and uses of anonymous pseudonymity that have greater analytical purchase for the research that follows.

Sustaining anonymous pseudonymity

By considering anonymity and reputation as ongoing changing aspects of pseudonymity, identity design can be better understood as a performative, iterative and collectively contested process.

The anonymity of a pseudonym is generally unstable and varies in strength over time. In almost all cases the strength of a pseudonym's anonymity can only ever be reduced, through elimination of the crowd of possible authors (anonymity set) and through the accrual (collection, categorisation and storage) of identifying signature features. There are exceptions, maintained by the most meticulous and careful use of pseudonymity apparatuses, in which author identity has remained disconnected from pseudonymous personas for an entire lifetime of publishing (Mullan 2008).

Pseudonyms can have known authors from the start or remain disconnected for short or longer periods of time. Maintaining anonymity and reputation requires effort and is unstable in negotiation with audiences. Anonymous identity design is a form of negotiated reputation (North 2003) that requires building fame and authenticity – at times through the intrigue and status of anonymity itself – often competing for attention within a bounded subculture of interest, or mixture of knowing insiders and wider publics in which 'legendary status' can be sought (North 2003). Existing power roles and status are required to even access the resources of certain anonymity cultures.

North also talks of the possibility of "recovering anonymity" (2003, 9) through later anonymous editions of an originally attributed printed text. Networked apparatuses of

34 Berki and Jäkälä (2010, 104), for example, propose "polynymity" as a term for "having and presenting oneself with many different names" to describe one-to-many psedonymity (see also "altaholics" (Manning 2013) and the many-to-one notion of "improper names" (Deseriis 2015)). I would argue that the distinction between one or more than one pseudonym does not warrant a separate category of polynymity. They also propose eponymity for a state of being identified by a legal name and nonymity as "the state of not being identified by any name nor any other distinctive individual features" (Berki and Jäkälä 2010, 96) along-side anonymity and pseudonymity. Nonymity relates to the passive, disembodied observation made possible in online space, but is problematic as nearly all digital network connection is associated with some individual identifying features, even if there is no intentional communication.

authentication through massive connectivity, processing and storage on global scales suggest that any reconstruction of anonymity is only one click away from re-identification. However, imperfect archives (bit decay or damage) (Steele 1983; Kahle 2013), potential inherent indeterminacy in massive databases (Brewer 2017), and legal enforcement such as the "right to be forgotten" (Koops 2011), all test whether recovering anonymity, while unlikely, may still be possible.

The strength of the anonymity of a pseudonym depends on both maintaining a disconnect – that is, an un-traceability of signatures – and sustaining a large enough number of similar possible authors – an anonymity set – in which to be hidden (Bachmann, Bialski, and Hansen 2017, 424). Strategies for developing the size of the anonymity set can be thought of in terms of obfuscation, which Brunton and Nissenbaum (2015, 46) define as adding "a plethora of related, similar, and pertinent signals—a crowd in which an individual can mix, mingle, and, if only for a short time, hide". What Nissenbaum (1999; and Brunton and Nissenbaum 2015) identifies from a socio-technical legal perspective, security system researchers have also identified from a practical position – anonymity is not only about technologies controlling signature and unlinkability, but just as importantly socially constructed and dependent on "blending into a crowd" (Reiter and Rubin 1998, 66; Bachmann, Bialski, and Hansen 2017).

In addition to an anonymity set and the socio-technical possibility of reputational unlinkability, anonymity also requires an accepted cultural norm of anonymity practice. The "Anonymous movement", and the part the *4chan* website community played in particular, represents one of the few examples of functioning processes of anonymity culture in recent internet history (Coleman 2014). In addition to technological anonymity design choices (Bernstein et al. 2011), subcultural spaces like *4chan's /b/ forum*, the *Something Awful* forum and a number of early *Reddit* groups, all maintained participant anonymity through performing an aggressively offensive yet subculturally fashionable public discourse (Knuttila 2011). Similar suppression of civil identity through contexts of over-the-top grotesqueries and vitriol can be found in the histories of carnivalesque and "Billingsgate" humour (Bakhtin 1984, 5) which included not only celebration of bodily function and disgust, but also racist, xenophobic and sexist "displaced abjection" (Stallybrass and White

1986) in-amongst the subversion, humour and celebration. For example, the *gnaghe* subculture of Venice masking culture drew on gaudy taboo, in part enforcing a need for anonymity (Johnson 2011, 21).[35] Official roles and wealthy identities are able to be temporarily lost in carnival anonymity and deniability.

Some social constructivist perspectives, in resisting active formulations of the role of technology infrastructure in questions of power (as purely utopian, for example (boyd 2014)), risk eliding the parts that the materialities of the network play in forming and sustaining anonymous pseudonymity.

Cryptography

The science and practice of cryptography suggests tools for sustaining anonymous pseudonymity and exposes the ways power over identity authentication and communication apparatuses are strongly contested. Internet apparatuses of identity control are almost universally enforced through encryption. Within increasingly networked physical spaces – such as payment, access control, ticketing and border policing – encryption is of growing importance to centrally coordinated tracking and boundary-making processes of exclusion more generally.

A number of counter models have been proposed and developed to decentralise identification using the features of cryptography to redistribute some control of reputation and anonymity to publics or democratic organisations themselves. As urban public spaces and traditional media became increasingly authenticated through the ease of totally encompassing networked tracking, the agency contested by encrypted communication is becoming the only potential apparatus for producing and maintaining the anonymity of a pseudonym (Nissenbaum 1999). As such, networked encryption is becoming the fundamental *material* that makes anonymised pseudonymity, and therefore distributed identity design, possible.

Encryption describes methods for trying to scramble a message so that its content (and identifying signatures) cannot be read without the possession of a key, as well as using the

35 While Johnson (2011) is clear in his efforts to distance interpretations of Venice masking culture from Bakhtin (1984) and the carnivalesque, forms of carnival empowerment and inversion are still found in his accounts.

control of such scrambling to be able to prove some sort of ownership or signature over messages. It becomes important in controlling systems of publication through methods of authenticating access to an audience, computer, channel or signature (Chaum 1981). Cryptographic authentication can serve to try to control access to a pseudonym's trust signatures, publisher or audience and, in a similar function as cultural shibboleths, to signal belonging.

Modern cryptography is the advanced science of mathematical puzzles that are easy to calculate when locking a message and difficult to calculate when trying to decipher meaning without the information held in a key. It is shaped by rapid changes in digital processing, storage and connectivity technologies, and developments in mathematics and quantum computing. These are combined with the sociotechnical arts of:

- steganography – hiding the existence of keys or communication in social contexts, technical materials or sufficient randomness to avoid detection;
- tamper resistance – trying to detect if a new key has been read; and
- trust networks and hierarchies – negotiating distant authentication, shared secrets and certification.

A number of potential encryption methods exist, based on ingenious mathematical properties and system design intended to reduce risks of revealing information or connections (Ferguson, Schneier, and Kohno 2010).

The field of cryptography scholarship has tended to advocate analysing its methods publicly to identify potential issues and publicly known software implementations tend to be equally well scrutinised through free software models (this is often dismissively contrasted with relying on "security through obscurity" (Schneier 2002)). This has conceived the cryptographic tools of anonymous pseudonymity as a form of public commons. While pseudonymity is often framed in terms of individual privacy and technological determinism, much of cryptography research acknowledges – and is embedded in – social structures of democratic governance, commons and redistributive empowerment (see Chaum 1985; Chaum 1981). Some framings of 'cypherpunk' cryptography have adopted a kind of libertarian fundamentalism (pro-property individualism), positioning encryption and privacy as entirely individualistic (Hughes 2012). There is also a long history of well-

funded national and commercial cryptography researchers that have attempted secretive and proprietary approaches (Ferguson, Schneier, and Kohno 2010). Counter to cryptography as a common good are some forms of corporate bug bounty, security embargo, zero-day hoarding and proprietary encrypted-messaging protocols which have recently acted to shift focus of some cryptography out of an academic and free software public discourse (Ablon and Bogart 2017).

Anonymous pseudonymity as resistance

Resistance in networked publics can be understood in terms of agency and power and in terms of legitimacy and subcultural status (Jenkins, Ito, and boyd 2015, 15–16). Resistance studies in networked publics draw on histories of subculture, as well as a Foucauldian understanding of technologies of domination (Pickett 1996) and existing studies of everyday resistance that build on the work of James Scott (Scott 1990; Vinthagen and Johansson 2013). As discussed, some research characterises active identity design through anonymous pseudonymity as a form of empowering resistance, while other accounts position it as utopian fantasy. Rather than an either/or position, this thesis seeks an understanding of resistance through anonymous pseudonymity that can be both.

The possibility for resistance is shaped by who has access to technologies and social structures of anonymous pseudonymity and who is excluded from them. Turkle (1995) recognised the potential and limitations of role play as a form of political resistance. boyd (2010) similarly notes the importance of who is excluded from networked publics. North (2003) identifies the ways that the potential for empowerment is collectively contested over time. Prejudices and fears also shape audiences. Democratic and cooperative forms must acknowledge the challenges of cognitive biases and recognise the potential for malice, selfishness or exclusion by publics (Stallybrass and White 1986).

Even just within the affluent and privileged research communities of users accessing early internet environments, Turkle (1995, 247) identified how anonymous pseudonymity allowed for redistributive resistance and experiments in "a new kind of social power".

The material-discursive possibilities of anonymous pseudonymity allow for forms of resistance: through exploring possible alternative social structures (Radway in Turkle 1995)

and through political criticism, solidarity and strengthening identity (Jenkins 1992). Turkle (1995, 242) frames MUDs as "places of resistance to many forms of alienation and to the silences they impose". As she argues, "building realities" and "the satisfactions that people experience in virtual communities underscore the failures of our real ones" (Turkle 1995, 241).

Possibilities of experimentation with political empowerment are fostered by the resources of agency and power exercised through anonymous pseudonymity apparatuses (Turkle 1995, 247). However, identity is contested, and the power of belonging and communicating is bound up in disparities of political and economic hegemony. Designing for anonymous pseudonymity, then, must acknowledge its position within ongoing negotiations of exclusion and control against well-resourced actors. Most publics have little power to freely construct new identities and audiences (Dingledine and Mathewson 2006; Vinthagen and Johansson 2013).

Designers like those in the Creative Exchange (CX) consortia may engage with centralised systems of network power, such as employment or collaboration with a cloud corporation, but must recognise that even then they are unlikely to hold much authorial agency with which to openly shape spaces for redistributed identity design as they wish. Rather, as Barad (2007) reminds us, agencies and possibilities are mutually constituted in contesting apparatuses of identity. This has been a crucial and explicit dynamic within the research for this thesis.

The role of anonymous pseudonymity

For anonymous pseudonymity to effectively underpin identity design by publics, it must be recognised as a wider public good. While some framings of anonymity position it as inherently deceptive and destructive, or almost universally open to manipulation and abuses of well-resourced malicious actors (Coleman 2014), histories of anonymous pseudonymity show how anonymity within pseudonymous reputational cultures has been of significant importance in creativity, resistance and empowerment, and suggest that the positioning of anonymity itself is often part of the contesting of power in identity.

North (2003, 2) identifies some of "the incredible advantages of anonymity" and emphasises

"its usefulness and flexibility, the distance it can create and the intimacy it allows". She describes how anonymity can "conceal identity" but also "'identify' the moral character of the author", how it can be used as a tool for the "making of names" but also the "preservation of social boundaries", and ways of signifying authenticity at the same time as making authentication impossible (North 2003, 4).

Anonymity and pseudonymity have also been considered through the framework of ethical and legal status. Nissenbaum (1999) offered an early legal and conceptual framing of networked privacy studies. She has gone on (2009; 2015) to consider shifts in perceptions and uses of anonymity as public life becomes increasingly networked and advocates a normative and legal strategy that emphasises social domains of contextual integrity (Nissenbaum 2015) and expectations of privacy.

Nissenbaum (1999, 141) sets out how prior to digital networking, anonymity has been an infrastructural norm in everyday aspects of "conducting one's affairs, communicating, or engaging in transactions anonymously" and documents the ways that later networked technologies have tended to encroach on such identity agency. She identifies a range of experiences and audiences of anonymity including: publishing poems and pamphlets, charitable donations, developing critical discussions in charged debates, seeking support for socially stigmatised issues (such as domestic abuse or sexual health); as well as other "socially valuable institutions like peer review, whistle-blowing and voting" (Nissenbaum 1999, 142).

Pseudonymity makes space for artistic expression and creative exploration of role, character and tone of voice (notable examples include Kierkegaard, Gary and Pessoa (see Ciuraru 2011)). Often under-theorised in accounts of such creative noms de plume are the empowerment and resistance possibilities they also afford (Mullan 2008). Untraceable pseudonyms make public critique and whistleblowing conversations possible in contexts of repression and retribution. A rich history of safety and social change is built on the outcomes of these hidden voices of dissent (Magnanti 2012). The same tools of untracked communication also sustain secret sources in journalism and anonymous tip-offs in the investigation of organised crime (Goldberg, Wagner, and Brewer 1997; Bachmann, Knecht,

and Wittel 2017).

Deceptive anonymous pseudonymity – in which an audience is unaware that a constructed persona is disguised as a legal civic identity – is predominantly framed as deviant or malicious (Nath and Kriechbaumer 2015). Dominant media narratives include a moral panic that "magnifies fears about pedophiles" (boyd 2014, 103), and the realities of astroturf political lobbying by social media bot and troll accounts (Phillips 2018). Some uses of hidden pseudonyms are socially licensed, and yet simultaneously contested by those targeted or excluded by the deception. Examples include nation-state and corporate espionage, undercover police infiltration, and informant, witness or 'convict rehabilitation' protection (Marx 1999).

There are even more fundamental motivations for anonymous pseudonymity under apparatuses of observation. Mass (totalitarian) surveillance has been recognised as part of a long history of abuses, violence, oppression and control (Black 2001; Solove 2006, 513). Engineering a world of attempted omniscience implies that some tracking process should try to 'know everything' about everyone, and store that information somewhere, accessible to everyone, or accessible to people in government or corporations (Chen and Cheung 2017). If authentication apparatuses were to somehow strip away public ability to be ambiguous, it raises incredibly complex questions about identity. Furthermore, if nations or corporations were to find a way to limit access to anonymity to a few authorised actors – and, of course, organised criminals who could steal credentials – that would leave publics with no access to identity outside determinate categories, nor to the rich cultural and critical heritage of anonymous pseudonymity. With echoes of the knowing complicity of IBM and their identity tracking apparatuses in Nazi conquest and genocide (Black 2001), Chertoff, a key architect of draconian US bulk surveillance overreach, now warns such mass totalitarian apparatuses of observation allow "government […] private enterprises or groups" the "alarming" "limitless" reach to "pressure, manipulate, or incentivize […] without any public accountability" (2018, 22–23).

Space for anonymity

Anonymous pseudonymity traditions, as examined above, suggest a number of often

ambiguously overlapping ways in which socially accepted anonymity comes to be widely practiced within a public. Early digital spaces, like MUDs, that emerged from gaming environments into broader social communities, were specifically intended for the creative process of role playing, and therefore included anonymity features as a design choice. However they were equally receptive to anonymous pseudonymity as necessary or acceptable through *lack* of features. Authentication was infrequently imposed, either because of the limited resources to do so, or because it did not become a point of contention for the relatively small audiences of the early internet.

In North's (2003) account of early print anonymity, the source of anonymity is often indeterminate, through an intersection of possible intention or error of many participants including authors, editors, publishers, collectors and reading groups. The networked telegraph distribution and syndicated assemblage in early North American newspaper publishing produces a similarly deniable indeterminacy of authorial source to the pseudonymous journalists of the time (Taylor 1991).

These examples suggest anonymous pseudonymity is about access to tools of unlinked authorship, but also about large enough anonymity sets of participating identity designers that social norms of acceptable indeterminacy in specific anonymous contexts allow authors to deny particular identity designs, but also to deny seeking anonymity at all.

Networked publics

Anonymous pseudonymity can be considered within the emergence and actions of a networked public or publics. Networks of communication are a key socio-technical consideration of anonymity. This section sets out the importance of taking an intra-active – that is, material-discursive and iteratively, mutually constituted – understanding of identities, networks and designing. Models of the network and the public matter. Fraser (1990, 68) argues that publics are "arenas for the formation and enactment of social identities". As discussed, this thesis follows a definition of *networked publics* set out by boyd (2014; 2010; 2008).

Publics are changing and being changed by network access, not only as shifts in socio-technical possibilities and subsequent re-stabilising of social norms, but also in the

changing ways technologies can help to constitute identity. While all media can be considered in terms of "communication networks" (Meyrowitz 1985, 327), it is electromagnetic and particularly digital networks that are the focus here. Ideas of networked publics draw on a number of perspectives on what publics are (Caplan and boyd 2016, 2). When we talk of 'the public' we are often describing an “imagined community” (Anderson 2006; Marwick and boyd 2011) with shared access to resources, spaces and information. The *public sphere* (Habermas 1991) is used to describe shared, and widely accessible, spaces and debates (Caplan and boyd 2016). Yet the term rarely applies to the entire global population, which becomes more clearly apparent as we start to consider boundaries of access such as poverty, language, citizenship, membership, proximity, literacy and infrastructure. Individuals also define themselves in relation to a sense of belonging or exclusion from the imagined collectives of spaces, debates and their publics (Caplan and boyd 2016; May 2013). By considering the public in terms of belonging and access, it begins to be experienced as many publics with boundaries of inclusion and exclusion (Warner 2005). A public may form around "a common understanding of the world, a shared identity, a claim to inclusiveness, a consensus regarding the collective interest" or as an audience of a "shared text" of media, performance or perspective (Livingstone 2005, 9).

boyd's (2010) definition emphasises how networked technologies restructure publics. In this view networked publics are shaped by and shape audiences and identity. Ito (2008, 3) argues that:

> Rather than assume that everyday media engagement is passive or consumptive, the term publics foregrounds a more engaged stance. Networked publics takes this further; now publics are communicating more and more through complex networks that are bottom-up, top-down, as well as side-to-side.

Networked publics are social, cultural and civic configurations of gathering, influence, belonging, and exclusion, shaped in part by computer network infrastructure technologies of massive, near-instantaneous digital connectivity, storage and computation. boyd's (2010, 39) understanding of a networked public is a way of thinking about both:

> (1) the space constructed through networked technologies and (2) the imagined collective that emerges as a result of the intersection of people, technology, and practice.

Networks reconfiguring publics

The changing scales of (greater) computation, (greater) connectivity and (greater) storage have meant a shift first to a network that afforded anonymous connectivity (through new distributions of digital communication), and then to one shaped by forces of "a dossier society" (Chaum 1985, 1030) and totalitarian authentication (through growing resources to trace, recall and authenticate). As Meyrowitz (1985, 329) observes:

> once invented and used, media affect us by shaping the type of interactions that take place through them. We cannot play certain roles unless the stages for those roles exist

boyd (2010) warns against technological determinism – interpretations that "assume that technologies possess intrinsic powers that affect *all* people in *all* situations the same way" (boyd 2014, 15) – but recognises that:

> Networked technologies reorganize how information flows and how people interact with information and each other. In essence, the architecture of networked publics differentiates them from more traditional notions of publics. (boyd 2010, 41)

The term architecture here encompasses "the design of physical structures […] part engineering, part art, and part socially configuring", but also its use "in technical circles to refer to the organization of code that produces digital environments" (boyd 2010, 41).

Networked publics can also be framed within public participation (Jenkins, Ito, and boyd 2015). My research explorations have been informed by the call of theorists of network enclosure (Bachmann, Knecht, and Wittel 2017) to sustain networked commons and "contribute to the formation of political solidarities with more duration" (Dean 2005, 71). Zuboff (2015, 86) calls for citizens and scholars to act "before the full consequences of the surveillance project take hold". Platform cooperatives (Scholz and Schneider 2016) suggest new models for continuing collective organisation, while Lovink (2013; 2016) extends ideas of tactical media to consider sustainable forms of grass roots networked publics. Srnicek (2016, 128) calls for the growth of public platforms "owned and controlled by the people".

Defining the network

The metaphors used to describe how publics are structured by networks matter (Hu 2015). Star (1999) connects the way we think about networks to their legibility and use. I use the term network while acknowledging the competing models of the network across the literatures used: as public commons and architecture, as holistic experience, as cloud and

walled garden, as infrastructure and as socio-technical assemblage.

Using the term 'network' has overlap with the way 'network' features in actor-network-theory (Latour 2005), in discussions of telecommunication infrastructures (Latour 1987, 180). However, actor-network-theory explicitly distances itself from just technical networks (Latour 2005, 132) and instead attends to an encompassing of matter and bodies in institutional and political structures, and studies of the concentrations of influence in significant actors – human and non-human nodes – through which the development of science and technology can be traced. Barad's (2007) agential realism extends the material-discursive accounts of actors beyond actor-network-theory, to (re)enfold infrastructural *and* methodological interpretations of the network together.

For the purposes of this thesis, *the network* is defined to mean the experience of hyperconnected material-discursive infrastructure, interfaces, models and systems of the internet, and the apparatuses and phenomena that intra-actively shape it.

Digital public space is a framing that imagines networks establishing community contexts, spatial metaphors or interfaces, and public agency over a common good (Ageh 2012; Jacobs et al. 2013). Early internet digital public spaces have become enveloped by "walled garden" *clouds* (Hu 2015 XXI), in a set of largely commercial monopolies dominated by an abstracted mental, technical and business *cloud* model of opaque, seamless, distant, monolithic services (Hu 2015; Burrington 2016).

Bratton (2015, 8) describes an experience of the network as a holistic “accidental megastructure”, and as a technological software *stack* of conceptual and organisational layers sitting between global network resources and users. Sterling (2012 post 3) identified "Google, Apple, Facebook, Amazon and Microsoft" as totalitarian corporate "stacks". He argued just these "big five American vertically organized silos are re-making the world in their image", identifying the monolithic, centralised cloud models that propagate walled gardens of access and resources, and maintain identity authentication apparatuses. However, Star (1995) argues that layered representations of infrastructure are inevitably "mushy" and dependent on temporary cuts of determinacy and indeterminacy "laden with contingencies" (1995, 94).

Here *network* rather than *internet* is used (except where the term is ambiguous) to acknowledge both distributed agencies of connectivity and the way that assemblages of computers, technologies, protocols, organisations, users, audiences, platforms, services, clouds and interfaces are constituted and experienced as cohesive. 'Inter-net' – both the space and cooperative protocols between networks – has a tendency to imply a neutral space between national, research and commercial networks.

Networks are material-discursive and contested

The digital electromagnetic bits (Negroponte 1996; Mitchell 1995) from which networked experiences of identity, interaction and place are coded, communicated, processed and stored, superimpose different possibilities on the atoms that matter in traditional bodies and architectures. Computers use vast networks of transmission, processing and storage components that remap and rework the information encoded in binary data (Dalton and Frid-Jimenez 2013).

Some of the assumptions of the emergent properties of digital networks implicitly represent networked publics as two distinct forms of space: stable neutral material hardware (and protocol) commons; and more contested (and socially shaped) digital software systems. For example, boyd (2010, 41) reiterates a duality in which "physical structures are a collection of atoms while digital structures are built out of bits". However it is worth reemphasising that digital structures are built out of bits that are themselves sustained by atoms. All computation, storage, processing and connectivity is configured by matter.

Binary identity data has been mapped to numerous physical media including electricity flow, magnetic polarity, light in fibreoptic cables, semi-conductor transistors, a spectrum of electromagnetic radiation encodings, sound and quantum entanglement.[36] Digital representations[37] can be easily duplicated, compressed and transmitted (Negroponte 1996).

36 Barad (2007) emphasises the telecommunication connectivity implications of quantum computing for networks and identity apparatuses.

37 Digitisation produces an encoded representation of text, images and sound, spatial form, chemical structure, movement pattern, and so on, encompassing the copying, sorting and searching of any information that can be mapped to numerical quantisation and therefore binary storage and transmission as bits. Digital data processing is founded on assumptions of 'lossless' copying (Shannon 1948) and transmission over time and space. With common binary formats to store, retrieve and calculate any encode-able information, general purpose computers emerged – that can be re-programmed to work in new ways more easily than designing new physical mechanisms – and came to dominate information infrastructures.

The necessity and ease of digital copying of communication and identities in computer networks introduces longevity to previously ephemeral moments and conversely indeterminacy about originality or location of information sources.

An explicit identification of the shifting power structures that come about from the physical ownership and hidden labour of network infrastructures complicates narratives of the neutrality of bits. This is not to suggest that the position of boyd (2010) and others in using the term networked publics is naive in respect to these power structures of the material network. In particular, Caplan and boyd (2016) strongly question the implied neutrality of algorithmically mediated public spheres. They acknowledge "relationships between governments and platform owners" (2016, 5), "relationships of power that can become embedded into networked systems" (2016, 13) and that "key parts of the architecture involve cables and data centers that sit within nation-state boundaries" (2016, 10). The conceptualisation of digital networks primarily using a model of public audiences or public spheres connected through digital interfaces, images, video and text can de-emphasise or leave unquestioned the material agencies and infrastructural territories of the network apparatuses and their political actors. The location and ownership of data warehouses, trans-national fibre-optic 'backbone' cables and network switches are of growing dominance in contesting 'network neutrality' and the centralised business and publishing models of the cloud (Star 1999; Graham 2004; Blum 2012; Dalton, Frid-Jimenez, and Dahmen 2013; Burrington 2014; Hu 2015; Burrington 2016).

Star (1999) draws on the idea of making invisible networks legible through *infrastructural inversion*[38] (Bowker 1994; Bowker and Star 2000) in calling for researchers to attend more directly to the hidden aspects of "standards, wires, and settings" (Star 1999, 379). Graham (2004, 139) notes that networks:

> remain driven by the old-fashioned geographic imperatives of putting physical networks (optic fibres, mobile antennas and the like) in trenches, conduits and emplacements to drive market access […] this traditional, messy business of getting it into the ground in highly congested, and contested, urban areas. This hard material basis for the “digital revolution” is neglected but crucial.

38 Infrastructural inversion describes a way of turning attention to seamless, invisible and clouded infrastructure: a “gestalt switch” of “learning to look closely at technologies and arrangements that, by design and by habit, tend to fade into the woodwork” (Bowker and Star 2000, 34). It is discussed in more detail, particularly in relation to network literacy, in the *infrastructural inversion and carnivalesque inversion* section of chapter 4.

Network topology dynamics

The dynamics of how networked technologies restructure publics can be characterised by massive scales of connectivity, storage and processing that reconfigure the topologies – "questions of boundary, connectivity, interiority, and exteriority" (Barad 2007, 244) – as well as geometries – "questions of size and shape (Barad 2007, 244)" – of publics.

By connecting computer devices that can sense and actuate the physical world in networks – and networks of networks such as the internet – distance and boundaries between geographically and architecturally separate spaces start to be re-topologised. As storage technology develops cheaper and denser mechanisms for persistently holding digital data, the distance between points in time are similarly superimposed. As boyd (2010, 42) puts it, "bits do not simply change the flow of information, […] they alter the very architecture of everyday life". In rethinking "human, nonhuman, and cyborgian forms of agency" (Barad 2007, 238) together as "a contingent and contested, constrained but not fully determined, process of iterative intra-activity" (Barad 2007, 237), Barad observes that:

> This machine […] is a topological animal that mutates through an open-ended dynamics of intra-activity. Questions of connectivity, boundary formation, and exclusion (topological concerns) must supplement and inform concerns about positionality and location (too often figured in purely geometrical terms). (Barad 2007, 240)

She continues:

> The topological dynamics of space, time, and matter […] require an ethics of knowing and being (Barad 2007, 246)

Topologies of space are reconfigured by copper wires, fibreoptic cables, radio, and quantum entanglement connectivity. Topologies of time are similarly reconfigured by recorded marks (cuts, grooves and ink), magnetic bits, and quantum state storage. Likewise, digitisation, computation, categorisation, sorting, searching, actuation, and quantum computing reconfigure what matters and what comes to matter. Network topologies of space, time and matter figure in the possibilities for public participation. For Barad (2007), networked topological intra-actions: (1) offer "the potential to do more than participate in the constitution of the geometries of power"; (2) "they open up possibilities for changes in its topology and dynamics"; and (3) suggest that "interventions in the manifold possibilities made available reconfigure both what will be and what will be possible" (Barad 2007, 246). Barad describes telecommunication networks in terms of apparatuses of observation,

identity and bodily production, and a "politics of possibilities" (Barad 2007, 246). Networked identity is at once an apparatus of discursive power and material infrastructure. All identity apparatuses make cuts of exclusion and belonging, as well as drawing lines between what is configured as network and as publics.

Context collapse and identity

The networked experience of re-topologised space, time and matter can be jarring, particularly with the emphasis of this thesis on sustaining distinct or anonymously unlinked identity reputations and audiences. boyd (2010) has developed the term *context collapse* to describe how cloud social media sites have a tendency to juxtapose communication from multiple audiences and contexts. She extends Meyrowitz's (1985) discussions of celebrities and politicians trying to navigate the multiple audiences brought about by telecommunication networks of TV and radio, and draws on ideas in Goffman's (1959) work on contextual norms of specific social contexts. Where Goffman described mostly a world of fixed and separate situations, Meyrowitz identifies a shift through electronic communication to a more interconnected mediated public where situational contexts and audience boundaries are no longer so clearly legible or enacted.

Unexpected and jarring, *context collapse* describes either a loss of situational cues and role definition, or a juxtaposition of otherwise (tactfully and architecturally) separated contexts. Goffman refers to collapses in contexts in two main ways: (1) he describes how people suppress collective backstage familiarity in public to avoid a "collapse" of distinct social roles sustaining the "working consensus" of a particular context (Goffman 1959, 107); and (2) also the use of "civil inattention" to maintain tactful distance between strangers to avoid a "collapse of separateness" (Goffman 1966, 145) in public space. Meyrowitz (1985, ix) deftly analyses how communication-at-a-distance across contexts produces a juxtaposition of "'audiences' that are not physically present and 'arenas' that do not exist in time and space", noting how networked electronic media "has a tendency to collapse formerly distinct situations into one" (Meyrowitz 1985, 92).

Against this background, boyd develops an updated definition of context collapse (boyd 2008; boyd 2010; Marwick and boyd 2011; boyd 2013; boyd 2014) suited to discussing her

observations of social network sites and other online communities and as a key pervasive feature of networked publics:

> Like many social network sites, Twitter flattens multiple audiences into one – a phenomenon known as 'context collapse'. The requirement to present a verifiable, singular identity makes it impossible to differ self-presentation strategies, creating tension as diverse groups of people flock to social network sites [...] Privacy settings alone do not address this; even with private accounts that only certain people can read, participants must contend with groups of people they do not normally bring together, such as acquaintances, friends, co-workers, and family. To navigate these tensions, social network site users adopt a variety of tactics, such as using multiple accounts, pseudonyms, and nicknames, and creating 'fakesters' to obscure their real identities (Marwick and boyd 2011, 9)

Context collapse is experienced when disparate social and temporal contexts of communication are connected and assembled through new topologies into a seemingly coherent selection or list. Attempts to mitigate the experience of stark contrasts in context include "tools for segmenting [...] individuals into lists for the purposes of sharing and restricting content" like Google "circles" or the Facebook "lists" features (Ellison and boyd 2013, 162) – that attempt to enforce separateness in role, reminiscent of Goffman's (1959) observations of separate backstage familiarity – as well as what we might call 'algorithmic tact' – in which a subset of contexts, and friends are selected as the focus of a feed on behalf of each user by opaque blackbox social network site software processes – that tries to appropriate what Goffman (1966) called separating function of civil inattention.

Following Meyrowitz, boyd (2014) describes how networked identity construction forces decisions on what the most generally acceptable or least controversial facets of self are for a combined audience of all possible contexts and roles. Although Facebook gained notoriety for a number of policies undermining norms of privacy (Zimmer 2010), this may not (just) be a product of Mark Zuckerberg's so called privacy-is-dead ethos (Gehl 2013, 227), but rather an issue of failing to account for the repercussions of network topologies (the sedimentation of mass digital storage and the interconnectivity of networked publics).

The ease with which records of interaction and expression can be stored and connected, and user pleasure in returning to see near continuous social 'status updates', and the space this provides for advertisers, tends to encourage social network site designs that "obfuscate temporal, spatial, and social boundaries" (Vitak 2012, 454) and endlessly aggregate and display continuously and monolithically authenticated communication fragments.

Furthermore, in the algorithmically-filtered and rapidly updating architectures of social network sites (Ellison and boyd 2013), presence is defined by continuous action. Identity in Twitter and Facebook must not be just *written into being*, but continuously re-typed, clicked, liked, shared, copied and posted into being. It is experienced as a struggle against instant obscurity or invisibility, dropping from view like swimmers treading water, keeping their heads above the surface:

> Over time, the profile has shifted from a self-presentational message created by the individual to a portrait of an individual as an expression of action, a node in a series of groups, and a repository of self and other-provided data. (Ellison and boyd 2013, 154)

Thinking of identity in terms of ongoing processes of networked publics attends to the audiences that identity design co-constitutes, and the materialities and discourses that are reconfigured by network connectivity. The monolithic cloud has emerged from technical architecture research to become a business model of enclosure, opacity and massive centralised authentication. Public experience of the network can be summarised as the context collapse of their identity reputations and audiences through the signature logging by obfuscated clouds. However *networked* is both a way of experiencing telecommunication apparatuses, and new topologies of time, space and matter that are constituted by network participation. This notion of the possibilities of reconfiguring networked public topologies is used to explore patterns for action, and in particular prototype design patterns[39], in the research for this thesis.

Designer-researcher practice

The CX framing of *digital public space* implies an 'architectural' or 'systems engineering' role of designers planning and building digital spaces for identity design by publics through the manipulation of hardware and software. My research participants' Social Machines group have treated public spaces and identity apparatuses as socio-technical machines to be designed (Smart and Shadbolt 2014), while subsequently shifting to question the role of the designer (Shadbolt, Van Kleek, and Binns 2016, 109):

> moving from a perspective of top-down human-powered computing […] to one in which the various kinds of people involved, including citizen participants, system designers, and scientists, form complementary parts of a dynamically unfolding social machine

39 I discuss prototype design patterns in the *grounded theory research through design* section, chapter 3.

As Barad (2007, 230) asks:

> What role do humans play in the operation and production of machines?

This thesis follows the understanding that designers cannot position themselves as somehow external to the identity apparatuses they construct. It follows Barad's questioning of externality, and a notion of situated social machine design (Donath 2014), to read the contributions of design-researchers as inherently intra-active within networked publics.

As with non-digital public spaces, patterns and norms of use that shape public experiences of digital spaces do not simply replicate the intentions of the system designers, but instead are constructed through negotiation between the agency of designers, developers, networks and publics. The framing of such negotiations online are frequently dominated by commercial and governmental bodies, but are significantly shaped by public decision making, including free software projects, and the activity of vast numbers of personal computers and their users.

Social machines

In the history and practices of anonymous pseudonymity, there is an interplay between social and technical systems, with technological constraints or features helping to establish anonymity norms. In pre-digital networks, communication media such as the postal system and print publishing machinery happened to encourage or even enforce the anonymity of an author. Similarly in early digital systems, anonymous pseudonymity cultures relied on computers to help structure a disconnect between author and created reputations. Berners-Lee and Fischetti (1999, 172) frame these sorts of creative social-technical processes as "social machines":

> Real life is and must be full of all kinds of social constraint – the very processes from which society arises. Computers can help if we use them to create abstract social machines on the Web: processes in which the people do the creative work and the machine does the administration.

Building on this definition Smart, Simperl, and Shadbolt (2014, 6853) argue that it can be difficult to distinguish creative and administrative tasks along a human and computer cut, and instead social machines should be defined as:

> Web-based socio-technical systems in which the human and technological elements play the role of participant machinery with respect to the mechanistic realization of system-level processes. (Smart and Shadbolt 2014, 6858)

This definition emphasises a cyborgian socio-bio-technological hybrid system (Haraway 2004) that the authors posit may include potential for a "web-extended mind" (Smart 2012). This definition formed the basis of a study of existing social machines by the researchers as part of the SOCIAM Theory and Practice of Social Machines project (SOCIAM 2012).

The term *social machines* has developed more generally (Smart and Shadbolt 2016) to describe the interplay between the emergent constructive processes of social action, and reproducible aspects of digital systems and algorithmic structures. Successful emergent social systems and commons are emphasised by those studying social machines (Shadbolt, Van Kleek, and Binns 2016), bringing to the fore concepts ranging from collective governance to subcultural identity (Dalton 2013).

In thinking of identity apparatuses as social machines, the digital-material aspects of networked publics are emphasised, as are the intended or actual discourses of the cultures of use that emerge. However, a narrative of industrial machinery, categorisation, and of the underlying (scientific) mechanics that dictate the properties of the system forms the dominant model, and this in turn frames requirements such as "semantic web" structures, metadata and taxonomies (Hendler and Berners-Lee 2010).

Another working definition of social machines emerged in the Laboratory for Social Machines (LSM), formed in 2014 in a collaboration between researchers in the MIT Media Lab and researchers employed by Twitter. Deb Roy described the intended research of the lab as being "in areas of public communication and social organization where humans and machines collaborate on problems that can't be solved manually or through automation alone" but through "social feedback loops based on analysis of public media and data" (MIT Media Lab 2014, para. 4). *Social feedback loops* crisply captures the process of creating pseudonymous reputations and co-constituting audiences.

It is useful to think of social machines in terms of intent to design or engineer them. As such, social machines are the intersection of networked publics and design intent: networked socio-technical processes that are shaped by the intent of designers, architects or engineers (or the *attempt* to shape, even if it is unsuccessful), but also including existing or emergent publics. The social in social machine implies something on the scale of a networked public.

Designing social machines

As Shadbolt, Van Kleek, and Binns (2016, 109) articulate, designers of social machines risk constructing a "top-down" hierarchy over "workers" and "machinery" in a role of social engineers.[40] Both the SOCIAM and LSM social machines research groups employ "apparatuses of observation" (Barad 2007, 201), monitoring and analysis as key objectives for such research, which relates to a foundation on structured data and semantic web approaches (Berners-Lee, Hendler, and Lassila 2001), and widespread access to 'big' public data. However, in relation to public space, both social machine research centres positioned their work in a language of public and community empowerment, addressing "pressing societal problems" (MIT Media Lab 2014) and "supporting purposeful human interaction on the World Wide Web" (SOCIAM 2012):

> These collaborations are empowering, as communities identify and solve their own problems, harnessing their commitment, local knowledge and embedded skills, without having to rely on remote experts or governments. (SOCIAM 2012)

These social machine definitions draw on concepts of "human computation" (Von Ahn 2009). The social machines model tends to place human participants and digital machinery as equivalent:

> Rather than dividing between the human and machine parts of the collaboration (as computer science has traditionally done), we should draw a line around them and treat each such assembly as a machine in its own right comprising digital and human components … This view is of an ecosystem not of humans and computers but of co-evolving Social Machines. (SOCIAM 2012)

This is a powerful post-human perspective for enacting change through networked systems, since programming human participation with the speed and reach of other networked 'resources' can have a huge impact (such as political activism and collective human knowledge). However, the social machine narrative can have a tendency to privilege regulatory intent of the designers over the other participants in the machinery. The rights of Mechanical Turk workers or the immaterial labour of users of social media sites, for example, can be side-lined in narratives focused purely on mechanics (Dalton and Fass 2013). It suggests a machine that can receive instruction and deliver a result, which raises questions of control and participation (Shadbolt, Van Kleek, and Binns 2016). For whom is

40 *Social engineer* is a loaded term that references both the developing field of social machines, and the more established one of security research into psychological manipulation of organisational systems, trust and identity information (see Hadnagy 2010).

an identity play social machine designed? If it is the designers or engineers of the machine, then what of the people participating in the system? If the outcomes are shaped by the participants, is this a democratic process? Does it treat agency equally among the people involved? Conversely, to what extent can the emergent evolution of a user-shaped social machine be designed in any meaningful sense to fulfil a pre-defined outcome or objective?

The uncertainty the term 'social machines' raises in the power structures of control is apparent in some of the stated SOCIAM and LSM research positions. For example, SOCIAM seeks to "act as an early warning facility for disruptive new social machines" (SOCIAM 2012), and implicitly (given their heavily centralised research focus on "health, transport, policing" (SOCIAM 2012)) to discover how to stop such disruption. A similar emphasis may be implied by the LSM objective to use "analysis of public media" in "creating mutual visibility among institutions and individuals" (MIT Media Lab 2014). As Donath (Donath 2014, vii) warns:

> The word "machine" also has harsher overtones […] A machine is inherently sterile, inanimate, automated, unthinking. The "social machine" under its sinister interpretation processes people for their data; it automates relationships, atrophying the human dimension. As designers and users of these technologies, we need to recognize this darker side to ensure we are instead creating tools for the benefit of those who use them.

Design within social machines

Donath positions the designer-researcher *within* the networked publics of the social machine, together, "as designers and users of these technologies" (2014, vii), while the SOCIAM and LSM definitions of social machines in play during this research have tended to choose language that places their design-researchers outside the systems. In considering the "nature of machines and machinic agency" Barad (2007, 231) contends that there is no meaningful externality or neutrality for the designer-reseacher, instead we must move "away from the familiar habits and seductions of representationalism (reflecting on the world from outside) to a way of understanding the world from within and as part of it, as a diffractive methodology requires" (Barad 2007, 88).

Donath (2014, viii) presents a definition of social machines based on accounts of social media research:

> The "machine" […] is the computer. In its incarnation as a "social machine," its abstract binary digits are programmed to transform it into a communication medium and a setting for interactions, an electronic place to see and be seen.

This definition develops ideas of the general purpose computer through the patterns of design and social interaction to put an emphasis on reconfiguring networked "place" (Meyrowitz 1985). Indeed, Donath (2014) compares the social machine with Le Corbusier's (1931, 87) statement that "the house is a machine for living in". Donath (2014, 281) uses the terms "public spaces" and "public realms" to introduce ideas of collective norms and control of intimacy, and the "tension between subject and viewer" (2014, x) in social machines. Donath states the objectives of designing social machines:

> To decide what we should build, we need to understand what makes society function, what people want to know about each other, and the way this knowledge changes our behavior. (2014 viii)

The social machines stance of my participants encompasses questions raised by the CX about the role of the designer-researcher in making digital public spaces, and specifically, the role of design-research in making space for the identity play of networked publics. I read Donath's conceptualisation of social machines as an intra-active one in which the designer mutually constitutes social machines from within. Shadbolt, Van Kleek, and Binns (2016, 109) identify a similar turn to "dynamically unfolding" co-participation and citizenship.

A material-discursive understanding

For Barad (2007, 140), identity can be understood as "a differential sense of being" enacted through the "ongoing flow of agency" in which one "part of the world makes itself differentially intelligible to another part of the world". Thus, reputation and anonymity are forms of differentiation. In the reputational design of pseudonyms, standing out, becoming trust-worthy and being authentic, always sits in contrast to others, as does the anonymity agency required to do so. Barad (2007, 146) starts from a reading of discourse which:

> is not what is said: it is that which constrains and enables what can be said. Discursive practices define what counts as meaningful statements. (Barad 2007, 146)

She develops this Foucauldian notion of discursive phenomena and apparatuses as "actual historically and culturally specific social conditions" (Barad 2007, 147) through a reading of the quantum physicist Bohr's (1963) understanding of phenomena and apparatuses as "particular physical arrangements that give meaning to certain concepts to the exclusion of others" (Barad 2007, 147). This leads her to a stance in which concepts of identity are specific

material-discursive configurations of the world:

> it is not merely the case that human concepts are embodied in apparatuses, but rather that apparatuses *are* discursive practices, where the latter are understood as specific material reconfigurings through which "objects" and "subjects" are produced. (Barad 2007, 147–8)

Social media scholarship can tend to emphasise identity online as purely formed from social interaction and software regulation. Thinking in material-discursive terms not only re-emphasises the role of embodied users, but the agencies of the network's material forms and mechanisms of control, not in terms of mediation but co-constitution.

Barad's account of networked identity is performative, but it is also more-than-human. She draws on Butler's performative production of human bodies and Foucault's notions of discursive power in human social practices. However, "neither address the nature of technoscientific practices and their profoundly productive effects on human bodies, as well as the ways in which these practices are deeply implicated in what constitutes the human, and more generally the workings of power." (Barad 2007, 145).

By taking identity apparatuses and phenomena as fundamentally intra-active, the agencies of anonymous pseudonymity are viewed as co-constituted rather than assuming "individuals with inherent properties there for the knowing, there for the taking" (Barad 2007, 233). Similarly, "the unboundedness of the apparatus does not imply that everything and anything matter equally" (Barad 2007, 452), nor does performativity entail free determination but rather "an ongoing reconfiguring of both the real and the possible" (Barad 2007, 235).

Following an application of Barad's (2007) intra-active and material-discursive understanding to identity design, networked publics and design-research, this chapter has used this holistic stance to draw together performative, technological, historical and design literatures on identity, anonymous pseudonymity, networks and publics.

This thesis treats the mechanics of design-research as the reconfiguration of identity design agencies within intra-active and material-discursive identity apparatuses by placing an emphasis on making space for public practices. Making space, not as a claim on neutrality, but as an active exclusion of cloud models. The thesis articulates this exchange or inversion of responsibility and claims on the flow of agency in terms of taking on the network. As

such, Barad (2007, 235) notes that agency cannot "simply be distributed willy-nilly over nonhuman and human forms" but rather "it is the enactment of iterative changes to particular practice—iterative reconfigurings of topological [...] relations", and "even when apparatuses are primarily reinforcing, agency is not foreclosed".

Chapter 3 – Methodology

This research asks three questions: (1) how to explore identity design practiced by networked publics themselves?; (2) how to make space for networked publics to design identities?; and (3) what design patterns can make space for the identity play of networked publics?

To address these questions, I combine a design conversations and design projects model of critical analysis and a grounded theory approach to develop a grounded theory research through design methodology.

This chapter provides a thorough overview of the methodological issues and debates this research has engaged with. It discusses the role played by The Creative Exchange Hub (CX) in generating the *design conversations* that form the basis of - to borrow a term more common in social research – the *data set* analysed in this thesis. It considers *research through design* approaches to data collection, constant comparative analysis and theorising, and critically explores the *constructivist grounded theory method* that underpins this research. It discusses *critical reflective research practices* and shows how my research has embraced those practices.

I use a *diffractive* research stance to synthesise the constructivist pragmatist foundations of design research and grounded theory with an *agential realist* attention to material-discursive intra-action which I consider central to the study of digital public space.

Project conversations

I participated in 4 CX Lab events, contributing to 11 CX project proposals, co-developing 7 designs, resulting in 5 of my collaborative projects (and 3 continued by other researchers). I created or co-developed 10 prototypes, 5 events and field trials, 13 workshops, and 22 talks, exhibitions and performances, in collaboration with 21 *designer-researcher* members of the CX consortia and their networked public audiences. From, and alongside, these emerged numerous design sketches, smaller crits, and interactions.

I draw an equivalence between a spoken interview and a directed design conversation. Within the process of each CX project, I conducted significant collaborative prototyping

processes, meetings, events and other design actions that formed the directed design conversations (see appendix A). These processes tended to average several hours in duration each. Design conversations often involved more than one participant, and attended to the 'back-talk' of material considerations as well as participant contributions.

I engaged the individual methods and tools of my designer-researcher participants as part of design conversations within each project, while maintaining the overarching structure of research framed clearly by the grounded theory research through design process. One participant, project or prototype might use public workshops and co-design, the next speculative futures, the next discourse analysis of historical images and texts. Each of these design-research practices can be understood as part of our conversations directed within my program of intensive 'interviewing'.

I consider my studio of CX design projects as consisting of several hundred design conversations. Each project contains many design conversations, often returning to the same materials, participants and audiences. I analyse my design conversations through design, through further projects, sketches and crits. Spatial and memo-making sorting of concepts and categories translated to text during the writing up. I use my design conversation fragments to develop concepts and categories into design patterns and theoretical contributions, and also as quotes and field notes to support my discussion.

I understand design conversations as material-discursive practices (Barad 2007) – reflective (or more precisely, diffractive) conversations with complex situations that encompass human and non-human agencies. Design conversations are interviews that include people and materials. These conversations also draw on forms of ethnographic observation and additional contextual documentation such as archives, images, digital media, and graphics. Both *grounded theory* and *research through design* emphasise situated co-constitution as necessary for research, requiring what Charmaz and Mitchell describe as the "immediacy of participation" (2001, 163).

Scope of the study and theoretical sampling

The shared objective of understanding and making digital public spaces provided a focused

community of practitioners. The CX participants – organisations and collaborators – were distributed geographically (mostly across England), and over the length of the four and a half years of the programme. The initial representative sampling of organisations and academic partners selected through the CX consortia provided "a point of departure" (Charmaz 2006a, 100) that establishes "criteria for people, cases, situations, and/or settings before you enter the field" (Charmaz 2006a, 100). My criteria for selecting design conversation participants included that they were: 1) engaged in making (at whatever stage) digital public spaces; and 2) collaboratively engaged in an event, project, prototype or sketch of the CX. The collaborative project structures, events and digital spaces of the hub helped me to draw together a coherent studio framework of interacting participants, processes and actions.

I was able to shape my emerging projects and prototypes to ensure a "rich and sufficient" (Charmaz 2006a, 18) range of contexts, participant perspectives and actions. Following grounded theory I have not tried to gather a statistically representative sample of participants, but rather a *theoretical sampling* that follows developing theory and conversation leads *sufficiently*.

Theoretical sampling means initially remaining open to "all possible theoretical directions" (Charmaz 2006a, 46), looking for what "ambiguities, and questions subsequently arise" (Charmaz 2006a, 104) from the comparative analysis of memo-making, and becoming more selective as concepts and theory develop as to "what, when, where, why and from whom data are obtained" (Charmaz and Mitchell 2001, 168).

My prototyping, sketching and memo-making form an iterative constant comparative analysis through design to look "from multiple vantage points, make comparisons, follow leads, and build on ideas" (Charmaz 2006a, 135). Theoretical sampling involves experiments in which "you may not to be able to foresee endpoints" (Charmaz 2006a, 135) or you may have to "retrace your steps or take a new path when you have some tentative categories and emerging, but incomplete idea" (Charmaz 2006a, 96). I followed an iterative and emergent process of following ideas and developing concepts through theoretical sampling that has meant returning to early projects and participants for further focused design conversations, including collaborating on new prototypes, and also including several historical accounts of

identity play, and later projects that focused more specifically on participants attending to pertinent aspects of network resistance and responsibility and forms of identity fabrication in digital public space.

Negotiating design conversations within the CX context helped me to focus on emerging "*theoretical categories*" within identity design and pseudonymity "rather than on a single empirical topic" (Charmaz 2006a, 106), leading me to "sample across substantive areas" (Charmaz 2006a, 106) of multiple projects, organisations, collaborators and fields. Using theoretical sampling I have sought to *saturate* (Glaser and Strauss [1967] 1999) theoretical categories with successive design conversations and construct them into an emerging theory of the results. I have used Dey's (1999) concept of "*theoretical sufficiency*" (Dey 1999, 257) to gauge saturation, when to stop sampling, applying rigour to Schön's (1983) notion of starting and finishing practitioner reflection-in-action research:

> it is terminated by the production of changes one finds on the whole satisfactory, or by the discovery of new features which give the situation new meaning and change the nature of the questions to be explored. (Schön 1983, 151)

The concepts that emerged from my projects, sketches and crits – and new theories of how to make space for the identity play of networked publics – are discussed in my four analysis chapters.

Research through design

The project focus and exploratory design work focus of the CX led me to taking a 'research *through* design' approach (Frayling 1993; Findeli 1998a; Stappers 2007; Chow 2010; Jonas 2015; Stappers and Giaccardi 2017) that is project-grounded and "projective" (Findeli 1998a; Findeli 2010, 293) within a studio framework (Stappers 2007) of multiple overlapping and emerging projects.

The main proponents of research *through* design advocate a pragmatic onto-epistemology stance that draws on foundations of action research and grounded theory (Findeli 1998a; Sleeswijk Visser 2009; Glanville 2015; Jonas 2015; Stappers, Sleeswijk Visser, and Keller 2015; Stappers and Giaccardi 2017). Research *through* design is an approach which assumes that "making/designing is a way of knowing and therefore one can research through design" (Chow 2010, 10) directly.

I understand research through design as employing "designerly" ways of thinking (Cross 1982) through playful prototyping and sketching that makes room for developing both comparative patterns and creative leaps of inspiration in interpretation. Schön's (1983) discussion of design research as reflective practice in projects describes how designers create space for "exploratory experiment" (Schön 1983, 145) which is "the probing, playful activity by which we get a feel for things" (Schön 1983, 145). Abductive analysis involves making space for leaps of inspiration emerging from inductive analysis to explain new phenomena and construct meaning.

Jonas (2015) reviewed the key features of research through design:

> An embodied/situated/intentional observer inside a design/inquiring system, generating knowledge and change THROUGH active participation in the design/inquiring process. Research is defined/determined by ethical assumptions regarding the purpose of designing (What is design good for? How do we want to live?). (Jonas 2015, 31)

Applied to this research, I understand myself as an intra-active (Barad 2007) design-researcher within the practice I have studied, using a studio of projects approach, with a number of iterative, concurrent projects and smaller sketches and crits that I directed in negotiation with participants and that I treat as design conversations and analytic methods. I have sought to produce theoretical concepts which have the potential to enact ethical change.

Findeli (1998a) argues that research through design is typified by asking questions through projects. Using projects as the research field and method is a designerly way of asking questions, analysing contexts and formulating concepts. Designerly ways of thinking involve doing design, and reflecting on that process. However the literature of what these processes entail has remained diverse, tacit or under-theorised until recently (Findeli 2010; Stappers and Giaccardi 2017), with an emphasis on prototyping as a form of discovery and analysis.

My projects are a process of prototyping. I use prototyping as part of my design conversations as a material-discursive way of confronting theory and the world. Prototyping serves a range of functions in research through design, as Stappers notes (2013, 85–86):

Prototypes are unfinished, and open for experimentation; they are:

- a way to experience a future situation,
- a way to connect abstract theories to experience,
- a carrier for (interdisciplinary) discussions,
- a prop to carry activities and tell stories,
- a landmark for reference in the process of a project.

I have used prototyping as a central part of the research process. Through collaborative imagining, sketching and making of exploratory digital public spaces, I have focused on processes of designing, and "immaterial objects and complex systems" (Findeli 2001, 15) in addition to specific designed artefacts or objects. In exploring complex systems, Findeli (2001) argues that "designers are expected to **act** rather than to **make** […] to the extent that even 'not making' is still 'acting'" (Findeli 2001, 14). Sometimes design work is choosing not to make something (Baumer & Silberman 2011).

I have used a studio model (Stappers et al. 2007) as a framework in which several projects (and smaller sketches and crits) are conducted together, generating productive comparative analysis between them and iterative theoretical sampling. A research studio model draws together concurrent and sequential, disparate but connected projects to ask questions across and within them. "Numerous small interactions, discussions, and informal observations" (Stappers, Sleeswijk Visser, and Keller 2015, 170) also contribute to the research process. My 'studio' was my home research centre at the RCA, and distributed across activities with the networked partners of the CX.

The diffractive practitioner

Schön's (1983) book *The Reflective Practitioner* is a familiar approach to understanding how designer-researchers work, and how reflection and reflexivity can be situated in research through design. However, Schön holds the publics he works with at a distance, and with little possibility for questioning and reworking power more directly, or participatory action. As Haraway ([1992] 2004) argues, reflection alone is not enough, as it can replicate a mirroring and duality that reproduces the cuts and boundaries it seeks to question. Haraway instead proposes *diffraction* as an alternative research stance. Barad (2007) develops this to articulate a diffractive methodology that attends to the detail of productive differences. She extends Haraway's use of diffraction to implicate researchers within

phenomena they study and as part of the exclusions and power imbalances enacted. Barad argues that "we can understand diffraction patterns—as patterns of difference that make a difference—to be the fundamental constituents that make up the world" (Barad 2007, 72).

In my design-research, my diffractive practice takes the form of collaborative projects, workshops, and other design conversations with multiple audiences, including the entangled non-human agencies of network infrastructures. Barad (2007) argues that constructing a conceptual apparatus can make new connections through time and space (perhaps especially so when considering networks which enable new forms of connectivity). Following Barad,[41] I engage with the practice of *doing design and design studies as a single entangled endeavour* (Barad 2007, 248; see also Balsamo 2011; and Bath 2014). I approach design research in the ways that Barad posits responsibility:

> what responsibility entails in our active engagement of sedimenting out the world in certain kinds of ways and not others […] [is] that our responsibility to questions of social justice have to be thought about in terms of a different kind of causality. (quoted in Dolphijn and van der Tuin 2012, 68)

I have a responsibility as a designer-researcher as my construction of theory, of a conceptual apparatus, is "sedimenting out the world in certain kinds of ways and not others". Identity design agency is often key for those who are most disempowered. Our CX project efforts to make new digital public spaces often initially assumed a stance of neutrality. However, the history of public spaces and what it means for a space to be public is never neutral, but rather grounded in contested agencies of belonging and possibility. While identity design often assumes a neutral or benign stance, designing for reputation, exclusivity and trust in audiences, often only for clients who can afford such services, is entangled in acts of control, exclusion and agency of accountability. I therefore attempt to take into account how the distribution of agencies of identity design is always politically contested. In adopting a design-research approach I recognise (and seek to question) the limits of design within what Suchman (2011, 3) describes as the "cultural imaginaries and micropolitics that delineate design's promises and practices".

41 Who encourages scholars to take up her stance of "doing science and science studies as a single entangled endeavor" (Barad 2007, 248).

Grounded theory approach

Constructivist grounded theory (Charmaz 2000; Charmaz 2006b; Star 2007; Charmaz 2008; Clarke, Friese, and Washburn 2015) strongly compliments the reflective practitioner (Schön 1983) approach of research through design. I have adopted grounded theory methods to frame my studio model of research through design projects. I look for emergent design patterns as a form of grounded theory, I do this through constant comparative analysis through iterative projects and crits following theoretical sampling. My evaluation criteria is *theoretical sufficiency*, as defined by Charmaz (2006; Dey 1999) and Schön (1983 151).

I have gathered my data through "directed conversations" (Charmaz 2006a, 25) that are "design conversations" (Schön 1983, 76) in collaborative project situations, and analysed it using constant comparative methods (Glaser and Strauss [1967] 1999) embodied in designerly ways of thinking (Cross 1982).

Constructivist grounded theory provides a framework for ensuring:

- *reflection* on the intersection and construction of my own and my participants (including non-human) agencies;
- rigorous, emergent project development as *theoretical sampling* and *constant comparative analysis*; and
- strategies for developing and translating designerly knowledge into a final written articulation of *middle-range theory* (Merton 1957).

Charmaz and Mitchell (2001) suggest that researchers can use existing theories constructively to *sensitise* (Blumer 1969) them to “certain issues and processes in their data” (Charmaz and Mitchell 2001, 169). Constructivist grounded theory invites critical reflection on this extant supporting knowledge, engaging it in a similar way to other historical and organisational documents, as socially constructed and open for directed conversation and comparative analysis.

Frayling (1993) identifies traditions within design of drawing on the social sciences for methodological resources. Design research methodology is relatively under-theorised (Chow 2010). Findeli (1998a, 111) defines project-grounded research as “a kind of hybrid between action research and grounded theory research”. In the studio model of design

research, Stappers, Sleeswijk Visser, and Keller (2015, 170) introduce action research and grounded theory for "methodological support". Jonas (2015) and Glanville (2015) similarly draw on these two fields of methodology. Action research and CX research through design both follow investigation through fluid cycles of exploratory action. However, while action research is strongly connected with empowering and emancipating co-participants (Grundy and Kemmis [1981] 1988), the CX is structured around organisations, practitioners and researchers making digital public spaces *on behalf* of publics, rather than focusing on engaging and empowering the users of those spaces more directly. Invoking action research in this *weak* (Almond 1987) form, without substantial participatory methods, would therefore contribute little to the already projective stance inherent in research through design.[42]

Grounded theory has an emphasis on situated, emergent research with participants (Bryant and Charmaz 2007). It describes a reflective method of iterative data collection and constant comparative analysis, and also the developing theoretical outcomes of this process. Grounded theory emerged out of the pragmatist philosophy and ethnographic fieldwork by sociologists Glaser and Strauss (1965) and nurse Benoliel (1996). Pragmatism "assumes that people are active and creative […] meanings emerge through practical actions to solve problems, and through actions people come to know the world" (Charmaz 2006a, 188). Grounded theory positions the researcher as situated, and reflectively engaged in co-constructing meaning and research processes with participants, but still as a distinct researcher-authority role. In this way it reflects the structure of projects and distinct "design authorship" (Pierce et al. 2015, 2088) roles the CX model proposed.

Grounded theory offers guidelines that can be used for sharpening the "analytic edge and theoretical sophistication" (Charmaz and Mitchell 2001, 161) of other methods, such as design research. Glanville (2015) and Cross (1999, 7) warn against "swamping" design culture with social science methodologies in "a sort of academic colonialism" (Glanville 2015, 15). Instead, Stappers (2007, 83) proposes reading design and social science *together* for

42 This thesis does, however, describe designer-researcher collaborators and their audiences as participants, and conceptualises collective public action as participation. I acknowledge the rich history and productive possibilities of participatory design, particularly its traditions of empowering resistance and responsibility within design research (Simonsen and Robertson 2012).

productive "similarities of doing design/research" as the "way forward". He argues that considering design research and social science together is best done by "instantiations in design research projects". My approach has been to use Barad's (2007) diffractive methodology to read grounded theory and research through design diffractively together so that they "interrupt each other productively" (Haraway in Schneider 2005, 149), shaped by the emergent instantiations of each project's methods throughout the CX. Reading these diffractively together lets me bring design conversations to semi-structured interviewing, and a studio of projects, sketches and crits to constant comparative analysis. Each project had its own academic collaborators with their own methods. A diffractive method (and constructivist grounded theory) invites this and provides a rigorous framework for it.

Grounded theory methods are characterised by open-ended data collection – such as intensive semi-structured interviewing and ethnographic observation – and simultaneous constant comparative analysis, in which the researcher follows theoretical leads through interpretive reflection and further data collection. My semi-structured interviews and ethnographic observations are through the design conversations of conducting collaborative projects. They are material-discursive interviews with objects, design materials, processes, audiences, collaborators, and institutions. My constant comparative analysis is a studio model of concurrent, iterative projects and smaller sketches and crits. These return to, fragment and develop emerging concepts through design. They encourage me to reflect on my emerging themes, following a theoretical sampling approach to further data collection.

Grounded theory compliments research through design strengths through the ways it attends to "patterns of difference that make a difference" (Barad 2007, 72). Stappers, Sleeswijk Visser, and Keller (2015, 171) argue that in research through design, "grounded theory provides support in developing insights bottom-up from the phenomenon" and "provides room for the research's interpretation as part of the data collection". Glaser and Strauss ([1967] 1999) argue that intuitive – inductive and abductive (Reichertz 2007) – research in practitioner contexts can be used for data collection and as a valid and substantive approach to analysis and theorising. Grounded theory methods support research through design in questions of legitimacy and robustness by suggesting an articulation of existing designerly forms of critical reflection, analysis and theory building

that is grounded in research data. For me, diffractively reading design research through grounded theory has meant articulating and reflecting on what data collection and analysis entails in my own design practice, moving the design project process explicitly towards developing analytic theory. The systematic checks and reflexivity that grounded theory emphasises must be similarly addressed in the context of designerly ways of knowing.

The grounded theorists and the research through design stances I follow are social constructivist (and responsive to an agential realist re-interpretation). Constructivist grounded theory methods identify and make problematic an objectivist position in research situations; treat theory as a process of co-construction rather than discovery; and attend to social and historical contexts of studied worlds (Bryant 2002; Charmaz 2000; Charmaz 2002; Charmaz 2005; Charmaz 2006a; Charmaz 2008; Clarke 2003; Clarke, Friese, and Washburn 2015).

As Charmaz (2008, 409) summarises, her constructivist grounded theorising:

> assumes relativity, acknowledges standpoints, and advocates reflexivity. My use of constructivism assumes the existence of an obdurate, real world that may be interpreted in multiple ways. […] I assume that people make their worlds but do not make them as they please. Rather, worlds are constructed under particular historical and social conditions that shape our views, actions, and collective practices.

Research through design and constructivist grounded theorists agree that "theorizing is a *practice*. It entails the practical activity of engaging the world and of constructing abstract understandings about and within it." (Charmaz 2006a, 128).

Charmaz's (2008, 409) notion of an "obdurate" reality, negotiated through socially constructed interpretations, could suggest a form of *critical realism* (Maxwell 2012, 4) which acknowledges social constructions of multiple interpretations of an underlying, and perhaps unknowable, real world. Obdurate is a useful term as it suggests materiality and agency – and perhaps an ongoing process of negotiation – more in keeping with *agential realism* (Barad 2007). Barad effectively distances agential realism from reproducing dualisms of social and physical worlds, or micro and macro scales.

Agential realism proves useful as a framework for reading the material practices of prototyping and sketching of much research through design together with constructivist

grounded theory methods, because it draws our attention to, and makes problematic, the role of non-human agencies in constructing meaning. The making of digital public space in the CX suggests the importance of taking into account such material-discursivity. For example, we can see socio-technical negotiations in the obdurate character of a particular mathematical puzzle underpinning encryption, or the condensed power at points of exchange within the physical infrastructure of the cloud.

My use of constructivism[43] is read through an agential realism in which coherent explanations of a real world can be treated as consistent and reproducible under certain conditions, but understands that conceptual apparatuses that produce phenomena can fundamentally be constituted in multiple ways by the material and discursive circumstances of their arrangements. My engagement in practice supports a pragmatist emphasis on developing situated meaning through useful action. I draw on agential realism to see symbolic interaction – including the notions of identity design, semiotics and interactions design – in Barad's material-discursive terms, as performative intra-action. As such, researchers are implicated in, and co-construct their research conversations, analysis and theory with their participants within particular social and historical contexts.

There are some examples documenting constructivist grounded theory in design research. Indeed, Coulton and Hook (2017) build on the CX to produce a similar reading together of research through design and constructivist grounded theory, which they propose for to the context of game design. Roxburgh (2015) describes an exploratory process of writing, sorting and diagraming notes and extant literature about design. His is an attentive reading of grounded theory literature through design methods. Echoing my own thoughts while I was conducting a studio of prototyping projects and thinking about how to produce grounded theory from them, Roxburgh (2015, 353) observes that:

> Designers typically use reflection in action as a kind of conversation with a design situation that draws upon the designer's experiential knowledge (Schon 1992) and, in a similar manner, grounded theorists use the reflective process of memo writing to encompass an understanding of the role of their subjectivity in the construction of knowledge (Charmaz 2003).

43 Barad states: "To be clear, I am *not* a social constructivist, a point that should be understood from the very naming of the alternative I propose: 'agential realism.'" (Barad 2007, 408). However I follow her use of *social constrictivist* "for rhetorical purposes" (Barad 2007, 408) and to enfold the compatible constructivist design research and grounded theory literatures I employ.

Roxburgh (2015) focuses on text-based coding and memo writing as approaches to analysing design writing. Costa, Patrício, and Morelli (2018) collect more multimodal field notes of their design processes, and code through visual sorting, but still use pre-defined written categories.

The similarity Roxburgh (2015) notes between Schön's (1983) notion of reflective design conversations and grounded theorising – data collection and analysis – supports my approach to grounded theory research through design conversations themselves. It is to emphasise the shift from spoken conversations and written data analysis to design conversations and project data that I have drawn on Barad's (2007) material-discursivity to shift from being not only a reflective practitioner but also a *diffractive practitioner*.

Grounded theory research through design

In this research, I adopt design conversations, design memo-making, and a design studio model of critical analysis as my grounded theory methods of data collection, constant comparative methods and theorising.

One way that grounded theory can be applied to design sketches, images and prototypes is by writing fieldnote observations about them, and then analysing the notes as text. Several grounded theorists have experimented with such visual grounded theory, transcribing video and images into text descriptions for analysis through processes of observation and categorisation (see Konecki 2011 for example). However, in this grounded theory research through design I have conducted data collection, analysis and theory development through processes of design itself: "'The act of designing' itself is the locus where new ideas get constructed by confronting technology, theory, and phenomenon (that what happens in the world), and many of these confrontations take place before the prototype has matured into a testable thing" (Stappers, Sleeswijk Visser, and Keller 2015, 164–5).

During grounded theory data collection, interviews are shaped yet emergent iterative processes. Intensive interviews are a form of "directed conversation" (Charmaz 2006a, 25) or "guided conversation" (Lofland and Lofland 1995, 18) of "intensive" questioning and observation (Lofland and Lofland 1995, 18). Research through design is characterised by Schön (1983, 76) as a "conversation with the situation", suggesting a form of directed *design*

conversation. By framing the CX as a grounded theory process, I understand myself as leading directed design conversations – through collaborative, negotiated project development – towards my theoretical development. In this process I also needed to acknowledge (and question) my own objectives and agency as I negotiated the directions of my research conversations.

Design processes and products serve an equivalent interpretive and categorising function to the constant comparative methods of coding and memo writing. The process of coding "fractures data" (Charmaz 2006a, 60), and "simultaneously categorizes, summarizes, and accounts" for each fragment (Charmaz 2006a, 43) and "gives us a preliminary set of ideas that we can explore and examine analytically" (Charmaz 2006a, 71). I followed a process of taking apart through design crits and clustering fragments from design conversations, and adopted a method of memo-making (Charmaz and Mitchell 2001, 167) (in place of text) as research reflection to compare across conversations and contexts and explore uncertainties and ambiguities (Charmaz 2006a). I have included an example in appendix B of the details of this process, by mapping out my memo-making research processes during a week-long residency half-way through my research.

My research through design uses prototypes, sketches and products in the context of a studio to "absorb knowledge from different directions and confront, integrate and contextualise this knowledge" (Stappers 2007 84). I used grounded theory techniques of spatial mapping and clustering (Charmaz 2006) that are reflected in design studio practice (Koskinen 2015) in my projects and writing. Research through design offers established means of doing the constant comparative analysis work in the processes and artefacts of design itself. These approaches – of playful routines of abstraction, critical reflection and comparative analysis – are familiar to design practice in sketching, prototyping, visualising, exhibiting and crits. I did the constant comparative analysis of a grounded theory approach through design and translated projects, sketches and crits to text in my thesis writing only after my conceptual categories were already emerging.

I assume that the products and other outputs of my research through design do not 'speak for themselves' as some forms of design research-by-practice might, but treat the

documentation of my analysis and theory as a written thesis. I have analysed my data of visual and textual quotes and fieldnotes from my design conversations through iterative projects, sketches and crits to construct "middle-range" (Merton 1957) interpretive theory. Middle-range theories are “abstract renderings of specific social phenomena” (Charmaz 2006a, 7) which, in this research, is identity design in networked publics. In research through design, this is considered “a theory or a model which is involved, situated, and embedded into a project” (Findeli 1998b, 68) or projects (Stappers, Sleeswijk Visser, and Keller 2015), abstracted as "patterns of similarity and difference in reflection-in-action" (Schön 1983, 267).

I conceptualise *prototype design patterns* to describe the form of abstract rendering of specific social phenomena grounded in projects. I have been most significantly informed by Barad's understanding of a diffraction pattern as "a material-discursive phenomenon that makes the effects of different differences evident" and "a way of understanding the world from within and as part of it, as a diffractive methodology requires" (Barad 2007, 88). The term design patterns traces a lineage from Alexander, Ishikawa, and Silverstein's (1977) development of a pattern language as a form of theorising architectural design phenomena, grounded in an understanding of interlocking patterns of events and patterns of space (Alexander 1979). Design patterns have been taken up by the software design, human-computer interaction and design research communities, among others (see for example Kent and Cunningham 1987; Hooper 1986; Gamma et al. 1994; Vlissides 1998; Bayle et al. 1998; Tidwell 1999; Schuler 2008; Tidwell 2010; Lockton, Harrison, and Stanton 2013; Bösch et al. 2016), as a way to capture and organise abstracted design actions with examples.[44] Some approaches to design patterns emphasise a standardising dictionary format and repeated structure for each pattern (Gamma et al. 1994), while others focus on the situated contexts in which they are grounded (Schuler 2008). This thesis follows the latter approach, in keeping with the emergent process of grounded theory research. As I will discuss in chapter 4, by bringing Barad's (2007) notions of diffraction patterns of intra-action to Alexander, Ishikawa, and Silverstein's (1977) formulation of patterns of design action I articulate prototype design patterns for taking on the network through the structure of my analytic

44 While finding less adoption in the field of architecture from which they emerged.

chapters. My prototype design patterns are defined through intersecting meanings of key design actions, in the form of the phrases "sticking together", "fashioning our own belongings" and "taking on the network". These were developed through the emergent diffractive process of developing middle-range theory from grounded theory research through design conversations, and structured through each chapter in the sections of identity design, public participation and designer-researcher practice. As patterns that have emerged from early prototyping, with limited participatory evaluation, these patterns acknowledge their own prototype form, and are less directly instructional as a result.[45]

I understand the agential stance of the design researcher as "characterised by iterative cycles of generating ideas and confronting them with the world" (Stappers 2007, 82) to develop what Charmaz (2006a) describes as an "*interpretive rendering* of the worlds we study rather than an external reporting of events and statements" (Charmaz 2006a, 184). Grounded theories are emergent conceptual apparatuses that "serve as interpretive frames" (Charmaz 2006a, 139) or – in my case – diffractive design patterns.

Alexander, Ishikawa, and Silverstein (1977, x) emphasise their pattern language is intended as an ongoing and participatory living and evolving language for publics and designers to use together. Emphasising patterns of action, for designers and for living, also shifts focus away from a dominant militarised language and structure of strategies, stratagems and tactics (Fuller and Goffey 2012; Garcia and Lovink 1997). The next steps in using prototype design patterns is an approach such as participatory action research, that allows for them to be honed by being put into practice intra-actively.

While Alexander, Ishikawa, and Silverstein (1977, x) define a pattern language as a network, they propose a hierarchy of scale in their pattern language for architecture and urban design in which large scale patterns are associated with city-scale phenomena, such as a neighbourhood, and multiple patterns, such as a public park, fit within theses, themselves formed from smaller architectural and construction elements, and so on. Barad's understanding of diffraction patterns helps problematise assumptions of scale as a pre-

45 In relation to Alexander, Ishikawa, and Silverstein's (1977, xiv) terms, these prototype design patterns are "one asterisk" patterns that are some way towards universally "invariant", such that "we believe it would be wise for you to treat the pattern with a certain amount of disrespect—and that you seek out variants of the solution which we have given, since there are almost certainly possible ranges of solutions which are not covered by what we have written".

existing hierarchy, so that "the tracing of entanglements might well be a better analytical choice than a nested notion of scale" (Barad 2017a, 108). She suggests instead that diffraction patterns produce more entangled dependencies and topologies than simplifying hierarchies allow for, in which patterns are: "each contained inside the other, each threaded through the other [… a] strange topology" (Barad 2017a, 109). As such, prototype design patterns are formulated in relation to one-another, yet try to remain entangled and iteratively interdependent. In this thesis the patterns of Sticking Together and Fashioning Our Own Belongings are similar yet distinct, and are both clustered within the overarching pattern of Taking On The Network. The way that I have formulated and presented these patterns, designer-researchers wishing to follow the pattern of sticking together, for example, are doing so at multiple scales[46] yet always within the encompassing pattern of taking on the network, and may choose to focus on sticking together, or to intersect it with the pattern of fashioning our own belongings.

Constant comparative design methods

At the heart of my grounded theorising are "constant comparative methods" (Glaser and Strauss [1967] 1999, 101). My project prototyping, sketching and crits are doing the work of fragmenting and categorising emerging concepts as textual coding traditionally does. I have used studio methods of laying out material from multiple projects in a visual form. Stappers (2007, 87) describes the "realisation of working prototypes" as "the essence of 'research through design'". I consider my prototypes as generating *and* carrying knowledge. My use of design to develop ideas constitutes active forms of design analysis and reflection, what de Zeeuw (in Glanville 2015, 17) distinguishes as a *sketch model* for exploring rather than a "model of what something is". I laid out my project materials in a studio, organised my collaborations across institutions in this studio model, and brought together disparate projects into a process of comparative analysis:

46 We will see, for example, that sticking together describes the hands on construction of identity design simultaneously to the larger scales of public participation.

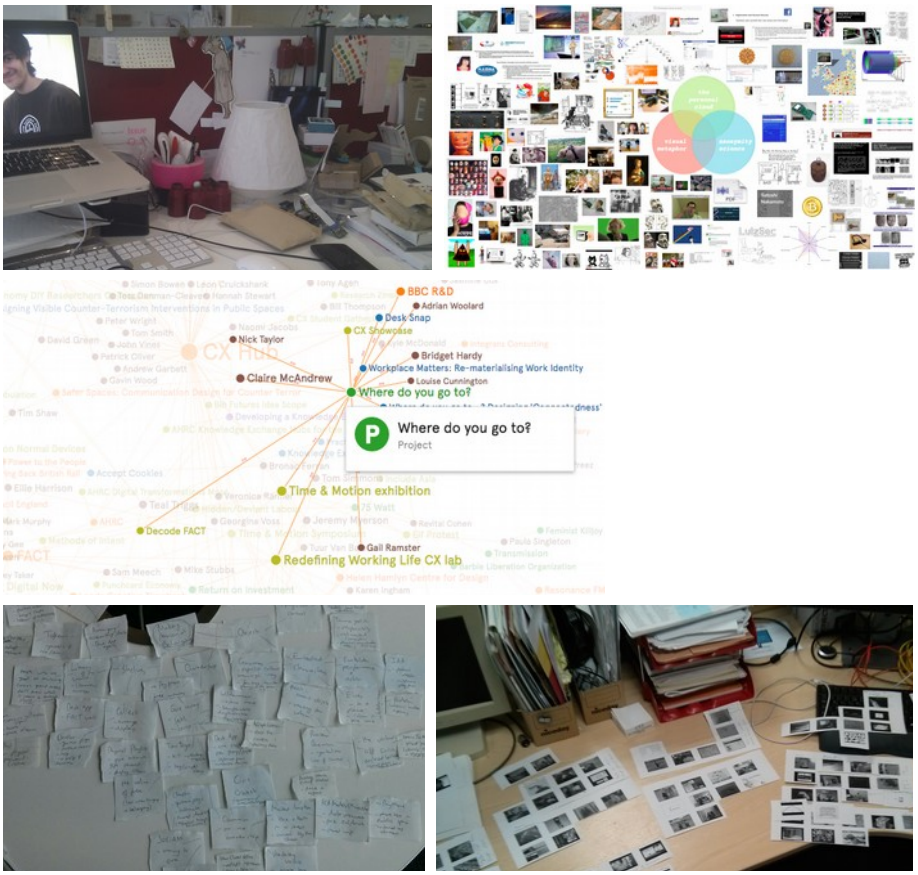


Fig.1 Comparative analysis through some of my studio mapping and sorting practices, including informal desk arrangement and more structured sorting of research project fragments.

I used this design studio approach as a physical and (trans-)institutional setting for spatially organising and comparing projects, prototypes and sketches, and as an approach to developing and using knowledge. Stappers (2007, 89) offers a description of how studios do comparative analysis through serendipitous and collaborative spaces which set off:

> unplanned and informal communications, and present people with unexpected inputs, which can serve as part of solutions and lead to serendipitous innovation.

My studio of overlapped projects offered the potential for comparative analysis and synthesis between them to develop emerging categories from within the study.

The framework of my projects developed through a structure of successive levels of abstraction. Beginning with collaborative projects developed from lab events, through more directed projects and accompanying sketch memos, to projects synthesising earlier themes and categories (see appendix A for project details and appendix B as an articulation of this process). As Charmaz (2006a, 3) explains: "as we proceed, [...] the categories become more theoretical because we engage in successive levels of analysis".

The constant comparative process is “part play” that “allows us to try out ideas and to see where they may lead” (Charmaz 2006a, 71). Play is a useful concept for describing reflexive conversations, as it represents iterative and even transgressive exploration (Sutton-Smith 2006). Stappers (2007, 89) describes how their studio “formed a playground in which design researchers could ‘live with their prototypes’, an important ingredient of ‘research through design’”. My own design conversations worked to create space for creative leaps. Bryant (2009) identifies this playful stance as clearly linked to making space for abductive leaps. Charmaz (2006a, 135–6) echoes this:

> Although tools may help, constructing theory is not a mechanical process. Theoretical playfulness enters in. Whimsy and wonder can lead you to see the novel in the mundane. Openness to the unexpected expands your view of studied life and subsequently of theoretical possibilities.

Fostering a research process that has allowed for *playing around* feels worthwhile for constructing a conceptual and research apparatus, by making space for trying things out, and for new creative leaps. Barad (2007) suggests a careful, specific, directed form of playing around in material-discursive conversation with a situation.[47]

Critical reflective research practice

I took on a number of roles within projects including: 'academic'; 'designer'; 'technologist'; 'RA (research assistant)'; 'presenter'; 'doctoral student'; 'lead artist'; 'co-author'; 'expert'; 'participant'; 'audience member'; 'driver'; 'protestor'; 'tea maker'; and 'guest professor'. In these settings and roles, as Charmaz (2006a, 110) observes, “the lines between involvement and distance in field research often blur and may require continual renegotiation”. While research through design can take on an auto-ethnographic stance at times mine has predominantly been one of a situated, yet distinct, authorial researcher role. It is a continuous task to stay aware of assumptions I have made and how these have influenced

47 Barad recounts Schrodinger's dismissal of "any old playing around" with an apparatus as not being a meaningful measurement process. She is careful to avoid a label of play that might be used to dismiss or undermine the work she does in bringing together current scientific and critical social theory. She also questions and critiques a characterisation of playful physicist as popularised in accounts of Richard Feynman and others that seem to be used by researchers to distance themselves from their inherent ethical obligations (for example during Feynman's work on making a nuclear bomb of immense destructive power). Barad (2007) draws on Haraway's (2004) productive word play – what Meyrowitz (1985, 308) calls the "intricate—though very serious —pun" – to do the work of staying with the trouble (Haraway 2016) and reading things together (Barad 2007). I also understand this stance as the embodied play of 'constructionist' bricolage (Turkle and Papert 1991) identified as key to scientific and design research practices in action.

my co-constructions of my design conversations. I have tried to acknowledge my positions, taken and given, of relative power and role with my participants (Charmaz 2006a) as well as those of the organisations.

As a researcher conducting design conversations I had to consider how to build rapport and trust, and how the projects – and my roles – may extend forms of organisational power already exerted on my collaborators and participants (Smith 1999). This entails not only considering how I construct my design questions and analysis, but also attending to the dignity of the research participants (Blumer 1969).

As a designer-researcher I tried to shape each project and design interaction to negotiate mutual trust and access and probe tacit understanding. I tried to be critical, question unspoken assumptions, and yet remain respectful to my collaborators and our audiences, and positive in how my projects concluded.

Constructivist grounded theory recognises that researcher and participants are co-constructing their conversations and knowledge, and Charmaz (2006a, 185) reminds us that "knowledge is not neutral, nor are we separate from its production or the world".

A reflective, intentional practice of design research can offer grounded theory methods a wealth of experience in enacting change within ongoing systemic feedback of complex design conversations "aimed at constructing a possible future" (Stappers, Sleeswijk Visser, and Keller 2015, 163). Schön (1983, 346–7) observes that as designers:

> we construct ideas powerful for action concerning the issues and crises of our society, the problems to be solved, the policies to be adopted. When we act from these ideas, we change social reality. Sometimes we make our ideas real, but also thereby create new problems and dilemmas.

However, we must also critically question Schön's – at times individualistic and/or benevolent – certainty and preconceptions, that reflect a pervasive *lone genius* assumption in design (Triggs 1998), of design action on behalf of others, rather than in co-constitution with co-participants or publics.

Designer-researchers "do not describe the world as it is, but rather they change the world (no matter how tiny the change) by making new objects, services, processes, etc." (Glanville 2015, 16). Design research, in this projective stance, takes "courses of action aimed at

changing existing situations into preferred ones" (Simon 1996, 111). Design is authorial, intentional and seeks to change the world (Pierce et al. 2015). Constructivist grounded theory also admits it should transform practice and social process and contribute to a better world (Charmaz 2006a, 185).

My context within the RCA and the CX bring with it rich influences from a history of the critical and speculative design articulated by Dunne and Raby (2001), and the 'socially inclusive design' practices of the Helen Hamlyn Centre for Design (HHCD) (Gheerawo 2016). Dunne and Raby (2001, 58) established a definition of critical design that serves as a strong basis for critical practice within design: "we need to consider alternative visions to those put forward by industry". They call for the "design profession to take on a more responsible and pro-active role within society […] that link it back to everyday life" (Dunne and Raby 2001, 59). However, Dunne and Raby and their collaborators have tended to focus on design works that "stimulate discussion and debate" (Dunne and Raby 2001, 58), rather than empowering action or agency of practitioners or audiences. They underemphasise a key strategy of their approach: the power of design to construct audiences of practitioner-publics around complicated socio-technical ethical considerations.

The success of Dunne and Raby's intentionally critical designer stance has no doubt strengthened the broad range of approaches in critical practice within design that have followed. Dunne and Raby (2001, 58) problematised views of "design as somehow neutral". The debates around the term critical design (Dunne and Raby 2013; Malpass 2013; Pierce et al. 2015; de Oliveira 2016) and critical making (Ratto 2011; Hertz and Ratto 2012; Sayers 2017), should be read as a productive refinement of now established critical practices.[48] Post-colonial and feminist perspectives have helped to complicate the largely white, middleclass, Anglo-colonial assumptions of designers and their institutions in the discourses and practices of critical design, and to recognise positions of unacknowledged privilege (de Oliveira 2016; Prado and de Oliveira 2014). Research participants and contributors within the CX have also brought additional critical design perspectives to my projects (see for

48 In relation to networked publics, the concept of 'critical infrastructure' (Dalton et al. 2015) is of note, as by adopting this form of critical work, we are acknowledging critical design as central rather than incidental to national and international concerns. I use the term critical as Barad (2007 ; Dolphijn and van der Tuin 2012, 49) does. Noting how she questions the simplicity and implications of criticality I follow her proposed alternative of the practice of diffraction and the ways she draws on critical social theory.

example Harrison 2009; Garcia and Mars 2014).

Charmaz's (2006a, 131) grounded theory methods help bring a rigour of systematic reflection on assumptions and power to my authorial roles of designer and researcher:

> grounded theorists can ironically import preconceived ideas into their work when they remain unaware of their starting assumptions. Thus, constructivism fosters reflexivity about their own interpretations as well as those of their research participants.

Intra-active contestational prototyping

In asking how to make space, from within, for networked publics to design identities themselves I follow the practical examples by Tad Hirsch$_{p.313}$ and the Institute of Applied Autonomy (Schienke and IAA 2002; IAA 2005; Hirsch and Henry 2005; Hirsch 2009b; Hirsch 2009a; Hirsch 2016) of contesting new spaces for communication to include often excluded voices (and exclude more dominant ones). Hirsch articulates, through working with political activists, how designers can catalyse social change using contestational design.[49] This thesis has not undertaken sustained work directly with activist groups, but I see identity design by publics as key in a number of contested political contexts and spaces (as evidenced by the history of anonymous pseudonymity cultures presented in chapter 2). This contestational design frame for identity design captures the possibilities for response in its intra-active nature.

Barad (2007, 178) formulates intra-action as always implicating all of us in taking on responsibility:

> Particular possibilities for (intra-)acting exist at every moment, and these changing possibilities entail an ethical obligation to intra-act responsibly in the world's becoming, to contest and rework what matters and what is excluded from mattering.

It has been personally important to follow Barad's emphasis on an inherent ethics in all action. Contestational, intra-active understandings of design help to produce patterns of action – that is, prototype design patterns – to guide how designer-researchers can

49 Contestational design recognises that all design activities, and the audiences they serve, are political and contested. Following Mouffe's (2000) theorising of agonistic contested debate, Hirsch (2008) argues that political change through design, and indeed all design plays a role in this, is best understood as a contestational, movement building process rather than purely neutral and deliberative. Contestational design is similar to the subsequent theories of adversarial design (DiSalvo 2012), but better recognises the responsibility of the designer for participatory political action and active opposition (Hirsch 2016). The etymological roots of contestation as 'witness together' diffracts through this.

"contribute to the differential mattering of the world" (Barad 2007, 178).

Hirsch (2015, 4:30) describes his design research stance as "explorations + experimental constructions", in which some design work is "a kind of research and strategy practice" (4:35) charting new design frameworks and methods. The CX processes defined boundaries of: resources and funding focused on early prototyping projects; consortia of collaborators drawn from scholars and practitioners of digital public space; only limited scope for 'public-facing field trials'; a focus on commercial, cultural and academic impact; and a timeline and structure of a studio of multiple projects rather than ongoing development through public use. As such, my approach is not activist-led, but rather "strategy practice" (Hirsch 2015), similar to the earliest collaborative IAA work of Hirsch and others in which a functioning prototype is produced that points towards potential communities of use.[50]

My design-research emphasises prototyping "technologies for the public […] that *work*" (Schienke and IAA 2002, 103–6 emphasis added).[51] Prototype designs however remain prototypes – not used extensively, and not iteratively developed into fully participatory, or deployed, digital public spaces. Such designer-led processes perform the traditional roles of 'R&D' rather than a recent 'constant beta' deployed public testing approach (J. Ito 2016b, 143). As such, my method seeks to produce what I recognise as *prototype* design patterns, as the first step towards future participatory design work of building and testing in practice.

This chapter has set out the methodology for using project conversations as the basis for asking questions of materials, designer-researchers and audiences about identity design by networked publics. I have drawn on the research through design literature to identify studio-based project methods of data collection and analysis through design practice as most appropriate for this research inquiry. I have combined this with constructivist grounded theory to develop a grounded theory research through design approach to

50 Such as the surveillance camera tracking apps of their iSee project that began as "art practice" "pedagogical devices that provoke public discussion of critical issues", but were taken up by communities of users as "functional tools that dissidents can actually use", which "has more to do with engineering (or at least hacker) practice" (Schienke and IAA 2002).

51 The Institute for Applied Autonomy deprecatingly and satirically boast of the engineering of their early speculative contestational robotics with the tag line "Our Shit Works." (Schienke and IAA 2002, 105). They describe this as particularly important: "We are certainly not the first people to point out problems within engineering discourse. What I think we do that is not as common is to critique engineering culture on its own terms - that is, through the design and fabrication of experimental systems. Similarly, we're interested in public space. So we engage these issues in public, and not only in protected environments - like museums and galleries - where the work never gets seen by the people who most need to see it" (Schienke and IAA 2002, 109).

conduct constant comparative analysis and theoretical sampling through design methods. I reflected on my role and assumptions as a designer-researcher, and situated this research within a critical design research practice understood as contestational and intra-active.

The next chapter details the analysis and sets out the overarching pattern of taking on the network, and the form of the prototype design patterns it entails. To make a bridge, I first provide a note on the projects through which my design conversations have been conducted.

Introducing the data analysis: a note & an appendix of the data set

This section of the thesis provides critical commentary on the data analysis generated as part of this research. As noted, this thesis has employed a *grounded theory research through design* approach. The data upon which these analytic chapters are based spans theoretical sources and multiple projects, events, installations, apps, publications and collaborations - and my design conversations within them - that are bounded by the CX hub and its activities over the period between 2012 and 2016. Data collection and analysis involved a continual 'to-ing and fro-ing' process between the multiple CX activities and the design patterns that have been generated from this multi-layered empirical research. This has made writing up, itself a fundamental part of the data analysis, incredibly challenging as this kind of analysis does not lend itself easily to the 'findings-results-discussion' order of much doctoral research. The purpose of this note is to prepare the reader for the breadth and reach of the data used across these chapters so that the narrative there can be followed despite what may sometimes feel like vast or repetitive leaps across multiple projects, design conversations and prototypes. The following four chapters constitute a critical (re)interpretation of the meanings of this corpus of work for our understanding of space for identity play as an intersection of identity design, networked public participation and design research practice.

In seeking to provide clarity for the reader an appendix that details the components of that corpus of work is provided. The entire data set is to be found alphabetically in appendix A. As noted earlier, in keeping with grounded theory the data 'set' upon which the critical analysis is based, spans over 70 different projects, events, prototypes and crits that I have been involved in (to greater or lesser extents) within the broader CX enterprise. The number of projects and crits analysed exceed some conventional expectations of data set size, but the analysis of each contributed codings of significance towards the generation and saturation of the prototype design patterns. The project appendix describes each of the 'actions' that have been used as data to allow for a greater focus on the analysis in the subsequent chapters rather than reiterating the individual project details.

2012

- Creative Exchange Hub launch
- Data is Political[p.298] event
- CX Launchpad[p.297] event
- Crafting Urban Camouflage[p.295] workshop
- Mediating Heritage[p.308] event
- Public Service Innovation and Democracy[p.314] CX lab
- Open Planning[p.312] proposal
- Masked Soapbox[p.308] prototype
- Redefining Working Life[p.315] CX lab
- Hybrid Lives[p.305] proposal
- Where do you go to?[p.320] proposal
- Return on Investment[p.316] proposal
- Accept Cookies[p.288] prototype
- Rethinking Real-Time Protothon[p.315] event
- Making the Digital Physical[p.307] CX lab
- Physical Playlist[p.312] proposal

2013

- Sensuous Knowledge[p.316] talk
- Modelling Digital Public Space[p.309] CX lab
- Walk in the Park[p.319] proposal
- Hashtag Radio[p.304] proposal
- Bio Futures Idea Scope[p.292] event
- Chattr[p.294] at FutureEverything[p.304] prototype
- Berghs Interactive Communication Prototyping[p.292] workshop
- Rapidly Syncing Clouds[p.314] prototype
- Theory & Practice of Social Machines[p.317] talk
- Desk Snap[p.300] prototype
- CX Showcase BBC[p.297] event
- Chattr[p.294] at Today's Art[p.318] prototype
- Time & Motion exhibition[p.318] event
- Where do you go to? Exhibition[p.321]
- Elf Protest[p.302] workshop

2014

- Decode FACT[p.299] workshop
- Hidden/Deviant Labour[p.305] workshop
- Graph Commons[p.304] workshop
- Time & Motion Symposium[p.318] event
- Superposition[p.316] talk
- New Cloud Atlas[p.309] proposal
- Bundle Publishing[p.292] proposal
- Numbers that Matter hackathon[p.311] prototype
- noPayPhone[p.311] at FutureEverything[p.304] prototype
- Walk in the Park[p.319] INDX and Mydex add-on prototypes
- BBC Connected Studio[p.313] event
- Digital Economy DIY Researchers Colloquium[p.301] event

- Mapping Post-Digital Futures[p.307] workshop
- Pinky Show[p.312] interview
- Public Practice Studio[p.313] visit and talk
- Vancouver[p.309] visit
- CX PhD Symposium[p311.] event
- Place Playlist[p.313] proposal
- Barrow Woodwose[p.291] prototype
- AcrossRCA Private Clouds, Public Good[p.288] workshop
- Authenticity & 'Real'? Bodies[p.290] talk
- Tata Consultancy Services[p.317] workshop
- CX Student Gathering[p.298] workshop
- Janez Janšas[p.306] event
- Manifesto for Digital Messiness[p.307] event
- Chaos Communication Congress[p.293] talk

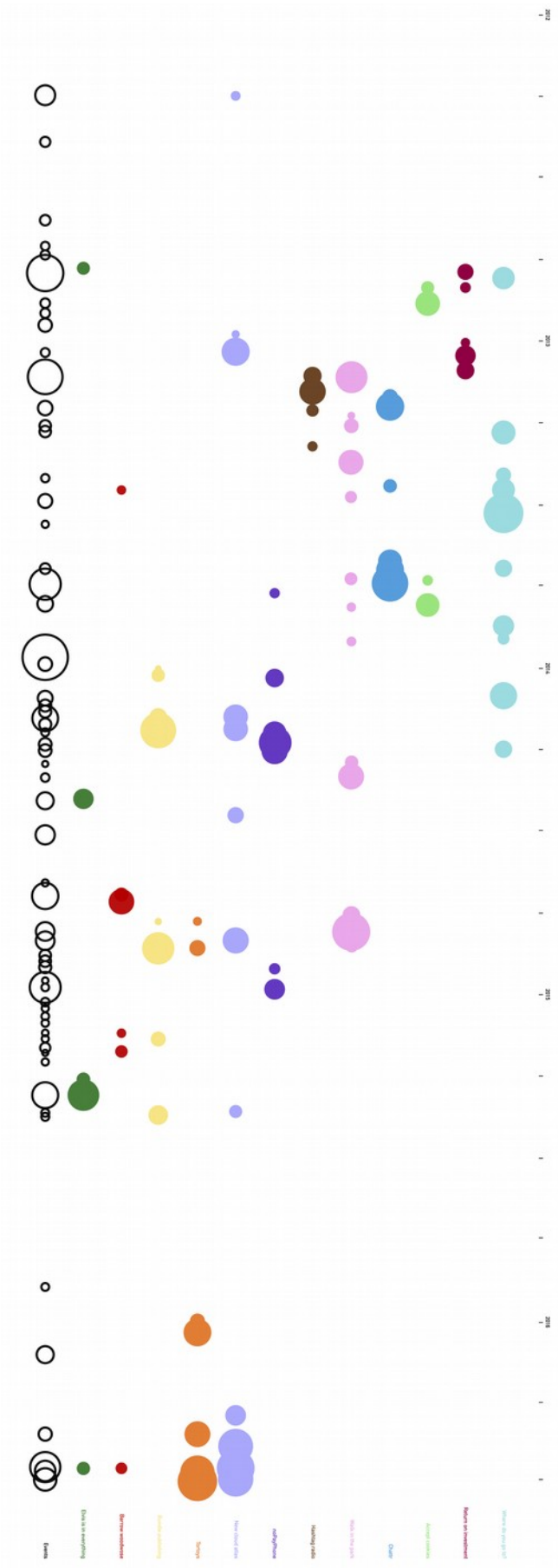
2015

- Design Without[p.300] crits
- Editorial Design Group[p.301] crits
- Memory of the World[p.301] visit
- Why Would I Lie[p.321] event
- Elvis is in Everything[p.302] prototype
- New Cloud Atlas[p.309] prototype
- //Parental Leave//

2016

- Gnome Street Gnome[p.304] prototypes
- CX Designing Digital Now Exhibition[p.296]
- Tor Toys[p.318] workshops
- Tor Toys[p.318] prototypes
- New Cloud Atlas[p.309] workshops

Fig.2 A timeline of activity of the larger projects and proposals during my CX research process.



Chapter 4 – The overarching design pattern

The overarching construct of *taking on the network* emerged from the analysis of design conversations with the participant collaborators and questions I posed through projects about how to make space for networked publics to design identities. I identified the call to take on the network and patterns of action for taking on the network as a central thread throughout the projects of the Creative Exchange (CX). For some projects the emphasis is on understanding and taking responsibility of network function, for others on resisting unequal power the network exerts over identity and public space. The process of successfully taking on the network requires a superposition of these meanings. Through the analysis I demonstrate how taking on the network is a pattern of action that enfolds an interplay of its meanings. Following Barad (2012a, 33) I consider this a process of reading 'taking on the network' diffractively through itself "to cut across the cuts that define these terms". I discuss the relationship of Barad's diffraction patterns to the traditions of design patterns further in the next section.

The term *taking on the network* is shown to cut across three connotations here. It describes a form of challenge or resistance to identity infrastructures of power — a taking on of some dominant inequality by disempowered individuals or groups. It suggests forms of responsibility — taking on the work or burden of sustaining an identity network apparatus. And it also entails inhabiting, performing or taking the form of the network itself – taking on and comprehending the embodied characteristics of distributed, connected, collective topologies.

Making space for more distributed agency in identity design – conceptualised here as the identity play of networked publics – entails and builds on patterns of taking on the network. Taking on the network means asking what part audiences can take in the function of the network itself, and negotiating power to take part more equally.

As introduced in the note preceding this chapter, my analysis in this thesis draws on a significant data set of design conversations drawn from 'large' prototyping projects and 'small' design sketches alike. In keeping with grounded theory methods I have been careful

to stay open to the emerging themes in these design conversations, and to treat all participants (human and otherwise) as of equal potential significance. The key outputs of this thesis are the three prototype design patterns: of *taking on the network* as a way to make space for the identity play of networked publics, and *sticking together* and *fashioning our own belongings* clustered and intersecting within that. This research was also structured by the format and logic of the larger CX projects and proposals that emerged through the period of the design conversations. These were Chattr$_{p.294}$, Where do you go to?$_{p.320}$, Walk in the Park$_{p.319}$, noPayPhone$_{p.311}$, Bundle Publishing$_{p.292}$, New Cloud Atlas$_{p.309}$, Barrow Woodwose$_{p.291}$ and Tor Toys$_{p.318}$.[52] My design conversations over the course of this research have drawn on, and been in conversation with, these larger projects, and examples from them reoccur throughout my analysis.

Chattr$_{p.294}$ was a provocative performance of cloud surveillance and terms of service in the form of an exclusive cafe at art festivals accessible only through acceptance of recording, transcription and publishing of everything said within it. The project is a reference point, in the taking on the network chapter, for analysis of how resistance and identity play can emerge if infrastructures become visible, and in the sticking together chapter for how identity can be assembled.

Where do you go to?$_{p.320}$ was a project exploring how groups of hot-desking and telepresent collaborators at the BBC could communicate their shifting workplaces and working contexts to their team members through digitally sharing images of their desks. It became a prototype DeskSnap app, and a study of how privacy and workplace intersect. The project revealed totalitarian aspects of cloud identity apparatuses in daily working and public life and, in the sticking together chapter, the ways that people expressed identity through the arrangement of their desks feeds into the analysis of assemblage. The fashioning our own belongings chapter draws on design prototypes for the app as a physical object in understanding user control and agency.

Walk in the Park$_{p.319}$ was a project building on the expertise and infrastructures of two personal data store projects to explore how intimate data could be shared and used in

52 These projects were larger in the sense of the time and activity invested in them by my collaborators and I, as well as those that were officially funded by the CX proposal process.

public. This was done through the development of additional features for the existing data stores, and through several workshops speculating on how to design for a lifetime of user data. Concepts of distributed infrastructures, encryption and accountability from this project run throughout several aspects of taking on the network while, in the fashioning our own belongings chapter, storing personal data in owned objects is a key insight.

The noPayPhone[p.311] project set out to prototype a future city infrastructure of free phoneboxes, powered by donations of 'free' mobile minutes from nearby strangers. The sticking together chapter learns from how public responsibility and anonymity can become more commonplace, while also drawing on the histories of phoneboxes as urban places and public commons. Notions of donation and networked (dis)ownership feed into fashioning our own belongings.

Bundle Publishing[p.292] was a project that proposed ways of distributing anonymity tools to a large audience as a by-product of a regular publication, driven by the logic of producing a large enough anonymity set of possible users as a regular enough occurrence to keep the software more securely updated. Influences of fanzine culture form a significant part of sticking together. Practices of anonymity tool use and distributed systems explored here feature in taking on the network.

The New Cloud Atlas[p.309] was a project to map the visible infrastructure of the internet. It did this through public participation in mapping activities on city streets and contributions to an online database of the resulting map data. The taking on the network chapter draws from the ways that mapping is part of holding cloud models to greater accountability, while sticking together considers aspects of public transgression and resistance that become acceptable through actions like mapping walks.

Barrow Woodwose[p.291] was an art performance and resulting costume made during a week-long artists residency from 'modern day wilderness' in the form of pound-shop and military surplus items, first worn in a public park. It explored the feeling of producing and performing an anonymous identity in public using traditions of wildman masking and carnival, something I return to in fashioning our own belongings. Carnival also concludes the analysis of taking on the network as a form of playful and resistive inversion.

Tor Toys[p.318] was a project and series of workshops prototyping how to use the self-publishing features of anonymity tools to empower networked fanzine communities. It used small, cheap, commonplace computers and simple interfaces, like a document scanner, to publish .onion mini websites on the Tor network. My later CX projects were shaped through theoretical sampling by following the emerging themes of the earlier research. The final project, the Tor Toys workshops and prototyping, encompasses a practical intersection of all three of the design patterns that I produced and therefore also marks a point of theoretical sufficiency in my grounded theory analysis. The Tor Toys scanner features as an example of collage making in sticking together, as a bricolage networked object that users can (dis)own in fashioning our own belongings, and as a playful hands-on intersection of resistance and responsibility that illustrates taking on the network. The workshop represents a prototype example of a pattern that makes space for the identity play of networked publics through combinations of networked identity design literacy and anonymity set movement building.

In addition to the way these larger projects reoccur as design conversations 'quoted' throughout the analysis chapters, several iconic moments from other prototypes, sketches and events are reoccurring reference points.[53] For example, these include: a zine making workshop[p.298] in which I noticed collage as a form of identity design; the Accept Cookies[p.288] project in which a manifestation of identity tracking data could be eaten; a moveable type print workshop[p.290] revealing a genealogy of anonymising assemblage; and a Google hackday[p.315] prototype browser spirit and a simple video identity that reflect on my feelings of relative agency. I link to the relevant page of the project appendix for each fragment from a project, prototype, event or design sketch.

Prototype design patterns

A prototype design pattern is a theory of (intra-)action produced by reading a term through itself to produce a constructive and deconstructive "diffraction pattern" (Barad 2007, 72) of intersecting concepts, roles and actions. My conceptualisations of taking on the network, and within it, of sticking together and fashioning our own belongings each take this diffractive form, what Meyrowitz (1985, 308) calls an "intricate—though very serious—pun"

53 Such resonant moments or design actions can be thought of as similar to *in vivo* codes from traditional text-based grounded theory coding that become raised to categories and theory.

which works as a pattern of meanings. I understand Meyrowitz as using such a pattern as a theoretical tool in his book *No Sense of Place*:

> No sense of place [...] is intricate because the word "sense" and the word "place" have two meanings each: "sense" referring to both perception and logic; "place" meaning both social position and physical location. The pun is serious because each of these four meanings represents a significant concept in the theory. (Meyrowitz 1985, 308)

The pattern of *taking on* emerged out of the way that design projects within the CX engaged with the network, and with the challenges of making digital public space. It is a construct that structures prototype design patterns for identity play through its overlapping meanings of responsibility and resistance. Taking also emphasises material-discursive comprehension, simultaneously connoting both a physical act – taking hold – and a process of understanding – taking note. Taking on the network develops through patterns that are simultaneously and inextricably material-discursive, and about social and collective action as forms of resistance-responsibility-embodiment.

I have constructed the meanings of taking on the network from my design conversations to produce the intersecting patterns of action for how to simultaneously *take responsibility*, and *resist*, and *comprehend* the network in meaningful ways to make space for networked publics to have greater agency to design identities. Taking on the network, and the patterns within it, are also positioned in relation to other relevant literature – artistic and technology practices, and theoretical frameworks.

Sticking together and fashioning our own belongings are both design patterns within taking on the network for identity design practiced by networked publics themselves. The superposition of resistance, responsibility and embodied network topology that taking on the network describes also structures these prototype design patterns, and the facets of resistance, responsibility and embodiment can be found throughout each. However, each pattern carries a different emphasis and approach.

Through the analytic work I illustrate how the intersecting aspects of taking on the network produce a balance of anonymity and pseudonymous reputation required to cultivate space for networked publics to have the agency to design identities, understood as identity play.

From the stance of communication design, the concepts that have emerged from the

grounded theory process are made more legible and usable by structuring each analytic chapter in relation to a design pattern form. This form captures the multiple 'scales' at which these diffractive design patterns operate under the sections of identity design, public participation and designer-researcher practice. As discussed in chapter 3, Alexander, Ishikawa, and Silverstein (1977) structure their design patterns as a strict hierarchy of scale that Barad's understanding of diffraction patterns helps to complicate. In Alexander, Ishikawa, and Silverstein's (1977, xiii) terms the design pattern of taking on the network is the "larger" pattern in which the cluster of "smaller" patterns of sticking together and fashioning our own belongings are "embedded". However, following Barad, this thesis recognises that all three patterns, and their constituent parts, are more iteratively and recursively enfolded. With this understanding, for example, the practical activities of designing and making workshop spaces for participants to stick together collaged expressions of identity not only produce the possibility of taking on the network, but are also produced by it. That is, the patterns are not strictly hierarchical instructions, structures or steps, but rather ongoing iterative intra-actions.[54] Furthermore, the design patterns presented in this thesis are prototypes, both in how they have emerged out of the design conversations of prototyping, but also in their projective and emergent state as prototypes themselves, still awaiting further testing in practice. The balance this thesis seeks between entangled diffraction patterns and legible design pattern structures reflects an inherent tension between the complexity of sustaining spaces for identity design by networked publics to take place, on the one hand, and wanting a simple set of steps a designer-researcher can follow to make this space, on the other.

Each of the prototype design pattern analytic chapters is divided into three sections. In the last analytic chapter, I return to the design pattern of taking on the network itself. Each prototype design pattern makes space for identity play through three entangled phenomena: designing *identities*; networked public *participation*; and designer-researcher *practice*.

54 Alexander, Ishikawa, and Silverstein's (1977, xiii) notion of design patterns is in fact very accommodating of Barad's diffractive patterns interpretation. On scale, they say that "when you build a thing you cannot merely build that thing in isolation, but must also repair the world around it, and within it, so that the larger world at the one place becomes more coherent, and more whole; and the thing which you make takes its place in the web of nature, as you make it".

Identity design

Each chapter is conceptualised as a pattern for identity design practiced by members of a networked public themselves. The patterns allow for identity design through the agencies that produce anonymity and pseudonymity, by simultaneously excluding centralised tracking of authorial signatures and performatively creating relations of audience and reputation:

- Sticking together is an identity design pattern that excludes signature analysis through applying creative constraints and context collapse as design methods. It negotiates reputation through 'knowing fabrication' by combining and juxtaposing existing fragments of character and communication.
- Fashioning our own belongings considers identity primarily in terms of audience and membership, and designs objects of group belonging. It manages an author's (potentially error prone) relationships to their distinct personas and audiences through collections of objects with the possibility of (dis)ownership.
- Taking on the network is a topological stance to identity design that emphasises adopting and inhabiting network forms of connectedness. It is decentralising and appropriates the tools of cryptography to exclude cloud tracking.

Networked public participation

Each of my prototype design patterns entail collective action, as a relational aspect of developing network literacy and access to identity apparatuses, and as part of the relational and exclusionary practice of growing anonymity sets. Each pattern places a different emphasis on collective action:

- Sticking together works through solidarity and sustainability, and makes anonymous pseudonymity commonplace through collective assembly.
- Fashioning our own belongings builds public objects, common places and community ownership and draws on the desirable exclusivity of fashion and belonging.
- Taking on the network makes a call to resist and take a stand through cloud accountability, and uses the networked topologies of re-distributed connectivity.

Designer-researcher practice

The contribution to the field of identity design is a form of participatory identity design by and within networked publics, that designers make space for. Each prototype design pattern constructs a necessary design stance for my own and my participants' practice as designer-researchers.

- Sticking together's practice is that of assembling existing tools, libraries and publics in pragmatic and knowingly fabricated ways.
- Fashioning our own belongings focuses on bricolage making, and grappling with networked objects. It is good to think with object making about the network.
- Taking on the network encompasses the other prototype design patterns, with an emphasis on participatory ways of taking responsibility for network apparatuses through material-discursive literacies.

Infrastructural inversion and carnivalesque inversion

The analysis goes on to construct *taking on* as an inversion. Inversions are not just a destructive toppling through subversion or nostalgic and complicit flip of hierarchy, as Stallybrass and White (1986) caution against, but a constructive and deconstructive contestational practice of 'turning into' – a topological inversion of relational connectivity rather than just a geometric inversion of position. Taking on the network is an *infrastructural inversion* – which can be defined as a "gestalt switch", "a struggle against the tendency of infrastructure to disappear" (Bowker and Star 2000, 34), of noticing, tracing, exploring, understanding and using infrastructure that is normally invisible – and a *carnivalesque inversion* – which is about the possibilities of collective public commons, role reversal, and transgressive playful exploration in situated contexts (Bakhtin 1984). Taking on is also a hands-on material-discursive inversion, of feeling how to turn things around.[55] In the framing of carnival, pseudonymity and play are shown to be closely related. Both are often humorous or satirical, but can simultaneously serve 'more serious' uses through space for transgression and ambiguity. Over the course of the analytic chapters identity play emerges as the means of intersecting these patterns of inversion. Making space for identity

55 We might even call such an inversion found in the entangled meanings and practices of taking on the network a ‘creative exchange’.

play superimposes identity design practices by networked publics themselves with requisite collective participation and the role of the designer-researcher, in ways that are commonplace yet productively indeterminate and playful.

The design space: Designing for identity play

The literature review made connections between the agencies required for networked publics to design identities and the traditions of anonymous pseudonymity. A design space for identity play was developed as an emergent finding of my research process through asking audiences, materials and designer-researcher participants iteratively evolving questions relating to anonymous pseudonymity, and through testing access to anonymous pseudonymity tools in projects. Out of these design conversations across disparate project, organisational and audience settings of the CX consortia come patterns that required multiple aspects of anonymous pseudonymity simultaneously in order to be effective.

Identity designers needed anonymity in order to begin constructing a new audience and character separated from their existing reputation. They needed to control this anonymity if their reputations grew. This anonymity had to mask authorial signatures, while being part of a large enough anonymity set to not itself be a conspicuous act. To design an anonymity system for a specific group of users or need would have immediately marked them out if they tried to use it. Instead, motivating collective action required patterns of identity play with indeterminacies of use. Collective use also required literacies of networked anonymous pseudonymity. Using an anonymity system for the first time is conspicuous and prone to errors that reveal authorial signatures. Read together these requirements, along with the role of the designer-researcher in making space for this identity play, define a design space for the patterns I set out here, that emerged iteratively alongside them through my projects and analysis. This also required going back to the technical and historical literatures of anonymity practice, to draw in relevant aspects. The key contribution of the patterns is to describe a necessarily simultaneous *superposition* of elements I have set out in order to make space for identity play to be possible.

Here I summarise key features of the design space that emerged from my analytic process. The design patterns sit within the design space of making anonymous pseudonymity

possibilities. I have focused particularly on aspects of masking authorial signatures and building and sustaining anonymity sets of participating identity designers.

Taking on the network is assembled and conceptualised as a design pattern well suited to experimentation with identity, role and social hierarchy, and simultaneously experimentation with anonymity tools. Identity play and anonymous pseudonymity are entangled, each entailing and requiring aspects of the other. Building audiences makes space for greater anonymity, for tools to be tested practically, and for users to develop network literacy through experimentation. Reducing traces of identifiable information when using a pseudonym requires considerations such as reducing unique traits in the authoring system, hiding location and timing information when posting updates, establishing ways of viewing the resulting communication safely, and obtaining tools for these steps that can be trusted to work as expected.[56]

Controlling the connection between user and designed identities allows authorial power to be exerted over how they are used. The programmer and author Why The Lucky Stiff ('_why') famously deleted large sections of the online work and communication they had produced under their pseudonym in a single act of withdrawing from the network (Lowrey 2012). Suddenly people invested in _why's work were no longer able to interact with them, while their legal name reputation and interactions remained distinct. This act demonstrates the power invested in constructing a separate reputational form. I had a similar experience in my CX interview discussions with Pinky from the Pinky Show$_{p.312}$ (Lithgow 2010). When I tried to get in touch with Pinky with some follow up questions, I discovered that her email address and web site were seemingly unattended, and that the Pinky Show$_{p.312}$ had not been updated for a long period of time. This places control over how she interacts with others in her hands in a way that dealing with a civic name in a highly authenticated and searchable society like the USA or UK does not.

Identity designs such as _why and Pinky use obscurity and the semi-privacy of online cloud services to separate designed identity from author. Cloud obscurity offers partial anonymity, but does not take control over identity from the companies that run them. I

56 The Guardian newspaper advice on how to contact their journalists securely is a practical example of anonymous pseudonymity considerations (Hoyland and Fenn 2017).

assume that Pinky decided to stop producing the show after the death of her collaborator Bunny, but she could have been shut down through mechanisms such as copyright claims, complaints or censorship.[57] Domain name registration, web hosts, Twitter, Facebook, Youtube and Gmail can all seize or close an account, preventing an author from maintaining a connection or verifying their authorship on their terms. In our conversations, Marcel Mars$_{p.308}$ described the Artists, Architects, and Activists Reading Group (AAARG) having to find new domain names, as did Peter Sunde$_{p.298}$ when discussing The Pirate Bay.

Incorporating cryptographic authentication under public rather than cloud control allows designers of identity possibilities of verifying their communication. This can be used to mark out a pseudonym as authentic from copies by other authors for example.

Processes of cryptography remain relatively complex to undertake for beginners, and organisations often use these usability challenges to justify leaving control of encrypted connectivity to the organisation itself. Part of network literacy for anonymous pseudonymity is public feeling for technical possibilities and relative risks involved. Common sense feeling of anonymity does not match networked anonymity function. Historical uses of pseudonyms have established a sense for what is required to become and remain anonymous. Those expectations are almost always wrong in a system that is founded on meticulous identity tracking of many elements of our lives (Grugq 2017). Somebody wanting to use a pseudonym may create a new account to sign into Twitter and not enter a civic name or identifiable contact details (mobile or email), however, many signatures and traces are created or revealed at every step of this network access process. Encryption of messages between programs has had growing uptake in recent years (with the widespread network administrator adoption of first SSH, then https, then partial use of OTR [Off The Record chat messaging], then proprietary end-to-end encryption in WhatsApp, Facebook chat and others [Tan et al. 2017]). However, anonymous pseudonymity is not currently a standard feature of communication systems online. Modern systems of internet connection through mobile networks and internet service providers, and identifiable characteristics in software, hardware, and other browser fingerprinting and cookies make most internet users

57 One of the last Pinky Show$_{p.312}$ blog posts was an art provocation addressing American military responsibility for radiation contamination in Hawai'i .

easy to identify by those monitoring at a web server (end point), local network (start point), or at the wider network level (switches and intermediary connections). With shifting topologies of tracking, the same is true for once anonymous physical public spaces too. Critical uses of pseudonymity place significant trust in unfounded assumptions of cloud model anonymity.

Establishing anonymity is complex, and if only resorted to when needed critically can be lonely, confusing, and lead to accidental identification. This is the 2013 advice for the technically literate readers of the popular publication *Wired* on how to contact a journalist as a potential pseudonymous whistleblower:

> Get a dedicated computer […] pay cash […] Leave your cellphone, your normal computer, and your metro card at home […] Then go to a coffee shop that has open Wi-Fi, and once there open a new Gmail account that you will only use to contact the press and only from the dedicated computer. (Weaver 2013, para. 7)

Here anonymity systems are viewed as too prone to error without the additional anonymity of a temporary computer and anonymous (crowded urban) network connection. Even buying a computer or connecting to wifi as a stranger are under regulatory pressure and commercial models of identity tracking thus less effectively anonymous.[58]

As I will return to in discussing my experience of setting up phones to test the desk snapp.300 app, personal devices have become strongly tied to a single, authenticated, legal facet of identity, encompassing payment, public surveillance and network connectivity. My identity connections were checked and enforced at the levels of network access, software access, and social norms. Buying phone SIM cards, connecting to an organisation wifi, accessing the Android operating system and installing the app with certification, all required authentication with a national or international authority.

Making sketches with anonymity software, and proposing anonymous pseudonymity projects such as the Bundle Publishingp.292 and Tor Toysp.318 designs, led me to observe that designers cannot easily contribute to the specialist mathematical research of cryptography algorithms themselves because they are unlikely to have the mathematical training. Hence, I

58 I explored the (increasingly rare) experience of buying a computer anonymously with cash during the nopayphonep.311 project. The complex wifi instructions I was given at the CCCp.293 conference reveal the difficulty of secure, anonymous connection through even their specifically designed, specialist wifi infrastructure.

explored what role designer-researchers *can* pursue within the field of anonymised pseudonymity to make space for identity play.

Reflecting on the technical successes of anonymity tools developed in early practical cryptography, their significant influence on commercial and governmental encryption practices, but low widespread adoption by public audiences, Hughes (2012) notes:

> if you want to promote cryptography. you need to promote something else first and let the cryptography ride along with it (Hughes 2012)

The mechanisms (and compromises) of technically assembling and using networked anonymity systems are well studied in the recent history of networked computing (Dingledine and Mathewson 2006; Czeskis, et al. 2013; EFF 2014; Hankey and Tuszynski 2018; Hoyland and Fenn 2017). A number of tools are well established and maintained but lack popular adoption. We found even installing and using file encryption when sharing Chattr[p.294] transcripts complex and error prone. Audiences are limited by the perceptions of deviant or crisis use, and the complexity of obtaining and learning the interfaces of communication.

A social network that has not yet developed a community of users lacks meaningful connections. Establishing a working anonymity set (crowd to be lost in) for a prototype faces a bootstrapping problem:

> New systems need users for privacy, but need privacy for users. (Dingledine and Mathewson 2006 p10)

I will return to the challenges of sustaining a community of users when discussing the free public noPayPhone[p.311] cafe setting in chapter 5. Digital resources lower the costs of contributing allowing large crowds to make things with only tiny individual commitment. Pfitzmann and Hansen (2010) describe the technical system design aspects of making space for identity design – what they call "privacy-enhancing identity management enabling application design" (Pfitzmann and Hansen 2010 p33) – in terms of useability, trust management and signature filtering, but do not state the size of anonymity set as a designable consideration.

Dingledine and Mathewson (2006) set out the ways in which building a large public crowd of users is as vital as selecting the most effective individual encryption practices in

establishing and maintaining anonymity. A large anonymity set may be dissuaded if an anonymity tool is not easily useable or error prone. However, as my analysis illuminates, anonymity tools may be suited to uses other than security that would make them desirable, and the complexity of such tools may be overcome for shorter periods of exploratory, playful use and can make space for more critical anonymity when needed. North (2003, 138) identifies an anonymous pseudonymity culture within which to practise as vital in examples of pseudonym authors who "had confronted publication restrictions and had explored the possibilities of anonymity" before applying their experience to more critical uses. Dingledine and Mathewson (2006) make a case for the most *popular* anonymity tools (in their view their own Tor project), over the most *effective* research developments or advanced settings, because the unique signatures of disparate systems divide up users into correspondingly small anonymity sets. Rather than designing contexts for all possibilities of anonymity use, establishing a widely adopted, uniform and constrained tool for lots of users may provide enough scope for stronger anonymity and space to practice, while most can engage in other uses.

Anonymous pseudonymity apparatuses

A key supporting requirement in designing for anonymised pseudonymity therefore is establishing contexts for regular use of these systems that are considered commonplace and socially acceptable, or simpler processes of sustaining trusted resources, or both.

The technical challenge of digital anonymous communication has been incrementally tackled over the last three decades. Approaches to encrypting messages passing through the network are well defined if not universally adopted. Methods for making indeterminate which author or reader computer is connecting to which host (publisher) has been considered in protocols like mix networks and remailers. The Onion Router (Tor) is currently the most well known, well funded and widely supported of such systems (Dingledine and Mathewson 2006).[59] Removing signatures from tools for authoring and connectivity can include approaches such as regularly buying and throwing away generic 'burner' computers, but may also be possible using *virtual machines* to simulate disposable systems. As my participants and I have drawn on in our infrastructure projects, establishing trust in these

59 https://www.torproject.org/.

tools is achieved in part through *free software* licensing and open source cultures of development that allows for the possibility of public accountability and peer auditing. Free software development can also potentially create a wide community of developers on a single tool, which makes maliciously infiltrating the functions of the code harder. A further challenge of trust in tools is that they must be obtained and compiled (built to work on a particular computer from the code) without interference.

A free software Tor program can be downloaded using an encrypted connection, and the checksum (a number that should match a calculation on the downloaded file) can be obtained separately to verify the file is intact. This file can be obtained and compiled using a free software operating system that has also been installed over an encrypted connection and with the same checksum validation. Checksums are in theory fallible, and encrypted network connections require certificates of host identity, so a user might go a step further and confirm the files have been cryptographically signed by someone they can verify they trust (verifying this trust tends to require 'out-of-channel' networks, often built on friendships). Such lengths are arduous and potentially conspicuous if such tool use is rare, as I observed in our research uses of encryption.

A number of efforts have been made to create guides to using anonymity tools and establishing pseudonymous communication channels online (Hoyland and Fenn 2017; Hankey and Tuszynski 2018; EFF 2014). Free software repositories help establish trusted assessment of viable tools, but descriptions of how to obtain these tools remain complicated to read, and fraught with the possibility of anonymity-compromising error. Seeking out a package of dedicated tools for anonymised pseudonymity could inculpate the downloader for further investigation, a sense I experienced in practical experiments in anonymity (Tor Toys$_{p.318}$) and masking (Barrow Woodwose$_{p.291}$). A regular download of a suite of tools in a system package on set schedule of release faces the challenge of the niche endeavour. As do most 'crypto parties' (Wolf 2012) that support learning and installing encryption tools during social gatherings effectively, but remain focused on the niche of cryptography itself. Only a small subset of people who value anonymous pseudonymity systems would go to the effort of downloading such an apparatus, even if it was set up as a syndication platform, to download and update automatically. With a small audience, and little motivation to

download immediately, few peers would be concurrently using the system or hosting the file, and distribution would likely be mostly from a single centralised file server. With a small audience and a single use for the apparatus, anyone downloading the files (without already having the protection the tools provide) is openly implicated as seeking anonymous pseudonymity alone.

In fashioning our own belongings, I explore the proposal for completely segregating out a set of authoring and connectivity tools for each distinct pseudonym, and from an author's general civic identity and computer use. “Contextual identities” (Chew and Stamm 2013) in digital and physical forms have been explored by research at Mozilla (Vyas 2016), resulting in their recent public release of a “Container” system within the Firefox browser to “keep parts of your online life separated into color-coded tabs that preserve your privacy […] allowing you to use the web with multiple identities or accounts simultaneously” (Mozilla 2017, para. 1). This is part of a wider approach to using a generic suite of tools, within a self-contained system that can be installed in one focused session perhaps multiple times (see, for example, Larsson 2016; Ahmad 2017; Chromium 2018; Tails 2018). Such tools can be distributed as a ‘disk image’ that can replace the system on a device, requiring dedicated hardware like a spare phone or laptop, or enclosed in a *virtual machine* that emulates generic hardware so that it can run within a variety of systems. The Tails operating system is currently the most well known and popular set of tools in this form.[60] In the case of a dedicated physical device, an approach then could be to choose a popular, well maintained, generic device that will already be well supported by a free software community, and indistinct from a large population of actual devices. Raspberry Pi is currently one of the most popular cheap computers.[61]

Cryptographic identity apparatuses

As noted, designer-researchers do not generally have sufficient mathematical or security software engineering training to make a meaningful contribution to cryptography algorithms or software libraries underpinning anonymous pseudonymity. However, cryptography and its relationship to identity exists within wider technical and social

60 https://tails.boum.org/.

61 https://www.raspberrypi.org/.

infrastructures that can be designed for. Key areas include: (1) interfaces and communication forms that reduce the creation of unintended signatures; (2) reputation infrastructures of trust that sustain accountability and that distribute the software; (3) adoption and use of software and hardware that provide network access and cryptographic processes, developing familiarity with those tools, and creating contexts and anonymity sets in which they can be regularly used; and (4) sustaining communities that create, audit, distribute and maintain cryptographic and communication tools. A focus emerged in this thesis on patterns of reducing authorial signatures and building anonymity sets and spaces for network literacy practice.

Reducing signatures of use is a cryptographic and software engineering problem, but it is also deeply embedded within social practices. The ability to disown or share an anonymity tool can be designed for, to make it more deniable. There is also an element of interface design in shaping anonymity tools for effective performances of rich pseudonyms, creative explorations or subtle critical practices. Interfaces can be designed to be more usable, and to reduce the risk of accidentally bringing two identities together (by posting into the wrong Twitter window for example (Chew and Stamm 2013)).[62]

Networked software consistently requires updating, and updating or not updating software creates a set of signatures. If a user is always the first to update software, this could imply a critical need to use it. Consistent, up-to-date, widely available anonymous pseudonymity identity design apparatuses is a significant design challenge.

Attempting to build publics of use has two strands, developing familiarity and experience with the agency of anonymity and identity design, and creating indeterminacy through spaces in which tools are regularly used so that there is always a commonplace reason to be using them. Designing cultural contexts of use also reduces scope for the tools to be delegitimised.

Designer-researchers can play a part in maintaining reputation, beyond the reputational tools of cryptographic signatures and processes of identity-authentication. There are interface design possibilities, in creating patterns or rituals of use over time to increase

62 In 'operational security' research this is referred to as "compartmentation" (Grugq 2017, para. 5).

usability, around the relationship of cryptography to memorising pass phrases, or carrying identity objects such as tokens or keys (Ceglowski 2017). Building and sustaining reputation may be designed within existing social network sites, placing anonymous pseudonymity mutualistically or parasitically within centralised cloud services – or if those are constrained, by turning to a growing number of projects developing more distributed forms of social interaction, search and communication. These decentralised software projects could benefit from design approaches to audience building and contexts of exploration and use. Pseudonymity may also play a role not only of characters or personas of communication, expression and publishing, but also in roles of publisher and editor personas, that bring together or develop a continuation of trust and reputation over time.

In the next chapter, the prototype design pattern of sticking together is set out as an intersecting superposition of identity design, networked public participation and designer-researcher practices that meet the design space requirements of anonymous pseudonymity for identity play. It starts, from the identified focus of reducing authorial signatures and building anonymity sets, by considering sticking together as an assemblage activity that produces an anonymising creative constraint on signatures, and as a collective assembly activity that sustains an anonymity set.

Chapter 5 – Sticking together

Fig.3 Floor of paper cut apart together.

> The floor is scattered with cut and torn fragments of images and text, discarded from a creative process that fills the CX lab. Formal, linear structures of images and text from the morning's powerpoint presentations and google doc notes are scaled, printed, cut, ripped, glued and taped into new orderings. We work as a group, with many smaller temporary collaborations in the making of images. The space is conducive to experimenting with the layout and forms we are making. Playful humour and messiness suggest an environment for challenging how and why ideas have been presented. Formal academic and organisational iconography and characters are juxtaposed and re-edited. Images and objects are assembled on the tables – alongside dynamic discussions of research ideas and projects – ready to be scanned and shaped into the digital pages of our research zine. The resulting publication is a shared production, the work of no one author can be pinpointed on any one page, either for praise or blame. (Zine Workshop$_{p.298}$ notes.)

This chapter explores and develops the intersecting ways in which sticking together can be employed as a prototype design pattern to make space for the identity play of networked publics. I first identified this design practice in my design conversations with the projects in which I participated, and then set out to experiment in iterative ways through further design projects and conversations to develop the concept into a design pattern. The chapter elaborates the theory of sticking together to make space for identity play in networked publics generated from this iterative exploration of collage and assemblage as material-discursive forms of identity design. This pattern is produced by reading together practices

of: (1) identity design; (2) networked public participation; and (3) Creative Exchange (CX) design-research.

First, after setting out how sticking together offers possibilities of enacting anonymity boundaries and exclusions, I examine how this assemblage is also a creative way of constructing reputational identity relations. I make links to anonymous pseudonymity as a historical tradition, and the role of assemblage in producing reputation and anonymity in these networks of identity design practice. Secondly, I explore ways to enable public participation in using assemblage for designing identity, through collective action of publics that stick together to make identity design commonplace, and sticking at it together to sustain that commons. Thirdly, I describe the ways sticking together is a design-research stance of collaboratively assembling prototype identity apparatuses within networked publics. The design pattern of sticking together means collaborating to make space for designing identity, through collage itself and by taking on responsibility for networked spaces of identity experimentation and play together.

Identity design

Sticking together is a form of identity design drawing on collage and assemblage, understood as intra-active processes of co-constituting meaning and context (Barad 2007). It offers the possibilities for anonymous communication and the negotiation of relations of role and reputation.

Anonymity patterns: Creative constraints and context collapse

Sticking together offers the conditions for anonymous communication. The anonymity of identity design depends on sufficient author agency to determine how new reputations remain unlinked from existing ones. Here I consider the anonymity possibilities of the *creative constraints* imposed by the collage process and the uses of the *context collapse* produced by the juxtaposition of disparate character fragments.

I first identified anonymising constraints in the ascii type of online pseudonymity (Sexton 2010; KIBO 1994), and the moveable type of print pseudonymity, and the 'commonplace' book conventions of scribal pseudonymity (North 2003). I explored the relationship of the moveable type printing press, and early internet and bulletin board system text art to

anonymous pseudonymity, in my ASCII-Key$_{p.290}$ sketches. The development of printing presses removed identifying scribal signatures, while emerging postal systems anonymised senders, distanced authors from their publishers and introduced some plausible indeterminacy (North 2003). Early electronic text-based telecommunication similarly constrained voice and other identity signatures (Turkle 1995). These technologies both constituted new publics and anonymity sets through increased scales of reproduction and distribution, while at the same time constraining identifying signatures through limited pallets of typography:

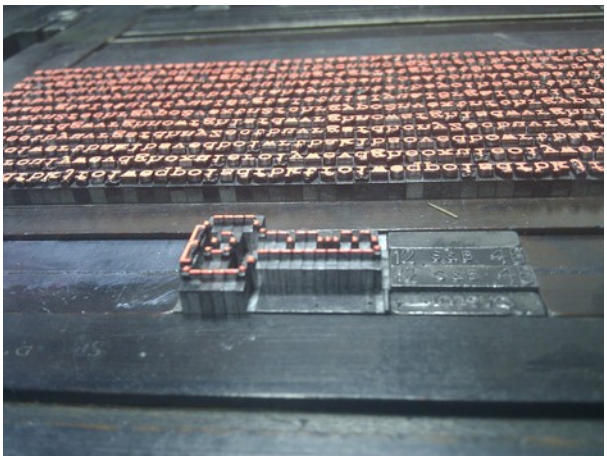


Fig.4 Printing an ascii-key experiment using a fixed-width typewriter-style font and early ascii art key image by jgs.

Communicating with a commonplace but limited palette (like a typecase of sort characters in moveable type or newspaper pictures in collage) offers a creative constraint which reduces unintentional authorial signatures:

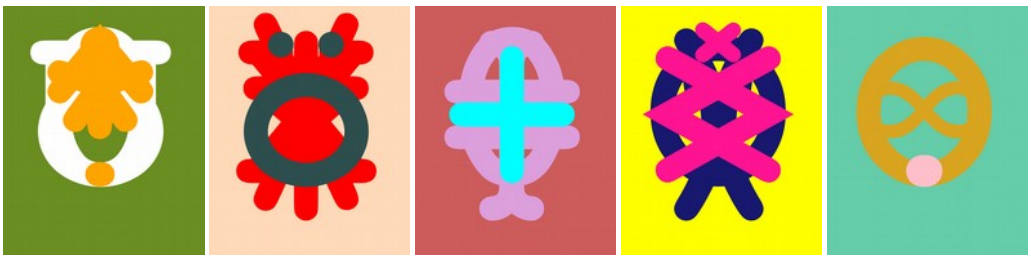


Fig.5 Experiments in mask making using memorable typographic forms and creative constraints. HTML faces made with layered CSS typography and default web colours.

Sticking together to mask an author signature is epitomised by the fictional cut-up ransom notes popularised by Arthur Conan Doyle in Sherlock Holmes. The anonymity of using widely available newspaper source material, the removal of signature writing style, and the

bold fragmented visual style help to entail the anonymity of the message. Readily available common palettes provide a publicly available default resource that is difficult to trace. Constraints limit the bandwidth of unintentional communication signatures:

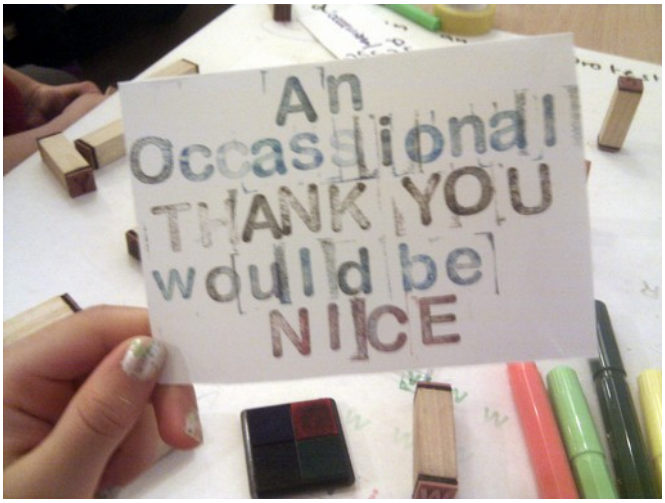


Fig.6 A placard written within the creative constraints of a stamp kit during the Elf Protest$_{p.302}$ *workshop.*

I experimented with the creative constraints of limited palettes of found and cheap materials intersected with ideas of costume and mask making I had researched. The found-materials of European Wild Man festivals documented by Charles Fréger (2012) link to urban camouflage and costuming projects, including artists RAMM:ΣLL:ZΣΣ and Lucy McRae, that I reviewed and responded to with Karen Martin$_{p.295}$ as part of our Crafting Urban Camouflage$_{p.295}$ workshop:

Fig.7 Charles Fréger exhibition in Liverpool where I first encountered the wild man costume tradition.

I experienced a vivid manifestation of sticking together a new anonymous identity in the making of my Barrow Woodwose$_{p.291}$ wild man costume. Through the constraints, my identifying signatures of movement, body and character were masked by the bold forms created:

Fig.8 Barrow Woodwose[p.291] *experiments over the week-long residency. Photos: Benedict Phillips*

Designing identity within creative constraints inverts the ways cloud social network sites impose their own constraints on how profiles and identities are allowed to be constructed (Ellison and boyd 2013). In Facebook and LinkedIn, for example, identity is curtailed into limited data entry fields in standard profile templates, in contrast to earlier MySpace and GeoCities design cultures (Lialina 2010).

The potential of creative constraints was further developed through the Tor Toys[p.318] project with a series of networked publishing objects that impose a creative constraint on communication. Each Tor Toy[p.318] prototype developed a medium of collage, assemblage or other constraint. My zine scanner adopted a traditional collage zine format. Other Tor Toys[p.318] designed in the workshops produced similar, potentially anonymising limitations. One Tor Toy[p.318] was simply a networked keyboard, limiting published output to a single long webpage of unformatted text like a pseudonymous newspaper columns or early internet post. One participant explored a text adventure game prototype that used the simplicity of early web text interfaces as a publishing form. A networked drawing tablet and networked Etch-a-sketch were proposed as single-function publishing constraints. The publishing forms accentuate their communicative and anonymising potential:

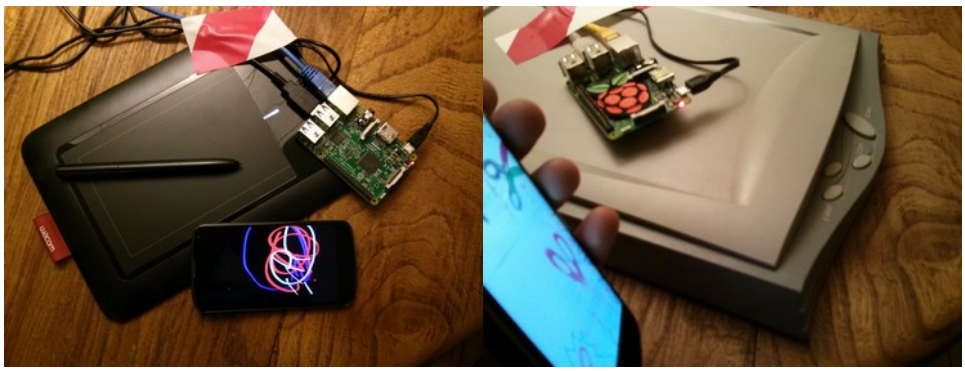


Fig.9 Drawing tablet and scanner Tor Toys[p.318] *prototypes.*

Creative constraints are also produced unintentionally. In the Chattr$_{p.294}$ project, we designed a heavy-handed surveillance architecture that mirrored the user acceptance process and subsequent identity publishing context collapse of services such as Facebook and Twitter. We offered visitors to the Chattr$_{p.294}$ cafe access to an eerily-titled 'enhanced social space' in exchange for agreement to a long obtuse set of terms and conditions that guaranteed Chattr$_{p.294}$ the right to record, transcribe and publish fragments of everything spoken by the visitors into a stream of text in the venue and online. Their talk was recorded, copied out by fallible transcribers and placed online as a single collapsed stream of fragments of anonymous text. This produced an unlinkable distance between the published raw text log of transcript fragments and the original conversation contexts, a creative constraint to which audiences responded by developing nuanced creative performances of identity and voice. Identity design in Chattr$_{p.294}$ was possible through the limited bandwidth of the Chattr$_{p.294}$ transcription and publishing process which reduced rich signatures of conversational speaking to anonymous written text. This allowed for collage identity forms and other approaches to taking on the network. One participant creatively responded to the constraints of unformatted, fixed-width raw text by assembling a text art$_{p.290}$ image by spelling out one letter at a time:

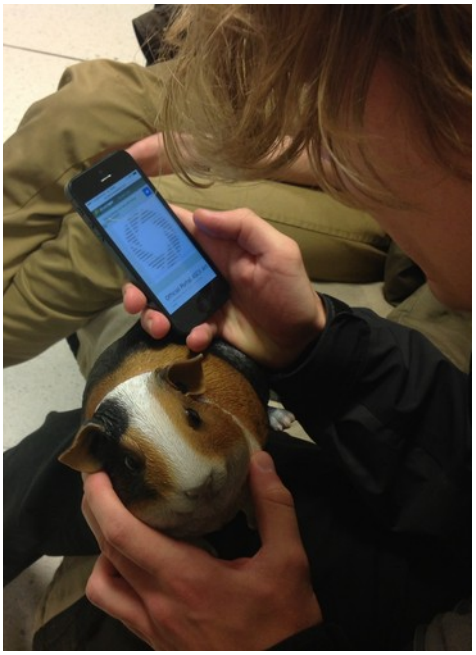


Fig.10 A Chattr$_{p.294}$ participant dictates a text art Aperture Science Lab logo to a recording object. Photo: Hwa Young Jung

Constraining identity data signatures by splitting messages into fragments and mixing

them together is also an anonymising approach studied in privacy enhancing technology design (Chaum 1981). In our Walk in the Park$_{p.319}$ project we explored the potential for public manifestations of personal data store identity through sharing collections of short snippets of personal data. These remain anonymous through the constraints on identifying signatures imposed by fragmentation and juxtaposition:

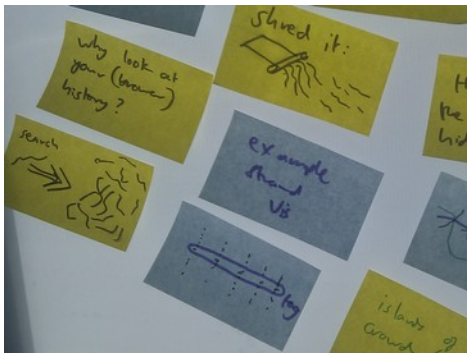


Fig.11 Notes from our early Walk in the Park$_{p.319}$ design discussions about anonymity through sharing snippets of data.

However, constraints in digital interfaces can be difficult for identity designers to stick to effectively. A scanner affords and enforces creative constraints that an unmodified mobile device camera does not, by limiting the framing to assembled elements on the glass. In the Desk Snap$_{p.300}$ app study, despite our instructions on intended use for the single function of capturing desk images, social norms of mobile photography such as participants taking selfies were still possible. Without a material-discursive constraint, other norms of reputation identification began to reoccur:

> I mean the one where [Participant B] took a picture of himself doing that, and that was surprising. I hadn't really thought about including me in the actual image. But I guess that was because he was using the Nexus 7, which only has a rear camera--, sorry, a front camera, sorry. So he had to look at the image. (Participant D interview in the Desk Snap$_{p.300}$ field trials)

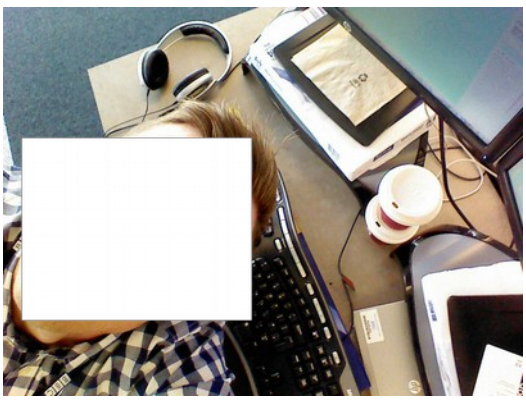


Fig.12 A Desk Snap$_{p.300}$ selfie by Participant B.

As I found in traditions of anonymous pseudonymity, it is only when creative constraints are unavoidable, like print limiting writing style (North 2003) or social norms preventing mask removal (Johnson 2011), that they provide authors and audiences with accepted conventions of productive ambiguity, leaving persona and author reputations indeterminate in socially acceptable ways.

In my material experiments with the Woodwose$_{p.291}$ costume, Tor Toys$_{p.318}$ zines and ascii-key$_{p.290}$ sketch, I observed the ways productive constraints produce anonymity, but can also become new authorial signatures that reduce anonymity as apparatuses of identification adapt to them. Processes of identification can counter the anonymising features of communication forms (such as the development of subtler stylometric feature analysis). As I noted while letterpress printing$_{p.290}$ mixing spot colour ink, the worn features of the moveable type and the hand spacing of typography all potentially introduced signatures of authorship and publishing:

Fig.13 The larger sections of a print typecase show the relative frequency distribution of common letters, which illustrates the mathematical signatures used to decode early encryption cyphers (Singh 2002).

The collaborative process of letterpress printing our designs, however, collapsed together our authorship signatures which introduced new potential anonymity.

The process of context collapse, the jarring juxtaposition that users of social network sites experience when algorithmic timelines collapse roles and audiences from multiple contexts together that boyd (2010) identifies in cloud identity apparatuses, can be inverted and used as an anonymising identity design method. The context collapse of juxtaposing multiple characters, genres, or authors complicates signature tracking.

Context collapse was utilised in the Return on Investment[p.316] proposal through re-recording many disparate public art stakeholder voices of the FACT gallery, of curators, international art critics, cleaners, local business owners, and families visiting the adjoining cinema, into a single consistent voice narrating a guide to the exhibition. This process collapses many voices to construct a new, single authoritative but fragmented narrative. More than just constraining their individual voice signatures, this process provides potential anonymity to individual contributors by sticking them together into the context collapse of an aggregate anonymity set.

The ways that audiences contested the public transcript publishing that Chattr[p.294] imposed included collapsing together multiple identities and roles (including the director of the FutureEverything[p.304] festival Drew Hemment):

> Oh haha, So what's gonna happen with the media? Oh I'm gonna play with this hahahaha.
> […]
> MY NAME IS DREW HEMMENT. That's such a juxtaposition like [muffled] beanbags. Yeah. It's gonna be transcribed and put online, but Ben was telling me you can choose to be anoymised. Hahahaha, so why is that guy doing an American accent now? With a hint of Korean! Hahahaha.

And a group of friends passing a single recording object between them, enabling play by collapsing multiple fragments and perspectives into a single anonymous transcript:

> […]
> we are sharing one guinea pig
> […]
> should we
> make a radio program for the guinea pig
> so who should we trash talk?
> who do we disappoint?
> I don’t know
> to bad talk and gossip about
> it’s not easy
> no no
> I don’t have any how is it called hate, hate mail
> no
> hello dear guinea pig, have you ever been felt
> […]

Meme images are often rapidly co-constituted through iterative digital editing and assemblage in sites of context collapse. The rich cultural productivity of *4chan /b/* is ascribed to the socio-technical imposition of stark constraints and mass of contextual contingency (Knuttila 2011). The visual language of anonymous online subcultures draws heavily on forms of digital collage that juxtapose contextual references. During our Data is Political[p.298]

project, I frequently saw photoshopping and remix in meme identity design, including examples that Peter Sunde showed from The Pirate Bay community and Gabriella Coleman showed from the Anonymous and LulzSec protests. The anonymous pseudonymity of older text-based digital spaces such as Usenet and, later, raw text press-releases of Anonymous and LulzSec, are dominated by text art formed from assemblages of existing memes and libraries of ascii art and typography:

Fig.14 Part of my sketch mapping the identity design histories of the LulzSec Anonymous group (featured in Frid-Jimenez 2012).

In this section I have looked at ways in which sticking together produces anonymity through forms that mask authorial signatures, unlinking author and designed reputations. Cutting up fragments like this acts to mask and constrain cultural expectations to connect up prior reputations. However, cutting up and sticking together is equally a form of creating and sustaining reputation with audiences. In the next section I discuss how sticking together constitutes identity relations.

Assemblage: Designing identities through sticking together

Sticking together is a form of identity design that negotiates relations of role and reputation through intentional combination and juxtaposition of existing fragments of character and communication. I initially identified the way in which individuals used assemblage to express and construct identity in the collaborative collages of a research zine-making workshop:

Fig.15 "On one page, we print a wikipedia image of a philosopher and gender theorist and use it to modify the fairytale image of little red riding hood. A background image of quantum diffraction patterns replaces the starry sky." (CX Student Gathering$_{p.298}$ field note)

Within the study of communication design, the many processes of sticking fragments together – including collage, photomontage, assemblage, bricolage, photoshopping and détournement – follow a pattern for making new expression and identity. Throughout my projects assemblage reoccurred as an approach to constructing identity and communication. The diverse histories and archives of collage and montage at the RCA informed my understanding of sticking together as an identity design practice, and my observations and experiments in collaged identity asked questions of the material possibilities of the form.

Cutting up and assembling adverts, magazines and newspapers inverts existing authority and character that audiences understand by making new connections and meanings. While my use of the notions of 'existing' and 'assembling' might suggest an assumption of stable, preexisting, separately determinate reputations and characters, I take an intra-active understanding in which sticking together juxtaposed fragments also reconstitutes the meanings and contexts from which they are taken. Following Barad (2007, 451):[63]

63 I focus here on the identity and communication design practices and actions of assemblage, common across a number of disparate design contexts and histories. I use Barad's conceptualisation to acknowledge the broader ways assemblage has been theorised and contested. Balsamo (2011) gives a further intra-active reading of assemblage in design, tracing its genealogy of use sociologically. The most prominent theorising of digital forms of assemblage is through the study of remix (Navas, Gallagher, and burrough 2015).

> assemblages are generally assumed to be collections of individual determinate objects. Importantly, apparatuses are *not* assemblages of preexisting, separately determinate individuals of one kind or another [but] intra-acting "components"

Collage encourages a reflective process of actively designing identities. Cutting up and pasting together commonplace communication forms allows narratives to be appropriated and reshaped. Familiar images and stereotypes provide a common language that designer and audience can share and understand. In the physical process of cutting and gluing images, collage represents a way of getting to grips with source material, finding new combinations and shaping new voices. Collage enacts the social construction of identity, in the ways voice and character are shaped out of arrangements of existing roles in culture and society. Sticking together collage epitomises designing identity as an explicit and active process of constructing a new persona and character voice.

Fig.16 Research identity zine[p.298]*. A zine workshop*[p.318] *participant's own zine. Students at the RCA modify advertising posters. A glossy magazine character*[p.300]*.*

While identity design is always grounded in influence, appropriation, inspiration, copying and reuse (Boon 2010), sticking together makes this process explicit by directly using the fragments of original voice and character.

Collage as identity design was explored further through my cultural[p.318] and research identity[p.298] zine making workshops. Participants were able to construct quick experiments using collage to edit and assemble a representation. We documented our meetings, discussions and practices in visual fragments of sketches, notes and objects. I looked for ways to publish our work-in-progress to the CX network using scanners to make networked documentation a simple, light-weight act. The assemblages were temporary, arranged on the digital scanner glass, captured and shared, and then disassembled for the next image. One researcher represented themselves by placing together images of research work, prototype artefacts and objects from the office:

Fig.17 An example of a quick visual composition by Ben Koslowski. A piece of office plant seems grow over the figures standing in an architectural design that fills the background of the research image.

Identity design through sticking together is not just found in collage. I observed identity construction in collections of objects and fragments where previously unrelated elements are assembled and drawn together, appropriating and combining meaning, tone, brand and aesthetics. In testing our prototype Desk Snap$_{p.300}$ app for sharing images of work desks, I found that freelance and hot-desking participants used assemblages of objects on their desks to creatively express identity and status to their networked colleagues.[64] Some items were intentionally assembled or rearranged on the desk for display, but even 'natural' desk spaces are organised or curated to construct certain structures and impressions of activity or focus. A half finished project and a book placed alongside a meal and cup of tea formulate an image of an individual situated in time, place and activity. These objects form an assemblage of signals some intentionally given, and some given off (Goffman 1959):

Fig.18 Sharing desk image status in the Desk Snap$_{p.300}$ prototype.

64 I will return to the role of objects in identity design in more detail in the next chapter.

Sticking together as identity design was also found in fashion, wearable technologies, masking and costumes of disguise[65] as in the Barrow Woodwose$_{p.291}$ costume inspired by the folk role and character assemblage design of masking traditions:

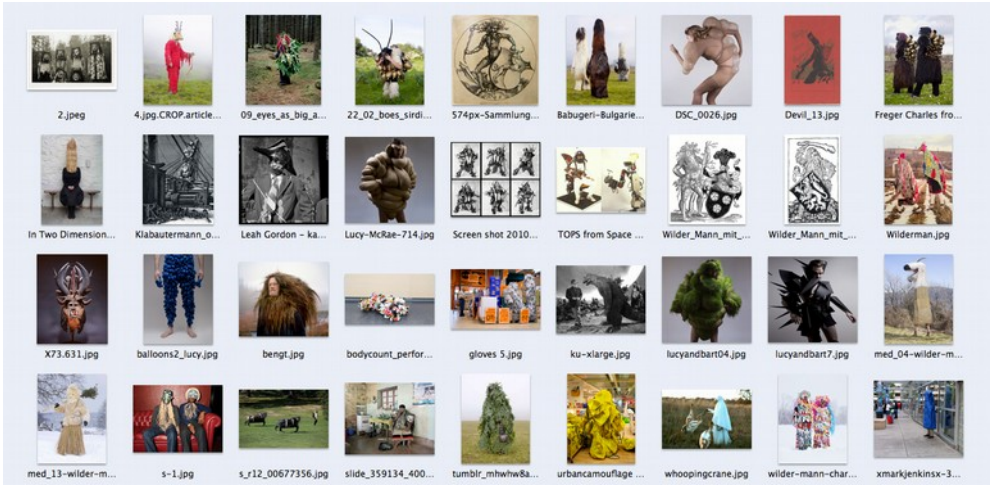
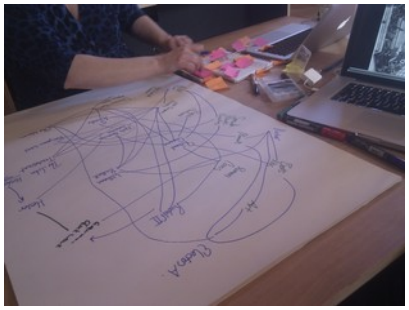


Fig.19 Screenshot of research references for Barrow Woodwose$_{p.291}$ costume.

I discovered that traditional forms of sticking together can be extended into digital practice. Digital technologies of collage can be made to replicate the ease with which paper cutting, repositioning and sticking can be done. I used paper assemblage in making designs, network mappings, and timelines, and then used digital approximations (including the Graph Commons$_{p.304}$ software of these processes) to add in algorithmic resources including search and automation:



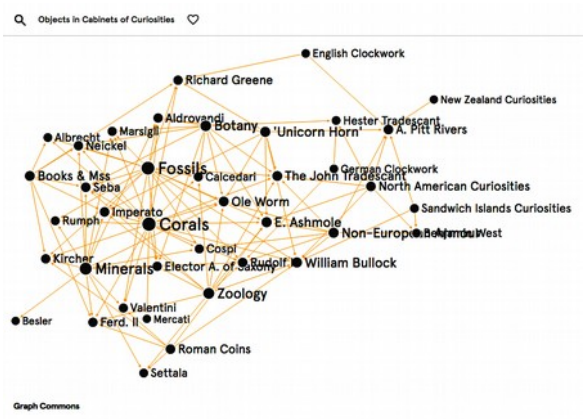


Fig.20 A workshop participant assembling graph networks on paper, and using digital Graph Commons$_{p.304}$ software.

My projects to explore the visualisation of personal data stores$_{p.319}$, and those that designed a curatorial or editorial role in radio$_{p.318}$ and gallery$_{p.316}$ forms, and in making mixtapes$_{p.312}$ and

65 The notion of fashioning is explored in Chapter 6.

personal libraries[p.308] also found participants producing reputation through creative assemblage. Through these projects I identified that key features are providing space to play with juxtaposed elements experimentally and the creative constraints of working with fragments of existing voices.

Entangling the juxtaposition of competing styles and signifiers of reputation in the CX research zine making workshop[p.298] led the designers to experiment with possibilities directly in the process of construction, rather than visualising an image or identity beforehand. One participant tore up a printout of computer code and layered under it a torn image of someone knitting. As they moved the two images together on the page, the knitting hand seemed to suddenly take on the actions of reworking the written code, evoking a new sense of weaving:

Fig.21 Fragment of a CX zine[p.298] page.

Sticking together can take forms including written text, fashion, sculptural objects, animation and computer-modelled environment. Sticking together encourages unexpected and delightful juxtapositions embodying the exploratory and creative aspects of developing a persona. In my projects and sketches, sticking together became a means of experimenting with processes of assembling and shaping expressions of identity relations, of reflection and public reputation construction. A critical dimension to these assemblages was their ongoing intra-actions and negotiations with publics of belonging and expression.

Resisting and inverting: Reputations and stereotypes

Sticking together offers forms of resistance and inversion. As I noted in my literature review, Turkle (1995) frames early internet identity creation as a form of resistance through exploration, criticism and building possible alternatives. Identity play often encompasses inversion or appropriation of gender, class, cultural and social roles (Taylor 1991). Identity design patterns are produced by, and produce the function of resisting and inverting roles of power.

The formal typography of a newspaper heading, or the glossy photography of a style magazine carry strong cultural narratives that can be played with and appropriated in processes of collage. Assembling and entangling fragments of stereotype and reputation challenge, invert and make claims on their authority. Through appropriation and juxtaposition, collage questions and experiments with the roles and voices of official identities and channels of communication, and can undermine reputation and dominant authority.

> In the printing press studio of the art college, we talked about stereotypes – the name for solid impressions that were copied from the original moveable type composition to a durable printing plate so that the same typography and image could be printed over and over again. The stereotype of printing – and the "cliché" sound the printing made – have become synonymous with the idea of a repeated image or notion. (print workshop$_{p.290}$ notes)

Fig.22 Discussing the role of printing press stereotypes in traditions of pseudonymity$_{p.313}$*, and an RCA press*$_{p.290}$.

Stereotypes have momentum as cultural norms of "collective representation" (Goffman 1959, 17) that makes them both useful as simplifying identity roles, and destructive as oversimple

othering, marking boundaries of belonging. In visual and written identity design, the stereotype represents an easily conjured and copied character, but working with such material comes with a responsibility not to reproduce dominant narratives unquestioningly (Adamowicz 2011). In the same way, Barad (2007, 383) notes:

> © is not a symbol of ownership of the right to copy, but rather of the responsibilities entailed in producing differences (for whom and at what costs?).

Cut-and-pasting stereotypes and clichés from popular culture form the basis of a common language with an audience. Sticking together makes space for trying on new reputations and authority. Identity design invokes and appropriates signifiers of belonging, authenticity and power.

In the MayDay Rooms'$_{p.308}$ activist literature archives I saw the political and communicative potential of self publishing. In my first Tor Toys$_{p.318}$ zine workshop I asked Teal Triggs to show examples from her collection of early feminist and punk fanzines (Triggs 2010) as the basis for our workshop prototyping how networked zines could be produced and shared. I took from her examples the diverse ways zine makers cut and paste together dominant images of stereotypes and aesthetics of authority into new narratives:

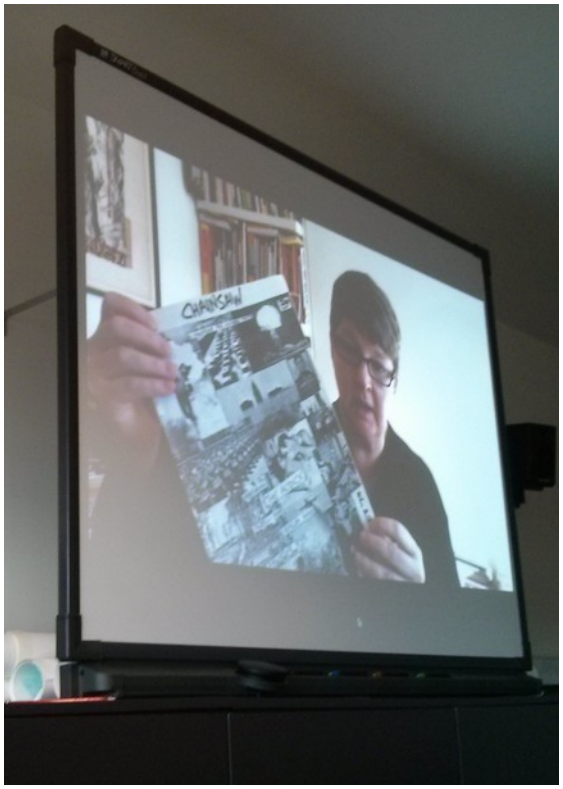


Fig.23 Triggs showing a copy of Issue 9 (1979) of punk fanzine Chainsaw during a Tor Toys$_{p.318}$ workshop.

Zines emerged as a focus of significance within forms of sticking together identity and communication. Zines remain – by definition of their form and cultures – spaces with limited centralised regulation, and with thriving readerships and communities of distribution. Much of the technology of production and publishing identifying as zines is still *by-hand* – through postage, fairs, scanners and photocopiers. That many zine makers resist publishing online, suggests that publishing spaces on the internet have remained largely unsuited to this particular culture of critical, contested publishing.

What zines demonstrated was that subcultures can act to popularise resistant identity communication practices, and normalise empowering publishing processes. Zines often epitomise the critical inversions of authority that collage can make (Triggs 2006). Importantly, zine cultures normalise DIY publishing socio-technical literacies, and suggested similar approaches to network literacies. One particular artwork example stood out in the zine makingp.318 workshop discussion: Hannah Höch's political collage *Cut with the Kitchen Knife Dada through the Last Weimar Beer-Belly Cultural Epoch in Germany* (1919). Her dadaist cutups reacted to her political context by constructing absurdist voices and mocking scenes along with varied and unexpected characters. The "kitchen knife" superimposes creative collage performed in the mundane DIY setting of the kitchen table with cutting feminist political critique (Adamowicz 2011).

In researching pseudonymity culture traditions, I identified ways that newspaper columnists, magazine editors and pamphleteers adopted character voices, constructed from stereotypes juxtaposed together (Taylor 1991). The authorial voices constructed under noms de plume were often several known character-types played with and re-edited to subvert the assumptions of the reader, and to hide the authors' own signature styles. These clichés were disassembled and re-edited to form engaging characters, often playing with roles of power and authenticity.[66] Bakhtin (1984, 81) describes such carnivalesque inversions as "topographical" work of turning inside out, such as the "reversal of the hierarchic levels" in which "the jester was proclaimed king". Barad (2007, 240) too conceptualises identity formations as "dynamics of changing topologies" in which relations of power are contested

66 Benjamin Franklin's Silence Dogood for example used a middle-aged widow persona juxtaposed with a humorous critique of the ruling power structures of British colonialism (Taylor 1991).

through ongoing "enfolding" and "(re)configuring".

Collaging contrasting stereotypical characters, visual forms and communication styles sharpens the impact of messages and audience curiosity. Sticking together like this takes the form of Debord's détournement (Debord and Wolman 1956), adopting and hijacking authoritative voices, contrasting simple, bold elements of popular culture and mass communication through juxtaposition with other perspectives and elements. In the Pinky show$_{p.312}$, a cute animated cat reminiscent of children's cartoons takes on the role and voice of educator and critically grounded political interviewer in a TV studio setting:

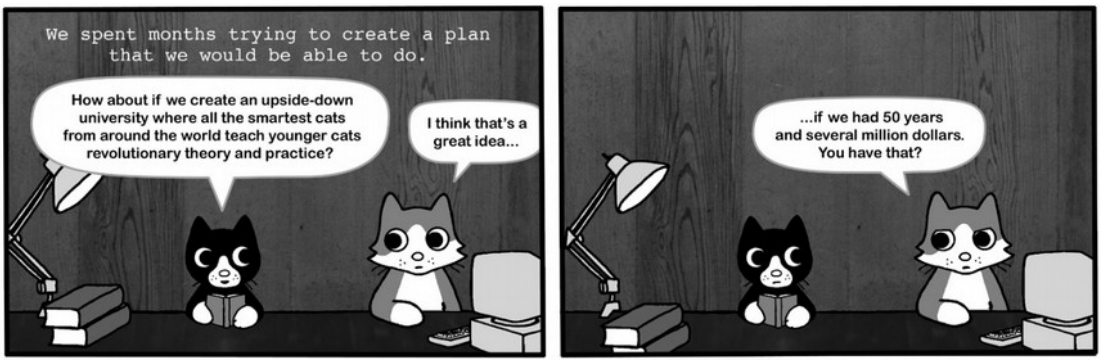


Fig.24 Excerpt from Pinky Show$_{p.312}$ comic by Pinky and Bunny (2013).

This juxtaposition helps the design of the character and to accentuate the points Pinky is making. As Pinky told me:

> I've tried to make *Pinky Show* pinky a good cat for communicating things we want to talk about - social analysis, culture, questions of good and evil, and so on. (interview with author, 2014)

Similarly the Institute for Applied Autonomy (IAA) described how they appropriated the visual identity design and communication style of DARPA (the USA's Defense Advanced Research Projects Agency) combining it with a critical arts practice and humour. They use design language and communication tools drawn directly from the brand identities and engineering audiences of sites of power to articulate critique. Both the Pinky Show and the IAA use forms of détournement in designing identities for pedagogic access to audiences:

Fig.25 Identity design of the Institute for Applied Autonomy (IAA) 1998.

In my own and my participants' explorations of ways of designing new identity reputations and pseudonymous relations, sticking together emerged as a creative process forming new constructions of identity involving resistance and questioning of dominant narratives. In the next section I discuss how sticking together is a form of anonymity that audiences can understand as honest and authentic.

Constituting audiences and authenticity through knowing fabrication

Designing identity anonymously entails simultaneously creating an audience and an authentic reputation in relation to one another. Sticking together is an iterative, experimental form of concrete thinking through doing (Turkle and Papert 1991) that also builds a documentation of process into the outcome. This form of communication design and character creation shows the marks of cutting and pasting, of imperfect combinations and abrupt juxtapositions. Sticking together is not seamless but read by authors and audiences together as a *knowingly fabricated* identity, as a shared signal of playful experimentation and hand-made honesty. These fabrications are not designed to deceive, but as playful intra-actions with audience and reputation, what Johnson (2011, 97) calls an "honest mask".

Knowing fabrication through sticking together leaves the seams and patina of construction on show. In traditional collage this is the rough cuts or tears, the imperfect positioning, and glue or tape marks. Similarly pixel imperfect photoshop hacks imply a work of assemblage and playing with existing elements. Being seen to be playing around with materials and identity can conceal critical exploration, mocking satire, and social transgression (Zobel Marshall 2016).

Fig.26 Material seams on show. Animated data sketch of a data growth$_{p.311}$*. Zine research identity*$_{p.298}$ *crop. My Bio Futures*$_{p.292}$ *pet prototype.*

When I remade a prototype of David Shield's assembled quotes book Reality Hunger for an

Editorial Design Group$_{p.301}$ sketch, I assembled original pages from books that I quoted, some glossy magazine pages, some high quality hardback bound archival paper from respected publishers, some cheap pulp paperbacks, bound together one after the other to put on show the disjointed affordances and statuses of source materials, to make concrete the joins:

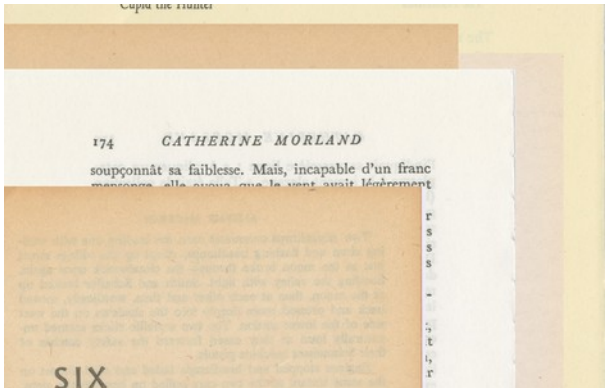


Fig.27 Reality Hunger-inspired sketch for Editorial Design Group$_{p.301}$ layering original book pages.

Forms of knowing fabrication were also common in historical pseudonym use. The humorous combination of styles and names left seams on show (Clarke 1977; Taylor 1991). Authors chose noms de plume that signify that they are fabricated identities.[67] Anonymous pseudonyms can draw in audiences and develop intrigue as people try to discover who the author can be, if they are invested in the characters and content over time (North 2003). Knowing fabrication invites intrigue as a form of "personal promotion" (North 2003, 104) and audience building, or sign of "discretion and nonchalance" (North 2003, 105), and marks it as distinct from the restrictions and requirements of other forms of identity construction.

In the Memory of the World, Marcell Mars showed me how he allocates algorithmic names, produced by combining historical library figures, to participant librarians. These pseudonyms stand out from modern day names, marking them as knowingly fabricated and intentionally anonymising.

An anonymous persona has a level of protection that can encourage cutting honesty, and grow audiences around this heightened possibility of critique and mockery. However, the audience must know that the persona is an anonymous creation and must come to trust

67 Names like Isaac Bickerstaff, Tom Folio, Ned Softly, Silence Dogood, Tomo Cheeki and Sut Lovingood all wear their fabrication openly, the name and writing style often juxtaposed for further effect (Taylor 1991).

their voice and characteristics over time. The Pinky Show used knowing fabrication in video essays, pseudonymous names and visual identities. In 'behind the scenes' images, the audience are invited to share a sense of knowing fabrication that emphasises both the intentionally constructed reality and seriousness of the cartoon characters. Parody and familiar humour are used to signal constructed identities, trust and authenticity:

*Fig.28 An image from the Pinky Show*p.312 *'behind the scenes'.*

During our Modelling Digital Public Spacep.309 CX sandpit, Neville Brody showed his collaborative design of the Facebook identity Rad Hoc that uses this language of knowing fabrication in the profile picture to signify an identity that sits apart from the reputational expectations and functions that civic names and identities serve in social interaction and public governance:

Fig.29 Rad Hoc, a collaborative Facebook identity shown by Neville Brody.

The knowing fabrication of sticking together inverts the seamless proposition of the cloud.

In the study of digital infrastructures Chalmers and Galani (2004) and later Vertesi (2014) argue that seamfulness draws our attention to the way that technologies are constituted, in contrast to the seamless experience design of ubiquitous computing (Weiser 1993). Seamfulness is not just a kintsugi[68] celebration of repair and history, but a knowing infrastructural inversion (Star 1999) of creative identity play and network literacy.

Beyond inverting dominant authoritative styles and roles, the creative constraints of seamfully sticking together develop into expressive stylistic forms of their own. In many mask and costume traditions – including the European woodwose (Fréger and Wilson 2012) – the assemblage styles became aesthetic forms in addition to parodying roles of power. Some zines recreate a cut-and-paste glue and tape style as a vernacular form or exclusive argot. In production techniques from photocopy zines to photoshop memes, I observed that grunge (Triggs 2010), glitch (Moradi and Scott 2009) and post-internet (Cornell and Halter 2015) visual styles are all conducive to seamful acts of sticking together.

The knowing fabrication prevalent in pseudonymity traditions rejects the perceived dishonesty of deceptive fabrication. Reputational systems are undermined by suggestions of dishonesty. Designing identity that appears to be a pre-existing legal person can be disorientating to an audience if then revealed as fabrication (Donath 1999). Some forms of identity fabrication are deceptive, including fraud, "astroturf" lobbying (Stauber and Rampton 1995, 79), espionage, undercover journalism and policing, and we do accept deceptive fabrication in some cases of organised crime infiltration and in witness protection programs (Marx 1999). But most designed identities are presented as authentic knowing fabrications using characters constructed with signifiers and conventions of their fabrication on show.[69] Deceptive fabrication also becomes seemingly necessary if there is no crowd to be lost in, such as within an authoritarian regime with only a limited anonymity set (Scott 1990).

In our Crafting Urban Camouflagep.295 workshop, participants made their experiments in algorithmic invisibility costumes acceptable in public spaces through the knowing

68 A Japanese tradition of highlighting the repairs to cracks in valuable pottery with gold.

69 The word 'deception' in some pseudonymity literature (Van Kleek, Murray-Rust, et al. 2015) is at times confusingly used to encompass all identity fabrication however knowingly produced with an audience.

fabrication seamfulness of performance, art and play. Grappling with the tensions in social expectations of identity and deception, they first tried umbrellas and hats as temporary shields from face tracking surveillance (that are acceptable if seen to be unintentionally concealing identifying features)[70] and then employed overtly designed wearable costumes and objects:

Fig.30 Crafting Urban Camouflage[p.295] *workshop invisibility umbrella. Body shape and limb count modifications for algorithmic invisibility.*

My woodwose costume[p.291] performances invoked a tradition of identity play in festival masking that audiences recognise as fabrication. However, knowing fabrication needs an

70 Veils and hoods on the other hand, have been drawn into both bureaucratic and social debates about deception and trust often loaded – in the UK, for example – by prejudices of racism and classism (Suterwalla 2013).

accepted context and audience, as out of place it too is mistrusted as deception. Experimenting with wearing costumes in public made me uncomfortably aware that such identity play needs collective participation or a context marker to normalise it. A carnival character needs a carnival within which to function and communicate. This highlighted the necessity of providing a context – like our New Cloud Atlas$_{p.309}$ mapping walks – to *make commonplace* the patterns of collective transgressive play that emerge.

Like other anonymising processes, sticking together an identity can be involved and complex to coordinate. Space can be made for collective knowing fabrications by making it more commonplace: through access to tools of anonymity that offer greater control for the identity designers to maintain a separation of reputations and by normalising forms of collaborative identity play and performative context collapse.

Networked public participation

In the first section I have set out how designed identities are constituted by and constitute the relations and exclusions of cutting apart and assembling together. Sticking together reconfigures relations of reputation and audience, and at the same time, exclusions of anonymity that contest signature tracking and legitimacy. Identity design by networked publics is not only collaboratively constituted with audiences, but is also dependent on participating publics to sustain anonymity sets of practicing identity designers, tools of cryptography and apparatuses of reputation. To make space for public participation, sticking together emphasises solidarity and sustainability, and makes a form of anonymous pseudonymity commonplace through collective assembly.

I have already described how constraining identity design to a palette of commonplace materials increases the *potential* anonymity set of possible authors who could have used them. However, the anonymity of a sole public costume performer (as when I was wearing the woodwose costume) is unstable and temporary, as there is no participant crowd in which the lone performer can be hidden or take off their mask. A small active anonymity set of identity designers leaves them with little space to practice complex anonymity that is inherently prone to error, without even the attention that this itself draws:

Fig.31 My lonely carnival character in the Barrow Woodwose[p.291] performance. Photo: Benedict Phillips

The awkwardness of a small anonymity set – of being the only or one of few using an anonymous pseudonymity tool – was something I first noticed during the Crafting Urban Camouflage[p.295] workshop. It was the extravagant forms of body modification by the participants that were most effective against automated identification and tracking by computational surveillance systems, but also most likely to grab attention from humans in a public space. I continued design conversations about awkwardness with the materiality of anonymity tools through my experiments with the woodwose costume. I felt very awkward and conspicuous, drawing attention to myself, on-view and under pressure in public. Not used to the costume, I felt uncomfortable and unstable in my body and worried parts might fall away. It shifted during wear, so for a time my eye holes were almost blocked. My peripheral vision was constrained, and my hearing muffled, which reduced my ability to experience my actions within the social context. The feedback loop of being aware of my own performance within a space was constrained. Wearing a costume without practice or context has similarities with the experience of network anonymity tools.

My workshop explorations of using Tor as a networked anonymity technology evoked similar experiences. I saw how the slowness of the anonymised network connection, the text-only communication channels of some anonymity tools and the access limits to

creating and using established social networks, all acted to reduce a situated feedback loop. Furthermore, these technologies were not familiar everyday tools, but rather uncomfortable to use with many possible ways of making mistakes and failing to remain anonymous. As with the feeling of being the only costume performer in the park, I noticed a theme of guilt in the Tor workshop participants about why they were "resorting" to a tool of anonymity, rather than a sense of creativity, usefulness, altruism, normalcy or fun required to develop and sustain anonymous identity design practices and spaces.

Making identity play commonplace

Building a large enough anonymity set to make anonymity tools effective requires a form of solidarity building in which a public sticks together that I conceptualise as *making commonplace*.[71] The solidarity of collectively practicing the anonymity of identity design collage makes it more commonplace, encouraging legitimacy and access. This inverts framings of exoticism and illegitimacy applied to pseudonymity and takes on the claims of legitimacy network clouds make.

The Tor Toys$_{p.318}$ project is an example of building ordinary uses and audiences to foster plausible indeterminacy. I experimented with whether Tor anonymity software could be normalised as a public commons of personal networked communication. I observed examples of using Tor in earlier workshops, where it both invoked guilt of illegitimacy, and was made more ordinary when we all used it together. An overall use of play and experimentation is able to hide individual critical needs.

We installed the software called Tor on a Raspberry Pi computer during a family workshop$_{p.304}$ on making 'smart' garden gnomes and open data. To the families in my design team for the day, Tor represented a quick and easy way of making a web page from inside their gnomes, for free. It was full of possibilities of triggering fart noises over the network when the compost bin is full or viewing the garden over the internet through a gnome's eyes. One participant described setting up a Tor webpage as "a bit like doing a tiny Minecraft Server".

71 I use the term commonplace here with reference to the collectively authored "commonplace books" of assembled writing and quotes found in the rich coterie cultures of early modern anonymous pseudonymity (North 2003, 162) as well as the senses of the word in meaning normalised and abundant, and as suggestive of a form of situated common good.

I installed the Tor Browser for a Design Without[p.300] crit, to view a website I had made. As Tor offers a means of stripping away some identifying features when accessing or hosting a web page, it offers a potential means of anonymous access to web information. In the crit, the conversation almost immediately turned to illicit uses that are seemingly made more available by Tor: the recreational drug market Silk Road, and more sinister popular tales of paedophilia, weapons, spam networks and organisers of terrorism. I noticed participants expressing nervousness to even use the Tor browser, as if they could become entangled with this image of the 'dark net' by association. Arguably the technology has been tainted with potential guilt.

In another workshop, for my Tor Toys[p.318] project, we followed the steps to set up a Tor *.onion* web site. Again, I observed participants (and myself) employ a framing of mischief and guilt, that the service deserved to only be used for illicit acts. Anonymity sits at the centre of social narratives of superheroes and super villains (Dalton 2014). It represents the stark possibilities of hidden identity, for acts of good or bad seemingly without social repercussion. In the words of one workshop participant, "I don't feel I need it yet", as if the act of seeking anonymity alone can itself mark out an individual as worthy of suspicion.

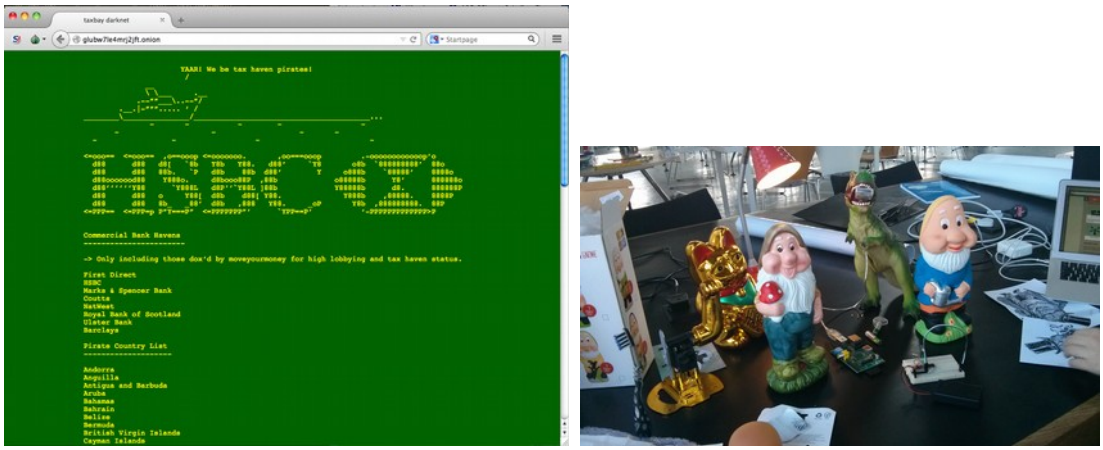


Fig.32 A Tor .onion website sketching[p.300] a 'deep money' taxbay prototype. A prototype gnome[p.304] Tor server.

With increasing signature tracking, the encryption and networking apparatuses of anonymity such as Tor are coming to be a prerequisite of designing identity in networked publics. However, seeking out and using the identity tools of encryption and steganography is an isolating experience and one of feeling guilty by association. Sticking together, aggregating many simultaneous identity designers, helps to create a large enough

anonymity set, entailing solidarity and collective mutualism. Making space for identity design must therefore seek to demarcate cultures of anonymity separate from dominant media narratives of the illegitimate, and present alternative forms of responsibility for anonymous reputation and access as commonplace. In order to build larger anonymity sets of network-literate Tor use requires crowded, popular spaces in which to be lost,and normalising play with tools of anonymity. There are comparisons between the arduous and conspicuous feelings of my performing in the lone woodwose$_{p.291}$ costume and the arduous and conspicuous feelings of my participants during the process of installing and using Tor:

Fig.33 A frame from the video recorders I carried during my Barrow Woodwose$_{p.291}$ performance showing the moment I was putting on my mask.

The carnival contexts in which identity play flourishes suggest similar patterns are required within which to practice Tor anonymity.

Public framing of legitimate discourse plays a role in how audiences grow and the sorts of reputations that can be sustained in these spaces. Carnivalesque spaces can take on subcultural authenticity to establish audiences, claim legitimacy and embolden participation as audiences grow. Identity apparatuses of public cryptography are

delegitimised as transgressive and subcultural.[72] Stallybrass and White (1986, 80) describe the contesting in carnivalesque spaces in material-discursive terms:

> Patterns of discourse are regulated through the forms of corporate assembly in which they are produced. […] Each 'site of assembly' constitutes a nucleus of material and cultural conditions which regulate what may and may not be said, who may speak, how people may communicate and what importance must be given to what is said. An utterance is legitimated or disregarded according to its place of production and so, in large part, the history of political struggle has been the history of the attempts made to control significant sites of assembly and spaces of discourse.

Sticking together means committing to collective acts and processes of anonymous pseudonymity to make them commonplace, through collectively experimenting with designing identity. In this pattern, space is made by providing easy access to the resources of identity design and undertaking identity design in large enough numbers to embolden members of a group.

An environment in which most participants are merely playing with the tools of identity construction creates a space for those with more critical needs to go unnoticed. I saw this pattern in the accounts of historical mask wearing in Venice, with most maskers recognisable to friends through social cues, but with potential to be hidden under hat, cloak and mask when needed (Johnson 2011). My Masked Soapbox$_{p.308}$ project created a public space, on a street in Leeds, and online in a Youtube account, for playful experimentation with masked performance. People performed songs and jokes, shared wisdom, spoke heartfelt messages, and left personal notes. Like a carnival, the Soapbox$_{p.308}$ made space for masking for a circumscribed time. During the street recordings, masks were used but were often removed before finishing, making them a performance, rather than anonymity, aid. However like Johnson's (2011, 8) accounts of empowered romance under cover of masking in Venice, the use of masks by many produced the opportunity for anonymity if need be.[73] People were drawn to the soapbox while others were recording, but showing the full extent of the anonymity set of recordings in the space itself may have emboldened further performance or evolving types of uses. A common use of the system by people playfully testing the format, as I also observed in the Chattr$_{p.294}$ cafe, provided the crowd in which

72 This subcultural standing of cryptography produces a dedicated technical audience for whom 'pirate' and 'hacker' retain an authenticity, while driving away other potential audiences.

73 Examples included intimate messages (https://www.youtube.com/watch?v=29zl439U080) and protest statements (https://www.youtube.com/watch?v=05e80FKO6sw).

those in greater need of an anonymous pseudonym could be hidden:

Fig.34 A singing masked performer with the public streets of Leeds behind them, during Lightnight, where the Masked Soapbox$_{p.308}$ was situated.

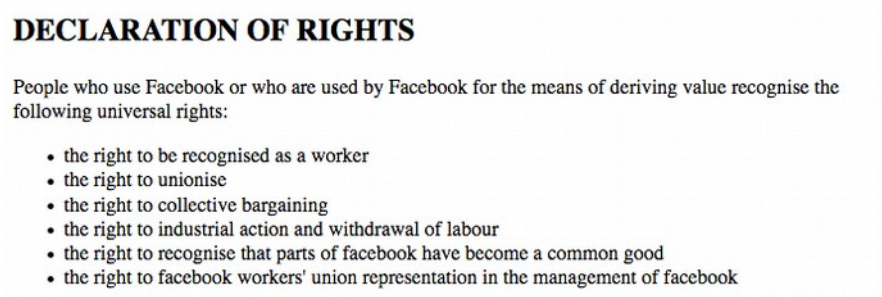
Making the possibility of anonymous identity design commonplace is a collective activity. If enough people engage in experimentation and play this makes space for other forms of designing identity. Choosing to stick together sustains these spaces. Yet taking on the network – taking part in making space for the collective potential for anonymity and resisting models of constant tracking – is not a neutral act. As discussed earlier, continuous identity logging increasingly dominates many business and governance models in digital publics. The designers and users of spaces for identity design may find themselves challenged by centralised social networking, commerce, authentication and regulation monopolies.

At the CX PhD symposium$_{p311}$ design research event, we discussed the frustrations of working with authenticated and restrictively-controlled walled gardens as both designers and users. We drafted a social media users union for those who use Facebook and other centralised networked publics. One participant highlighted the cost of individually acting against the momentum and network effect of sites like Facebook:

> as Facebook shifts from a commercial enterprise into a 'service' embedded in people's everyday lives we recognise that to individually withdraw from Facebook means to suffer social and informational poverty and is no longer a viable option

Acts of withdrawal and disobedience in social networks and communication tools have the potential to disrupt social, business, family and friendship interactions, especially for those not taking part (Brunton and Nissenbaum 2015; Van Kleek et al. 2016). In networked spaces in which identity is continuously written, shared and 'liked' into being, ceasing to post is like ceasing to exist.

Using framings of both parody and serious consideration of how collective bargaining might be initiated with cloud services, the group drafted a *hidden.workersunion.org* declaration of rights:



DECLARATION OF RIGHTS

People who use Facebook or who are used by Facebook for the means of deriving value recognise the following universal rights:

- the right to be recognised as a worker
- the right to unionise
- the right to collective bargaining
- the right to industrial action and withdrawal of labour
- the right to recognise that parts of facebook have become a common good
- the right to facebook workers' union representation in the management of facebook

Fig.35 Our hidden.workersunion.org[p311] *website screenshot.*

The challenge of making the potential for anonymity commonplace is finding ways of distributing, teaching and motivating collective participation in the cumbersome processes of encryption and networking.

The Tor Toys[p.318] workshops drew on zine practices to explore how expertise in publishing might be made more commonplace in digital networks by exposing technologies of design, web hosting and computer administration to participants. The Tor Toys[p.318] project creates reasons to use and experiment with Tor that are not related to critical uses of anonymous pseudonymity (such as a whistleblower, sex worker, or risk-taking cutting edge novelist). In addition to normalising an encryption tool, Tor Toys[p.318] also fostered literate use of the complex technical steps required in learning about the underlying systems and the creative constraints that are part of an anonymity preserving practice. Regular use of anonymity tools for 'non-essential' reasons creates a protective community – a larger anonymity set – around those that depend on more necessary uses of anonymous identity design. Such an outcome requires a populist and widespread use of the project. Some patterns identified in subcultural settings, zines, maker spaces and art practice, may be at odds with more popular up-take:

Fig.36 I still found myself invoking subcultural images like pirates to frame the Tor Toys[p.318] project at times.

The setting of the Tor Toys[p.318] workshops – an art gallery lab about zines, a maker space and co-location office, and in collaboration with a family workshop on smart cities – allowed consideration of intended appeal. In framing the networked objects as toys or zines, I evoked a DIY approach to playful experimentation. The appealing benefits of using the Tor network in the workshops is free, simple web hosting without need for a registration process or payment. The possibility of using the Tor Toys[p.318] for anonymised communication can be seen as merely a by-product of the DIY web hosting it offers. By shaping the networked objects as playful DIY publishing platforms to make zines, publish micro-blogs, or learn about the web I explored how to foster communities of users. If a large anonymity set of publics play with these tools, being caught up in the playfulness provides indeterminacy. Trying out anonymous pseudonymity tools as a regular activity enables other critical and creative uses to be passed off as playful experiments:

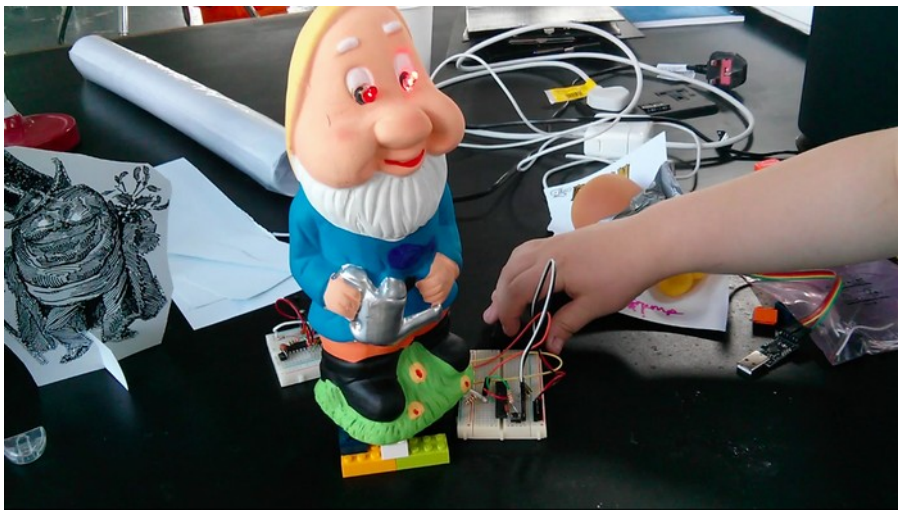


Fig.37 Playful Anywhere's Gnome Street Gnome[p.304] workshop fostered an exploratory normalising space for network literacy practice.

Practicing identity design because it is more commonplace in turn makes space for developing network literacy. Normalising access to tools can be achieved through distributing them as standard. Designers making space for identity play culture can make tools of anonymous pseudonymity more commonplace on the computers that people use rather than waiting for individuals to seek anonymity software and processes at moments of critical need. I explored ways to distribute anonymity enabling tools like Tor and GPG[74] encryption software more widely in my Bundle Publishing$_{p.292}$ design conversations. My resulting design was to include these tools as an incidental feature of a monthly magazine-style publication, thus making them available to a large crowd of potential users with no one person needing to show interest in downloading them.[75]

Networked software is an ongoing project of improvement, bug discovery and security updates. Accurately and regularly installing updates is addressed in centralised cloud-based app stores through automatic updates. In more distributed systems[76] like open anonymity tools, updating can be more arduous, and differences in the timing of updating can leave software insecure, and mark out users with distinct software version signatures. Through the Bundle Publishing$_{p.292}$ design, I explored these challenges by adding the constraints of a regular publishing schedule so that each month all audience members received any security updates and the versions they were using synced. I also adopted a collaborative bundle distribution model, like the BBC's own early iPlayer prototyping (Ageh 2014) that Ageh and Thompson described to me, that uses BitTorrent to collectively share the bandwidth and trust negotiations of distribution while encouraging the anonymity set of a short, intense release period.

Free and opensource software models of publicly developed technologies present the possibility of public accountability and collective commons. It inverts the military-industrial cloud models dominant in China and the USA. My own design choices followed many of my

74 GNU Privacy Guard (GPG) is a free-software replacement for the Pretty Good Privacy (PGP) encryption tools.

75 Additionally, I examined ways of building the use of anonymity tools into the editorial process of receiving or contributing to the next bundle, which would also make the use of the tools more commonplace.

76 I say 'more' as downloading and installing software also depends on centralised forms of trust and identification to prove the source validity, encrypt the files as they are transmitted, and compile and install the files as intended.

CX collaborators in employing free software and open hardware as tools to serve a number of purposes, including drawing on sustainable communities of potentially accountable infrastructure and commons. I developed our Chattr[p.294] and Desk Snap[p.300] apps using the Apache-licensed Cordova mobile development framework. My noPayPhone[p.311] prototype was developed using the Debian free software operating system and a GPL licensed implementation of bluetooth hands-free connectivity. Similarly, the Bundle Publishing[p.292] model focused on using and distributing free software as an accountable resource. While contributing to free software can be a daunting and often technical and expert process within political and contested public spaces of their own, the projects nevertheless offer a model that enables the possibility of collective contribution (Coleman 2013). My projects and those of my participants rely on such potential for accountability to ensure trust and resist hostile actors (Van Kleek and O'Hara 2014, 21).

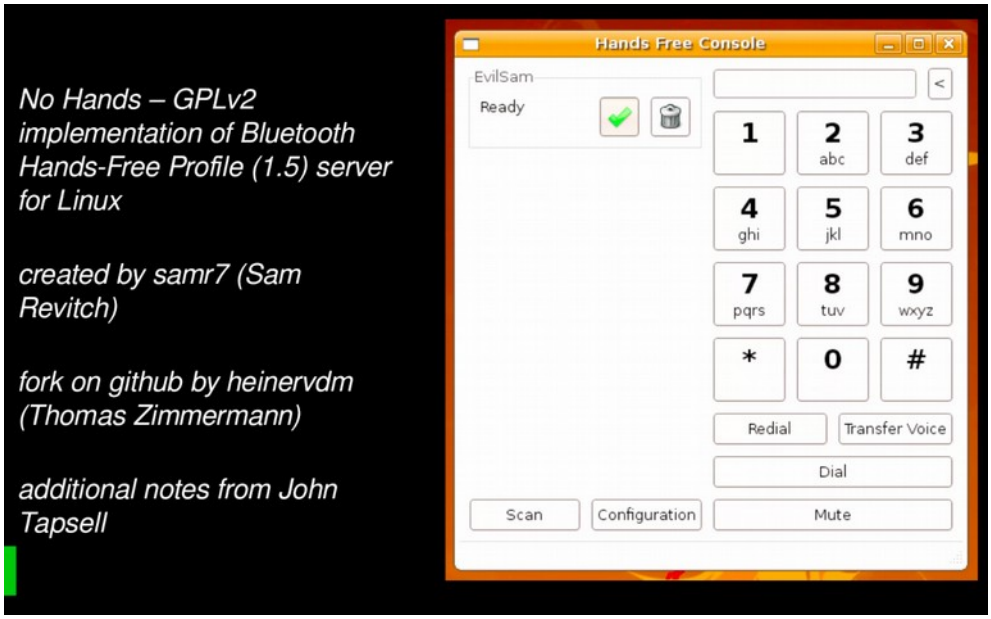


Fig.38 My slide[p.293] showing the free and opensource software I used to connect a computer to mobile phones using Bluetooth Handsfree mode.

I had noted in Marcell Mars' Memory of the World[p.308] project the use of the notion of the public library to re-normalise ideas of free public access to published materials in online contexts. Mars follows efforts such as Ubuweb, Archive.org, AAARG and Monoskop to build online libraries of educational and arts topics, to position their archiving, annotation and book scanning as building public commons. This contests narratives of piracy:

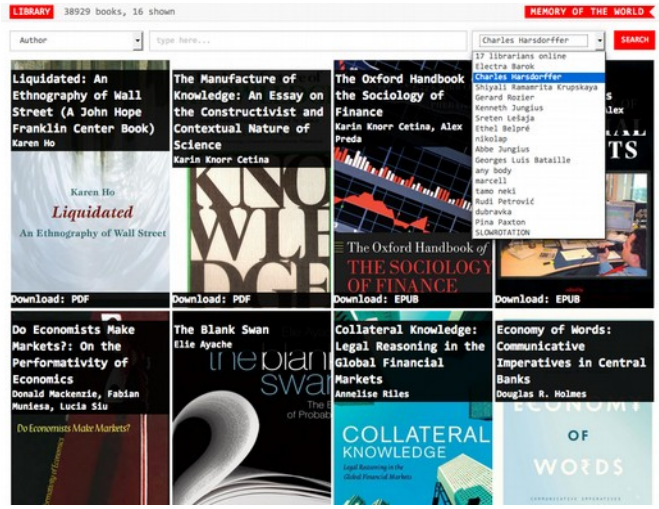


Fig.39 A public library collection within the Memory of the World$_{p.308}$ *website.*

In contrast, I found the Pirate Bay[77] (Peter Sunde, Data is Political$_{p.298}$) celebrates a pirate themed subcultural framing that the movie and music industries have also cultivated. The Pirate Bay wears a piracy label as a carnivalesque badge of honour. It uses a language of memes and pranks to speak to a large enough subcultural audience to sustain the distributed load of the file sharing. This approach is effective in building a popular following of users, but also acts to position ideas of cultural archives and commons back into the illegitimacy of 'dark web' narratives.

Fig.40 An image from Peter Sunde's discussion of the Pirate Bay: "We always considered Pirate Bay to be some sort of art piece [...] So we use that as some sort of defence".

A sense of sticking together emboldens group action and experimentation. Using existing subcultural norms (like art walks or zine fandoms) make this easier but limits audiences to that subculture. Sticking together as small communities, groups, workshops, friends, and subcultures, can provide permission and reassurance to each other in resisting or

77 A large directory listing and search engine of popular culture its users share through the bittorrent infrastructure without the permission of the publishers who have control of the copyrights granted.

transgressing aspects of networked identity apparatuses. In the Crafting Urban Camouflage[p.295] workshop, this took the form of fostering playful resistance to identity tracking technologies. Group activities can provide small models for wider audiences, allowing responses to be tested. The participants in the workshop played the role of public observers, providing a feedback loop of commentary, laughter and iterative development on ideas:

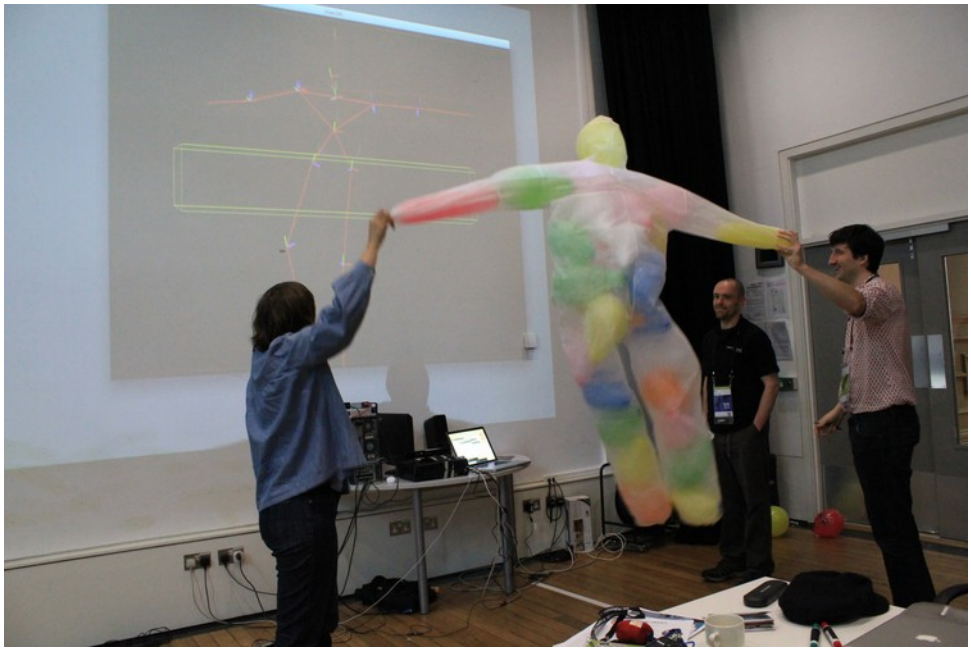


Fig.41 Laughter in the workshop[p.295] was a way of gauging social norms and showing playful resistance.

Making emboldened collective critical action more commonplace produces environments for contesting identity apparatuses and interrogating assumptions and structures invested in them. An art walk is a familiar structure for providing permission for a group of people to undertake activities different to normal social roles and functions in public, without providing explanation to others (Andreotti 2002). In the New Cloud Atlas[p.309] walks, a group helped to encourage transgressive behaviours. On the walks we found ourselves undertaking a range of increasingly less subtle actions. The language, methods and culture of dérive and psychogeography (Andreotti 2002) helped to shape the approaches of the walks, and to embolden participants to take the time to inspect and investigate internet telecommunications infrastructure. We appropriated a language of visual cues and behaviours borrowed from tourism tour guides, urban gaming and official inspection to structure and legitimise the actions of our group walks:

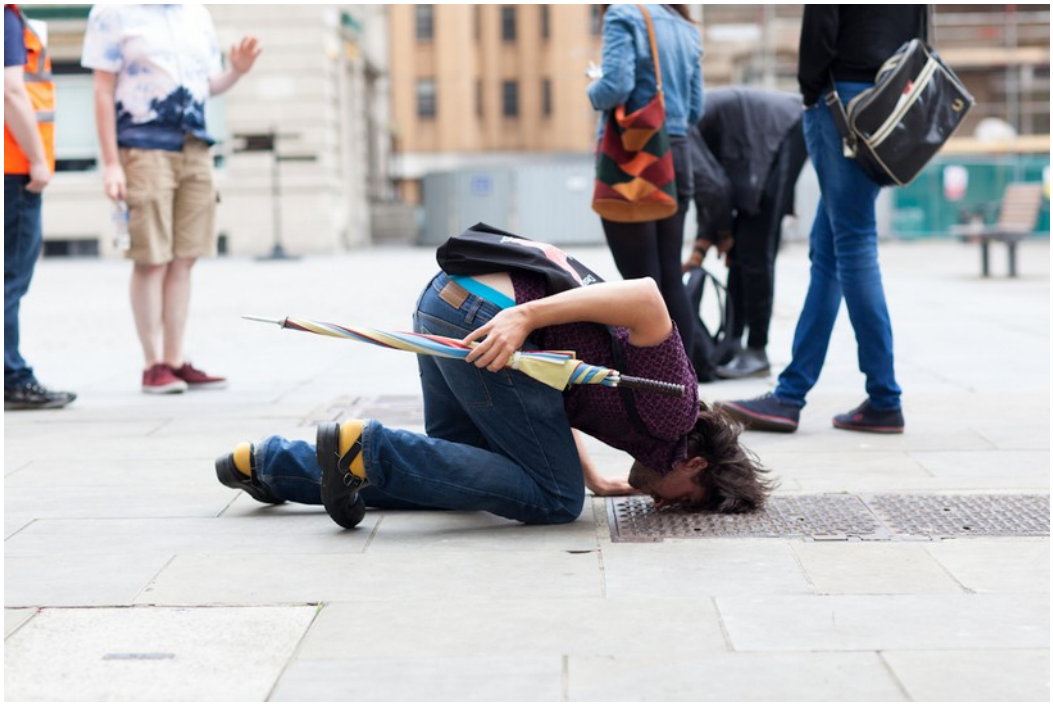


Fig.42 Our emboldened New Cloud Atlas[p.309] art walks. Photo: Loura Conerney

In the Elf Protest[p.302] workshop at FACT, families explored roles of hidden labour conditions and protest in the manufacture of Christmas. These hidden characters were created in the legitimacy of a family workshop and were introduced by the workshop audience into the gallery and cinema space, helping to reveal the staff and infrastructures in the building working behind-the-scenes to produce a winter festive experience:

Fig.43 Elf Protest[p.302] with the Minimum Wage Machine artwork by Blake Fall-Conroy installed in the background.

Fig.44 Gallery staff co-working space break. Slide from talk by Sam Meech[p.318] on the cost of giving an artist talk.

The subcultural voices and organising structures (including art, fandom, and political protest) I observed in my research, acted to energise collective action. Such subcultures can foster network responsibilities and practices of sticking together (Jenkins, Ito, and boyd 2015). However, building anonymity sets through subcultures can be limited through dismissal and stereotyping by wider public discourses. The noPayPhone[p.311] made space for identity ambiguity as a by-product of its primary function as a public telephone service common good. By positioning the phone box as a common good, the potential for anonymity, deniability and clouded identity data were by-products of volunteering to support a public infrastructure. It made contesting the identity logging of a network apparatus more commonplace.

In this section I have described the ways that sticking together can be understood as a form of collective assembly and solidarity that sustain identity design practices and apparatuses of reputation and anonymity. Collective action can also take on and resist the opaque, unregulated practices of cloud identity dossier building, not only through the context collapse anonymity of collective identity design, but also through more active contestations of identity data.

Designing identity collectively

Inspired by the experience of participants working on collaborative zine processes, I explored further forms of communication for collective identity design. Collaboratively designing an identity together, as with other forms of creative context collapse, can resist identity signature authentication that attempt to extract records of authorship. Collective collaging is well suited to collaborative identity creativity because the process can be done together:

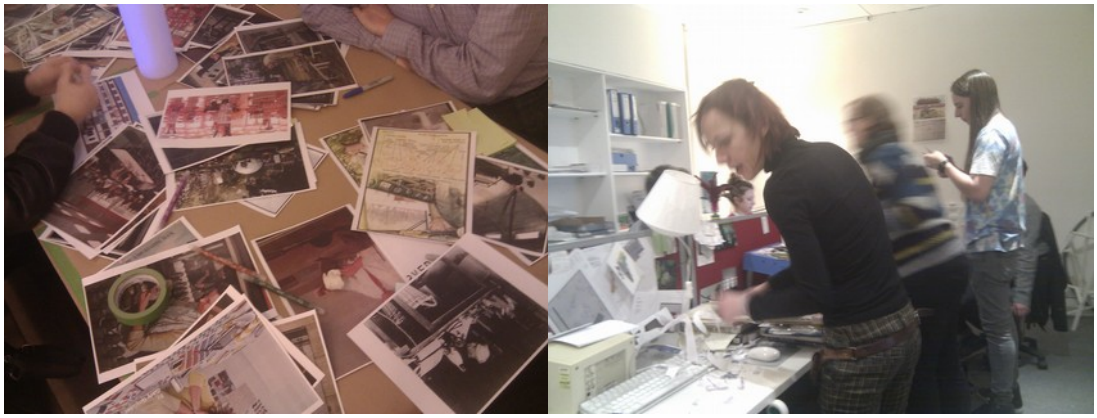


Fig.45 Collective table-top editing during our Hidden Labour[p.305] *workshop. Collaborative zine making during a CX workshop*[p.298].

Collective identity design can incorporate several motivations: performance and public critique, as in the work of the Janez Janšas[p.306], or anonymity, such as the attempt to direct attention to collective work rather than individual reputations in the work of mathematicians who wrote under the pseudonym Nicholas Bourbaki (Guedj 1985). In both these examples the group are exerting collective agency over existing identity systems:

Fig.46 Nicholas Bourbaki (Guedj 1985) collaborative pseudonym.

I developed a prototype collaborative Twitter editor[p.300][78] as a crit sketch[p.300]. Its rudimentary sharing of the social media site interface suggested paper-collage features that a digital collaborative editing space might adopt, including a cache holding-area for prepared fragments, a drafting area for assembling work in progress, a scratch space for rougher ideas, and a chat space for coordination and discussion. Such stream communication, in which elements of media are assembled into a list, are well suited to collaborative editing, as they can be asynchronously contributed to, with streams added to behind the scenes and

78 Using Mozilla's web page sharing project TogetherJS.

editing choices of multiple authors combined into an assembled collage identity and voice. Playlists and timelines use common stream-of-media forms of collaborative communication:

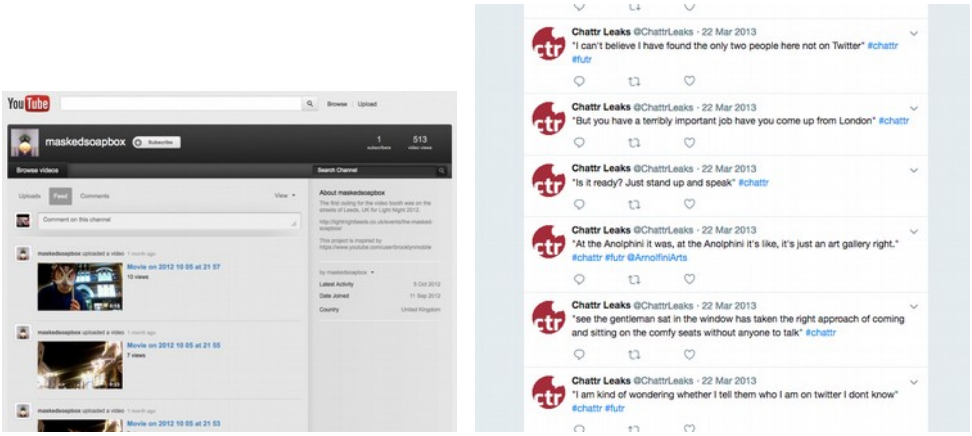


Fig.47 Masked Soapbox$_{p.308}$ *Youtube account. Chattr*$_{p.294}$ *Twitter stream.*

In our BBC Connected Studio Place Playlist$_{p.313}$ pitch, I designed forms of personalised playlist[79] that can be mixed with ideas of collaborative editing and negotiation. The place playlist investigated how to plan and experience events and locations in a space like a city or festival by ordering the experiences as a walk and timetable. It considered how a collaborative playlist model, such as in shared party music, might work as an interface for an iterative, negotiated shared journey and experience planning. In the Masked Soapbox$_{p.308}$, a linear timeline of posts constituted a 'voice' through serendipity and interaction of life on the street, in a rough form of collage. My Syncing Clouds$_{p.314}$ event used a backchannel for nominating video content for a live-edited video lecture. Suggestions of Youtube and Vimeo videos to play were tweeted by the audience to the Syncing Clouds$_{p.314}$ account in-real-time and were loaded into a shortlist interface. In our Hashtag Radio$_{p.304}$ designs, the radio studio model itself is considered as a basis for collaborative communication. This included a mixing interface for moving between and layering media fragments, and a structure of discussion in programs and themes.

Social data chaff

Data chaff is a collective form of anonymity agency in which a public can cloud their reputational relations from centralised data models if they stick together. It inverts a

79 Inspired by the Echonest and Spotify music recommendation playlists.

dominant cloud model that obfuscates centralising network and business practices behind opaque corporate identity design. Algorithmic identity tracking is susceptible to distraction and confusion by publics collectively producing decoy data chaff. Collective fabrication of data chaff creates obfuscation and clouds mass identity tracking.

I proposed *data chaff* (Dalton 2014) as a term for the clouding of data logging systems through collective actions of data fabrication in my projects. Producing data chaff is part of what Nissenbaum and Brunton (2015) call *strategies for obfuscation*. If enough people collectively disrupt or distract algorithmic logging through the fabrication of data they can create a window of opportunity, making space for identity design. This approach of sticking together is analogous to techniques of chaff, in which a cloud of metal strips can be used to confuse radar tracking systems (see Brunton and Nissenbaum 2015):

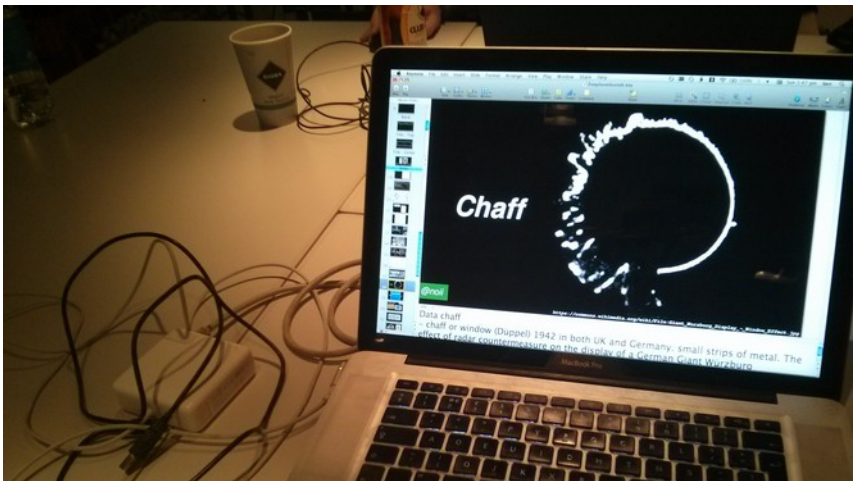


Fig. 48 My slide$_{p.293}$ *showing the effect of radar window, a form of metal chaff that obfuscates radar tracking.*

The Chattr$_{p.294}$ project produced an unexpected form of resistance to tracking. The design constrained and therefore anonymised publication, and with a large enough audience, a space was created for identity play. I observed how audience disobedience resisted the explicit surveillance context, often through humour and anonymity. This playing around worked to explore the way that the system works, and as a publicly visible gesture of resistance to the project's dystopian apparatuses. Sticking together to employ a strategy of obfuscation en masse can be an effective form of collective resistance.

Algorithmic identity logging depends on hidden design assumptions that shape how the data is collected and interpreted. The most effective forms of networked disobedience are

those that draw wider attention to the mechanisms of tracking and logging and to the intentions or implications of the totalitarian identity apparatus, with little impact on socially positive uses of the networked publics (Dalton 2014; Brunton and Nissenbaum 2015; Van Kleek et al. 2016). The noPayPhone[p.311] inserted unexpected phone call metadata of strangers into the call records of those who volunteered their phones to support the free phone box prototype. This disrupts the customer modelling undertaken by many phone companies. As most customers do not see their phone bills as valuable marketing data, provoking a company in this way forces them to remain silent or draw attention to their identity data practices.

The Elvis is in Everything[p.302] T-Shirt project explored an approach to producing data chaff to disrupt face tracking. Newton, Sweeney, and Malin (2005) describe how pixelation or blurring a face leaves intact many of the key features used by face recognition algorithms, despite no longer being easily recognisable by a human observer. This suggested that other images might also be selected that contained algorithmic features of face recognition, while remaining unrecognisable as a face to human observers:

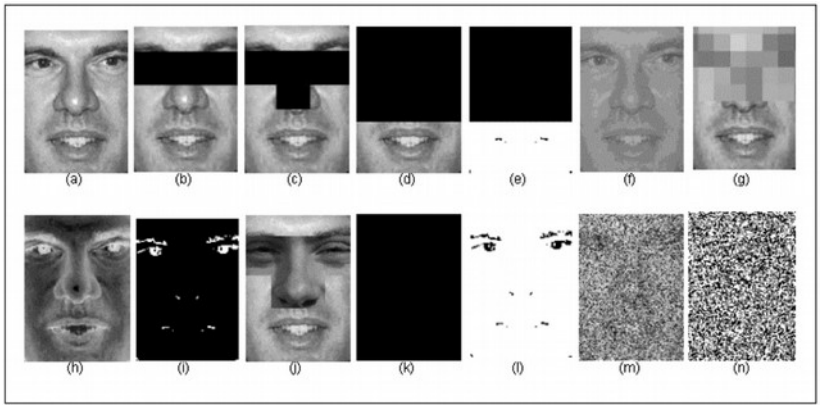


Fig.49 "Ad Hoc De-identification Methods do not Thwart Face Recognition Software", of these examples, only 'blackout' anonymises (Newton, Sweeney, and Malin 2005).

From this, I developed an approach in which many such decoy faces were generated using a face recognition system for the RCA research biennial[p.321] exhibitions. I proposed that these algorithmically-detected face images be printed on to t-shirts (for popular take-up) and scarfs (inspired by Metahaven's use of silk scarf fashion prints (Hellqvist 2011), and the potential for high-fashion desirability). If these could be distributed to a wide group of participants wearing them, the face hidden in the t-shirt images would regularly appear in

any face recognition algorithms susceptible to the fabrication, and potentially be blacklisted into invisibility.[80]

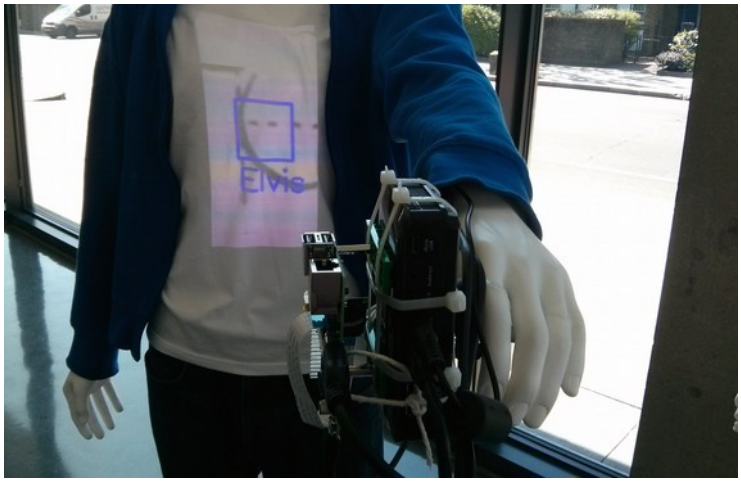


Fig.50 A projected t-shirt design$_{p.302}$ image displaying the face that has been detected within the decoy chaff.

Data chaff takes on and inverts power structures of corporate cloud obfuscation. For our Data is Political$_{p.298}$ presentation at the Sensuous Knowledge$_{p.316}$ conference, Amber Frid-Jimenez, Joe Dahmen and I identified techniques of obfuscation employed as business and structural strategies by cloud corporate and governance structures through definitions of beclouding and models of corporate clouds. It is through projects of exploration that such models can be identified and subsequently inverted through design patterns.

At Prototho$_{p.315}$, we made a browser that types questions into the search box whenever the user is not looking (and starts to delete them whenever they look back), generating data chaff hidden from human view. Examples like Tracenoizer (Rüst et al. 2001) and subsequently SuperVillainizer, similarly insert algorithmically-generated data chaff into communication systems:

> The net art project Tracenoizer[.org] is designed to undermine any assumptions of search reliability by using visitors' names to generate plausible – but false – homepages for them. (boyd, Chang, and Goodman 2004, 2)

Patterns for making effective data chaff algorithmically include using a large corpus of existing source material and using forms of randomisation, like adding 'salt' before encryption (Morris and Thompson 1979). The Elvis is in Everything$_{p.302}$ T-Shirts project

80 I have been inspired in my experiments on algorithmic face anonymity by the work of Adam Harvey and his contribution to my Crafting Urban Camouflage$_{p.295}$ workshop as a guest speaker. Subsequently, following our further discussions at FutureEverything 2014 about my Elvis is in Everything$_{p.302}$ project, we both developed projects printing algorithmically recognisable faces (in his case, eigenface-like Hyperfaces) onto fashion items (Hern 2017).

explored algorithmic data chaff by drawing on archives to generate random fragments of image that can trigger face detection erroneously. Algorithmic data chaff runs the risk of being just as easily removed by algorithmic means. By comparison, something like the practice of supermarket loyalty card swapping (Green 2002), introduces a form of *social* data chaff where people's actions generate the spurious data. Similarly, the confusing metadata of strangers' phone calls in a volunteer's phone bill are a form of social data chaff in the noPayPhonep.311 telecoms project.

A process of designing the Elvis t-shirtsp.302 using found image fragments rather than pixelated or blurred copies of the face, allowed for each image to be visually different, potentially resisting algorithmic detection[81] and produced a range of t-shirt styles to suit a range of fashions. A series of public pop-up shop events were used to distribute the t-shirts and develop a sustainable model of covering production costs. However, without mass collaboration, this form of data chaff is not widely spread and remains of limited value in terms of disrupting face tracking systems:

Fig.51 The sign accompanying my pop-up shopp.302 selling data chaff t-shirts.

81 The t-shirts are limited as a practical form of resistance by the instability of face detection in such found images printed flat on deformable materials like fabric, and developments in robust face detection such as with 3D models of face form and other features of face 'liveness'.

The collection and processing of identity data can be disrupted through generating additional data chaff, false positives or extraneous records, and it can also be confounded by removing data points. The Janez Janšas$_{p.306}$ project merged the identities of three artists and a politician into a single, official identifier causing collisions of identification logging. Both the Janez Janšas$_{p.306}$ and Elvis T-Shirt$_{p.302}$ projects explore the potential for an identity to be adopted by a group or community to contest the authority of a tracking system.

While data chaff focuses on clouding identity data collection and use, the pattern of sticking together equally takes on the network through making constructive forms of cooperative responsibility and ownership commonplace. Taking on the network entails striking a balance between resisting newer, overly restrictive cloud forms of identity authentication, while taking responsibility for traditions of sustaining common network apparatuses. Resisting network forces requires the formation of organising institutions, and collective coordination to generate crowd assemblies of identity design.

Designer-researcher practice

In asking what my role as a designer-researcher is in making space for identity play, I understand digital public space as iteratively produced (and contested) through intra-action. I have identified assemblage as a collaborative design-research practice through my projects, and sticking together as a way of understanding the productively entangled agencies of networked identity apparatuses and publics. Sticking together is a stance that my collaborators and I used and can use to make space for identity design as a form of anonymous pseudonymity play. It recognises that the "intra-actively emergent 'parts' of phenomena are co-constituted" and "effect what's real and what's possible, as some things come to matter and others are excluded" (Barad 2007, 393). The stance acknowledges our mutual constitution of spaces of identity play within publics, and our roles as designer-researchers with an intention to enact cuts in networked identity apparatuses to make public identity design possible. Our roles are intentional and authorial design and research ones, yet emerge through "an agential cut that cuts together-apart (one move), differentiating-entangling" (Barad 2017b, 78). As such, designer-researchers (but not just designer-researchers) can enact boundary cuts that make spaces and apparatuses of

identity play possible, and must do so from within and as part of networked publics so that "responsibility entails an ongoing responsiveness to the entanglements of self and other" (Barad 2007, 394). To stick together, then, is “to do collaborative research, to be in touch, in ways that enable *response-ability*” (Barad [2012] 2017, 155) as a practice that enables networked publics of study to respond.

Sticking together operated at several levels of practice within the CX. It is a form of identity construction that allows for active and critical character design and communication by publics, and also a process of collective assembly and design-research assemblage that offers a means of developing material-discursive apparatuses in which such identity design is possible.

In network infrastructures, sticking together draws in components, technologies and systems just-in-time (J. Ito 2016b), not only for prototyping rapidly, but as the primary means of building effective identity apparatuses within the dynamic topology of the network. Identity apparatus software and hardware is predominantly assembled from component parts (particularly free software and open hardware). Because of the specialist complexity of cryptography, the designer’s role within anonymous pseudonymity technology projects is best suited to assembling existing software libraries and tools, as exemplified in my Tor Toys$_{p.318}$ project.

Sticking together systems and tools is a form of design research that seeks to connect many disparate elements and competing desires within networked publics to create new experiences and practices. My research practice in the Tor Toys$_{p.318}$ project explored commonplace tools such as the Tor network software, Raspberry Pi hardware, Twine text adventure system, web tools like SSH, document scanners and usb storage. These systems are stuck together with "computational glue" (Suchman 2011, 9) using software scripts, patch cables and plastic zip-ties. I explored how to design contexts of use to encourage publics to engage with complex set-up instructions.

In designing with encryption technology, the approach of assemblage is not only a viable and desirable approach for the designer, but the only option. The anonymous agency of identity design entails the use of encryption tools that are themselves shaped by complex

material-discursive negotiations with mathematical properties, software development cultures and powerful stakeholders. The designer could attempt to contribute as a mathematician or computer programmer to these enormous projects, but design skills are better suited to taking these tools and communicating them or designing with them as a pallet of possible actions. The assemblage of elements as a design process extends the reach of the designer-researcher, allowing them to build on existing technologies and practices. It offers a way, as with sticking together identity, of leaving the seams on show, to reveal the technologies of construction which encourages a public critical engagement with the technology itself.

In the construction of objects and systems, sticking together implies an everyday craft of making (Murray and Hand 2015) rather than fetishised maker culture (Csikszentmihalyi 2012). Sticking together privileges the hand-made, permitting legitimate action without full access to professional apparatuses, leaving gaffer duct tape, zip ties and glue on show. In digital systems, I identify sticking together with scraping data (ScraperWiki 2016), scripts and plugins that dominated my and my participants' prototyping processes:

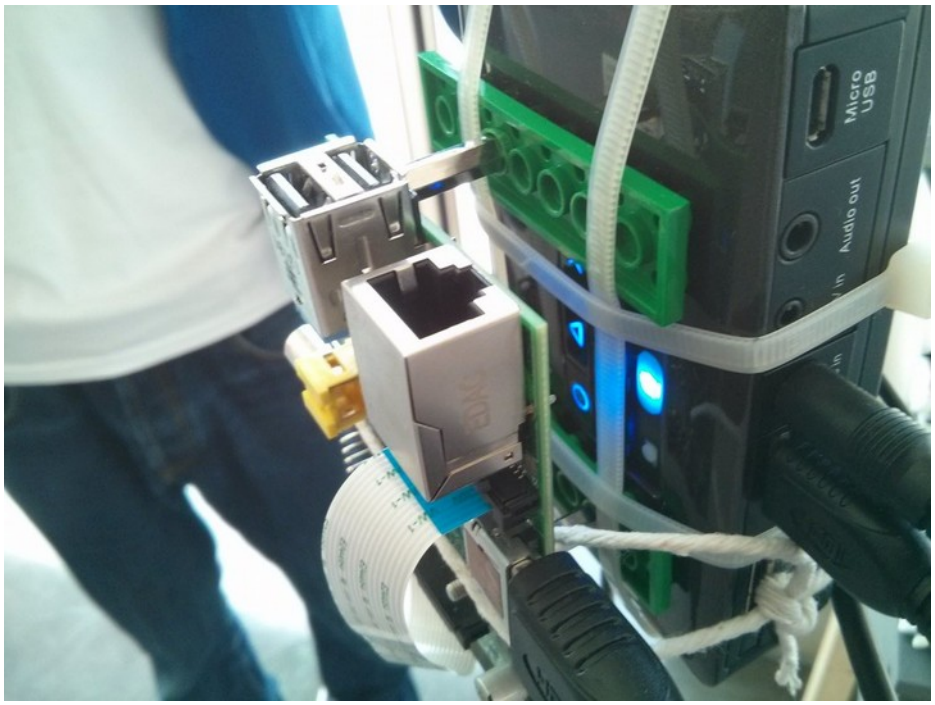


Fig.52 Elvis is in Everything$_{p.302}$ *prototyping stuck together with lego, zip-ties, string and kits.*

As I discuss further in the fashioning belongings chapter, the challenge in such a rough-and-ready technical context is to strike a balance between DIY empowerment and

overwhelming complexity. Exposing too much detail from too many systems and tools at once acts to drive away all but the most dedicated users of a new prototype. In the Tor Toys[p.318] project, the design goal was widely useable toys that encouraged informal and casual use by a large crowd, but many of the instructions and steps were still off-putting to generalist users. Parallels can be drawn between sticking together as a form of identity design and sticking together as a form of design research in shaping the contexts in which this can happen. Zines, for example, embody a DIY ethos as part of their aesthetics, often including instructions for audiences to become more active participants, collaborators or producers themselves (Marcus 2010).

Many technologies are already assemblages under the seamless veneer of polish and interface. The development processes of companies like Apple or Google assemble technical components and systems often through 'grass roots' projects and prototypes, and 'release early, release often' development cycles. The Linux, Unix and BSD systems on which much of the web and computer device technology is built is the product of a free and open source assemblage ethos and approach that connects together small parts that do something well to make more complex systems (McIlroy, Pinson, and Tague 1978). Indeed the 'hackday' development model – of drawing together expertise with a toolkit of system components and technologies – reflects the ethos of rapid, bricolage development as an effective form of innovation.

This chapter has set out how the different meanings of sticking together – as forms of assemblage, collage, solidarity and cutting together-apart boundary making – can be superimposed to produce a design pattern for identity design, networked public participation and design-research practice.

The chapter described the anonymity agency that sticking together offers through creative constraints and taking on context collapse as a design practice. It showed the ways that collage and assemblage were forms of reputation design and communication for my research participants. It concluded the identity design section by describing how collage can perform carnivalesque inversions of roles and reputations through cutting up and sticking together stereotypes, and the authenticity and relation with audience that knowingly

fabricating identity constructs. It moved on to examine the ways that sticking together was a form of networked public participation required for indeterminate anonymous pseudonymity and for sustaining identity design apparatuses and spaces for learning and practicing this identity play. It described how requirements for making identity apparatuses commonplace emerged from my projects and participants, particularly as forms of normalised public commons. It offered examples of how collective public assembly and growing anonymity sets can actively contest signature tracking. Finally, the chapter concluded with a discussion that draws a connection between the cut up assemblage and collective assembly of sticking together and an intra-active interpretation of the role of the designer-researcher in cutting together-apart within apparatuses and phenomena of identity to make space for identity play in networked publics.

The next chapter looks at the pattern of fashioning our own belongings – how to make network objects into belongings that embody identity design agencies, constructed through material processes of connectivity and making, which include extending aspects of sticking together assemblage.

Chapter 6 – Fashioning our own belongings

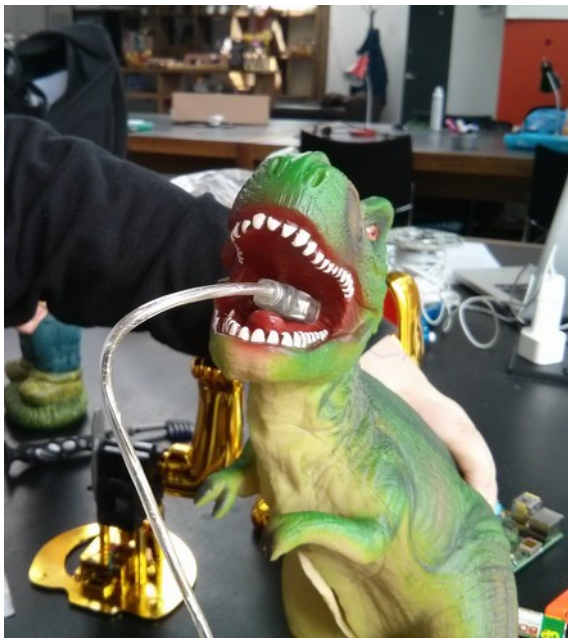


Fig.53 Crafting urban camouflage[p.295]*. Gnome street Gnome*[p.304]*.*

In this chapter I explore how making objects[82] can directly play a role in taking on the network, making space for identity design as a process of *fashioning our own belongings*. Analysis of the projects and the theoretical sources identified ways in which participants get to grips with the network, taking hold of identity apparatus functions and possibilities.

Fashioning belongings is a pattern of identity design through objects of belonging, taking on how networked objects function and which relations flow through them. This chapter

82 I follow Barad's (2007, 472) conceptualisation of objects, not as "self-contained […] with inherent properties", but rather "complex, open-ended configurations of intra-acting practices" even before accounting for networked topologies of connectivity that might flow through them.

explores how: making objects reconfigures the network, and human scales and perspectives; arranging networked objects into a collection of belongings involves negotiating multiple networked publics each with an audience-reputation; and how multiple belongings challenge models of a single centralised authenticated self in the context of playful identity design.

Identity is shaped by 'personal data' models of cloud services and their binary states of authentication. Expressions and records of identity, forms of authentication, and relational web connectivity histories are all regulated by the cloud through possessions such as mobile phones and data stores, and an expanding 'internet of things'. Over the period of my research, for example, Apple and Google have constrained the storage capacity of their devices to promote a model of moving user data to cloud-storage.

A device like an iPhone is a network possession. It is logged-on, easy, seamless, personalised, and in-the-cloud. Objects such as mobile phones and personal data devices demand positions of extreme intimacy in everyday life. The objects are often in constant contact with our bodies and attention. My design conversations exploring identity design agency are entangled with these networked objects. I have found that the opacity and regulatory apparatuses imposed by user logging and cloud storage make network possessions uncanny client devices that offer little creative agency. They are controlled by distant, centralised and obfuscated (clouded) logics of networked power. Trying to make use of mobile phones and data devices for identity design reveals ways in which they are part of identity apparatuses of observation, rather than the agencies of identity performativity. These devices are not really our own belongings, but rather, possessed by the network: a world of impersonal personal devices.

The making of networked objects into *belongings* is a process that allows publics to take on the network in a number of intersecting ways, and forms a prototype design pattern which emerged from the Creative Exchange (CX) to make space for identity design. Fashioning our own belongings considers identity primarily as relational, in terms of "making connections and commitments" (Barad 2007, 392) that constitute audience-reputation relations, while shaping objects as embodiments of group belonging and boundaries. This chapter sets out

how taking hold of identity design agencies and resisting dynamics of power means bothering to responsibly fashion networked identity apparatuses, while making clouded infrastructure visible and accessible by developing hands-on network literacies.

Identity design

Personal belongings are material forms of identity construction and identifiers of social relationships (May 2013; Buse and Twigg 2014). Superimposed with this, belonging also means enacting the fashions, boundaries and exclusions of performing identity and belonging (Goffman 1959) and embodying belonging, often to multiple and diverse groups (May 2013).

An object carrying an intimate sense of relationship and agency is a belonging. This feeling may come through its investment with significant meaning, personal information it contains, or from having control over it and who has access to it (Buse and Twigg 2014).

Belongings are significant because of their exclusive relations with others. Belongings can be shared or shown to perform identity and negotiate relationships. A belonging can be a social signifier of group membership, an intimate shared secret, a key to infrastructural access, or a valued symbol of moral, organisational or cultural standing.

Fashioning is a type of make-do making (Williams 2012) that simultaneously implies negotiations of (couture and pop) fashion (Smelik 2018). Fashion brings to identity design a performative and contested sense of collective constitution of relations and boundaries. During the Crafting Urban Camouflage$_{p.295}$ workshop I found participants negotiating fashions and acceptable forms of disguise when testing surveillance camera invisibility through craft costumes. In physical public spaces, agency flows through fashion as part of performing (or controlling access to) identity, raising tensions around reputation and trust that depend on displaying recognisable features, and social signifiers of gender, class and other groupings. Critical social theorists have long considered the ways that empowering agencies of identity can resist and provoke structures of authenticity and belonging in public (Barad 2007; Suterwalla 2013), as I presented in our Authenticity & 'Real'? Bodies$_{p.290}$ symposium Suterwalla introdced as “exploring and challenging questions regarding impersonation, politics and gendered resistance”:

Fig.54 Authenticity & 'Real'? Bodies[p.290] *talk. Body shape growths at the Numbers that Matter hackathon*[p.311].

Objects – personal belongings in particular – play roles in the construction of identity and the social negotiation of belonging to groups. For our Physical Playlist[p.312] proposal in the Making the Digital Physical[p.307] lab my starting point was the meaning attached to mixtapes. The process of choosing and recording two sides of a cassette tape with music involved time and attention. This DIY process invests generic cassette tape objects with specific relational and fashioned meanings. When gifted, mixtapes carry connotations about care and attention. The way a mixtape object can negotiate cultural trends and intimate relationships illustrates how fashioning our own belongings is a project of boundary making.

Marcell Mars[p.308] demonstrated how Memory of the World[p.308] volunteers digitise their collections of books into a personal library data store in the collector's home or office – into a networked object on the shelf alongside the original books. Each library device maintains and hosts a particular interest relevant to a particular community of readers, expressing specific identity and wider public library belonging.

Fig.55 Marcell Mars[p.308] *demonstrates a Memory of the World*[p.308] *DIY book scanning apparatus at the MayDay Rooms archive.*

The two personal data store$_{p.319}$ projects that I collaborated with illustrate how data stores accrue identity meaning and agency by collecting data from many disparate cloud services into a single store:[83]

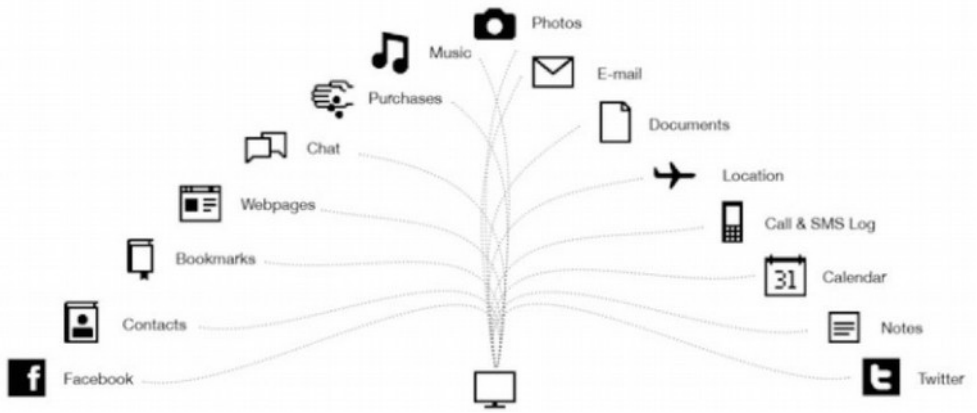


Fig.56 An image (Poyozo) from our discussion of personal data stores$_{p.319}$.

Mydex$_{p.319}$ used a personal cloud model, giving users control with a digital encryption key. The INDX$_{p.319}$ project embodied control further, copying data from various cloud services into a physical data store object that is carried, kept under a desk or in a house. This personal object model more directly connects personal data with personal ownership, while also securing it with an encryption key (though still using centrally coordinated encryption software).

Collecting and controlling identity data by storing it within an object begins to make it a belonging, investing it with personal meaning, and through agency over the data and information that belongs to the user. However, data held in an object only becomes meaningful in relationship to how it can be used. In mapping out how users might communicate or publish from their personal data store belongings, my SOCIAM$_{p.319}$ and Mydex$_{p.319}$ researcher participants employed framings of ongoing performative relational identity. Identity data describes relationships (not individuals) and is significant in its ongoing use and production – whether for communication, social authentication, scientific research, democratic decision making, accountability or customisation. Controlling how identity data is held and used raises questions about who it belongs to. SOCIAM$_{p.319}$ discussed how users might share a lifetime of information with health care researchers, but

83 This is currently a largely symbolic act of control as computers in network infrastructure operate on data by making copies of it so clouds do not transfer control. However personal data stores propose collecting, consolidating and sharing data in ways that might eventually negotiating control of data from other clouds.

not reveal the information to a predatory health insurance company that wanted to profit from the data or prevent access to care:

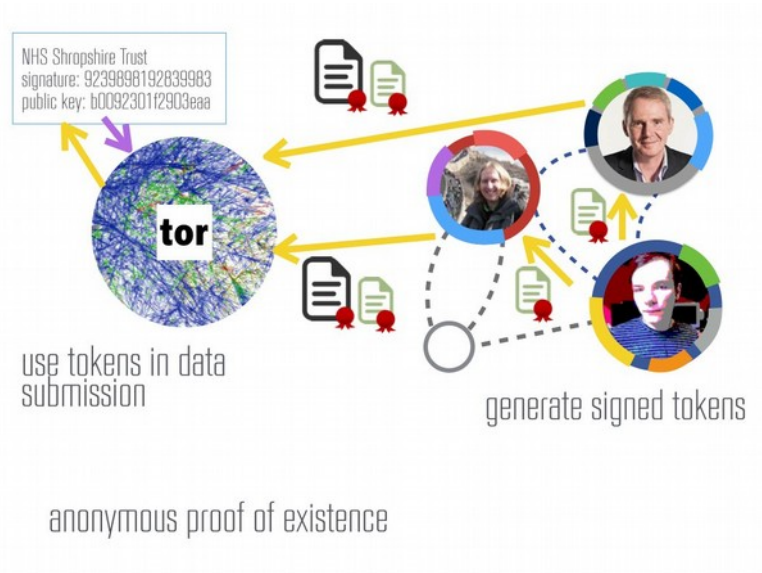
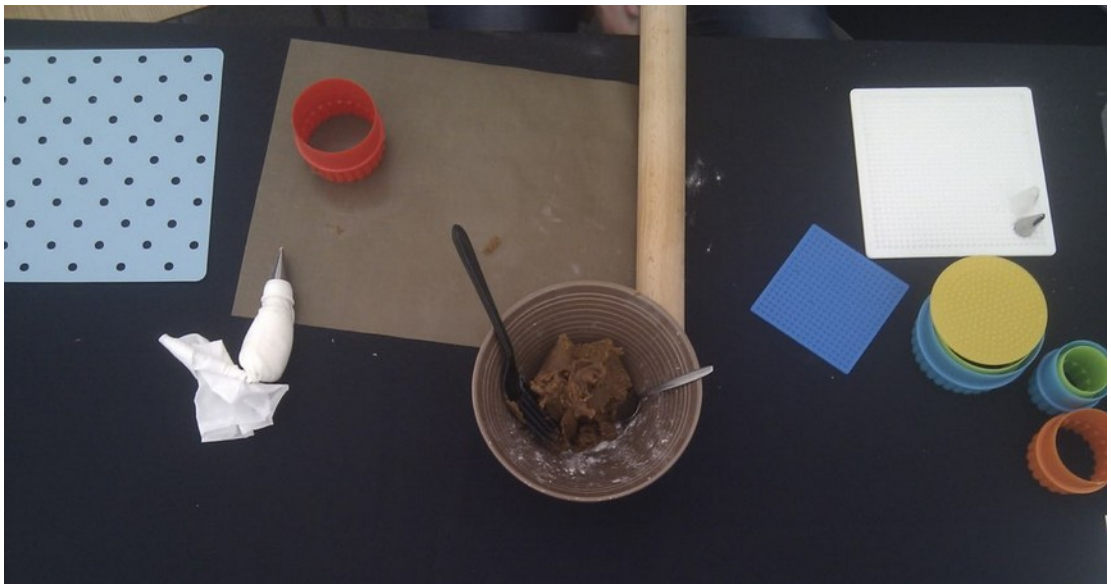


Fig. 57 A SOCIAM presentation[p.319] diagram of how one might anonymously share medical data for health research via Tor.

Filling an object with identity data gives it an immediate social value and meaning. The process of fashioning objects can make them personal in significant ways too (Norton, Mochon, and Ariely 2012). My Accept Cookies[p.288] project baked exhibition visitors' web browser cookies into edible ones to slow down and make visible the identity tracking and authentication technology of web cookies. The cookie owner could then choose to eat and (symbolically) destroy their tracking profile:



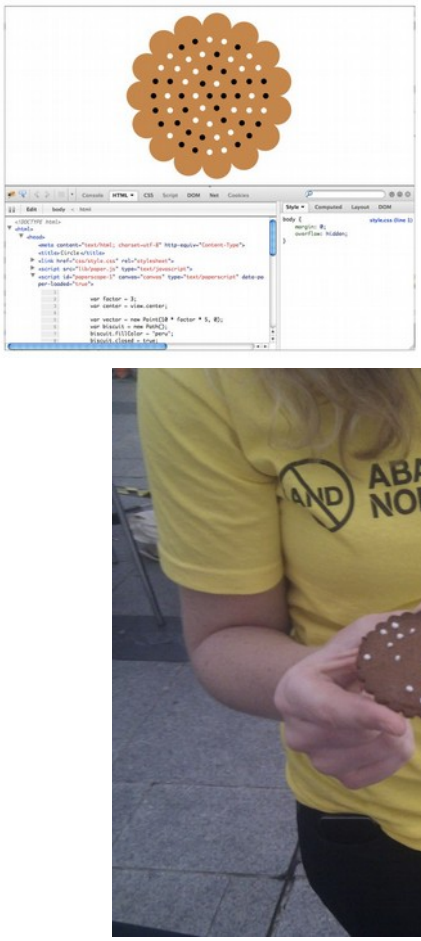


Fig.58 Accept Cookies$_{p.288}$ *table at the AND Fair in Liverpool. The cookie pattern generator prototype. Eating (destroying) a physical representation of a personal browser tracking cookie*$_{p.288}$.

The process of making the physical object invests something in that choice. The cookie as an object takes on a particular familiar, domestic significance, while digital cookies that pop-up on a website presents an ephemeral, and often meaningless acquiescence:

Fig.59 Screenshot of Facebook definition of cookie tracking.

Processes like crafting can make abstract cloud signature tracking more tangible and open to questioning. By forming it into an object the power and function of a networked tracking technology is made visible. Intimate attention to a networked apparatus is evoked and heightened through the experience of a physical object.

I explored ways of investing objects with personal significance. In a Design Without$_{p.300}$ sketch I embodied a decision about charity donation into an object. I used an early digital toy, a Tamagotchi,[84] that invites players to care for a virtual character over time, by feeding and nurturing it to keep it 'alive'. Turkle has discussed Tamagotchis as "relational artefacts" ([1984] 2005, 289), objects to which players "become attached, feel connection" (Turkle [1984] 2005, 290). I connected a Tamagotchi prototype and user payment details via a network script to a charity web site (GiveWell.org) so that the continued existence of the Tamagotchi on the screen was connected to the site's calculation of 'cost per life saved'.[85] This sketch inverts the choice of charity donation, from opt-in to opt-out. When you take hold of the Tamagotchi for the first time, you are faced with a realisation that you have to actively choose to stop feeding and caring for the virtual character, with the knowledge that it is part of a network apparatus of global wealth inequality, charity infrastructures and the life of a human being.

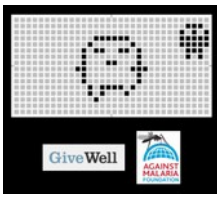


Fig.60 The screen and organisations used in my charity tamagotchi prototype sketch$_{p.300}$.

Inverting the logic of the attention economy through networked connectivity is heightened by the physical sense of touch. It uses the qualities of the Tamagotchi – an object designed to evoke intimate attention with a digital device – to implicate the user who takes hold of it directly in a global networked topology.

What emerged from prototyping a personal data store$_{p.319}$ object under our desk, an edible browser cookie$_{p.288}$ on our lips, and a charity Tamagotchi$_{p.300}$ in our hand is that the process of making objects asks questions of the network and takes on greater responsibility and agency through it. Making cookies$_{p.288}$ took an identification and authentication technology that is applied *to* people browsing the web, often without their choice, and made networked power and agency more tangible. An object can come to hold a reputational relationship with an identity audience.

84 A Tamagotchi is a digital keyring that purports to contain a living creature (see Turkle [1984] 2005 for a description).

85 Calculated by Give Well over three years via the funding of malaria-preventing mosquito nets.

Network cabinets

A network cabinet is a generic, monolithic object that holds and connects data.[86] This section sets out a series of project examples leading to cabinets of curiosity – a history of collecting and curating unique meaningful objects – suggesting a solution to an identity design issue found in the model and form of monolithic data stores.

User relationships with networked identities and audiences are predominantly represented digitally as apps:

Fig.61 Mydex[p.319] *offered users a mobile app and browser interface.*

Our desk sharing[p.300] prototype was designed for a single group of collaborators working on a particular goal at the BBC R&D studio[p.292]. After testing this as an app on a mobile phone, we considered how one user might share desk status with their multiple collaborative groups at once:

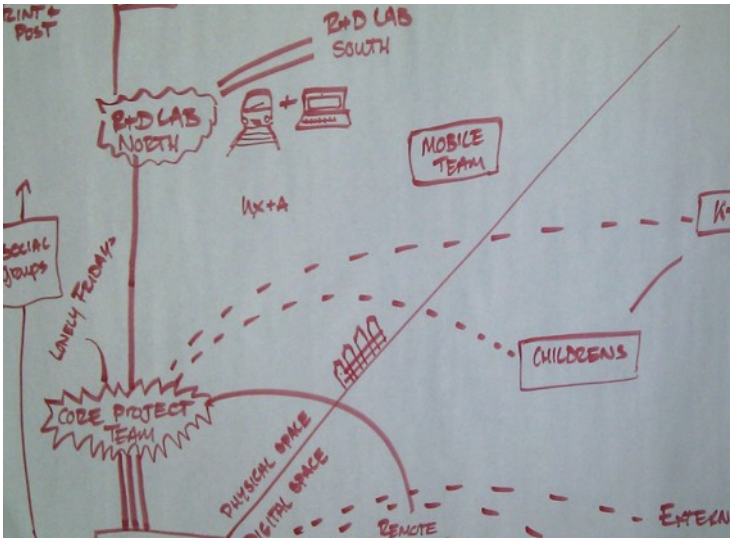
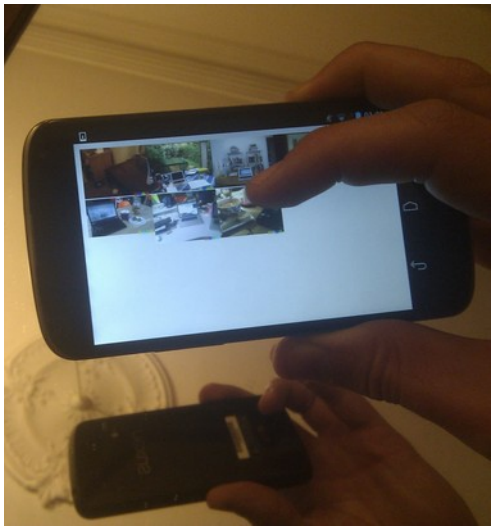


Fig.62 Part of a Where do you go to?[p.320] *workshop diagram showing one participant's multiple digital and physical teams.*

86 Network cabinets are the fundamental objects that make up cloud data warehouses, along with cooling and cables.

This presented a design challenge of signifying each separate group. One approach was a traditional app swipe interface between two screens on a single device, each screen showing one group's collage of desk images.



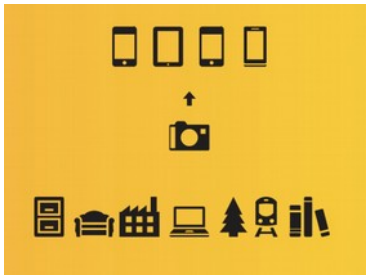


Fig.63 Desk Snap$_{p.300}$ *prototype showing desks on an app screen. Where do you go to?*$_{p.320}$ *mobile device iconography.*

However desk images were often a subtle representation:

> I liked the restraints that it didn't have an avatar of the person. I had to gradually work out whose photos were whose. But then if this was a wider net [...] you might need more signage to see who was who. (Desk Snap$_{p.300}$ Participant C interview)

It made it too easy to accidentally share an update on the wrong project page. Instead, I considered how different device objects might link to different collaborative group relationships to distinguish each group, focus of work and sense of belonging.

Both Mydex$_{p.319}$ and INDX$_{p.319}$ used interface metaphors of apps and tabs to present users of their services with multiple identity facets and visualisations of personal data, such as browser history or exercise data:

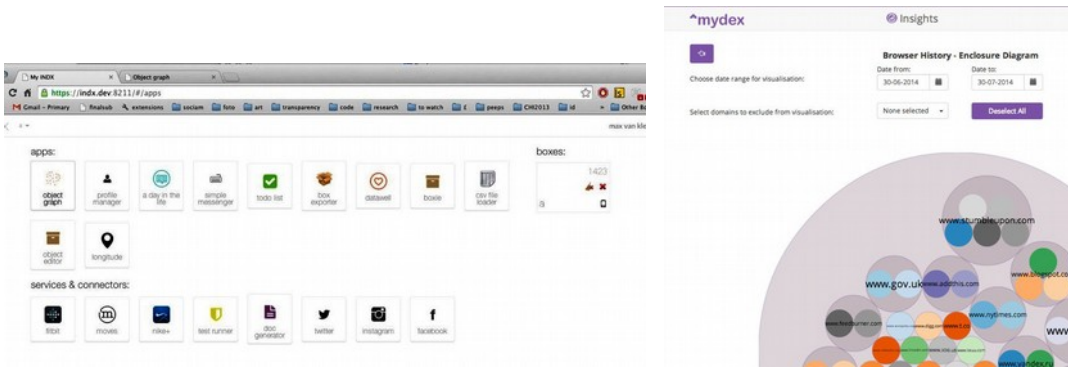


Fig.64 The INDX$_{p.319}$ *prototype app interface. One of several Mydex*$_{p.319}$ *browser view tabs.*

Theories of belonging propose we belong to, and co-constitute the boundaries of, multiple different groups and contexts at once (Barad 2007; May 2013), but even when multifaceted or pseudonymous data sharing is possible, personal data stores reproduce a cloud model assumption of one single, monolithic identity dossier per user. The physical objects offered for personal data storage follow the assumption of monolithic identity. They are primarily monolith-like black boxes. A generic monolithic product design in which a single object holds all a user's various multiple reputational relations and contexts:

Fig.65 Screenshot of data store devices.

The design assumption of monolithic personal data stores is further complicated by trying to make space for identity play. Separating out different identity design experiments requires creating multiple accounts or using multiple personal data stores. Creating an additional data store within the existing structures of monolithic governance log-in and tracking would imply having to fabricate a new legal identity. An alternative approach is to design space for each user to create multiple identity apparatuses and experiments. Commercial data store objects still face the problem of being indistinguishable. Using several meaningfully distinct objects to hold different identity designs avoids them being easily misidentified.

In the desk sharing$_{p.300}$ project, I could have adopted a product designer role to create object forms *for* teams, however, I noticed in their desk images that the participants were already experienced in making objects personal, imbuing decorations, desk toys or found objects with significant meanings of belonging and participation through modification and use. Desk objects that carry relationship meaning could also hold relationship data:

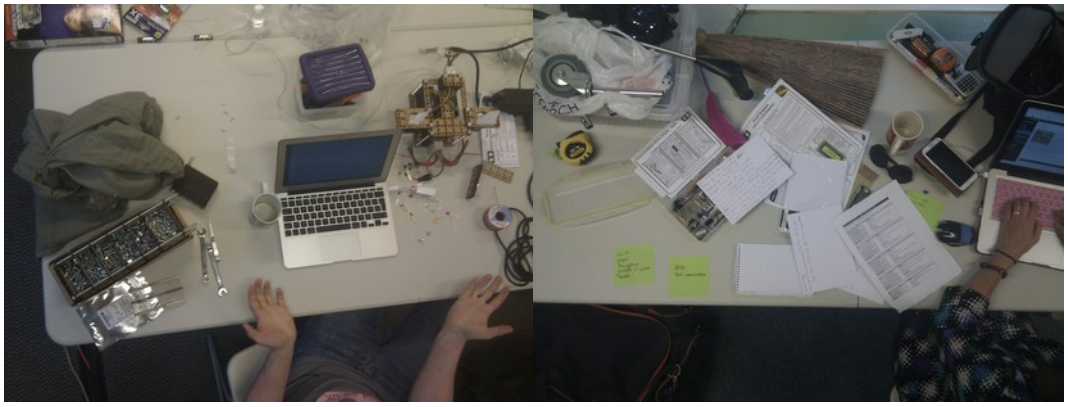


Fig.66 Hot-desk users and their objects performing identity.

My Tor Toys[p.318] project set out to experiment with shaping distinct networked objects through the creation of a series of networked belongings able to store and publish online media directly:

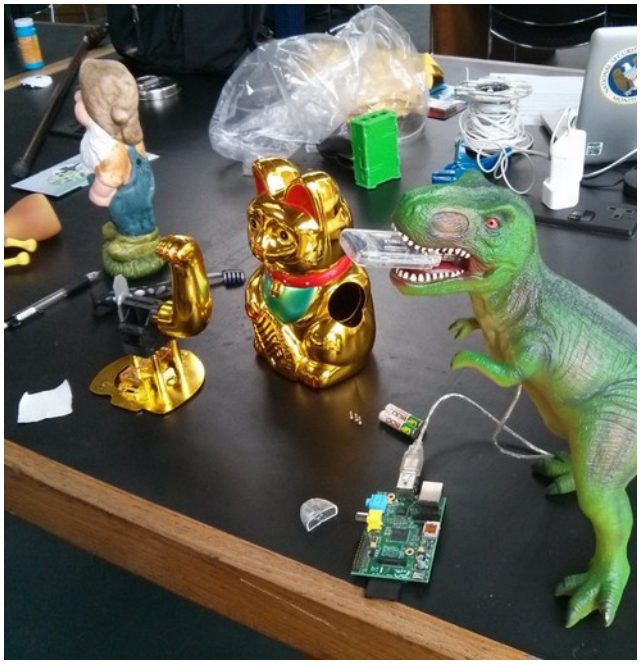


Fig.67 Prototyping Tor Toys[p.318] objects at Gnome Street Gnome[p.304].

As a precursor to the Tor Toys[p.318] workshops I participated in Gnome Street Gnome[p.304] a family day of making *smart cities* data and things. I co-designed a series of networked publishing objects with other participants including a plastic dinosaur that publishes files from USB sticks you plug into its mouth, a beckoning cat statue that hosts a diary story game, and a garden gnome that both farts and allows a gardener to publish emoji status updates about their vegetables. The prototypes explored how aesthetic and functional material properties can be related to network operation of the artefacts. Each publishing

object prototype was intended for a different online audience. The workshop format also mapped out whether the objects could be fashioned by their users in ways that developed the technical literacies necessary to maintain the publishing software.

Looking at desks, I saw how physically fashioning and arranging objects in relation to each other signified meanings, taking on different aesthetics, forms and configurations. Personal object archiving cultures like vinyl record collectionsp.312 and building librariesp.308 in which reputations and fashions can be reconfigured are ways of organising physical embodiments of audiences and contexts. They are part of identity construction and performance, just as people arrange objects in their homes in rich processes of negotiating identity (Miller 2009; Leslie 2009).

In discussions of designing for a lifetime of data during the Modelling Digital Public Spacep.309 CX lab, one participant gave an analogy of a spatial relationship with clothes: some clothes remain well organised in the wardrobe, regularly used ones sit in an informal context laid out across surfaces in the room, worked and re-worked in more amorphous collections, relating to possible fashions and contexts:

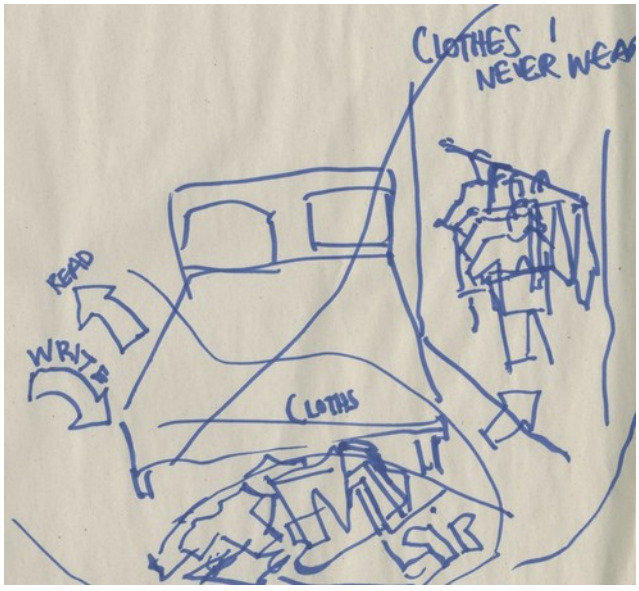


*Fig.68 Modelling Digital Public Space*p.309 *clothes sketch.*

These approaches to arranging objects in work and home life are ways of valuing, reflecting on and communicating with multiple groups and audiences. They offer a pattern for creating meaning and relationships through assemblages of networked cabinets. Displaying and sharing personal collections of objects is reminiscent of cabinets of curiosity, a topic

one graph commons$_{p.304}$ workshop participant examined. These cabinets were discursive-material forms of identity and meaning-making that suggest practices of fashioning belongings for maintaining and reconfiguring relationships with identity design audiences held in diverse networked objects:[87]

Fig.69 Graph Commons$_{p.304}$ workshop example: Ole Worm's cabinet of curiosities, 1654.

Possessions

Fashioning our own belongings sets out a process for taking control of identity agency and resisting apparatuses of observation by doing work to own networked identity objects. In this pattern anonymous pseudonymity is sustained through fashioned belongings that embody boundaries and relations of an author's distinctions between multiple audiences through collections of objects, and their possibility of deniable ownership.

Cloud models propose centrally personalised agents and seamless mobile devices that act on behalf of a user. Fashioning distinct objects that embody specific belongings reveals a tension in how centralised walled garden models control such experiences:

Fig.70 Advert for a personal cloud.

87 Cabinets of curiosity were collections in unique spatial arrangements, assemblages of objects using individually derived taxonomies, stored in cabinet rooms or strongboxes.

Objects played symbolic and material roles in taking control of aspects of identity construction for many of my participants. The personal data stores we examined evoked a sense of users taking back control of personal data through their iconography and, as discussed, some extend this control to encryption and physical objects held by users. The INDX$_{p.319}$ project model of storing data in an owned object invites renegotiating the terms of how identity is performed, through possessions and material control.

The iconography of personal data storage – in the promotional material, logos and interface designs we discussed in our Walk in the Park$_{p.319}$ workshops – is of clouds, padlocks and keys, or hands holding data-solids. These symbolic representations of personal data attest to a desire to take on control: lock and key as cryptographic control, and the solid data forms as a direct hold of the data.

Fig.71 Researching the symbols of personal data stores during Walk in the Park$_{p.319}$.

Personal devices like phones, purport to be the most intimate of belongings. The duration of the CX coincided with a period of significant research, development and marketing of these *network possessions* – ranging in forms such as 'smart' watches, diaries, jewellery, glasses and home decorations. Treating these devices intimately, however, reveals them to be "uncanny objects" (Turkle 2011, 8) – a sense of unnerving strangeness in objects that seek yet fail at intimate affinity, that seem "close, but 'off,' distorted enough to be creepy".[88] This sense of unease is accentuated when trying to use network possessions for identity design.

Within mobile device design lies a centralising and obfuscating model that shifts agency away from user. When designing magazine data bundles$_{p.292}$, I came up against cloud storage design logic in mobile tablets, phones and laptops. Devices produced for Google (from ~2012 onwards) follow a design decision to limit the amount of data storage within

88 Turkle's (2011) use of the uncanny references Freud's ([1919] 1955) discussions, and the later application of the term to the *uncanny valley* of humanoid robotics (Mori, MacDorman, and Kageki 2012).

them. A local storage model[89] was replaced by an opaque distant cloud storage model using identity gatekeeping in which it is assumed user data is stored 'in the cloud', in walled garden data centres of Google, Apple, Microsoft, Amazon, Netflix and Spotify.

Fig. 72 A slide about storage$_{p.292}$ *featuring my screenshot of part of a webpage advertising a Google Chromebook Pixel laptop in 2013.*

One of the most empowering features of personal devices is that they are general purpose computers and interfaces (Doctorow 2012). Users give up particular functional forms, but in exchange gain the creative potential to run any imaginable computation or task. However, combined with a cloud model, these devices become access clients, with centrally dictated 'features', with little possibility of repurposing as an identity design material. Centralised cloud models reject public agencies of identity design such as prototyping multiple identities with mobile phones, pushing design out into distributed network apparatuses[90] and the model of networked belongings. Identity design by publics requires space for them to exert control over authorship and expressive form, and to access different communication contexts, on their terms, by making network possessions into their own belongings.

Personal devices and agents appear to provide empowerment, but resist user control, remaining possessed by centralised network apparatuses. The uncanny intimacy simulated by cloud controlled network devices and identities reveals a tension about where agency lies. One uncanny object is the experimental display systems that were introduced in British

89 A model once central to the personal media storage of the original Apple iPod music player.

90 Popular decentralising technologies like BitTorrent, Tor and Bitcoin require that network publics directly take on responsibility for their distributed functions through their own personal computers and servers.

railway stations that I explored in our Messiness Manifesto$_{p.307}$. Like *smart assistants* from Google, Apple and Amazon, these objects were designed to simulate intimacy, but were unable to perform tact, negotiation or complexity. They represent an attempt to present specific information to a railway-using public, with no recourse or form of conversation despite the intimacy simulated by the animation and character design. They reveal their model of centralised design with intent, embodied in the object.

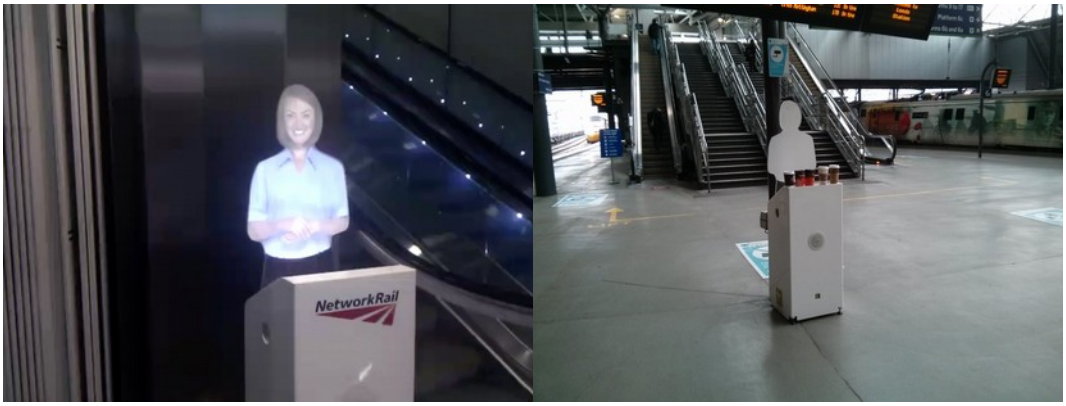


Fig.73 Railway station robot/display$_{p.307}$ Kings Cross London. The robot in Leeds station became a cup holder.

Personal mobile devices are at face value socially aware objects with an incredibly intimate user relationship – from their first moments waking up, to work, play, exercise and networked communication. However the process of my trying to use mobile phones in design prototyping$_{p.320}$ revealed an endemic gatekeeping designed into these objects that is bound up in centralised, networked apparatuses. This reveals a fundamental structuring of identity control away from the people who own them.[91]

Fig.74 A prototype exploring telepresence was unstable, limited by cloud device gatekeeping.

91 The cloud model that excludes designer agency and public distributed commons apparatuses is bound up in a feudal security (Schneier 2012) topology that depends on Google, Apple, Microsoft, Samsung, Huawei, Xiaomi or Blackberry controlling every aspect of a device to prevent competing corporate, national and other malware developers from being able to over-run networks of communicating publics. My design experiences do not offer alternatives to the feudal security model, but rather propose augmenting it with additional (disposable) networked belongings with which to creatively play and experiment.

In a number of cases in the CX I tried to place participants of a workshop directly in control of prototyping personal tools for data storage and communication with devices. I continually found a lack of control over the personal data stored. The centralised cloud is a model of control over authentication, data storage and third-party app publishing through walled-garden 'stores', and through security-as-a-service. Through identity design experiments I discovered that mobile devices were difficult or impossible to modify despite being well serviced with hardware resources such as storage, display, communication, networking, computational power.[92] The app processes close off each particular task into a separate context, and distance the designer from the object itself through APIs and peripherals:

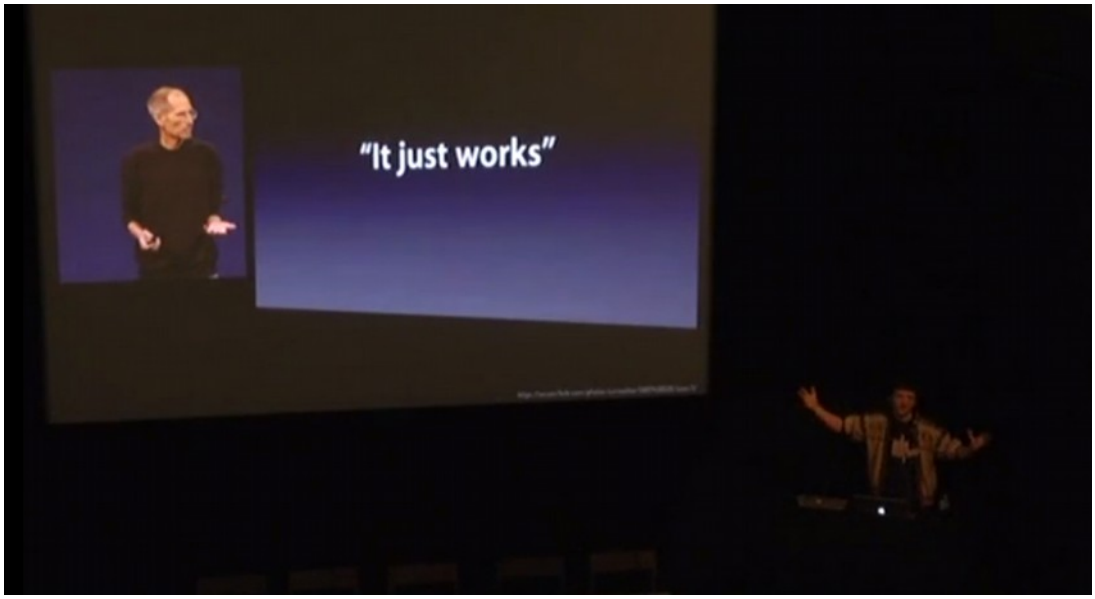


*Fig. 75 A slide about work*p.318 *featuring a screenshot from an Apple product launch with founder Steve Jobs.*

In designing desk image sharingp.300 as a form of networked place-making, we first considered a computer program that seamlessly captured images of a user's desk (for example, placing the camera under a coffee cup where lifting the cup captures an image) and placed these images in the background of a colleague's digital computer 'desktop' in a live collage of the various desks of a remote working team (bringing physical desks to examples like Maeda 2005; and Maurer et al. 2010). Taking photos of a desk regularly is cumbersome as a camera is needed to capture the context from above the work space:

92 As Chatting et al. (2017, 435) note of "using mobile phones as a networked material", while they were able to craft mobile devices into their prototyping, they were bound by the identity apparatuses of the cloud, requiring individually authenticated messaging, relays or servers.

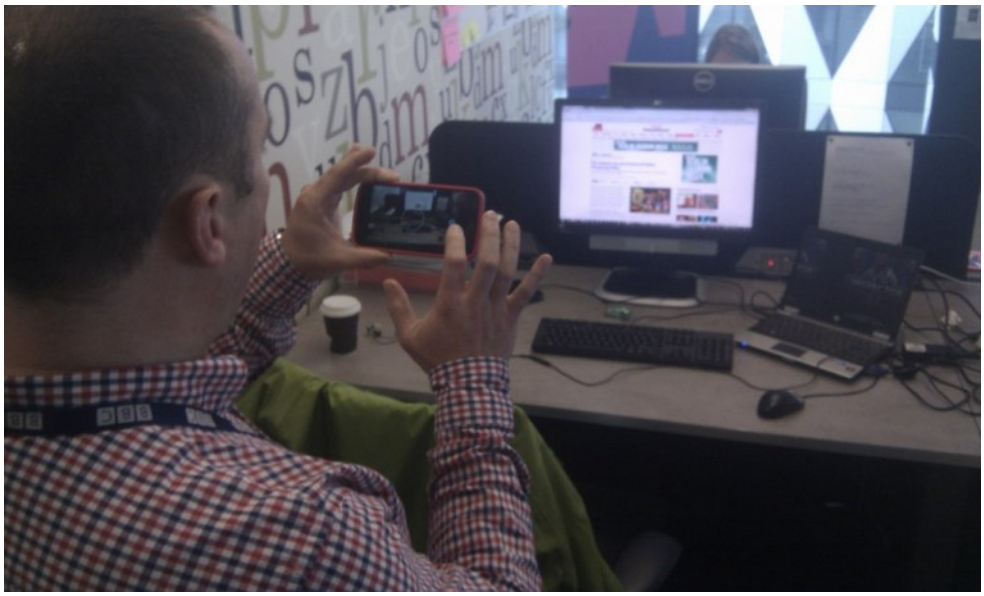


Fig.76 Prototyping sharing desk images$_{p.300}$ *as work status updates. Capturing desk images means standing up.*

Furthermore, as discussed, using existing business or personal mobile phones and laptops encounters a cloud model that exerts a monopoly over user data and access to the design of their daily interface.[93]

This suggested a design space of a separate object, that embodied the move away from images of users to a focus on desks and away from constrained access to the cloud business models and operating system stacks.

The authentication and communication models of the cloud reject authorial identity design agency, pushing it out to the periphery of the network, into the hands of the audiences, publics and users themselves. Belongings are a pattern for understanding the design space resulting from the dominant network model, as well as material claims on agency and forms of identity construction.

From revelatory to greater active agency

The object metaphors that developed through our desk sharing$_{p.300}$ design discussions show how my understanding of the interrelation of form and function has emerged during my

93 Historically this has not been so pronounced. Computers traditionally have had an ecosystem of applications running 'side by side', with the possibility of multiple concurrent and layered windows open at once. Within the more constrained environments of apps running on mobile devices, and business communication platforms, it became harder to access. The idea of displaying images in the background for example, or modifying the interface experience itself in any novel way becomes much more difficult.

research. I initially traced out designs that were revelatory and provocative or simulated intimacy with the users. I then turned to designs of belongings that emphasise greater active agency. This design approach demonstrates how fashioning belongings develops network literacy while avoiding provocations that fetishise the surveillant without suggesting any meaningful actions of recourse, and avoiding designs that simulate intimacy with personalisation features but no meaningful user agency.

My first desk sharing object sketches were a miniature military drone and a desk pet. The drone reflected discussions about feeling surveilled through making records of personal work patterns shared with colleagues (with a range of job roles of power and standing). If capturing a desk was to be an automated process overhead it felt like a personal drone. The drone raised important issues of control in a rhetorical or revelatory way (Klein 2017). However, an object coded as overwhelmingly military and surveillant heightens a sense of disenfranchisement rather than empowering users to act:

Fig. 77 Design sketch exploring personal data collection drone$_{p.300}$ *competes with more commonplace desk items.*

Around this time, during a family video call, my father-in-kin Rob introduced a motif that would reoccur in a number of my prototypes. He placed a guinea pig garden ornament in front of the video screen to represent a moment of attachment and communication. Later, this image would echo through my communications with ventriloquist Nina Conti, who

used her puppet Monkey to conduct an interview with masked artist collective the Guerrilla Girls, over a video call in a similar way (Cathro 2016):

Fig.78 Rob and the guinea pig. Nina Conti's Monkey interviews the Guerrilla Girls (Cathro 2016).

The second sketch object was in the form of a desk pet, influenced by folk tale traditions of dæmons and familiars – an animal or object that can work on someone's behalf (Briggs and Olivier 2008):[94]

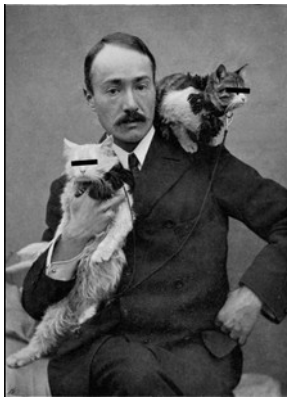


Fig.79 My modified photograph of Arnold Henry Savage Landor and anonymous dæmons Kerman and Zeris.

I experienced a moment of reevaluation in my research around the idea of a digital pet. At the digital prototype-athonp.315 our team conducted a number of design conversations through prototypes during the day-long technology event hosted by Google. One demonstration fits the category of a digital 'pet'. It was a browser plugin in the form of a helpful-mischievous browser dæmon[95] that aimed to complicate identity tracking by introducing false search terms into a Google search history. Marcin Ignacp.315 developed our

94 Early in my research process, this is where I thought the research would lead, towards a notion of an avatar or mediating tele-robotic presence, that could in some way work at a distance on behalf of an owner. Such a companion could do things like capturing a desk status, or perhaps even more complex tasks such as travelling on behalf of an owner to a meeting to represent them (Auger 2012).

95 The notion of a dæmon script draws on mythologies of house spirits, but also the automated daemon processes that run unnoticed in the background on computers (Corbato 2001).

prototype plugin using the camera of the computer to detect the face of the person using the search. Every time they looked away to attend to another task, this browser spirit would begin to type search terms, and when looking back to the screen, the browser spirit script would then start to delete anything it had been typing:

Fig. 80 My collaborators at the Google browser Rethinking Real-Time Prototothon[p.315] day demoing the browser dæmon.

What I had imagined discussing this prototype was that the personification of a character working on the user's behalf would provide a sense of a personal 'agent' with which to resist cloud tracking through empowering identity play. When we made the demo, however, seeing typing out of the corner of my eye had the opposite effect. It created a sense that this script was difficult to trust, to know if it was working on my behalf.

We created a second demo that took a typical Facebook social media page and replaced the static profile pictures of each person who had commented on a post with their live video streams:

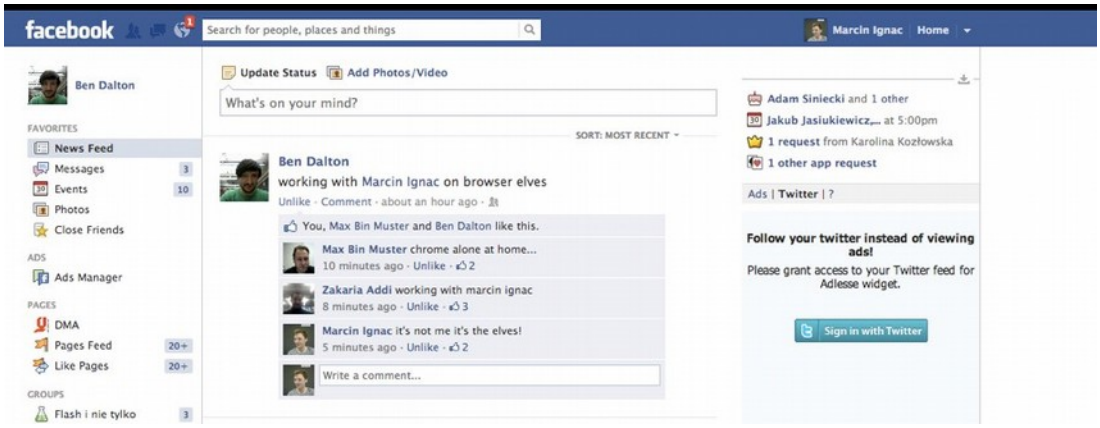


Fig. 81 A prototype for 'live' video profile pictures[p.315] on social network sites.

The live camera feed was intended as a critique of the encroaching data collection of realtime services, however, the effect was the opposite for me. The experience of having a text conversation, while seeing the live expressions of the other participants in the conversation felt intimate, and developed a sense of close connection around the conversation. At the same time not being centre of attention, like a video call, able to tilt or duck away from the camera, and see that immediately in the profile pictures within Facebook, created a feedback loop of performative visibility that felt strangely empowering.

The first prototype illustrated a tension around characters designed to appear to be working on a user's behalf but creating a sense of an uncanny network possession. The second prototype demonstrated a simpler form of enacting agency through physical control of the object, such as tilting away the camera. Modifying an identity apparatus like Facebook for more immediate and tangible network connectivity fostered intimacy and the possibility of a sense of direct control over anonymity.

Getting to grips with: Embodying identity design agencies

When users *can* treat networked devices as design materials, to do things on their own terms, they can fashion them into belongings. Choosing to manipulate the logic of the cloud through hands-on fashioning of networked objects enacts agency within identity apparatuses. As discussed, not only is assemblage, construction, deconstruction and playing essential to the literacies of taking on the network, but identity design agency is inherently pushed out of the clouds into personal networked objects.

The ease of tilting the laptop camera away and immediately seeing the result is part of a wider pattern in which the materiality of making networked objects offers forms of direct physical control over networked function. Through objects we can reconfigure our relationship with the network by getting to grips with infrastructures of power and identity agency. In contrast, cloud devices are possessed by the network, haunted by clouded intentions. By offering greater physical control over its function, a networked object can be fashioned into a belonging. Resources of identity storage, communication and authentication flow through the object and can be shaped for use.

Finding ways to (mis)use a mobile device as a craft material allows users to contest identity

and how it is performed. At Today's Art[p.318] I took part in a workshop by artist Aram Bartholl[p.318] in which he invited participants to produce over-sized digital jewellery by temporarily modifying mobile devices into medallions displaying images or animation.[96] This process uses the mobile device as a display surface placing it in the context of an art performance on the body. Temporary playful transgression strips the multimodal operating system of its many app and sensor connectivities. Giving it a specific physical function and context creatively constrains topology and function on a user's own terms.

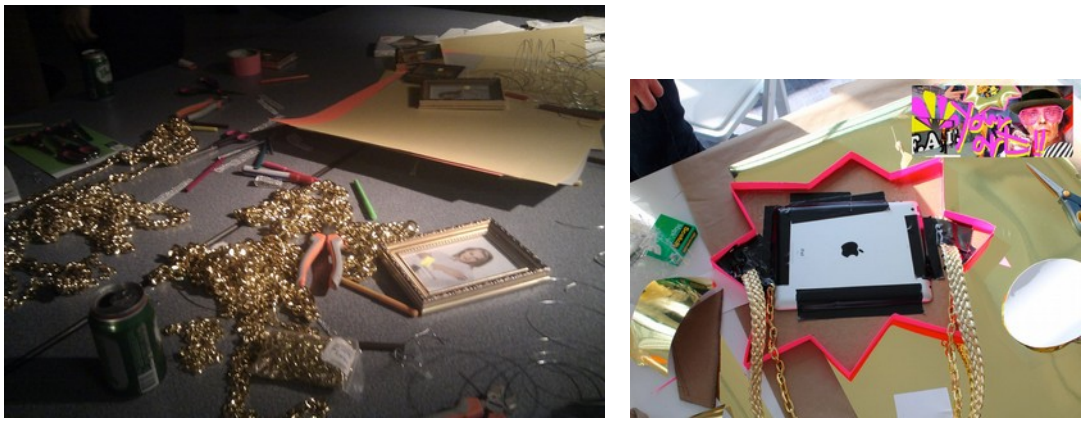


Fig.82 Aram Bartholl's[p.318] workshop. Workshop detail. Image: Aram Bartholl

Provocative revelatory awareness of the surveillant can be augmented by agencies and models of active resistance through physical objects that shape the function of networked apparatuses.

Discursive-material agency emerges through making and grappling with objects. The more materially embodied the recording function of the Chattr[p.294] object became, the more agency audiences were able to exert. I saw how my slick branding and zoomorphic design distracted audiences from the implications of their acquiescence to the surveillance apparatus terms and conditions we imposed. Nevertheless, being able to hold, hide and destroy a recording object allowed audiences to exert greater agency on their own terms.

The role objects played in each of the iterations of the Chattr[p.294] project illustrate how embodying network function can enable greater material agency in identity performance. In the first iteration I designed the process of acquiescing through long and abusive data

96 The performative gesture of appropriating regulatory apparatuses as jewellery was innovated by the comic-political *hype man* work of Flavor Flav in the hip hop group Public Enemy (Hess 2007). The Free Art & Technology (FAT) Lab of which Bartholl was a member, drew heavily on pop culture, and hip-hop in particular, in their "notorious R&D" approach (Juarez and Quaranta 2013).

terms and conditions of a paper contract, and a performative ritual of clipping a microphone and recorder onto participants.

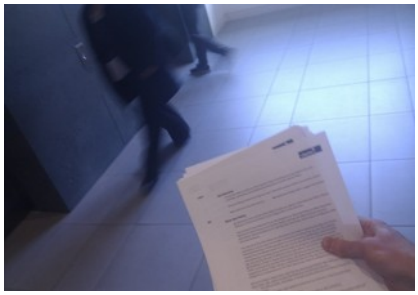


Fig.83 Chattr$_{p.294}$ terms and conditions.

The data collection process was visible and tangible to visitors as they wore the recorders, and then watched them being carried away to transcribers in our hand-delivered, hand-processed network (Maeda 1993):

Fig.84 Chattr$_{p.294}$ transcription table in the empty office building site of FutureEverything in Manchester.

Microphones exert a sense of social awkwardness and self-awareness, carrying a socially constructed power and meaning. Yet giving visitors the microphone and temporary data store to hold empowered them to exert control over the, at times intimate, data collected. Participants covered the microphone when speaking, unclipped the recorder, and even pressed the delete button before returning the device.

The role of public material agency in the surveillance apparatus became more pronounced in the second iteration of the project when I invested additional material characteristics into the process of accepting the Chattr$_{p.294}$ terms and conditions. Inspired by cute zoomorphic branding such as Twitter's character designs, and Google's Android character, I designed a user gesture of acceptance through taking a guinea pig device that acted as a physical token

and recording object. The guinea pig had a subtle but visible microphone in one ear, and the recording device was contained within it:

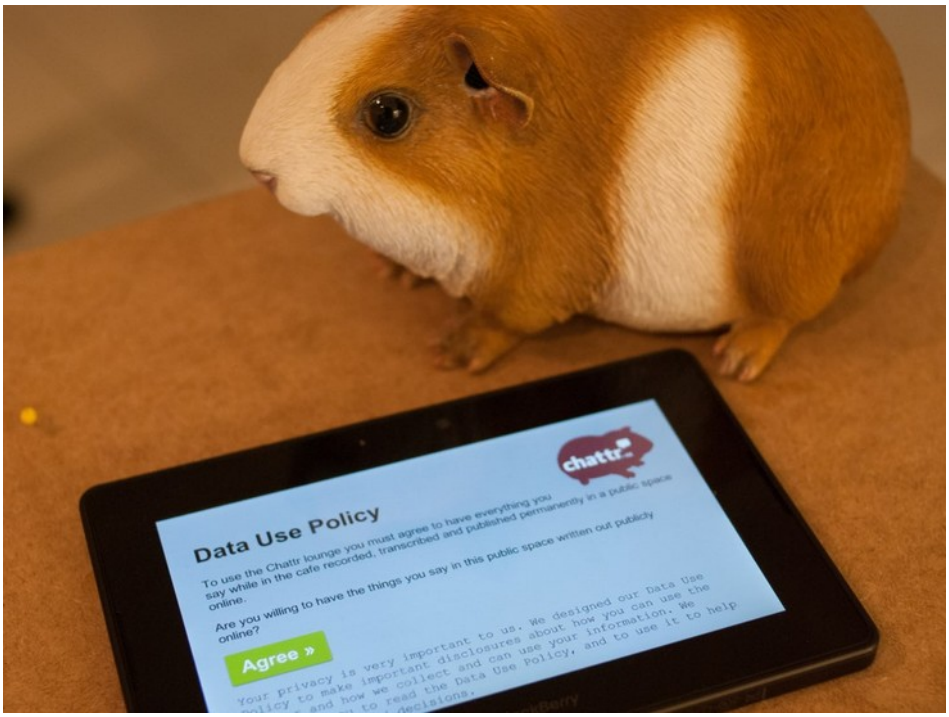


Fig.85 My Chattr[p.294] app and guinea pig prototypes. Photo: Hwa Young Jung

This object quickly took on different properties to the clip-on microphone. Some of this can be attributed to the character of the animal form – cute and engaging. People would talk directly to it, and were often won-over to accept the terms and conditions without thinking based solely on receiving this branded object.

Fig.86 The Chattr[p.294] cafe at Today's Art showing brand, object and surveillant transcript. Photo: Hwa Young Jung

However, as an object the guinea pig also empowered greater resistance to the apparatuses of observation through actions of public data (re)possessions, and potential to share or dispose of it. The object was not attached by Chattr[p.294] staff and did not carry the same cultural meaning as a clip-on microphone. Participants were able to move the object away from them more easily, to hand the object from one person to the next. I watched one group of visitors to the performance sneak a guinea pig recording object away with them around the rest of the exhibition.

Fig. 87 Audiences interacting with Chattr[p.294].

The Chattr[p.294] project developed out of design conversations with Kyle McDonald[p.294]. After co-developing the proposals that preceded Chattr[p.294], McDonald[p.294] 'forked' off the project to develop Conversnitch (Greenberg 2014).[97] Conversnitch was a privacy violating lightbulb that turned lamps in public spaces into a surveillant infrastructure performance, successfully raising widespread awareness and garnering valuable media attention (Gray 2014; Jeffries 2014; Vincent 2014). Like McDonald's[p.294] earlier *People staring at computers* project (2011), the Conversnitch expertly uses network connectivity to reveal the prevalence of surveillance possibilities. When I asked McDonald about the role of his work, he described his

97 Or perhaps more accurately the CX collaborators 'forked' off McDonald's original pitch, introducing additional concepts including explorations of linguistic style matching, before I joined the project – see appendix[p.294] for more details.

contribution as:

> my ability to lead by example as an outlier. artists have a sort of social contract that allows us to be the weird ones [...] the goal isn't to give people a piece of hardware or software to "fight back", i just want to give people an idea or a feeling [...] but they would see the action and understand that there is space to fight back (email to author)

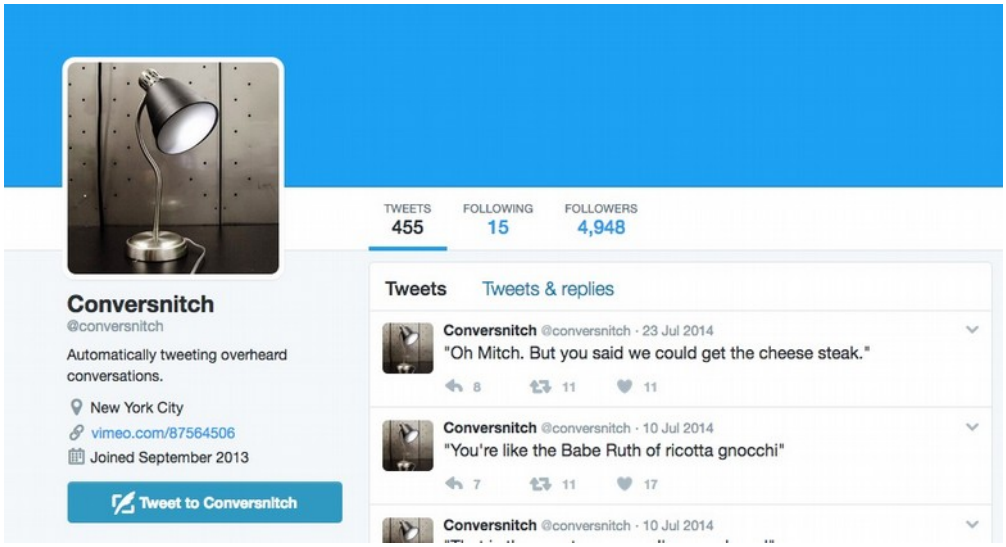


Fig. 88 The Conversnitch is a hidden computer in a normal light socket fitting that records conversation audio, transcribes the recordings using the micro-outsourcing service offered by Amazon's Mechanical Turk, and publishes the resulting conversation snippets as a stream of tweets.

A key difference in the role of the objects between the guinea pig in the Chattr$_{p.294}$ project and the lamp in McDonald's$_{p.294}$ Conversnitch project emerged during their respective performances. The Chattr$_{p.294}$ guinea pig was playful and tangible, permitting the audience to take hold of the surveillance infrastructure and exert ownership over data by getting a feel for the part that the object plays. In comparison the Conversnitch lamp objects were disguised within intentionally mundane lightbulbs fitted in libraries, cafes, offices and lampposts. The intervention was invisible to the people being observed. The Amazon Mechanical Turk transcription service further abstracted the data processing into the hidden labour of an opaque cloud network. The output of the Conversnitch project was invisible to those it recorded, whereas in Chattr$_{p.294}$, partial transcripts were displayed back in the public spaces themselves.[98] The relationship visitors to Chattr$_{p.294}$ held with the recording objects led them to experiment with responses, such as leaving the guinea pigs out of range of a conversation or in another room:

98 First in paper printouts on notice boards, and then in the second iteration of the Chattr$_{p.294}$ project screens were installed directly on the front and inside the cafe itself.

Fig.89 Guinea pig recorders[p.294] *unattended. Photo: Hwa Young Jung*

In the desk sharing app[p.300] project we drew inspiration from a project for children sharing images from their bedroom with family and friends, where the camera was installed inside a drawer (Siio, Rowan, and Mynatt 2002). Children could place objects into the drawer and close it to take and share a picture without turning the camera on themselves or the room. The physical drawer enacted control over the potential for the networked camera to encroach on the intimacy of the child's bedroom:

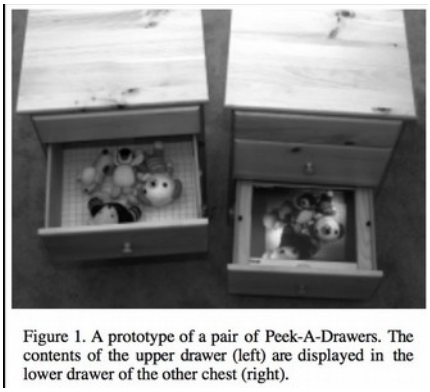


Figure 1. A prototype of a pair of Peek-A-Drawers. The contents of the upper drawer (left) are displayed in the lower drawer of the other chest (right).

Fig.90 An image from a paper about the peek-a-draws project prototype (Siio, Rowan, and Mynatt 2002) I presented in our Desk Snap[p.300] *design process.*

Grappling with a surveillance infrastructure means resisting and appropriating it through physical action. When someone ate an edible browser cookie the act was rhetorical, as destroying the cookie was performatively abstracted from the technologies of browser

tracking.[99] However in the Chattr$_{p.294}$ cafe I watched a visitor take their guinea pig recorder$_{p.294}$ and smash it on the ground, which prevented transcription and destroyed their records.

Fig. 91 Material conversations with the Chattr$_{p.294}$ objects during their construction in the RCA workshops.

Physically enacted control with a visible feedback loop feels more trustworthy than the digital promises of network possessions. This material agency is a design pattern. I noticed a reoccurring DIY gesture at a number of the CX events amongst the attendees, of covering the camera on their laptops with a piece of tape or sticker. This action represents a growing unease around the potential infidelity of cloud connected devices and uncertain status of a network possession:

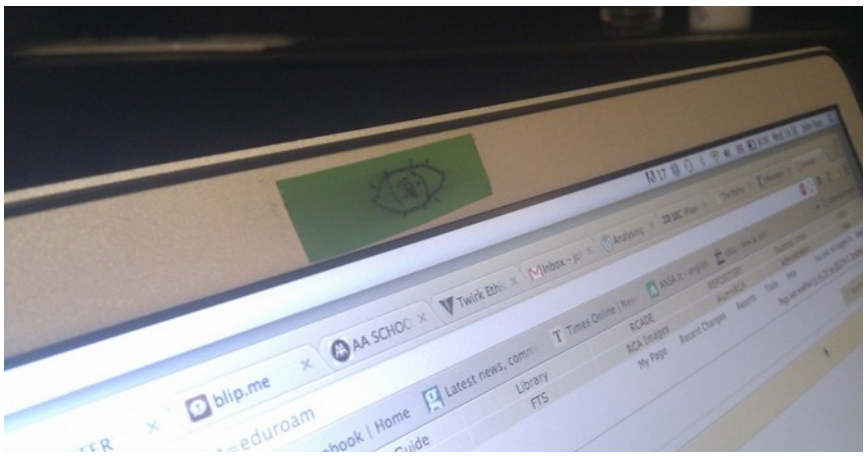


Fig. 92 A CX laptop camera covered with tape.

99 Eating the physical manifestation of the cookie data$_{p.288}$ did not actually change the power relationship of the advertising networks that use digital cookies to track their target users phones, but does suggest approaches to agency over data that do.

Material boundaries such as physical distance or architectural form are familiar and easy to understand. In our exhibition at FACT[p.303] gallery of the images generated during the desk sharing[p.300] project, I developed an approach to sorting the images spatially in response to the shape and constraints of the gallery wall and the contexts in which participants using the prototype had worked. Many of the desk images captured were in semi-public office spaces, some were in public, such as on trains and in cafes. Participants also worked in private and intimate domestic spaces like kitchens and bedrooms. I mapped the public-private settings of the photographs on the gallery wall using the height of the gallery to place the most private desk spaces furthest from the eyes of the gallery audience, constraining their access to the details of the images.

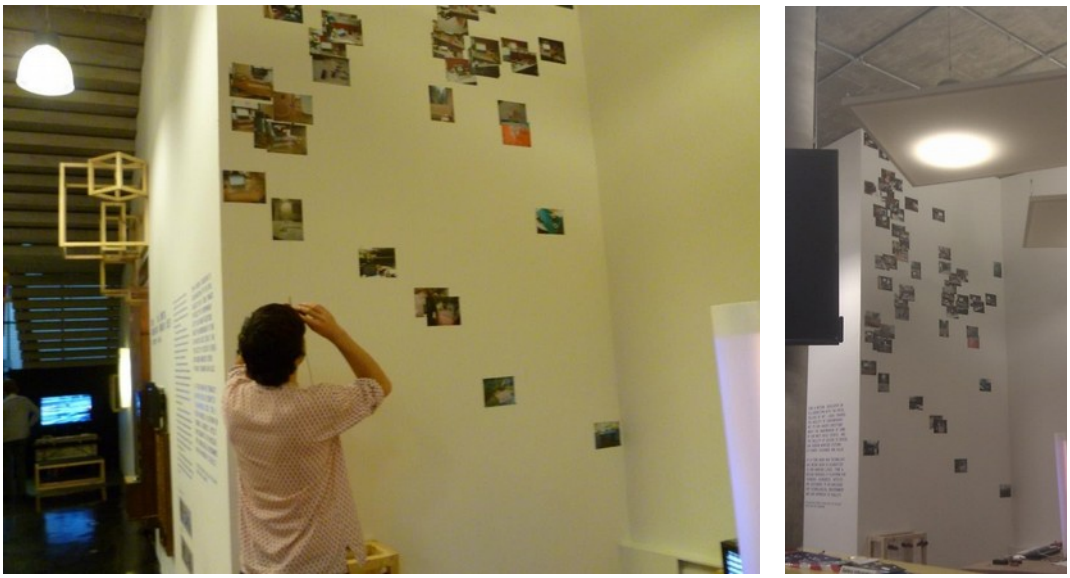


Fig.93 Looking through binoculars at my gallery installation of desk images[p.321] sorted up the wall by privacy, and across the wall by date. Photo: John Fass; Where do you go to?[p.320] photo wall in the FACT gallery.

One could imagine a similar digital interface that reduced the resolution of the images depending on their intimacy, however, physical position is understandable in terms of familiar material properties and thus trusted in a way that it is difficult to express in digital contexts. Encryption could control access to photos taken in private places but the properties of the software are necessarily complex and opaque to all but a few specialist computer security researchers. This claims something unique to the process of making parts of the network meaningfully physical, in addition to cryptography, in the direct control possible in that process (see also the explorations of (counter)functional design (Pierce and Paulos 2014)).

Forms of material-discursive agency reoccured in the workshops[p.319] I organised looking at storage of a lifetime of data. Designs included rituals of visiting data in remote locations or intricate puzzles, and the physical strength of embedding data into a concrete block and flight recorder black box:

Fig.94 Workshop[p.307] sketch exploring gardens as rituals and objects for a lifetime of data.

In Aram Bartholl's[p.318] (2010) Dead Drops project I saw a further example, placing a data store on the collar of a companion with defensive agency:

Fig.95 Aram Bartholl's[p.318] prior Dead Drops project. Image: Aram Bartholl

In these sections I have been discussing the process of fashioning belongings by more closely aligning material properties of an object with control of its network function. When a visitor to the Chattr[p.294] cafe smashed a guinea pig recorder they demonstrated physical control of an aspect of the network, and – intentionally or by accident – exerted power over their data. Fashioning belongings is a process of grasping cloud operations within a device so that control over the networking function is more clearly related to the control that can be exerted over the physical form. This entails getting to grips with the material qualities of an

object and how it relates to network function. One group of visitors to the Chattr$_{p.294}$ cafe first thought the guinea pig objects were transmitting their conversations wirelessly to the transcription screens in the cafe. They tested and disproved this assumption through the object, passing it between them, tapping it, using test phrases, and isolating it from their conversations, before deducing our hand-delivered network process.

Belongs to: Contesting (dis)ownership

I am constructing fashioning our own belongings as a pattern of being able to craft the form and function of a networked object while also controlling the potential to disown, share or dispose of it. Part of the agency of identity design is the power to disown as well as exert ownership over who an identity belongs to. Without the indeterminacy introduced by (dis)ownership, deniability and anonymous pseudonymity are difficult.

The anonymity of an identity design requires being able to deny any connection to it. The potential to give away or share authorship of an identity resists the centralised models of monolithic authentication. In the first iteration of Chattr$_{p.294}$ we sought to publish transcripts online without 'owners' using models that had emerged from the Anonymous and Lulzsec$_{p.298}$ movements the previous year (Coleman 2014; Frid-Jimenez 2012), in which groups established a routine of anonymously publishing messages through 'raw text' hosting on codesharing sites such as Pastebin.[100] I discovered that anonymous access is constrained by tracking and authentication, using IP address logging and anonymity tool blocking.

Discovering the disparity between my assumptions of accessible anonymity and practices of ubiquitous authentication led me to conclude that potential forms of anonymous pseudonymity must be regularly tested and used if they are to be kept open and available.

Placing identity data, encryption control and flows of network function within an object (dis)entangles identity apparatuses from imposed structures of authentication bound up in cloud tracking and identity databases. A belonging can be given away, empowering authors

100 The online code-sharing tool Pastebin – designed without an identity log-in for seamless ease of use (initially intended to reduce the barriers of use for programmers sharing code snippets) – became a de facto communication platform in early Anonymous activity and branding aesthetic because of its unauthenticated interface and signature constraining raw-text medium.

to creatively share or deny an identity.[101] This property is not generally graspable in uncanny network possessions such as personal mobile devices. In providing mobile phone devices for participants in the prototype desk sharing app$_{p.300}$ trial, I found a heavily regulated model of centralised authentication of a single legal identity. When buying SIM cards for the project, each card was registered and checked agains forms of proof of identity. Then when creating Google accounts necessary for making any use of the phones, a process of authentication was also required. These models of authentication and regulation of identity make it difficult for objects to be given away or shared between several people because they remain officially logged and attached to one legal author:

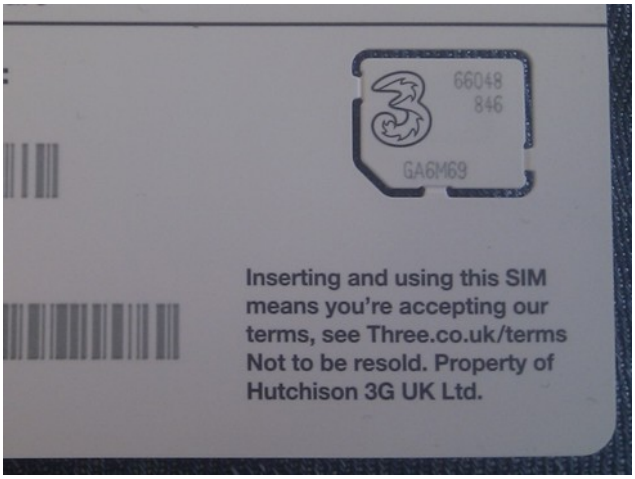


Fig. 96 Desk Snap$_{p.300}$ prototyping mobile network SIM cards.

A lack of potential for owning and disowning defines a sense of network possession. The noPayPhone$_{p.311}$ project raised questions of digital ownership through the use of personal mobile phones as a shared collective resource allowing people to share their 'free minutes' with strangers. The digital connectivity that I designed brought into question the nature of what owning 'free minutes' can mean. They are allocated every month but they are not, as they imply, belongings. There is no feature within the phone system to donate minutes to friends or strangers. The minutes are tied to a particular identity, and are a virtual allocation, to which the phone user is held account.

These tensions around ownership reoccur in wider negotiations of free software. In a CCC$_{p.293}$ conference session I heard again about the history of the Free Software Foundation GNU project (Stallman 2015) and General Public Licence (GPL) legal framework. The

101 An action that suggests an individual right to forget, rather than the centralised EU model of a right to be forgotten.

contemporary Free Software community and their ongoing initiatives, through computing development and research, to sustain useable software agency and collective ownership have driven a stable global infrastructure of free and open source software underpinning the majority of servers, routers and mobile devices, including (perhaps surprisingly) many of the cloud infrastructures (w3techs 2018; StatCounter 2018; Finley 2016). Free software relies on collaborative forms and legal definitions of software use to propagate notions of public ownership of the underlying human-readable representation of the computational instructions,[102] building a software commons that has proven competitive with closed, proprietary commercial efforts because of the collaborative nature of open accessible software:

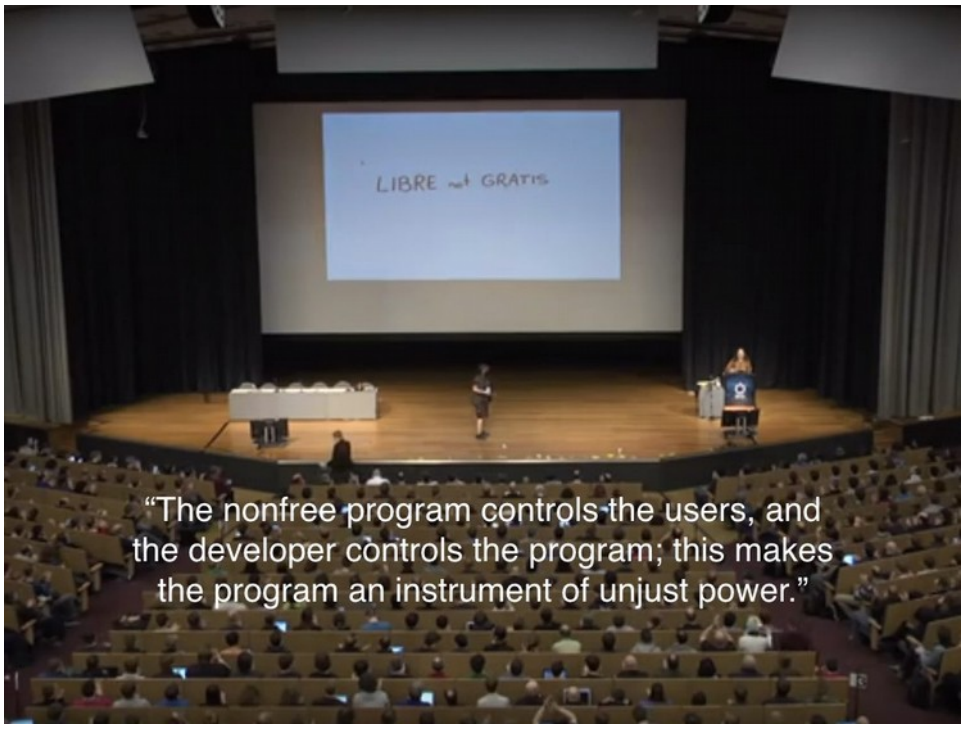


Fig.97 Free Software Foundation$_{p.293}$ *talk at CCC*$_{p.293}$.

Embodying network connectivity and data within objects makes physical (dis)ownership more meaningful and powerful. As discussed in the previous chapter, sticking together standard component parts or kits is a creative constraint that reduces potential identity signatures. A networked object with little trace of author identity can be shared, destroyed or given away, introducing productive ambiguity for anonymous pseudonymity. A widely used, and shared, device or kit produces an anonymity set.

102 The guaranteed ability for people to not only make changes, but to share their changes in public.

An object that hosts data within itself embodies an easily understood physical control over the communication. If the channel of communication represented by a particular object is no longer desired or needed, the author can simply take the object, disconnect it from the network, or destroy it as I observed. These self-contained identity design objects afford interesting interactions for identity play. Shared ownership is a way of creatively using context collapse of multiple authorial styles to complicate stylometric signature analysis and tracking. Such objects must be physically passed from one person to the next.[103]

Fig. 98 Chattr$_{p.294}$ *guinea pigs as kit objects.*

The power to disown an object by destroying it or giving it away represents a significant quality of personal belongings. By holding the authentication, encryption key, and hosted data physically in an object, sharing publishing objects becomes a simple physical act in the same way that those practicing supermarket loyalty card swapping (Green 2002), drop them into a box, and take away a different identity tracking object:

Fig. 99 A slide from my talk about identity obfuscation$_{p.293}$ *citing the example of the 2002 NTK/Mute Festival of Inappropriate Technologies attendees physically swapping supermarket loyalty cards (Green 2002).*

103 Although, with kits, they could also be designed to allow copying at a distance.

Participants in a workshop can be guided to make networked publishing objects that embody creative constraints and agency of authorship. I developed the Tor Toys[p.318] project to explore the forms of object suited to identity design through fashioning simple networked publishing belongings with workshop audiences. What emerged in our design conversations were publishing objects that could be made and remade through assemblage. The objects were part of specific identity design processes and cheap enough to be disposable. By modifying an old USB document scanner with a cheap computer (Raspberry Pi) using free software to connect a server (nginx) to an anonymity network (Tor), the 'copy' button on the scanner was linked to a script of instructions (Python) that immediately published the resulting scan image to a web page (.onion) hosted from within the belonging itself. Commonplace computer 'peripherals' like the USB scanner, keyboard and tablet took on new significance through the fashioning process. Participants also proposed a series of objects for their ornamental or defensive strength, such as a library of PDF poems hosted within a sold stone and a simple blog diary served from a networked snow-globe.

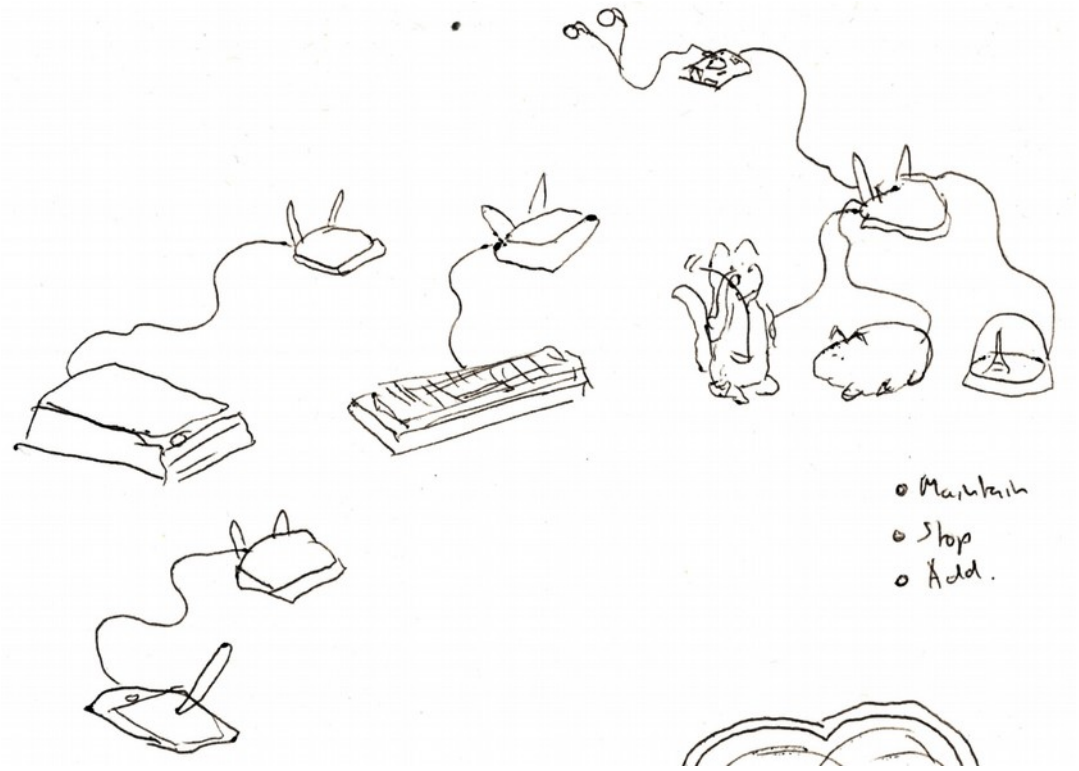


Fig.100 Tor Toys[p.318] workshop documentation sketch. Each object plugs into a network router.

After developing the Tor Toys[p.318] networked scanner as an identity design tool for anonymous pseudonymity I discovered an analogy in one of the first pseudonyms I had

researched. The character of Why the Lucky Stiff[p.318] ('_why') represents a successful identity design of pseudonymous reputation-audience relations through a mixture of social and technical reputational agency over several years (Lowrey 2012):

Fig.101 A self portrait of Why the Lucky Stiff[p.318] and other characters in Why's (Poigant) Guide to Ruby.

On the 19th August 2009 the author of the _why[p.318] character decided to delete their pseudonymous identity and contributions to the Ruby programming community in a single act.[104] In 2013 the Why the Lucky Stiff[p.318] character returned online to re-address an audience of dedicated readers, collaborators and fans through an interface that shares some features of the Tor Toys[p.318] modified document scanner publishing object. _why[p.318] produced a publication using a form of collage familiar to zine production and distributed it via a network protocol designed for document printers (Why the Lucky Stiff 2013). Followers of the character were able to connect their home or office printers via _why's[p.318] own DIY network apparatus to a document scanner. Each page that _why[p.318] scanned into the network appeared almost instantaneously as a printed page in the hands of their audience. The audience experienced a short networked publishing event over the course of the day as a 95 page book was printed out:

104 This is perhaps connected with attempts at that time to publish links to the author's legal identity (Lowrey 2012).

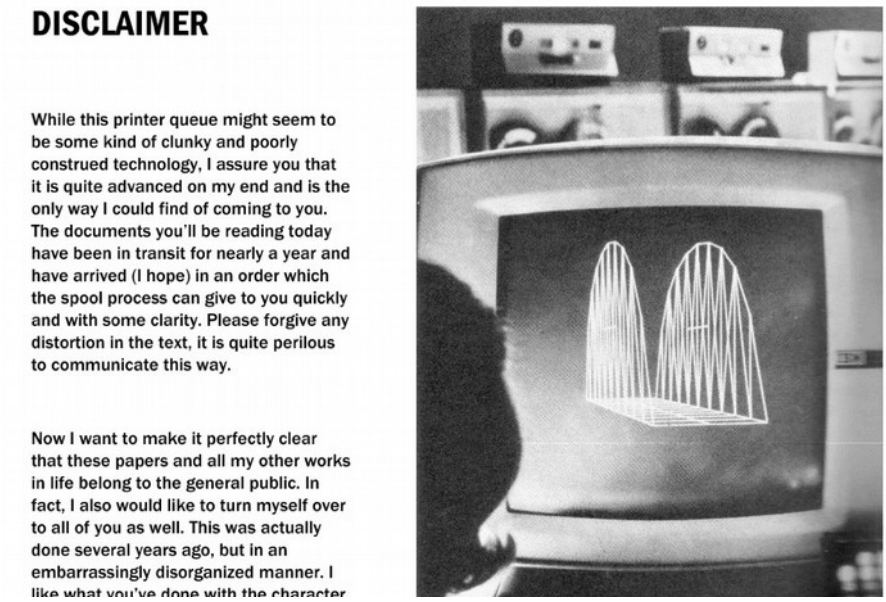


Fig.102 _why's[p.318] poetic description of testing the networked printing in the "Closure" book.

This example is significant in extending the physicality of publishing objects like the Tor Toys[p.318] scanner to include the printers in the hands of the audience directly networked to the author. With this performative identity apparatus, Why the Lucky Stiff[p.318] fashioned a pseudonymous reputation with a strong sense of belonging albeit within a network literate subcultural audience of the Ruby programming community.

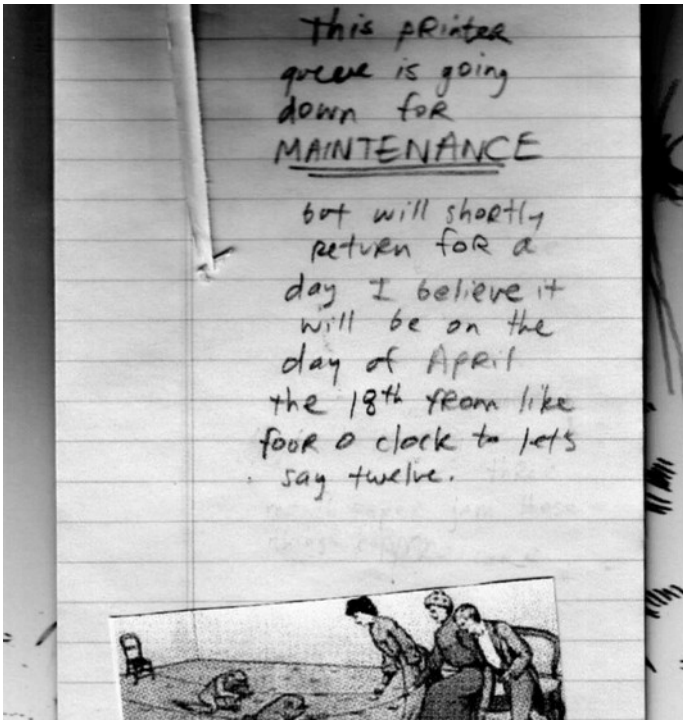


Fig.103 An example of _why's[p.318] networked collage style.

Common goods

The pattern of regulatory gatekeeping by clouds dictating who networked identity apparatuses belong to can be inverted, suggesting instead commonly held public belongings outside the clouds. Making shared networked objects with no single discernible owner anonymises authors and editors.

I have discussed how making networked objects plays a part in identity agency and relations of community reputation. Fashioning belongings can empower each individual author by making tools for designing identity and in communicating and negotiating belonging through those identities with networked publics. Fashioning our own belongings also involves making common objects of group belonging that make space for collective acts of identity play. Maintaining public objects as collective commons are forms of editorial reputation, accountability and public network infrastructure.

While designing Bundle Publishing p.292 I was introduced to the 1960s example of Aspen magazine boxes as a key example of editorial assemblage.[105] Editorial reputations are a frequent part of sustainable pseudonymity cultures, as illustrated by zine models of distribution (Duncome 2009) and norms of historical pseudonymous magazine editors (Taylor 1991):[106]

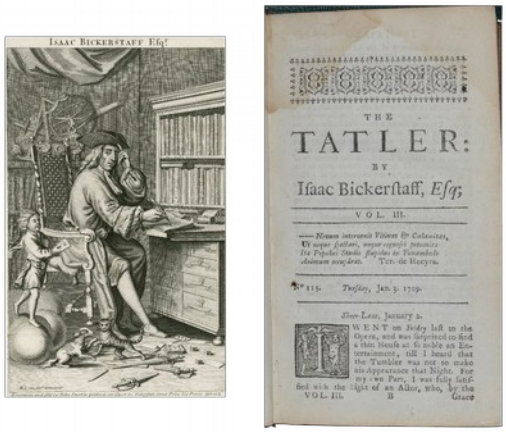


Fig.104 An early example of a pseudonymous magazine editor – Isaac Bickerstaff Esq. editor of Tatler.

105 Aspen Magazine was a series of fluxus-inspired physical boxes produced by artist/designer/publishers. Each box was assembled by guest editors, collecting together a range of media materials, including books, pamphlets, posters, vinyl recordings and flip books.

106 In the history of anonymous pseudonymity cultures publicly established reputations like editors and publishers often acted as the stable point of contact through which new pseudonyms were able to establish a trusted social status and consistent identity over time. Many editors were themselves in the form of pseudonymous characters (such as Isaac Bickerstaff the first editor of Tatler magazine) (Taylor 1991).

Pragmatically too, within anonymous pseudonymity, editorial and publisher forms are required to connect and build audiences. The Tor Toys[p.318] produce mostly un-searchable *.onion* websites that cannot find audiences without forms of collecting and editorial control to gather, publicise, and re-post materials produced by particular publishing objects and identities within a community of interest.

Public anonymous communication commons like the postbox (Mullan 2008; Ciuraru 2011) are undermined by technologies of increasing authentication and tracking (Brunton and Nissenbaum 2015), and by contested framings of illegitimacy, as I explored through designing the noPayPhone[p.311] as a public phonebox and at the Chaos Communication Congress[p.293].

Fig.105 An image shown in my talk about public resources and infrastructural commons at CCC[p.293]. Photo: Joachim Thurn.

Throughout my prototyping where we were seeking to create a collective resource within the network, we were forced to associate that resource with a single legal identity. With little scope in app developer tools to connect phone apps to decentralised infrastructure projects, I turned to a centralised web server script to host and share Desk Snap[p.300] participants' images between their devices.[107] Institutional network administrators resist the complexity of supporting such servers because of issues of authentication and permissions. I hosted the project in a cloud server rented from a company under my own name. This reveals a broader logic of authentication in which data storage, network communication, encrypted web connectivity (HTTPS certification), webserver domain name management (DNS), and

107 This centralised model is propagated by the design assumptions and available resources in the app programming and networking APIs templates and resources (Chatting et al. 2017).

server hosting access, are all directly connected to models of registration under a single legal identity, and regulated through the identity authentication processes of digital payment through banking services and administrator network connectivity.

Through networked objects in public spaces, such as civic architecture, publics could individually disown and collectively take on responsibility for spaces of identity play by hosting network infrastructure and community data within collectively owned objects. Collective editing shares and obfuscates author reputation and repercussions:

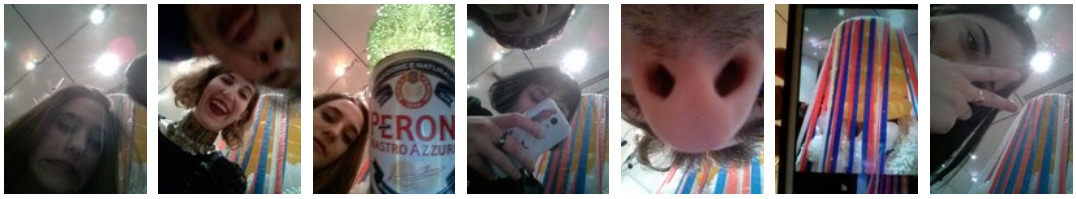


Fig.106 When exhibiting the Barrow Woodwose[p.291]*, I left a publicly usable mobile phone in its hand, which audiences explored the creative limits of.*

At the Modelling Digital Public Space[p.309] lab, using the analogy of a public park as a place for sharing personal data, we developed a series of sketches of civic infrastructure, in the form of a public monument, statue, water trough or clock tower[108] and introducing civic data commons and network resources into these objects. This notion of data in public also takes inspiration from the Dead Drops public storage project by Aram Bartholl[p.294] (2010).

108 Which were historically publicly needed resources often funded through collective subscription models (see also Ellie Harrison's[p.318] (2015) Radical Renewable Art + Activism Fund wind turbine project and subsequent Glasgow Community Energy co-operative).

Fig.107 Sketches from my Modelling Digital Public Space[p.309] workshop showing data monuments in a public park.

The Hashtag Radio[p.304] design combined public infrastructure objects with an established collaborative community radio process of editorial management as ways of collectively organising material and reputation with shared responsibility for its production and distribution. This extends the notion of collective assembly in sticking together as a way of curating content, to site it within a publicly held object and place. In the case of Rapidly Syncing Clouds[p.314], like the Hashtag Radio[p.304], this was focused on the activities of a co-located group developing a conversation collaboratively.

Making networked apparatuses into forms of commons that designers and publics can use to fashion belongings themselves is a complex and contested process, greatly dependent on reaching a critical-mass audience. Novel decentralised software projects are widespread but most lack sufficient users (Bolychevsky 2018; Corbyn 2018). Francis Irving[p.298] and his collaborators (Bolychevsky 2018) have documented numerous community technology projects that have emerged during the period of my fieldwork, that explore more distributed and collective networking processes of communication, hosting and naming, often as public commons. Only a few distributed infrastructure projects have gained enough widespread prominence for their distributed audiences to sustain them including BitTorrent (a distributed file server), Tor (a distributed mix-network), and Bitcoin (a distributed ledger and currency). The BitTorrent infrastructure emerged as a material in designing bundle publishing[p.292] as a way of hosting the bundles that shares the load and responsibility of distributing a large file across the audience itself:[109]

109 Although there are some centralised properties to most bittorent protocols.

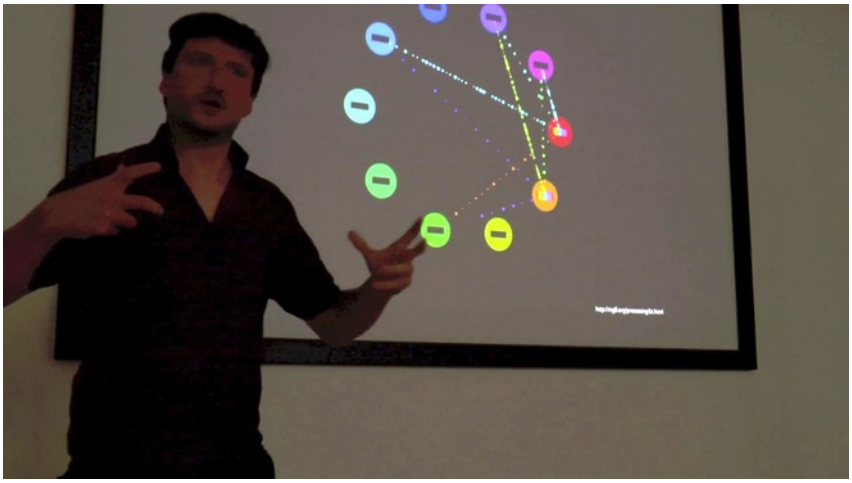


Fig.108 A diagram (aphid) showing the decentralised flow of data in bittorrent file hosting from my presentation about bundle publishing$_{p.292}$.

In a similar way, the INDX$_{p.319}$ data store design (Van Kleek, Smith, et al. 2015) and my Tor Toys$_{p.318}$ prototype both use the Tor network primarily not as an anonymising technology (which it was designed as), but because it offers domain name URL generation, end-to-end traffic encryption, and personal hosting behind internet service provider and home router firewalls, making it easier, simpler, and free to create a temporary web publishing space. These features made Tor well suited to workshops introducing DIY web publishing to people for the first time, and has the by-product of not needing centralised authentication, or any payment or bank authentication.[110]

What distributed 'common good' software projects offer is a design material and design model for communal ways of sustaining communication and reputational infrastructure. A number of centralising cloud processes remain in these projects however, in many cases including the development and distribution of the software (and hardware).[111]

Networked Public Participation

Belonging builds on public objects and community ownership. Fashioning draws on the desirable exclusivity of fashion and belonging. Belongings are good to think with about network literacy.

110 The other technology widely explored in this space is that of Bitcoin, which again uses a redistributed model in which the process of creating and using bitcoin also sustains a network of governance and accountability through logs of transactions. Indeed, this network has been appropriated as a form of public record commons, among other potential uses.

111 Another is the rare expert knowledge required to maintain the mathematical encryption approaches to identity agency which is much harder to imagine meaningfully distributing more evenly.

A common place: Public spaces

Patterns of fashioning belongings as common goods suggest forms of public participation in these collective commons through direct material access to identity apparatuses within objects in public spaces. Network infrastructure street furniture and architecture is mundane and unmemorable. By highlighting internet infrastructure, publics can reimagine them as forms of collective commons, as identity data apparatuses that reference historic public commons, holding them to greater account. Engaging with civic objects to make them more meaningfully belong to specific community contexts involves processes of infrastructural inversion.

We identified telecommunications architecture and other networked objects in public spaces through the walks and research processes of New Cloud Atlasp.309 network mapping. We experimented with getting to grips with the green and black street cabinets housing network access points to parts of the fibreoptic and copper network. These cloud internet infrastructure cabinets are prominent points of interconnection between strands of underground cable, but offer up no public comprehension. We used drawing, games, microphones, electromagnetic sensors, touch and smell to explore the material properties of these network nodes.

Fig.109 Looking for network infrastructure during a New Cloud Atlasp.309 mapping walk. Photo: Loura Conerney; Tim Shaw sonifying electromagnetic radiation from a street cabinet.

In a design critp.300, I explored ownership by inviting participants to imbue network cabinets with characteristics pertaining to their location in the street using chalk and tape. In a family workshop exercisep.309, I asked participants to use forms of play to lend the nondescript civic objects specific local community meaning:

Fig.110 New Cloud Atlas[p.309] *cabinet games.*

Civic architecture offers an approach which is normative, using institutional forms or social norms to maintain the commons, rather than temporary interventions. The design of public networked objects as common places is about collective agency and ways of sustaining reputational systems and editorial control over time. The fashioning of social norms in public places can contribute to making networked public belongings commonplace.

When we proposed publishing public conversations from the Chattr[p.294] cafe, we faced a common institutional nervousness about accountability – would we edit the transcripts for offensive material before publicly publishing them online? Placing a networked publishing object in public is bound up in discourses and fears of the 'dark net', imagining the ways in which anonymity without reputational and editorial apparatuses permit unacceptable, dangerous or disgusting communication. The design of public networked objects is therefore about the design of ways of sustaining reputational belonging and contesting illegitimacy.[112] Envisaging these objects as a common good proposes forms of editorial control through collective institutions and norms, such as democratic forms, rather than replicating centralised publishing models.

I identified how social norms in existing public spaces can shape and be shaped by collective responsibility as networked common places. Publishing through a public object in a busy public space creates a context in which transgression of social norms is both emboldened

112 Design challenges which sit more broadly within questions of working democracy and systems of social cohesion.

and regulated by social traditions and physical proximity. My Masked Soapbox[p.308] explored how a public object could mediate networked communication through traditions of a commons. Masking allowed performers some anonymity and empowered some agency over identity online, but beyond the video booth they were still within the social norms of a busy social context:

Fig.111 Masked Soapbox[p.308] as object and common place on the street.

Paluska[p.308] positioned his booths as archives of sense of place rather than live 'window' streams like the early public communication sculptures by Galloway and Rabinowitz (1980):

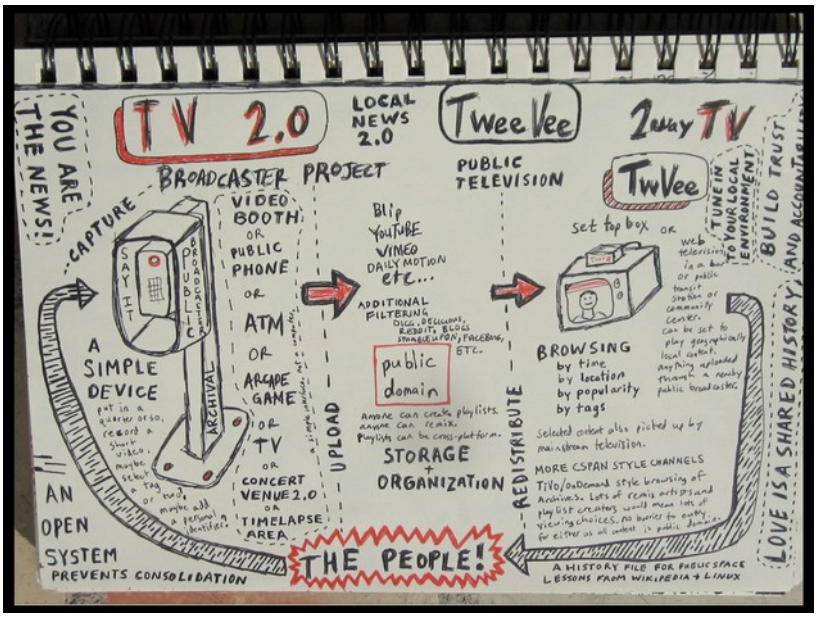


Fig.112 A sketch from Dan Paluska[p.308] detailing his proposals for a public video booth.

I experimented with this concept of public belongings further. As dicussed, the Hashtag Radio[p.304] project proposal considered how radio production could structure participation in collaborative communication. We considered what the forms and interfaces of established formats of radio production could bring to community activity and activism. Changify[p.304]

and Resonance FM$_{p.304}$ sought to empower their local community audiences through a hyper-local radio station that existed for as long and far as a social media hashtag was trending on a local issue. I proposed combining two technology resources, Dialup Radio (Hirsch 2009a) and Pirate Box (Anderson 2011), to embed radio production infrastructure directly into community spaces using existing street furniture such as lampposts, community buildings, public libraries or local cafes. The Pirate Box project offered us a simple way of connecting contributors to a set of communication tools within range of a local wifi network. This creates networked tools in a public space or shared building.[113] The Dialup Radio software developed by Tad Hirsch and his collaborators (Hirsch 2009a) uses the structure and familiar resources of radio production to create editorial and communication connections using existing phone networks for recording content, by ringing up an automated service and recording a series of messages, and for listening to dial up radio segments.[114]

My Rapidly Syncing Clouds$_{p.314}$ prototype also used physical proximity to engage a contributing audience in the video essay, performed more widely to a public through the Tweets documenting each video choice. I used the noPayPhone$_{p.311}$ project to experiment further with how negotiations of legitimacy and collective responsibility play out through existing norms of physical public spaces, and the positioning and design choices of project objects. It was sustained by the people nearby who had connected their mobile phones to it over bluetooth:

Fig.113 noPayPhone$_{p.311}$ handset.

113 These ideas also draw on Aram Bartholl's gallery router art objects, Constant Dullart's modified routers, and examples at the Tor Toys$_{p.318}$ workshop from Ross Dalziel and Glenn Boulter of a self-hosting text adventure game.

114 For a CX application of these ideas in a community voice project see Crivellaro et al. (2016).

The shape of a public location for the telephone resource was defined by a range of the connectivity, the scale of a room and choosing somewhere publics would spend enough time to become interested by the project and consider staying to donate some of their mobile call time. The phonebox was developed for users who don't have 'free minutes', those who cannot afford a subscription plan, those without resources like a mobile phone, such as some homeless people, and international travellers who are not able to use their own phone plans abroad.

These characteristics define a location for the noPayPhonep.311 as a publicly accessible, but comfortable social space, like a cafe, public library or gallery, in which enough 'free minutes' donors could be found. Somewhere that people can spend enough time for their phones to remain connected to support calls made by strangers, and publicly accessible enough to be nearby the phone and use it, and not spend a long time seeking it out. This attaches a resource to a publicly used place,[115] and like the Masked Soapboxp.308, placing the phone on view means the users are nearby to the donors of the minutes, so there is some sense of obligation and social norms of respectable use that act to limit its use for socially unacceptable behaviour.

Fig.114 The noPayPhonep.311 prototype installed in the FutureEverything art festival gallery cafe. Photo: FutureEverything

115 Either public, or commercially owned but publicly used like a cafe.

As previously discussed public anonymous pseudonymity cultures have long been polarised into framings of superheros and supervillains. After developing the Bundle Publishing$_{p.292}$ proposal I found a parallel in the physical practices of media distribution in Cuba, known as *El Paquete Semanal* (Harris 2015). This is a weekly bundle distribution through a physical *sneaker net* (Steele 1983) network of files passed on storage devices and market stalls around the country.[116] Because of the lack of regulation of which media, films or TV are distributed through El Paquete this system is characterised in the American press using the extreme language of "media smugglers" and "underground [...] dealers" (Harris 2015, para. 1). The Bundle Publishing$_{p.292}$ project specifically aimed to use content and editorial control that could not be easily framed in terms of piracy or illicit use.

Make good: Ongoing repair of identity apparatuses

Coming to view the making of belongings as a collective process of negotiation helped me to question my formulation of an ideal identity design object as some fixed thing or end point of a design project, rather than an ongoing process of forming, using and connecting identity through networked, social and material processes. My role in fashioning our own belongings emerged as contributing to making space for an ongoing participatory process of forming, using and connecting through networked, social and material processes, and to developing hands-on network literacy to make clouded infrastructure visible and accessible.

Parallels between physical notions of security and digital equivalents imply models for controlling agency flowing through physical networked objects. One folk custom calls for salt (or peas) to be scattered on a doorstep to impel a malignant daemon to waste time counting every grain without ever entering the house. The notion of a 'salt' in encryption (Morris and Thompson 1979) is a large randomly generated number combined with credentials encrypted in a digital system so that a potential attacker is forced to metaphorically count every grain of salt before they are able to reveal the message contained:

116 El Paquete combines aspects of the Humble Indie Bundle (Thompson 2010) and Dead Drops (Bartholl 2010) projects.

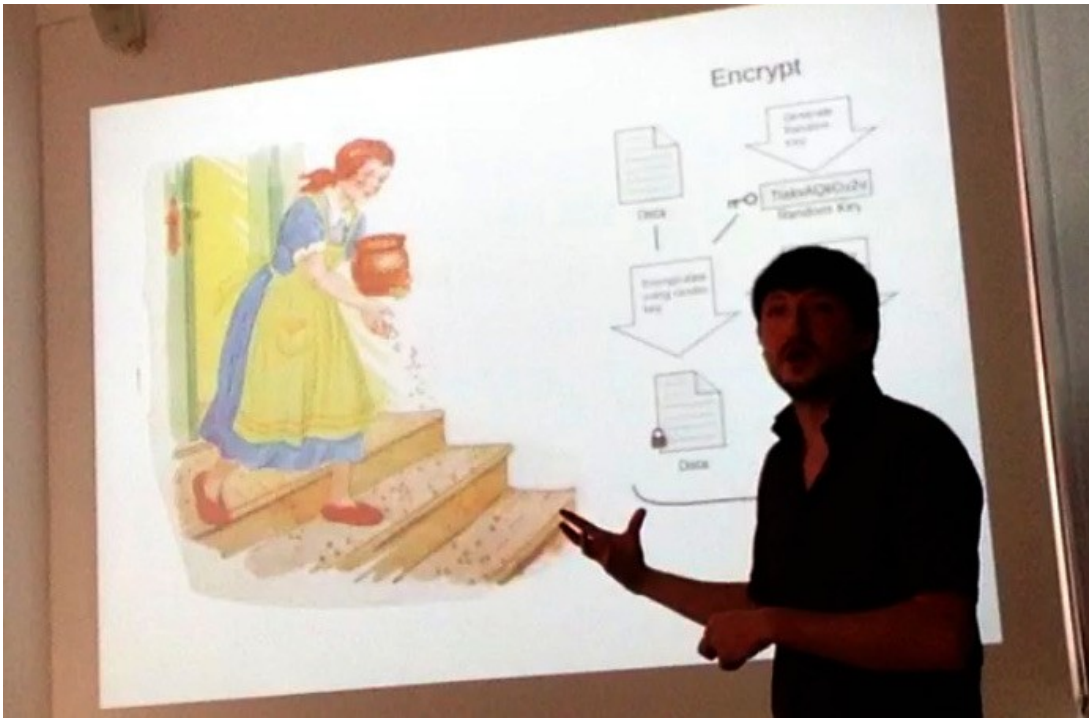


Fig.115 Image from my talk comparing rituals of randomness (scattering salt) in folk customs and encryption security.

Network apparatuses must be continually updated to remain cryptographically secure. Exerting agency through a networked object is always an interplay between physical and cryptographic control. The boundary relationship between the network and the object is not straight forward. An object that stores personal data within itself – like the Chattr[p.294] guinea pig or INDX[p.319] personal data store – can be smashed apart to delete and prevent access to it. However, if networked, it is only the mathematical properties of encryption and the function of the network software that lock out topologies of access from anywhere in the global network. For my Authenticity & 'Real'? Bodies[p.290] lecture I explored the relation of contested authentication to histories of 'unbreakable' locks that attests to ongoing negotiation of socio-technical agencies of ownership through keys and mechanical or digital locking. Each lock, physical or digital, is presented as a permanent unbreakable certainty and is then broken, and new counter measures must be designed into the system. This process has accelerated as physical authentication through locking and tokens has shifted to digital keys such as RFID and then to networked locking and encryption.

Fig.116 An 'unbreakable' lock in a museum.

The history of 'unbreakable' locks suggest an ongoing, and unpredictable, process of contesting access exacerbated by network topologies and scales. It is not possible to simply make a networked object, and assume that it will work for a user's lifetime (or for any significant length of time) without being connected to some infrastructure of updating encryption software through bug fixes, patches and upgrades.

Fashioning public objects, particularly those taking the form of commons, must tread a balance between playful inversion that allows for experimentation like the Masked Soapbox[p.308] for example and more stabilising institutions and infrastructures like those a community radio[p.304] format proposes. Infrastructural inversion is the slow understanding and revealing of the mundane aspects of the network while carnivalesque inversion is characterised by more transgressive playful acts. Carnivalesque inversion is empowering, and because of its short, intensive interaction is able to propose possible changes before they can be countered through structures of control. However that transgressive element of the carnival also tends to tarnish the resulting exploration with a characterisation of illegitimacy as boyd (2014) describes in terms of networked moral panic.

Data and software licensing decisions are part of the negotiations of collective control and public commons. As discussed, my participants used free software licensing models of contract and copyright law to produce collective commons and shared belongings. The New Cloud Atlas[p.309] project revealed open licensing of stored data as a facet of collective

responsibility. Cartographer Tim Waters[p.309] and I chose the OpenStreetMap project resources and database for their Open Data Commons Open Database License (ODbL) and active collaborative mapping community. The ODbL makes the collected map data openly available and more accountable:

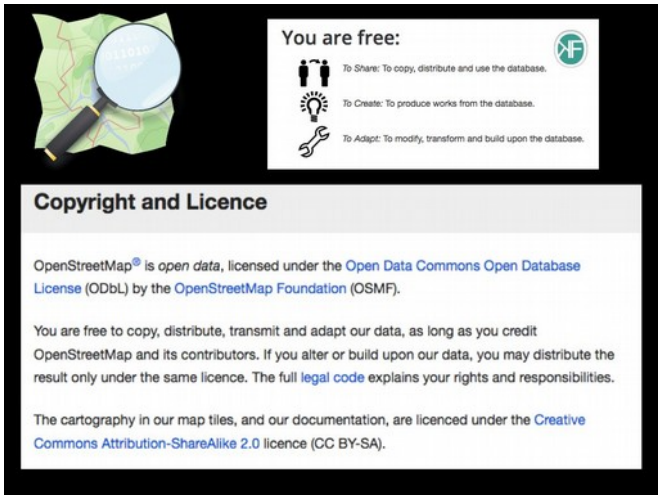


Fig.117 Open Data Commons Open Database License (ODbL).

Free software and open source models help to make public institutions of networked infrastructural commons. Fashioning belongings here means inverting forms of centralisation into smaller community models of federated identity apparatuses (De Filippi 2013).

SOCIAM[p.319] project collaborator Tim Berners-Lee tweeted from his early web-connected computer at the launch of the UK olympics "This Is For Everyone" (Berners-Lee 2012). His message suggested open access to the information that the internet provides (and the clouds currently offer) but also attempts to secure the shared responsibility and resources for *writing* as well as reading information, in the World Wide Web protocols he designed:

Fig.118 "This Is For Everyone" (Berners-Lee 2012)

Berners-Lee's work on the redistribution of personal data storage is influential on the designs of the Walk in the Park[p.319] project.

Fig.119 The GPL license details for the INDX[p.319] personal data store project.

In the personal data storage prototyping[p.319], the context of a free software licence and openly developed code using a shared repository (although often centralised, as with Github) serves another purpose which is to make possible an accountable document of the software development history, and the potential for review and critique of the security of the system produced. Free software and open hardware development represents the possibility of public accountability, although it does not guarantee that any auditing has taken place. In comparison, efforts to develop proprietary identity apparatuses in those commercial contexts that do not make use of GPL or similar licences have no way of demonstrating trust – that what is purported to happen when a network possession is attached to the cloud, is what actually happens. If the instructions for the device are distributed as machine instructions, it is difficult or impossible to decipher the intentions and workings of the system as fully. If the software is written in public view, and users are able to compile the functioning program from readable code that they have access to directly, there is the potential to audit the software and its function.[117] Free software has been a common material throughout my prototyping because of its ubiquity in the infrastructure of the network and its inherent accessibility.

117 In relying on the accountability potential of decentralised and free software and hardware projects, it is important to recognise the contested and centralised aspects of these efforts. Code gatekeeping, project hosting, trust verification, production infrastructures, cryptographic algorithms and volunteer effort are all forms of centralisation found in many of these projects. For example I found critiques to the limits in the accountability of the Raspberry Pi hardware used in my workshops, in the form of unaccountable 'binary blobs' of unknown functionality required by the objects to operate (Debian Wiki 2015). Therefore, in my Tor Toys[p.318] workshops exploring the ubiquity and literacy that the Raspberry Pi offered, I also investigated alternative open hardware including the Novena and Olimex projects.

Bothering

Within the pattern of fashioning our own belongings, and particularly the labour that fashioning requires, bothering means celebrating the complexity of the troublesome work of making space for anonymous play together, alongside cultivating a healthy sense of unease about uncanny seamlessness.[118]

Fashioning our own belongings requires investing time and energy in taking on responsibility for network and identity structures. It is inherently more complex and time consuming for the user. Cloud mobile devices mask a complexity of hidden labour and inequality. Inverting and celebrating this complexity can draw on the altruism of carrying responsibility while holding to account and cultivating a sense of unease in the hidden complexities within seamless cloud model publishing convenience (Wu 2018).

The fashioning of belongings process that seeks to comprehend the materials and technologies of networked objects is inherently complex and time consuming, and cryptographic anonymous pseudonymity even more so. Mark Fell$_{p.292}$ articulated this barrier to audience and participant growth in our conversations about designing Bundle Publishing$_{p.292}$ by asking "why would they bother?". We were puzzling how a prototype bundle might be produced with pseudonymous contributors and pseudonymous editors following the model established in the first 1709 edition of Tatler magazine (Taylor 1991). Fell$_{p.292}$ gave the example of an anonymous program of music and sound performance at a festival in which the majority of artists invited did not bother to contribute, seeing this as there being little motivation to play with pseudonymity in modern contexts of authorship. Furthermore producing an anonymous contribution required additional convoluted steps of identity control. During our desk sharing$_{p.300}$ prototyping, we similarly questioned why participants would carry and use a dedicated object when they could potentially simply share desk images on Instagram, WhatsApp or email. It was, in part, to play with the prototype, to see what it could do and out of a sense of obligation to the design-research process they saw themselves as a valued member.

Identity fabrication is inherently complex, in particular, collective acts of taking on the

118 The etymology of bothering as 'confuse with noise' is well suited to the earlier data chaff patterns of this thesis.

network are faced with challenges of how to create a large enough motivated group to provide shelter for identity play.

Ease-of-use emerges through the experience of design and branding of cloud sites and apps. As I discovered, the Chattr[p.294] guinea pig objects were incredibly compelling motivators for participation. Many users merely glancing at the contractual agreement when offered the opportunity of holding a guinea pig.[119]

Fig.120 Trolleys of Chattr[p.294] guinea pig objects made them easy to pick up. Photo: Hwa Young Jung

Making networked belongings means overcoming the path of least resistance of slick identity and communication interfaces offered by centralised cloud services. On a mobile device it means resisting swiping back to a simple app from a more complex process.

However, in many non-digital contexts identity and authentication are accepted burdens that must be continuously carried, often in the form of special objects. At the Numbers that Matter hackathon[p.311] event our design conversations turned to the effort exerted around objects and tokens of identity. Keys and cards are a continuous, mundane, effortful responsibilities of everyday life. Carrying a large bunch of keys or a thick purse of cards is necessary to prove official belonging to a number of organisations, architectures and objects. These tokens are a physical manifestation of mathematical security, and in certain contexts cultural tokens signifying belonging.

119 Chattr[p.294] was presented within the authenticity of an arts festival, so audiences were also trusting because of (implied) festival and academic assurances.

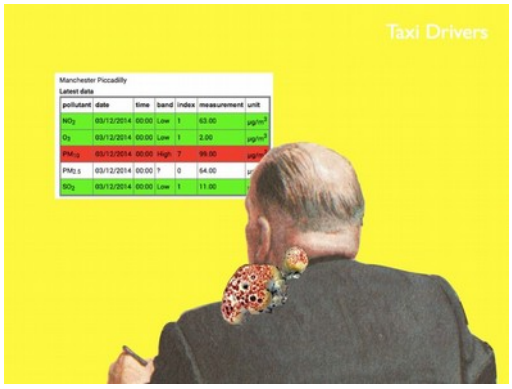
The possibility of replacing cards and keys with a single RFID mobile phone is seemingly obvious and highly desirable. Digital authentication is a seamless beep and safely backed-up in the cloud. The concessions (and costs) of permanently cloud-authenticated access are more hidden. Lending, charity, gifting and sharing of resources and places all become centrally arbitrated.

In networked systems too publics are giving over personal computer resources and time to sustain collective commons of authentication, as in the shared ledger of the Bitcoin system.[120]

Fig.121 A pocket worn into the form of a mobile device.

Social meaning is developed through acts of investing time and attention into physical objects. In the Numbers that Matter hackathonp.311 I collaborated to sketch designs of objects that signify a social cause through embodied connection to networked data. We looked at the city's taxi drivers and their relationship to pollution levels, modelled on worn tokens of awareness raising and support for causes. We imagined wearable objects that could signify a direct causal and health burden for the taxi drivers, so that their work and its relationship to pollution levels in the city might manifest as a growth worn on their clothing or bodies.

120 On a visit to one project partner university, a researcher showed me a computer 'mining' bitcoin, which is an intensive and – through dedicated computing resources and electricity used – costly computational task, involved in not only generating value for the owner, but also sustaining the decentralised networked infrastructure of verified transactions.



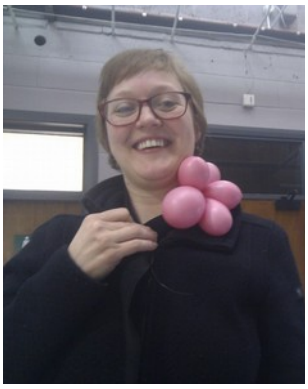


Fig.122 Numbers that Matter hackathon[p.311] *taxi driver Processing sketch. Testing a data growth prototype.*

Considering the shape of a lifetime of data, one personal data store[p.319] workshop participant imagined a *slow* data store ritual which he prototyped as a USB stick wrapped in a very long thread. A wrapping process of several hours means unwrapping the object would be similarly time consuming and proposes a place for keeping precious and rarely accessed information and media to be unwrapped and re-wrapped ceremonially at key points in somebody's life. Such tokens of belonging are objects used socially to show group membership or outsider status, related to cost intensive status symbols (Donath 1999).

In experimenting with making festival costumes I came to learn how they take on meanings of powerful roles and social status in their construction.[121] Many Wild Man traditions include symbolic status objects like a staff or stick (Fréger and Wilson 2012). In making my woodwose[p.291] costume I was reminded of Krzysztof Wodiczko's Alien Staffs project (1992) in which he built video devices for émigré communities new to a city to manifest in physical form their status as outsiders engaging with the city.

Fig.123 My Barrow Woodwose[p.291] *staff. Photo: Benedict Phillips.*

121 The burden of carrying heavy symbolic objects such as a mace, furs, animal bells, and wilderness materials, also serves a purpose of creating a time-limited carnival environment rather than throughout the year. The costume offers the performer some elements of identity play, but at a cost of weight and cumbersome decoration.

These objects of raising awareness, showing support, or signifying boundary status and belonging inform a key approach to fashioning belongings. The physical burdens of bothering to make and sustain these objects mirrors the technical difficulty of designing identity. The social function of these objects as signifiers of belonging proposes ways of making personal belongings for identity play motivate participation from audiences.

Fashioning belongings can overcome the ease of cloud possessions by revealing the altruistic or community value of the additional required effort. Bothering to make our own networked belongings is about recognising and celebrating things that are less easy. Feeling bothered and uneasy about cloud devices is an important part of this inversion. In collaboration with several artists during the Time & Motion exhibition$_{p.318}$ I explored the hidden labour bound up in cloud devices and the changing nature of work looking at the parallels between network models and work practices. Uncanny objects are presented as immaculate constructions, but carry genealogies of hidden labour and exclusion in their manufacture.

Fig.124 Still from 75 Watt shown by Revital Cohen and Tuur Van Balen$_{p.316}$ (2013) in the Time & Motion exhibition$_{p.318}$.

In our Return on Investment$_{p.316}$ design conversations, Tuur Van Balen$_{p.316}$ presented his work with Revital Cohen of an object assembly performance designed for factory workers in China. The network of hidden labour is brought to the attention of the audience in the gallery where the video was shown. Georgina Voss$_{p.318}$ and I explored this notion of hidden labour in our workshop$_{p.318}$ looking at the long chains of hidden labour needed to produce digital devices, reaching back through opaque business models of production and distribution. I explored these ideas further through a family gallery workshop$_{p.302}$ that looked at hidden labour working conditions through the imagined roles that Santa's elves

play in the production of Christmas. The elf protest signs took on meaning as objects in their placement within the gallery. By making objects, workshop participants comprehended the uneasy factory worker relationships to making gifts addressed in Revital Cohen and Tuur Van Balen's[p.316] work.

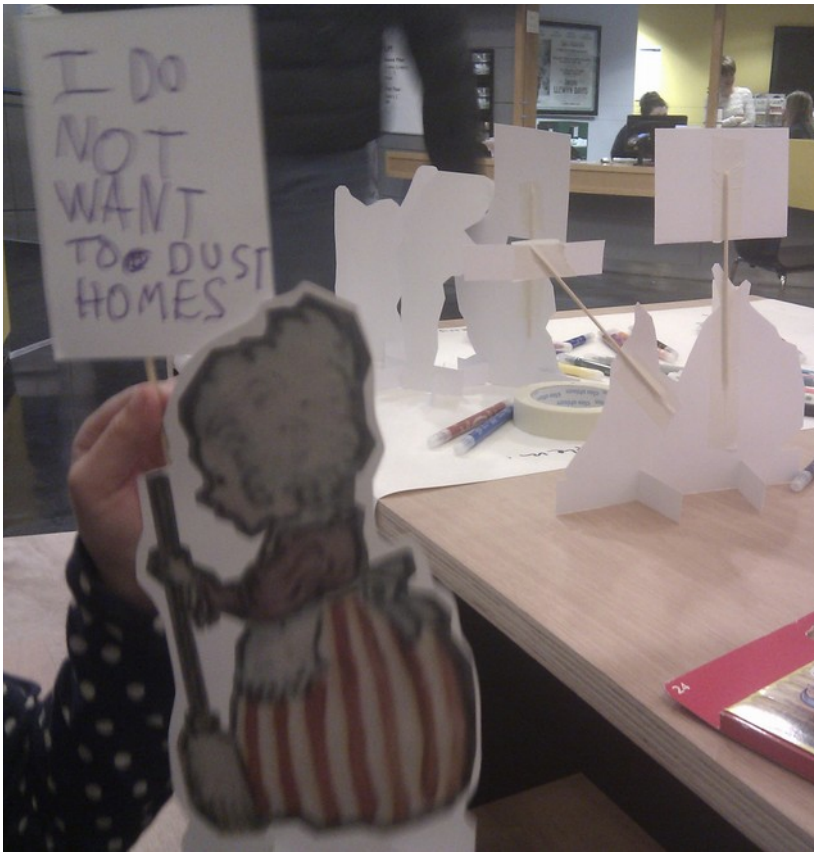


Fig.125 Audiences crafted Elf Protest[p.302] objects.

Like the Tamagotchi donation object[p.300] discussed at the beginning of this chapter, these exercises in embodying hidden responsibility and connectivity in objects are processes of investing value into networked belongings and their production.

Designer-researcher practice

The pattern of fashioning our own belongings focuses on make-do making, and comprehending networked objects. Belongings as I have described them entail a kind of intimate relationship with a possession through making and use. I use networked belongings to extend that intimacy and material possession through network topologies to take hold and contest identity apparatus responsibilities and audience relations. Playing with the network as a discursive-material offers experimentation to designer-researchers

and publics in reconfiguring the possibilities of identity apparatuses.

Making and getting to grips with networked objects is a design-research way of thinking about and through the network. This agency of making is informed by literatures and practices of concrete thinking, critical making and hacker culture. Playful public competencies in working directly with network 'server' computers contributes to network literacy and enacting agency in identity apparatuses (Swartz 2011).

In Tim Berners-Lee's original Web protocol design, publishing information was intended to be as simple as accessing information. This symmetry of both accessing and publishing through a personal computer shifted to a model regulated through cloud services. The Tor Toys$_{p.318}$ workshops explored how the Tor network reconfigures agencies of self-publishing by allowing users their own web server objects. The ability to play with the processes and resources of hosting and publishing develops literacy through exploratory making (J. Ito 2016a). Fashioning a personal web server is an example of crafting identity apparatuses into belongings of ownership, and seeks a literacy to comprehend opaque network dynamics through which identity is expressed.

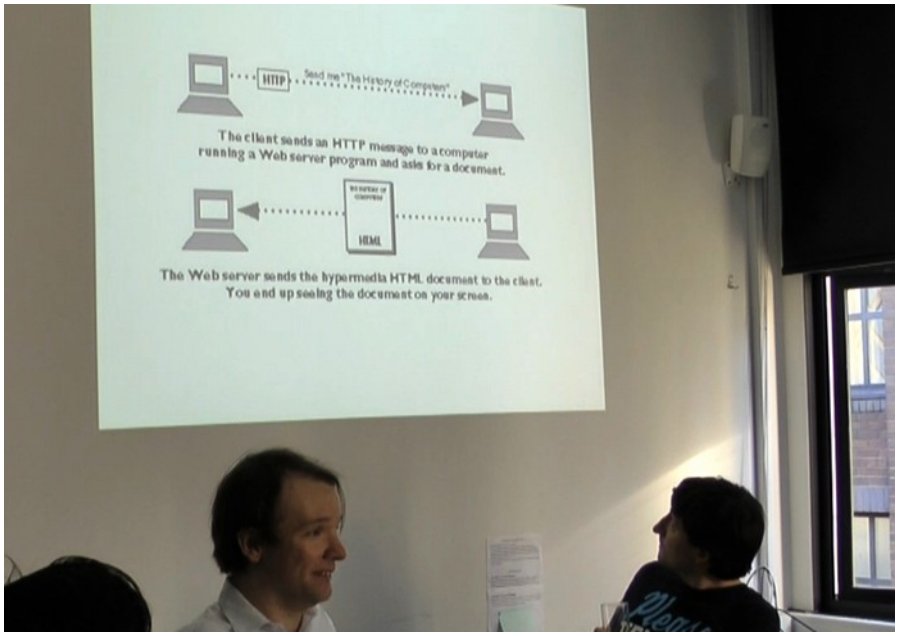


Fig.126 A diagram shown during a Walk in the Park$_{p.319}$ workshop that shows the simple symmetry of agency in communicating through the early web.

Networked making is a process of exploration and understanding characterised by Turkle (1995) as a form of *bricolage*. The iterative, exploratory 'tinkering' stance of bricolage allows publics to think through those objects to make sense of aspects of the network as a whole.

Turkle ([1984] 2005, 325) draws on Lévi-Strauss's (1966) notions of *good(s) to think with* and bricolage, and Papert's (1980, 173) use of "object-to-think-with" to mean forms of computer learning through doing. Turkle describes networked bricolage as playful experimentation and exploration through hands-on, playful thinking. I use the pattern of belongings to take up good(s) to think with as part of a practice of fashioning networked objects.

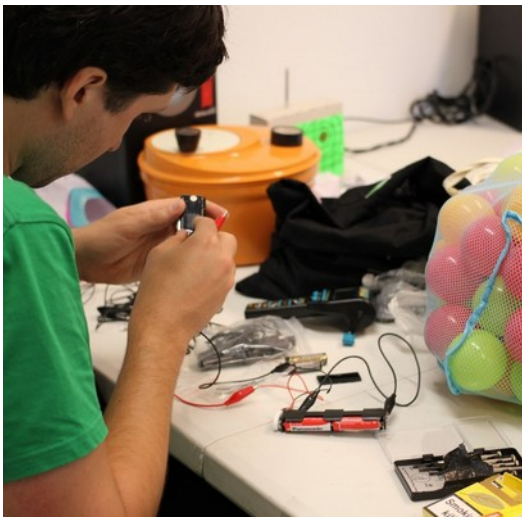


Fig.127 Digital Media Labs$_{p.301}$ *bricolage. Photo: Benedict Phillips*

The process of 'good enough' bricolage, as in the Masked Soapbox$_{p.308}$ fits well with the continuous negotiation of software and hardware necessary to maintain agency over identity. The instability of such experimentation however also suggests that anonymity is unstable in most cases. The anonymity of historical pseudonymity was short lived. Creating the space for playing with numerous designed identities as a shelf of networked belongings suggests creating multiple disposable networked objects, and network literacy practice.

Fig.128 Masked Soapbox$_{p.308}$ *'good enough' prototyping.*

Fashioning our own belongings draws on ideas within maker culture and critical making (Hertz and Ratto 2012) of empowerment and epistemic action (Dalton and Martin 2016). In critical making practices (Ratto 2011; Hertz and Ratto 2012) the freedom to tinker draws direct parallels with free software licenses. If you are unable to access the underlying resources of your networked object, then those are inherently controlled from somewhere else – a device possessed by the cloud. Maker or hacker culture is characterised by these notions of freedom to tinker (Balsamo 2011), including with underlying software and hardware designs. Collective maker spaces represent a potential form of accountability and commons. There is the possibility of exploration and holding networked objects to account, even if a user does not inspect every aspect of a networked object they have made. A number of events and my participants in the CX have drawn on the language and structures of maker culture (and its MIT hacker culture precursor). As with sticking together, fashioning our own belongings reflects maker culture in the ways that messiness and seamfulness of bricolage modifications are celebrated. The patina of fashioning can become fond, well worn features of heirloom belongings (Huang 2015).

Fig.129 Numbers that Matter hackathon$_{p.311}$ *making.*

Throughout my CX research, making networked objects has been a tactile process of questioning and exploring network materiality, a discursive-material process key to the workshops and design conversations, as well as my own processes of reflective memo making and crit sketching.

Fig.130 *Digital Media Labs*[p.317]. *Photo: Benedict Phillips;* *Gnome Street Gnome*[p.304].

In this chapter I have looked at the ways that *fashioning* objects emerges as a key pattern for taking on the network. Inverting the logic of uncanny *network possessions* – by troubling who holds possession – helps describe the shape of personal belongings as networked objects that afford identity agency and sense of belonging.

Chapter 7 – Taking on the network

Fig.131 New Cloud Atlas$_{p.309}$ *participants mapping network infrastructure. Photo: Loura Conerney; View of fibreoptic cables under Liverpool.*

In the previous two chapters data analysis of projects through design conversations and theory has been elaborated to construct two prototype design patterns, sticking together and fashioning our own belongings. The two prototype design patterns have been conceptualised as inversions that take on aspects of the network. For example: (1) the context collapses of collage, which follow the same juxtaposition pattern as a Facebook wall, provide a method of identity creation that inverts and makes use of the obfuscation model

of cloud infrastructures; (2) the making of networked objects through building simple self-publishing belongings takes on and redistributes the agencies of walled garden ownership. The two prototype design patterns of sticking together and fashioning our own belongings fit within the over-arching design pattern of taking on the network. Taking on the network, like the other patterns, is defined as a superposition of its meanings that encompass identity design, networked public participation, and the stance of the designer-researcher.

The forms of identity design in the patterns of sticking together and fashioning our own belongings are dependent on collectively, actively constituting relations and exclusions of identity. Sticking together assembles identity through juxtaposing roles and reputations creatively, producing new persona as part of a networked public that sticks together to make these activities commonplace. Fashioning our own belongings means embodying relations of audience and editorial belonging within networked objects, with a large enough public to take on this responsibility through commonplace belonging ownership.

Publics are left cut out of the centralising, commercial design agencies of cloud identity apparatuses that impose monolithic, permanent identity authentication dossiers. The anonymous pseudonymity that makes forms of identity design by publics possible must be collectively contested. Identity design produced through collective intra-action involves the recognition that designing identities is always situated within the contestation of a conceptual and material-discursive apparatus, not just a task of authoring a new account.

In this chapter, taking on the network means understanding public identity design as collectively resisting and redistributing where cuts are made between apparatuses of identity and the identity phenomena produced. Taking on the network is collective action to grasp networked agencies through the processes and objects of identity design themselves. Making space for the identity play of networked publics is an agential intra-action of cutting boundaries together-apart (Barad 2007), of cutting identity design practices apart-together.

Taking on responsibilities for networked identity apparatuses means holding the network to greater account through network literacy practices. By taking the network into their own hands, publics grapple with the material-discursive agencies of identity design. In this chapter I explore these inversions further, and the forms of resistance and responsibility

that taking on the network entails, through experimentation, observations and elaborations of how publics and designer-researchers make space for carnivalesque and infrastructural inversion, and identity play.

I set out the ways my participants and prototypes took on the network through resistance and responsibility. With the understanding of identity design by networked publics as the process of enacting new boundary cuts to include publics within networked identity apparatuses, I connect these forms to a balanced superposition of carnivalesque inversions and infrastructural inversions in identity design. I revisit the use of identity play to describe early internet anonymous pseudonymity cultures to emphasise the ways that identity play is contested and sustainable when it happens within wider networked publics.

Identity design

Taking on the network means adopting, embodying and inhabiting the form of the network by reconfiguring the topologies of distributed collective action. This follows Barad's (2007, 240–1) understanding of "identity formation" as "a dynamics of changing topologies of space, time, and matter" in which "'identities' are mutually constituted and (re)configured through one another in dynamic intra-relationship with the iterative (re)configuring of relations of power". Furthermore, taking on evokes a strong sense of material-discursive comprehension, through an etymology of *take* that emphasises embodied materiality. It implies grasping, in terms of getting to grips with and realising. The network often operates at invisible scales – speed of light fibre-optics, atom-scale magnetic storage, enormous numbers and calculations per second. Taking on means getting a feel for trust, agency and use by hand through the intimacies of touch (Barad [2012] 2017) and on a 'human scale'.[122] The two prototype design patterns – sticking together and fashioning belongings – emerged through the language and processes of physical actions and material forms that take on the network, to encompass active understanding and entangled practices of knowing and being in the network.

Taking on also means adopting, assuming and bearing responsibility. This can be in the form

122 Barad (2007, 136) questions the exceptionalism of "the distance scale of the human" and "the practices by which scale is produced". I follow her use of 'scale' when describing intra-actions that constitute the human, with apparatuses of observation, and her own "goals […] to build an apparatus" (Barad 2007, 233) which have included making 'human scale' objects such as books.

of owning and operating network infrastructure. Ageh (2012) argued that to make functioning digital public spaces we must (re)adopt more grass-roots egalitarian structures. The SOCIAM[p.319] personal data store project demonstrates how such a model can begin to more evenly distribute agency and increase intimacy. I have described how the personal data store projects of my Walk in the Park[p.319] collaborators (INDX and Mydex) shift responsibility for part of an identity data apparatus from centralised commercial and governmental walled gardens to each user, who controls access to identity data through encryption and physical ownership.

The context of Chattr[p.294] evoked acts of taking on the network to take responsibility for productive uses of the network by appropriating the infrastructure in creative and constructive ways. Once audiences had grasped the way Chattr[p.294] functioned they began using it for their own purposes. The Chattr[p.294] users who began to experiment with and comprehend the infrastructure were taking on and holding the apparatus to account as part of their own identity performances:

Fig.132 Audience figuring out our Chattr[p.294] infrastructure. Photo: Hwa Young Jung

I have explored how taking on network functions can mean taking public responsibility for cloud apparatuses of identity authentication and patters of clouding by inverting the role of accountability from the cloud into public commonplace forms, and inverting the action of context collapse into a form of identity design.

Taking on the network is a means of grasping its function, making sense of and having more control over the network as part of the agencies of identity design. I found grass-roots public models of cloud accountability in the prototypes of personal data apparatuses. One image the Social Machines group researchers$_{p.319}$ shared illustrated the concept of a decentralised "Personal Web Observatory" through which to conduct a science of the Web (Van Kleek et al. 2014). Building a distributed observatory from "billions of telescopes" is an analogy for how personal computers could be used to collect observations of the 'health' and function of the World Wide Web as part of a personal data store infrastructure:

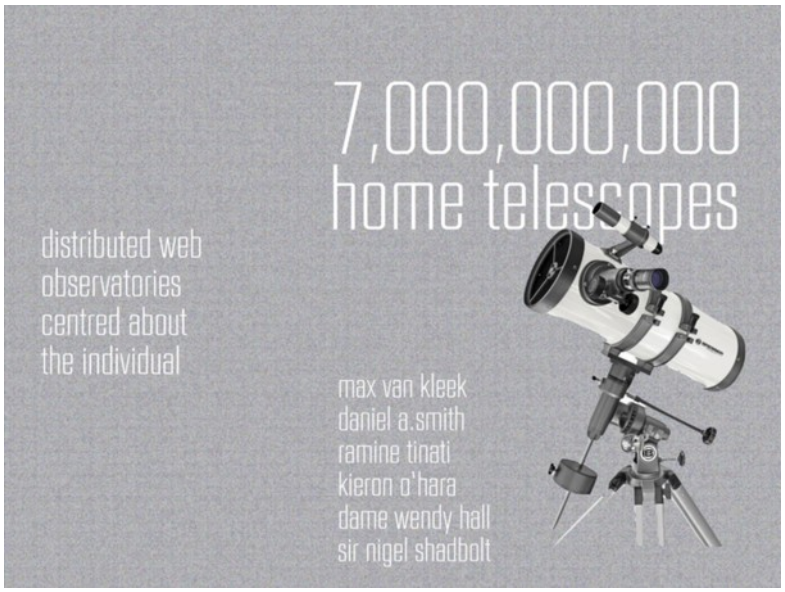


Fig.133 SOCIAM$_{p.319}$ slide of a "billions of telescopes" personal web observatory.

This striking image invokes a sense of mass collaborative participation.[123] In proposing a distributed mass observatory of the network using personal data stores, this image, like Ageh's BBC vision, takes a traditional notion of a singular, centralised, infrastructure and expertise – an astronomy observatory or a broadcast centre – and inverts that logic by proposing a bottom-up, grass roots distributed organisation.

Public responsibility for apparatuses of observation shift agencies of tracking into distributed forms. Making networked clouds more determinate is part of the same inversion as making the public identity designers of anonymous pseudonyms more

123 This is evocative of DIY accountability projects such as the work of Trevor Paglen's Limit Telephotography in which he turns home astronomy telescope lenses on the secretive military bases and the 'extraordinary rendition' kidnappings and tortures conducted there by the USA military. Or the IAA's collaboration with Paglen to make Terminal Air which draws on data from a global community of amateur plane spotters to track 'extraordinary rendition' kidnapping and torture flights.

indeterminate. Distributed public enactments of accountability "effect what's real and what's possible, as some things come to matter and others are excluded, as possibilities are opened up and others are foreclosed" (Barad 2007, 393). Barad conceptualises this tension and interplay between "revealing" and "re-veiling" (2007, 378) in who gets included in cuts separating productive indeterminacy and agencies of observation, as constituting specific identity apparatuses and identity phenomena.

Taking on has a meaning that evokes challenging and resisting a dominant power (such as "Taking on the Tech Giants" McCann 2018). I first identified this pattern of action in the responses by audiences to digital contexts with oppressive identity apparatus conditions which the Chattr$_{p.294}$ project created. I found forms of playful resistance and productive appropriations in the actions of visitors to the project. The creation of a communal context allowed for certain kinds of resistance – the use of satirical personas, playful multilingualism and physical manipulation – to be seen by and embolden others. The possibility of resistance emerged in the combination of the explicitly authoritarian surveillant context, the visibility of the infrastructure, and the anonymising features of the published transcript fragments:

Fig.134 Chattr$_{p.294}$ evoking play. Photo: Hwa Young Jung

Throughout both iterations of the Chattr$_{p.294}$ project I observed a range of transgressive – often playful – behaviour, taking on and inverting the surveillance infrastructure of the project. When someone theatrically adopted the persona of the director of the festival with a knowing nod to the readers of the transcripts, they used that pseudonymous voice as the basis for humour and critique. Participants in the project also challenged the recording and transcription of their speech with actions such as interfering with the microphones and using various forms of encoding and obfuscation including switching spoken language. One group of visitors tried provocative trolling using intentionally offensive language and topics like bomb warnings to try and prevent publishing.[124] As discussed previously, visitors also engaged with their temporary ownership of the recording data through actions such as destroying the recording object or finding ways of reverse-engineering how to delete all the files. They addressed the workers transcribing their voices directly in a number of instances and played games or challenged them:

> hmmm, sexy thing [laughing]
> it's just me and the cavia...
> like this, it's just started... [eardeafening blowing in the speaker] and the microphone is somewhere here, we can spy on people.... ther's a tiny recorder in him..
> it looks suspicious over here. give him an eye-patch.
> (Chattr$_{p.294}$ Logs)

The patterns of resistance during Chattr$_{p.294}$ seemed to be a product of the dominant presence of the overt surveillance architecture, spelt out through our signage and scripted interactions with visitors, and through the materiality of the data collection, transcription and transmission process, which allowed people to notice and act on the recordings that were made physical. As discussed previously the project was an anonymising infrastructure. There was a feedback loop so that audiences could see that resistance was occurring. This resistance did not emerge in the Conversnitch project (Greenberg 2014) in which people did not realise that they were being recorded, or have any ability to access the infrastructure to resist.

Controlling processes of classification exert power over how complex and entangled forms of identity are collapsed into digitally encoded, binary state representations. Interfaces of

124 This is reminiscent of patterns of anonymity enforcement through trolling, pranks and vitriol in online 4chan /b/ culture (Knuttila 2011).

personal data storage give an overview and access control to users but also standardise and order the semantic categorisation and structures of how identity and personal data is stored, represented and conceived by others. If public anonymity or indeterminacy is possible in more distributed identity apparatuses, then the power of collapsing the entanglements of identity can be shifted into the hands of publics and communities themselves.

As an example of how identity agency plays out through ambiguity and indeterminacy, artists Janez Janša, Janez Janša and Janez Janša[p.306] discussed with me how they complicated networks of authentication by all officially adopting the same infamous name. The redistribution of power in this act became evident in minor bureaucratic interactions with identity infrastructure when I invited the three artists to present their work in the UK. In organising the post-talk meal, my email conversation was with three identically named accounts, who all made different choices of the pre-booked menu. Even in this small moment of bureaucracy, power was shifted from the administrator to the three artists themselves who could identify their own meal choices or even swap without the control of such everyday micro-authentication. When travelling, the three Janez Janšas[p.306] report difficulties when boarding the same flight, facing identity infrastructures, a boarding system, that cannot handle more than one of the same name on the same booking. The Janez Janšas[p.306] used this indeterminacy in productive resistance to the leader of their country at the time, the nationalistic, xenophobic, conservative politician, Janez Janša, problematising his identity through their shared names.

The corporate-political accountability achieved through the intersecting accounts of multiple co-authors like the Janez Janšas[p.306] or multiple personas like the INDX[p.319] personal data store web observatory, indicate that a community can take on the models of the network through collective action – inverting the corporate internet cloud model of obfuscation – by holding the clouds to account and simultaneously clouding the tracking and classification of personal identities. Taking on the network resists and redistributes the power of centralised models of authentication to enact what is determined and what is left indeterminate.

It is the nature of the collective act that enables the Janez Janšasp.306 to exert some power over identity apparatuses of their nation, the news media and the art world. They told me they became attuned to identity infrastructure through their performances. For designers, play can function as "experimental interactivity" (or even a "series of small pilot studies") (Büscher 2006, 1), and is "iterative design" that is "too complex and emergent to script out in advance, requiring the improvisational balancing that only testing and prototyping can provide" (Zimmerman 2003, 184). I identify this as a carnivalesque inversion that combines negotiating acceptable transgression with pop cultural triggers for collective commitment. The carnivalesque is a pattern with which to ask questions about the interplay between political intentions and the social norms of transgression (Johnson 2011; Bakhtin 1984).

Networked public participation

Taking responsibility for accountability by holding the network to account, as the *billions of telescopes* personal web observatoriesp.319 model advocates, is a reoccurring pattern I observed in the Creative Exchange (CX). Tools and techniques of logging, mapping and tracking are taken up by networked publics themselves as part of contesting apparatuses of identity. A model of distributed accountability requires a decentralised infrastructure in which a wide community of participants take on responsibility for collecting and structuring information about the network. It is a form of resistance to the opacity of centralised cloud infrastructure and can be understood as an inversion of patterns of cloud identity.

The distributed power of billions of observatories seeks to hold clouds to greater account. In our research into the politics of (big) datap.298 about the ways in which we might design "accountability technologies" (Dalton and Frid-Jimenez 2013) we drew on the analogy of the International Meteorological Society and their Cloud Atlas[125] in thinking about how to make sense of the modern-day cloud corporations (Dalton, Frid-Jimenez, and Dahmen 2013).

125 In the late 1800s the original International Meteorological Society had proposed a collaborative, distributed observatory network in order to track the shape and movement of global cloud patterns. From this developed early observatory telecommunications networks and a Réseau Mondial (global network) infrastructure. However, Vilhelm Bjerknes realised that to collect weather observations with enough fine-grained geographically distributed detail, he needed to call on the help of individual people within the sea communities stretching along the coast of Norway. Bjerknes (in Jewell 1984, 802) compares his recruitment of a vast network of observers to the half-tone images of faces printed in a newspaper – "telegraphically communicated portraits". Up-close each of the dots in the pattern represent one person's observations, but viewed as a whole, the dots form a recognisable pattern that can make sense of trans-national cloud systems.

There is a parallel between a distributed web observatory – inverting the surveillant apparatus, giving a grass-roots audience Trevor Paglen's (2015) powerful telescopes – and the history of cloud observatories.

Early cloud observatories required the vision of decentralising observation in a collaborative global apparatus to map cloud systems inherently larger than single nations. To get sufficiently dispersed and detailed perspectives on the clouds, a much more distributed grass-roots participation was needed. In the same way the Social Machine$_{p.319}$ group's proposal of a distributed web observatory, calls on a large community of "citizen scientists" (Shadbolt, Van Kleek, and Binns 2016) to maintain a distributed infrastructure of network cloud observation. Taking on part of the process of making networked identity infrastructures more determinate is an agential cut that reconfigures the possibilities of public identity design. Each observation is about "taking account of the entangled materializations of which we are a part, including new configurations, new subjectivities, new possibilities-even the smallest cuts matter" (Barad 2007, 384).

By applying forms of tracking, mapping and categorisation to make sense of centralising cloud infrastructures, distributed publics take on and invert tools normally applied by the cloud sites themselves, thus an inversion of power in cloud identity accounts. Taking on the apparatus of authentication and accountability acts not only to reveal features of the network, but to shape them.

I worked with Burak Arikan$_{p.304}$ to adapt his Graph Commons$_{p.304}$ software workshop format as part of the Time & Motion: Redefining Working Life exhibition$_{p.318}$ at FACT gallery. Arikan has developed and sustained an open graphing platform for building, analysing and publishing maps of accountability (Arıkan 2013). He has explored ways of being "an active agent to criticize networks"[126] by appropriating network mapping tools and roles, enabling public critique of power in networks, inspired by artists Mark Lombardi (1997) and Hans Haacke (1971) among others. Our workshop equipped participants with a greater network literacy through hands-on participation in critical mapping.

126 Arikan in his Graph Commons workshop slides provided for the Time & Motion exhibition$_{p.318}$ workshop.

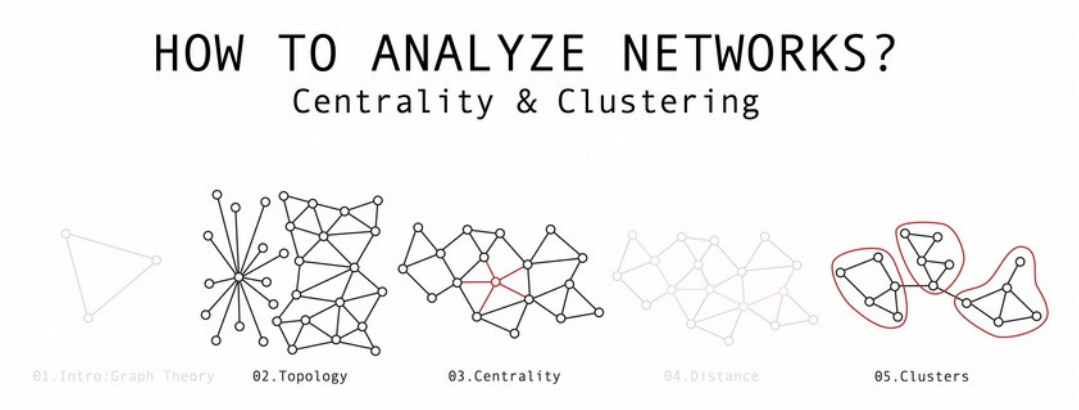


Fig.135 Graph Commons[p.304] *workshop slide on topologies of network mapping from Burak Arikan*[p.304].

Arikan identified and inverted roles of logging and tracking, re-envisioning them in the hands of networked publics. He emphasised the role that material thinking can have in processes of hands-on network analysis, including paper, string and post-its. I used this workshop approach to allow me and my participants to physically grasp the network diagrams analysed as they take shape and are made sense of, and to foster collaborative analysis. In two workshops, timeline logging of hidden labour[p.305] in supply chains, and mapping global geographic networked connectivity[p.318] of the gallery visitors and publics, we made use of craft materials – paper, pins, cut-ups, and string – to comprehend the shape of hidden infrastructures and networks. Arikan's digital tools further extend this mode of network analysis.

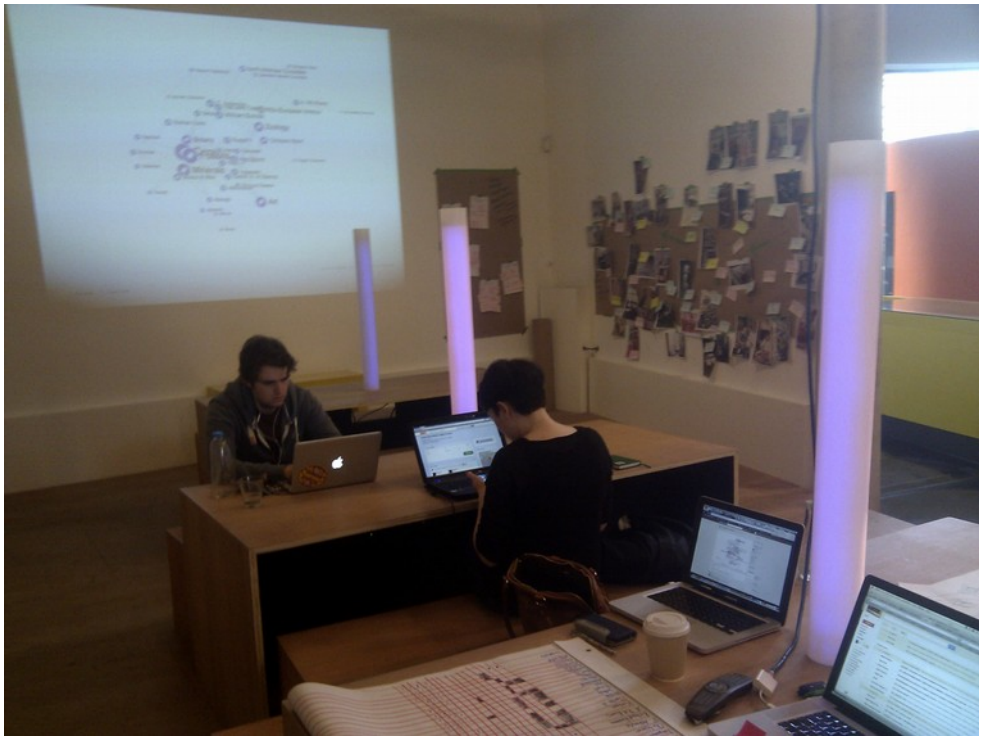


Fig.136 Paper graph mapping in the foreground, digital behind. Hidden/Deviant Labour[p.305] *on the wall.*

A design to collectively operate network infrastructure can seem unachievably cumbersome and lonely without the solidarity of a movement of playful transgression and resistance. Similarly, subversive exploration of anonymity can become nihilistic without investment in ongoing social and infrastructural responsibility. 'Just' taking responsibility can appear arduous without a call to resist, while 'just' resisting can make little progress without also taking responsibility.

Taking on the role of network auditor and cartographer empowers audiences to take responsibility for asking critical questions of normally hidden roles and infrastructures. I saw how our New Cloud Atlas[p.309] workshops built consensus for the legitimacy of critical action in addition to developing literacies to map power within networks.

I found successful models of literacy and movement building for distributed infrastructural commons. A number of CX collaborators, partners and projects were concerned with building public support and sustainable movements of distributed public network infrastructure. The New Economics Foundation presented their work to normalise and build support for redistributing paid and unpaid labour practices in our Time & Motion

symposium.[127] The NEF approach showed me ways of focusing on public perception and policy impact as patterns for building public participation, emphasising redistributive empowerment and choice.

Artist Ellie Harrison$_{p.318}$ mobilises policy change strategies through her re-nationalisation campaign projects Bring Back British Rail (BBBR), Power to the People, and Radical Renewable Art + Activism Fund (RRAAF) by commissioning and writing policy documents, and mobilising volunteer networks of support and membership through brand identity events, and media presence. Harrison has experimented with taking on public and personal responsibility for our capitalist system (Harrison 2015, 8:19).[128] She contributed to the Time & Motion symposium$_{p.318}$ models of cooperative and community infrastructure in which publics fund and commission their own stake in sustaining infrastructure.

In conversations with Sue Ball about the Leeds Creative Timebank[129] I saw a project that used a local currency framing to redistribute resources and community responsibility in a specific community.

In considering the fragmented future of worker identity for our Time & Motion Symposium, I articulated a model of *micro unionisation* to consider how agile, networked systems might allow workers to renegotiate collective responsibility for work conditions more fairly in the context of algorithmically allocated user-work and zero-hours contracts (Dalton and Fass 2013).

Taking on the network through establishing and sustaining identity design apparatuses and participatory network literacies were illustrated in the Bundle Publishing$_{p.292}$, noPayPhone$_{p.311}$, Tor Toys$_{p.318}$ and New Cloud Atlas$_{p.309}$ projects. These design conversations questioned what is possible with audiences and network infrastructures. Throughout my

127 I interviewed Anna Coote about their work (Coote and Franklin 2013) articulating how paid work is unevenly distributed, and 21 hours is the UK average number of paid hours worked legitimising concepts such as *national gardening leave* (Simms and Conisbee 2013).

128 These follow patterns of self sacrifice including a self-imposed travel ban, and daily food, exercise and data rituals (Harrison 2015).

129 A CX case study (Haslam 2014), and also a network of which I am a member. In this model, open and cooperative principles are used to develop a time sharing community that also tends to rebalance notions of value in normally paid and unpaid work roles. Aligned with the work of the NEF into local currencies, the Leeds Creative Timebank takes on and redistributes traditionally centralised roles of banker, time broker and roles of expertise, while making more visible hidden labour and infrastructures of care, housework and volunteering.

fieldwork I have identified examples of carnivalesque audience building through the focus of a localised time or place. Carnivalesque play contributes to the productive indeterminacy about why publics are involved and what they are doing, making space for transgression and creative experimentation. Play is the "playful nip" (Bateson [1972] 1987, 186) that asks "is this play?" (Bateson [1972] 1987, 188), drawing on notions of ambiguity to make space for boundary testing and experimentation (Cheyne 1989). Designing a carnivalesque context for bundle publishing$_{p.292}$ meant creating a download *event* in order to draw a large enough audience to sustain the distribution of the files using BitTorrent.[130]

I discussed the need to overcome the complexity and legitimacy barriers of anonymity use in fashioning our own belongings. The bundle publishing$_{p.292}$ project uses the content of the magazine publication to try to structure a community of users, and motivate them through its entertainment value, interest, or scientific value. The free phonebox of the noPayPhone$_{p.311}$ tries to create motivations for use that are about the practicality of the tools themselves. As with the bundle, in order to create an ambiguity and deniability of use, I looked for other practicalities of the tools so that anonymity is not the primary reason for being in the place or using the tools. These projects look to commonplace motivations for audiences, rather than catering exclusively to rarer critical uses.

Both the Bundle Publishing$_{p.292}$ and the noPayPhone$_{p.311}$ invite audiences to take on responsibility for sustaining anonymity resources, but the latter is more explicit in also inviting resistance to identity apparatuses through the anonymity of calls and obfuscation of phone records, yet still within the framing of a legitimate public good.

The *zine fair* format with which my Tor Toys$_{p.318}$ project experimented combined the temporal public event of the Bundle Publication$_{p.292}$ and the spatial public place of the noPayPhone$_{p.311}$. Tor Toys$_{p.318}$ were developed and shared in workshop spaces influenced by zine fairs that combine ongoing DIY production, with norms of gathering and exchange.

My Tor Toys$_{p.318}$ workshops experimented with motivating people to go through the reasonably complicated steps of setting up, maintaining and distributing digital anonymity publishing tools themselves, by inviting them to take on the role of DIY zine publisher. As a

130 BitTorrent is a distributed network bandwidth sharing model that requires an intense burst of collectively hosting and downloading.

by-product of communicating a fan identity, zine makers often became experts in self-publishing, editorial reputation, audience building and distribution (Triggs 2006; Duncome 2009). They gained access to the anonymising features of creative constraints of collage, the anonymity of commonplace tools, and distribution through zine reputation networks and face-to-face distribution at fan events. Tor Toys$_{p.318}$ seeks to create DIY networked zine publishing objects by trying to extend the model of zines so that similar communities might be developed or enriched using affordable network resources, and kits of instructions, software and hardware.

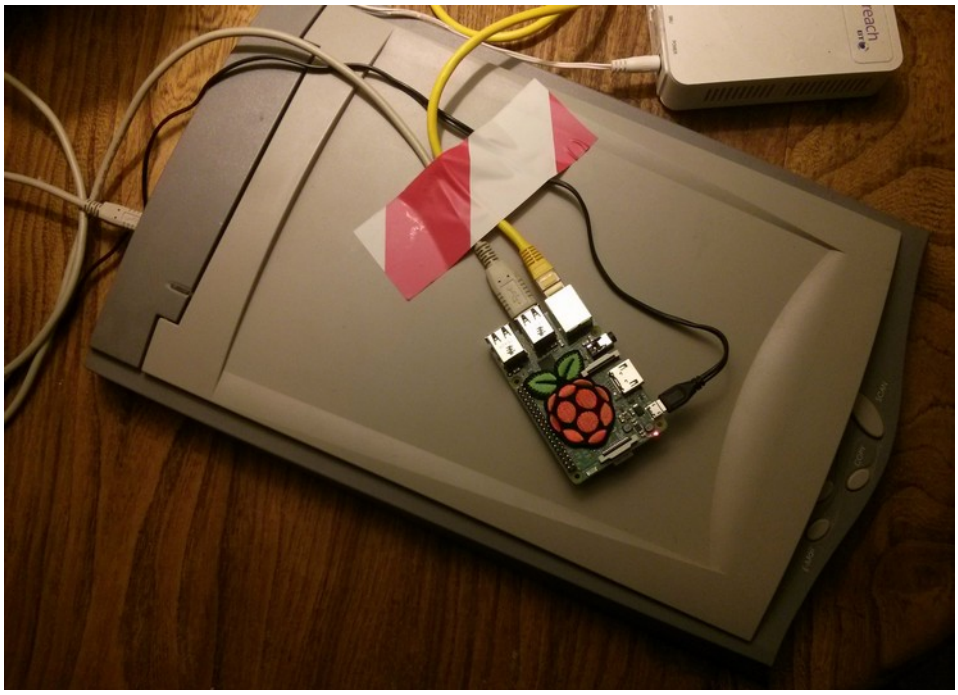


Fig.137 Assembled Tor Toys$_{p.318}$ scanner components.

Through these project examples I have elaborated the possible stances that a designer can take in relation to cryptography, security design and anonymity tools, thinking about the construction of social contexts that foster resistance and responsibility situated in spaces and events. The power of a sense of responsibility for a networked common good, of sustaining an important infrastructure, or specialist interest emerged in these projects. I observed how subculture reoccured in project settings as a way of drawing in audiences through playful transgressions.

I have observed how taking on the network is a complex interplay of contested intra-actions. In the Bundle Publishing$_{p.292}$ project, audiences were asked to help distribute media files and

anonymity infrastructure software simultaneously, and to take hold of these tools to contribute through comments, submissions or part of the editorial team. Placing an anonymous pseudonymity identity apparatus directly into audience hands is normalised as a magazine publishing schedule and readership rather than a hypothetically useable 'emergency' resource.[131] The noPayPhone$_{p.311}$ similarly asked publics to take on their role within the process of creating obfuscation and the potential for anonymity as a community taking part in collective acts. Here audiences take on the network through responsibility for a communal, common resource, but also in resisting caller tracking, producing an interplay between the altruistic and the resistive acts. Making Tor Toys$_{p.318}$ objects invited and required an engaged effortful development of an anonymity practice of building and self-publishing with these tools. As audiences are directly intra-acting with the Tor anonymity apparatus in a playful and cultural space, they are part of challenging the way Tor is construed as illegitimate (Owen 2004). Both play and established self-publishing contexts move Tor away from a self-reinforcing 'dark web' narrative.

There are some notable examples of Tor use that build audiences without a focus solely on anonymity, in addition to those projects like the Walk in the Park$_{p.319}$ INDX data store that propose Tor as a general purpose distributed communication infrastructure (Van Kleek, Smith, et al. 2015; Ahmad 2017). The Adafruit electronics site has written a clear guide to practically installing Tor on a Raspberry Pi with a focus on learning and creativity (Fried 2013). In 2014 electronic musician Aphex Twin and his label Warp Records promoted a new album via a Tor *.onion* site (Aphex Twin 2014). Net artist Olia Lialina produced Self Portrait (2018), an artwork that required audiences to install Tor and Beaker (a different distributed browser project) to view it. However, these examples have still tended to draw on the frisson of anonymity as part of their promotion and subcultural audiences (Minsker 2014). Also of note is the Tor2web project to make Tor websites easily viewable in all browsers (Swartz 2008).

Using DIY publishing tools requires an ongoing practice that develops an active participatory network literacy. It involves understanding more of the network

131 This could be compared with the SecureDrop journalism project (Schafer and Bolger 2015) which offers almost no scope for practicing with the tools, so potential whistleblowers will be faced with getting the process right the very first time they come to use it.

infrastructure, and the interplay between the hardware and software components to sustain those tools with updates.

Taking on the network is defined in terms of responsibility, resistance and comprehension. It means taking on apparatuses of authentication and power embodied in models of cloud infrastructure. Taking responsibility for aspects of the network, like being part of a file distribution service, being a hop in an anonymising mix network or being part of a crowd using an anonymity tool, sustains the resources collectively, so that it becomes harder to identify people who need to use it more critically. Contesting the positioning and legitimacy of these tools is a form of resistance, as is taking part in transgressive, carnivalesque play to constitute what is possible and socially accepted.

Comprehending the network is a material-discursive practice of taking on. By building with, and using, networked anonymity tools audiences are coming to understand them and control them in a way they would not have before. Comprehension means grasping the network, in the sense of understanding it more deeply, and taking hold of or seizing some control of the apparatuses of authentication.

It is the superposition of these meanings of taking on the network that produces a pattern of how to make space for identity play, for the productive indeterminacies that empower identity design by networked publics. If actions are purely in the mode of resistance, but fail to take responsibility for functions of the network, or try to purely design a functional resource but fail to build any kind of empowering collective movement, they fail to make space for audiences and authors to create, and fabricate identities under which to communicate and entertain and all the other possibilities pseudonymity affords.

Chattr$_{p.294}$ showed that given some comprehension of an identity apparatus, contexts of play, and potential for anonymity, that carnivalesque resistance can emerge in spaces of public communication.[132] The playing around I saw negotiated moments of collective transgression, allowing users to get a feel for and therefore also shape agencies of the network.

132 The audiences of Chattr$_{p.294}$ found themselves playing around in the construction of a prototype pubic sphere.

I found patterns for protest and infrastructural resistance in Harrison's[p.318] movement building artworks. She invited me to join her at Kings Cross for a public transport network ownership commuter protest she had presented at the Time & Motion symposium[p.318], organised in collaboration with other rail infrastructure stakeholders. Similarly in our Walk in the Park[p.319] research Phil Booth[p.319] reflected on his involvement in starting the No2ID (Wheeler 2008) and medConfidential (Booth 2015) campaign groups that both resist centralised identity data apparatuses. Both Harrison and Booth used protest and movement building to advance a focused policy argument about distributed ownership of networked infrastructures. The BBBR campaign features protests, banners, pins, stickers and t-shirts, all familiar elements in sustaining public support for institutions of resistance.

Fig.138 Ellie Harrison[p.318] BBBR protesting disproportionately rising rail fairs at Kings Cross station.

Resistance, and its identity design, sits in a contested space of negotiation and renegotiation of legitimacy and wider public support. Part of resistance movement building are what have become traditional tropes of resistance including fists of power, demonstrations, protest placards, and workers tools (Martin 1996). In the iconography of our Facebook Union[p311] website draft manifesto, a Walk in the Park[p.319] participant's imagery of redistribution, or Harrison's Power For The People campaign, I found these subcultural signifiers of collective, grass-roots empowerment.[133]

133 Recast in some narratives as a trope of nihilistic Stalinist violence or misguided youth.

Fig.139 Network resistance from our Facebook Union$_{p311}$*, SOCIAM*$_{p.319}$ *and Ellie Harrison*$_{p.318}$.

Resistant identity design doesn't have to take subcultural forms. While an established *revolutionary* visual aesthetic of protest materials can be a way of engaging publics and communicating resistance, entrenched stereotypes about protest imagery may also act to divide audiences, or even drive away public support in some instances. As I discussed in the détournement of the Pinky Show and IAA identities, a counter approach is to *take on* more hegemonic brands, such as the way identity designer Fraser Muggeridge adopted an inverted British Rail network identity for the design of the BBBR campaign (see fig.139), effectively appropriating corporate reputation and invigorating it with new life and meaning.

Harrison's use of public play, staging a zombie brands walk (French 2015), and solidarity building, such as collaborating with train employee stakeholders in BBBR's case, showed me different possible counter actions in ongoing contestations of legitimacy and audience. As did Phil Booth's involvement in consulting on the design of the distributed identity apparatus of Mydex$_{p.319}$ as a continuation of his resistance to more centralised identity and medical data tracking projects which he opposed.

In our discussions$_{p.301}$ Marcell Mars drew on histories of anarchy and revolution to frame his public library, but the Memory of the World$_{p.308}$ project also invokes traditions of taking on shared responsibility such as the creation of republic standards of metric measurement, calendars and geographical naming (Garcia and Mars 2014). The frisson of revolutionary imagery gives way to the more stable infrastructural forms of change through reframing and taking on roles of categorisation and librarianship:

Fig.140 Marcell Mars[p.308] *presenting during our visit to the MayDay Rooms archives.*

Like Pirate Bay[p.298] the anonymity cultures of *4chan /b/*, LulzSec and the Anonymous movement (Dalton 2012; Dalton 2013) were often raised by my participants because of their reputation for illegitimacy and offensiveness. The history of these online anonymous spaces equally shows elements of sustainable supportive communities and social justice, through collective calls to action against perpetrators of animal cruelty, scientology and paedophilia for example (Bernstein et al. 2011; Knuttila 2011). However as a strategy of empowering grass-roots agency, the vitriolic nihilism practiced by some participants in these spaces (that also acts to enforce anonymity) leaves little room for collective political empowerment or more widespread legitimacy and movement building.[134] Perpetual anonymity without sustainable pseudonymous reputations also opens up greater potential for divisive manipulation by powerful state actors (Coleman 2014).

It is possible to turn the opacity of infrastructural bureaucracy against itself. The Janez Janšas[p.306] demonstrated how to take on official apparatuses of authentication – name change bureaucracies, party political membership, marriage, banking, border crossing and communication networks – as a form of resistance, to cloud and subvert the role of *official identity* and identity brand in both art and party political contexts and mobilise a wider political critique.

134 In its own contested terminology, 4chan culture has developed the term "moralfag" to reject/celebrate explicitly ethical and political activism (Coleman 2014) – the ambiguous role of the slur "fag" in 4chan argot as either an insult or a term of endearment is derived from the homophobic disdain for uninitiated users "newfag", and its subsequent partial reclamation as a term of status "oldfag" (Knuttila 2011).

The majority of publics in authoritarian contexts do not have enough power or privilege to openly enter into playful resistance and other overt forms of protest. Instead they engage in ongoing forms of everyday, hidden or covert resistance (Vinthagen and Johansson 2013; Scott 1990). Communicating resistance covertly, to build solidarity, relies on deniable forms of communication. Working to empower and legitimise forms of resistance can be supported by other forms of momentum building. Successful projects keeping up the "socio-political maintenance" (Goldsmith 2011) of distributed identity apparatuses include the work of Autistici/Inventati (2017, 172), and in particular their "Plan R*" to decentralise their communication tools by "multiplying and blurring the attack surface across many subjects in different nations with different regulations".

Ambiguity is valuable in organisational contexts in which overt play is framed as unprofessional. In the context of the workplace, we found the Desk Snap appp.300 was prototyping richer *side channels* of (sometimes playful) communication between colleagues that made use of the subtlety and ambiguity of sharing workspace images, rather than unambiguous text status updates.

Our New Cloud Atlasp.309 project positions its grass-roots network accountability building within a legitimate narrative of public mapping, that follows successes in claims to a public cartography commons such as the OpenStreetMap and UK Free The Postcode public domain geographic information system (GIS) data projects (OpenStreetMap Wiki 2009). This legitimacy allows the project to draw in insider knowledge (employees, network infrastructure companies, retired engineers, mechanics, and infrastructure fan cultures). We used a number of additional patterns of action, including 'mapping parties' and derive walks (Waters 2016), adapted from OpenStreetMap, to embolden acts of getting to grips with infrastructure. Annotating and drawing directly onto the street furniture infrastructure echoed childhood games of street chalk drawing, and street markup norms of roadway engineers, and took inspiration from Ingrid Burrington's (2016) New York internet infrastructure sketching and rubbings.[135] We took on official roles and language for our actions. Clipboards, cartography apps, high-vis jackets and branded activity sheets

135 I also borrowed colouring-in and storytelling activities from children's games, aimed at making invisible infrastructure more visible. Sound performance was combined with cloud mapping to sonify hidden electromagnetic aspects of the infrastructure.

legitimised critical infrastructure mapping, allowing participants to attend openly to otherwise invisible apparatuses.

Fig.141 High-vis jacket and clipboard in New Cloud Atlas$_{p.309}$ mapping.

Carnivalesque patterns suggest a transient calendar, event or place-based approach to motivating collective action and resistance. Exploration, creation, practice and boundary-testing become possible. The carnivalesque also references exclusion and belonging, and the legitimacy or illegitimacy of public spaces for identity play (Stallybrass and White 1986).

By interpreting inversion as a hybrid of carnivalesque and infrastructural inversion, I conceptualise taking on the network in terms of a hybrid of short-term, repeated pattern, event-based, transgressive and playful carnivalesque inversion, and a longer-term, more mundane, effortful, institution and social-norm building infrastructural inversion. To make space for identity design, an interplay between these two modes is necessary. Cycles of contested belonging and legitimacy manifest as grass-roots or transgressive institutions that sediment into centralised forms of network power, and then are themselves tested, reconstructed or reconfigured by further carnivalesque work. Models that rely solely on the

discord of continuous carnival are in need of infrastructural inversion to temper an ongoing community and negotiate the visibility of sustainable apparatuses through systems of reputation. Meaningful identity design finds itself between the extremes of a nihilistic anonymity, open to use and abuse by centralised powers under the guise of individual agency, and monopolies of totalitarian authentication that permit no critical or creative identity fabrication at all.

Designer-researcher practice

The material-discursive qualities of taking on the network emerged from a number of design considerations. The activities of sticking together, fashioning our own belongings, and taking on the network can all be understood in relation to Turkle's (1995) description of patterns of networked apparatus development as iterative processes of bricolage. For Turkle, bricolage is playful, concrete, embodied tinkering and thinking. In my Masked Soapboxp.308 videobooth, the bricolage ethos communicated an authenticity that Paluska highlights in his original street-videobooth experiments.[136] Paluska's design sensibility (Paluska and Lieberman 2008) helped to reduce prototyping costs and overcome barriers to experimentation, and communicated a performative style of bricoleur service design, and a 'knowing' authenticity of seamfulness. Our Crafting Urban Camouflagep.295 workshop similarly invoked an intersection of craft and hacking sensibilities to broaden the skills and enrich approaches of participants in our design-research exploration of computer surveillance tracking.[137]

A bricolage aesthetic often develops in tech and net art projects (Juarez and Quaranta 2013; Bookchin and Shulgin 1999). While this is in part a product of limited resources and prototyping compromises, the form is a vital aspect of critical design in ways that seamless tech demos and polished speculative design artworks often gloss over. Bricolage prototyping reduces dependence on opaque tech demo slight of hand, or reliable but pre-packaged resources such as distant networked cloud APIs or plug-in project solutions.

Apparatuses of anonymous pseudonymity are assembled from tools designed for aspects of

136 This project developed from discussions with Dan Paluska about his street-videobooths with his permission.

137 This is what Karen Martin and I, reflecting on our workshop format and its outcomes, have called *epistemic action* (Dalton and Martin 2016).

privacy and anonymity, and appropriate other unintended infrastructures mutualistically or parasitically (Hirsch 2009b). As discussed earlier, I experimented with appropriating Pastebin in combination with Tor in setting up the original Chattrp.294 web publishing.

Contesting clouds: Re-distributing agencies

Cloud structures reject public design projects and the role of the authorial designer, pushing the designers and the audiences they design for out of walled gardens to the 'edges' of the clouds or into more distributed federated communities and spaces. This produces design patterns that redistribute rather than centralise.

The call to take on the network I found in the BBC digital public spacep.297 and SOCIAM web observatoryp.319 projects can also be understood in terms of pragmatic design constraints. For the BBC, decentralisation helps share the load of cataloguing and digitisation tasks with the resources of other cultural organisations and with the labour of audiences themselves. This model follows the early music sharing networks of volunteer digitisers and metadata authors that "assembled the largest library of human creativity ever […] for free" (Doctorow in Gaylor 2008, 21:50), and the more recent hidden user labour underpinning cloud recommendation algorithms. The need to decentralise a web observatory for the Social Machines group has a pragmatic and practical aspect. Not only individual users are excluded from cloud and infrastructure access, but large organisations also have no access to each-other's walled gardens. As the web has shifted from mostly public publishing on homepages, blogs and forums, to a series of increasingly clouded and walled-in spaces, identity gatekeepers like Facebook prevent other organisations from 'spidering' and 'scraping' information as part of the digital cataloguing process. Social media sites limit access to their data and understanding of their algorithms through mass personalisation. Any overview such as a web observatory becomes predicated on triangulating the distributed perspectives of individual users of these systems through their personal data stores,[138] because any one point of observation is limited in its access to data (see for example the Lightbeam cookie tracking project Gibbs 2013; Frid-Jimenez 2016).[139]

138 I propose that this might even be understood as *decentralised cloud tomography*.

139 The individual competing cloud corporations appear to have been engaged in an ongoing process of attempting to outmanoeuvre and gain access to each other's walled gardens, which can be seen for example in an arms-race to occupy interface design positions between the cloud services and their users through meta-interfaces such as Google Glass (an interface between the wearers eye

Designers who approach the questions of agency and reputation within networked publics and are not employed by an identity apparatus regulatory body, such as Facebook, Google, PayPal or gov.uk, are limited by the clouds in their attempts to equip publics with tools to enact identities.

The overarching structure of cloud communication interfaces, app stores and operating systems are heavily constrained by gatekeeping roles of authentication, and models which offer little interplay between apps. These design constraints function to exclude publics, designers and design agencies from the apparatuses of identity. This is illustrated by our desk sharing projectp.300 in which existing apparatuses of team collaboration were experienced through cloud controlled interfaces. Microsoft dominated most of the participants' communication platform, Apple and Google products were used by individual researchers and collaborators, and app services included Google docs, WhatsApp and Slack.

Without access to cloud resources as design materials, identity design activity can only meaningfully take place in the hands, computers, and resources of distributed publics.[140] The CX designer-researchers often found themselves at the boundaries of multiple clouds. Even if they were employed within one of these organisations the other clouds would appear opaque and inaccessible as design resources to them.

Even in decentralising the work of accountability tracking there is a tension in access to apparatus agencies. As with Ageh's modelp.297 that moves to sustain a distributed digital space in more egalitarian ways, public participation underpins the model of billions of telescopesp.319, suggesting a form of decentralisation which distributes tools of accountability into the hands of networked publics. In these models I found a tension about who controls or orchestrates the observatory and what questions are asked through it.

The tension about the need to collect information centrally to make sense of it, and who has ownership, reoccurs in the centralised analysis of the distributed observatory, and the

and their screen, thus able to scrape competitor web pages), Amazon Echo (an interface between the family home and the web, thus able to log and shape searches and internet information), or startups like Grammarly (a textbox plugin that is granted access to all of a user's writing).

140 Seeking employment with one cloud organisation that holds a monopoly on a networked identity apparatuses to access their interfaces and massive data resources leaves all the other cloud walled gardens out of reach. A design space that completely encompasses the experiences of a user is untenable except perhaps in super-centralised control such as the apparatuses of the Chinese state media.

centralised editorial and authentication control of the BBC's public space. Citizen science projects need distributed activity, but raise questions of who has control of the product and direction of that labour (Shadbolt, Van Kleek, and Binns 2016). In making sense of the impact of the CX (Dalton, Simmons, and Triggs 2017), I looked at the ethos advocated by Joi Ito (2016b) which he demonstrated in projects like the Safecast distributed geiger counter, which tried to encode distributed accountability into the database, API and legal structure of the system (J. Ito 2016b; Huang 2012).[141] It might be possible to go further and take on processing and storage in more distributed ways too.[142]

Intersecting aspects of taking on the network

The New Cloud Atlas$_{p.309}$ project provides an example of how the different aspects of taking on the network can intersect, attending to agencies of logging, mapping and categorisation of cloud infrastructures, and provides a model which can be applied to taking on the apparatuses of identity authentication.

It extends a playful, transgressive mode of learning, and engaging with technology of the network, while exploring processes of sustaining new institutions or commons. Although the Tor Toys$_{p.318}$ project also implies the development of a long-term structure of distribution and reputation, it does not yet address those design questions directly.

The New Cloud Atlas$_{p.309}$ takes elements of carnival and play and uses them to build critical accountability as an infrastructural commons through the act of network mapping. It combines prior grassroots network mapping patterns, with the ethos and tools of public commons projects like OpenStreetMap. The project uses the carnivalesque performativity of art walks to encourage public wandering of the city, using playful elements of spotting and documenting signs of network infrastructure, and existing methods of the

141 It is worth noting that just before this thesis was published Joi Ito's own accountability as director of the MIT Media Lab, in knowingly accepting and concealing funding from convicted paedophile and child rapist Jeffrey Epstein, was brought to light (Mboya 2019; Farrow 2019).

142 In 2011 I presented work at Viewing Area, an art and plane-spotter conference at the Terminal Convention Art Festival in Cork Airport, organised by future CX participant Ross Dalziel. I discovered there that in addition to hand collecting and photographing airplane data, spotters were involved in building grass-roots networks of data sharing, and also contributing to global airplane tracking projects. Some plane enthusiast systems were open databases, while others like flightradar24 took up a centralised proprietary data processing model in which the flight recorder system collects data from individual plane-spotters, but returns only processed aggregated data. However, it was the distributed structure of more traditional plane-spotter networks that was able to identify and make public US 'extraordinary rendition' flights (IAA, Paglen, and Henry 2007).

psychogeographic dérive for exploring the city in new ways.

By using well established open communities of cartography technology from the OpenStreetMap project, including open licenses for data storage and for software development of the collaborative tools of mapping, our project seeks to create a common cloud atlas map of global network infrastructure that can be incrementally contributed to and re-verified over time. It is a practice, building tools of ongoing accountability that deliver on aspects of the SOCIAM[p.319] notion of a web observatory. By collectively walking and mapping network infrastructure, and building the prototype map as an ongoing process, we are taking a grassroots approach, rather than negotiating in advance the categories that might exist for networked apparatuses, or lobbying for government or commercial databases of internet infrastructure to become public commons. In building a working map the project invites participants to take responsibility for aspects of the network through inhabiting it, seeing oneself within the infrastructure, walking along the urban traces of hidden or unnoticed fibre optic cables and exchanges – publicly performing the path of a packet of data moving through the city. Beyond the performative elements, there is the collective responsibility of maintaining the map information, entering it into the geographic information system (GIS) database, sustained by volunteers and collective models of the FLOSS licenses of the software infrastructure and the free data licenses of the map itself:

Fig.142 Tim Waters[p.309] mapping New Cloud Atlas[p.309] infrastructure at FACT gallery with public participants.

Mapping network topology exposes and challenges sites of power by attending to the

monopolies and 'bottlenecks' which allow for censorship, filtering, commercial control, anti-net neutrality and inequality of network access. Through a mapping commons, these are brought into public discourses and into the public domain.[143] The process of mapping, for each participant, develops network literacy (Jenkins, Ito, and boyd 2015; boyd 2018b) – an ability to grasp aspects of the network infrastructure that directly connect to home or work, enabling audiences to understand wider relationships of identity apparatuses and anonymity tools to elements of network infrastructure and the extremes of permanently authenticated internet access.

Hidden within the model (and brand) of the commercial cloud, ideas of public agency and corporate accountability can feel ephemeral, seemingly beholden to some sort of omnipotent deity of the clouds. Through embodied actions of tracing routes, walking and mapping, the materiality of the network is realised, and the control exerted by commercial and noncommercial bodies is made more tangible.

Cloud network apparatuses operate at global scales. One can trace the data of sharing a message with someone on an established social platform out, down one's own street, through a city, out alongside the railways to the coast and into the ocean, and across to America then into a vast database in a warehouse in the desert, and then back again. Making a map is a material-discursive practice of exploring what the network is made up of, and of taking responsibility for constructing and maintaining the map as a new network apparatus, as well as holding the centralised, hidden, clouded aspect of the network to greater account. The New Cloud Atlas$_{p.309}$ uses the resistance of taking on the network, in the forms of arts festival carnival to give permission and confidence to publicly map infrastructure, spending time staring at secured telecoms buildings, listening to humming broadband street furniture, and peering into gaps in fibre optic access hole covers.

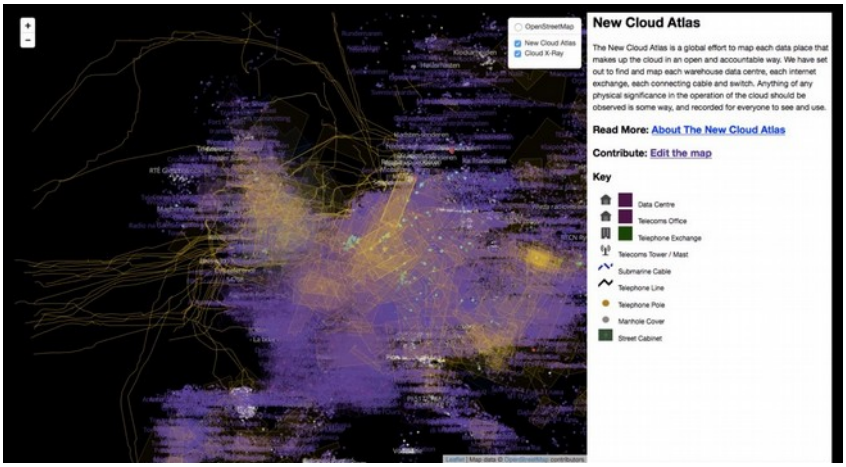
Mapping co-constitutes a contested reality it documents. As Tim Waters (2016) notes about our mapping walks and the New Cloud Atlas$_{p.309}$ prototype:

> Telecoms features in OpenStreetMap haven't been well mapped before […] the taxonomy (or folksonomy to be more accurate) – the tags that describe these features – have not been standardized […] We have the opportunity to define the tags […] I started WikiProject

143 Although it would be naive not to expect a successful grassroots accountability project itself to also become a site of contested network power over time.

> Telecoms on the OSM Wiki [...] please suggest better ways to map these features!
> https://wiki.openstreetmap.org/wiki/WikiProject_Telecoms

An atlas as it is usually understood is a book mapping (and validating, naming and making claims over) geography. The original meteorological Cloud Atlas was a taxonomy for standardising observation and encouraging collaboration rather than just a map. The New Cloud Atlas sought to build both, a map of the socio-material manifestations of the cloud infrastructure, and an enriched open community process for classification of those data places and architectures.



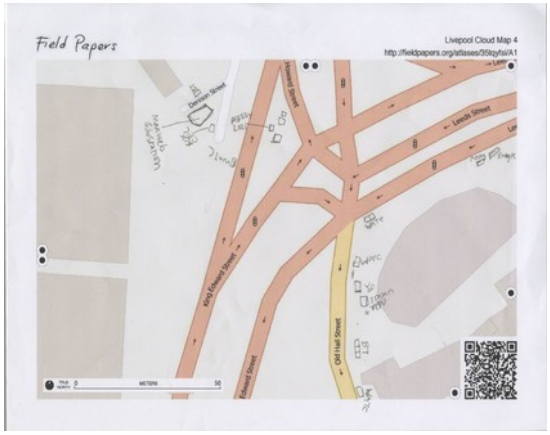


Fig.143 Cloud view website and field papers from our New Cloud Atlas[p.309] *mapping.*

Recommended tagging

```
man_made=street_cabinet
street_cabinet=telecom
communication=outdoor_dslam (if its dslam type)
ref=
operator=
colour=
heat=
sound=
texture=
```

Fig.144 Screenshot from the OSM Telecoms Wiki.

Identity play: Inversions and literacies

In this section I set out reasons for revisiting and adopting the concept of identity play as a way of describing identity design by networked publics. Firstly, play implies a possible, relational form.[144] At the beginning of my research I had thought that I would be engaged in the two-dimensional graphic design or three-dimensional product design of identity in service to a networked culture of pseudonymity in new digital public spaces. I have come to see the role of the designer, in redistributing identity design agencies, lies in making space for identity design rather than making individual trust marks themselves.

I employ *making space* in this thesis as a description of the processes of *making room* for identity design to happen — removing constraints, building audiences, and so on — and also in reference to the reconstruction of situated sense of *place* as Meyrowitz (1985) understands it — potentially shaping contexts of belonging, audience, intimacy and roles of social standing. According to Meyrowitz such space is not predetermined, but open to collective re-configuration and design:

> On a *group* level, the situation is even less deterministic. For *we* design and use our rooms, buildings, media, rituals, and other social environments. We can redesign them, abandon them, or alter their use. (Meyrowitz 1985, 329)

Making space does not describe distinct grand architectures or fantasy gardens of anonymous pseudonymity, but considers how to make room for public identity design practices situated within wider social contexts. Making space is intentional action to allow for (temporary) situations of identity design *within* networked publics to potentially emerge.

In relation to identity I claim that the stance of the designer in understanding 'digital public space', the original CX remit, is making spaces for identity design by publics themselves, rather than designing particular identities or interfaces on their behalf, and that play is useful in conceptualising how to make such space possible. The focus is on design patterns for establishing contexts of use.

Iterations of identity play

Here I analyse further what the prototype design patterns I have developed are doing for identity design in public and by publics themselves. Each design pattern consists of a way of

144 Even when seemingly playing alone (Barad [2012] 2017).

creating and performing an anonymous pseudonymity identity — whether through new topologies of connection in *taking on the network*, an assemblage of roles in *sticking together*, or the collective boundary practices of *fashioning our own belonging* — superimposed with forms of resistance, responsibility and embodied networks that each of these patterns entail. Taking on the network is the design pattern that defines this approach: a *serious word play* that means embodying a networked identity form, whilst standing up to and carrying out the roles of network apparatuses. Within this pattern are the two focused patterns of sticking together and fashioning our own belongings. Each of these prototype design patterns takes a design craft that holds more than one meaning, and lays out a way of taking on the network to make space for identity design through anonymous pseudonymity culture.

I understand the experimental, intra-active, emergent form of identity design by publics I evoke in each of these prototype design pattern chapters as *identity play*. Conceptualising public, distributed identity design in terms of identity play situates my design contributions within the productive ambiguities and contested spaces encompassed by notions of *play*.

Play can work as a "style of concrete reasoning" (Turkle 2011, 6) found in scientific and creative processes, childhood learning through experimentation, material comprehension, and bricolage. Play can offer "a mode of understanding, a positivity, a cultural analytic" through playful events (Stallybrass and White 1986, 6). It can be used as space for testing, building and disrupting institutions although such space is also contested (Ward 1988). Play can foster "the realisation that established authority and truth are relative" (Bakhtin 1984, 256), yet play can be delegitimised by authority (Levi-Strauss 1966; Adamowicz 2011). Play makes claims on legitimacy as a fundamental aspect of civilisation (Huizinga [1944] 1964).

Play can also be a designed manipulation of the players, as "a means to encourage participation in the process" (Von Ahn 2015, 11) or viewed as a containment:

> a permissible rupture of hegemony, a contained popular blow-off as disturbing and relatively ineffectual as a revolutionary work of art. (Eagleton 1984, 148)

The (intentional) playing around that my prototype design patterns enact can be understood through a superposition of the literatures of *carnivalesque inversion* and *infrastructural inversion*. When networked publics engage in identity design it is identity play, and

simultaneously, identity play characterises the design patterns that make space for such identity design in the first place. Taking on the network is an iterative process that depends on and produces identity play.

Identity play in carnivalesque spaces

Identity play encompasses both the experimental construction of personas and the spaces that make such construction possible. A carnival of identity play makes space for pseudonymity by increasing the size of potential authors and audiences (the anonymity set), establishing acceptable contexts for practicing with anonymity and accountability systems, and amassing techniques and components of creative identity design. Identity play is also "flexing rights" (in Paglen's (2015, 1:19) terms) and the ability to sustain public claims to resources of anonymity and accountability that pseudonymity can afford.

I understand identity play as carnivalesque in Bakhtin's (1984) contestational and emancipatory sense. Bakhtin sets out carnivalesque inversion as a "traditional folklore method of contrast" (1984, 403), of "positive negation" (1984, 405) grounded in historical "medieval carnival" (1984, 10) precedent:

> the peculiar logic of the "inside out" (*à l'envers*), of the "turnabout," of a continual shifting from top to bottom, from front to rear, of numerous parodies and travesties, humiliations, profanations, comic crownings and uncrownings. […] We must stress, however, that the carnival is far distant from the negative and formal parody of modern times. Folk humor denies, but it revives and renews at the same time. Bare negation is completely alien to folk culture. (1984, 11)

For Bakhtin (1984), play, humour and marketplace festivity do not just enable utopian imagination but experiences of temporary inversion of hierarchical rank and spaces of liberating communication. The carnivalesque describes contexts in which identity play can contest roles and hierarchies. Historical pseudonymity is tied to this playful creativity and transgression (North 2003).

Bakhtin's utopian egalitarian portrayal of folk festivity and grotesque satire in carnival are bound up in his own project of carnivalesque critique in the Stalinist period (Holquist 1984). It is uncertain in his discussions the extent to which he is placating or challenging the very real threat of the cultural policing of the time. His analysis nevertheless clearly articulates and establishes a set of functions that carnivalesque play can serve in taking on institutions

and structures of power. I see Bakhtin's productive indeterminacy of intent as itself a demonstration of the carnivalesque pattern through which he is offering possibilities of action and critique.

For Bakhtin, carnival can make space temporarily within cycles of festivity, fairs and markets for experimentation with roles and structures that function as forms of escape and resistance. Stallybrass and White (1986) set out the features of the carnival that foster identity play. As a strategy of collective agency, carnivalesque inversion motivates collective resistance by creating permission for transgression, for people to try out and play at roles of power, responsibility and agency, to imagine alternative possibilities, and through acting out these roles, making such changes seem possible or achievable. Acceptability also provides cover for those who can use a period of carnival to undertake specific and usually forbidden action.

Stallybrass and White (1986, 38) identify in Bakhtin's carnivalesque a meeting of inversion and hybridisation:

> a point of economic and cultural intersection [...] not just as the potential space of popular and local subversion

They position carnival play as both empowering and through institutions of licensed play largely disempowered and contained. The escapism of identity play can be a symbolic rebelliousness. Much of the "retreating" (Turkle 1995, 244), "compensatory" (Turkle 1995, 249), "escape" (Turkle 1995, 241) facets of identity play that Turkle identifies can be understood through a framing of licensed play which tends to reinforce hierarchies. Carnivals can be understood as appropriation by institutions and individuals in power of contested customs of celebration, negotiation and resistance. The history of European carnival is bound up with "moments of crisis, of breaking points in the cycle of nature or in the life of society" (Bakhtin 1984, 9) in seasonal superstition, and in poverty, starvation and community food management throwing into stark relief the relative disparity in wealth and resources. Carnivals have constrained tensions around food scarcity through rituals of performance and licensed transgression.

Turkle (1995) notes the potential for identity play to be used to reinforce existing power hierarchies and hegemony by the players themselves. This is what Stallybrass and White

(1986, 53) call *displaced abjection*:

> the process whereby 'low' social groups turn their figurative and actual power, *not* against those in authority, but against those who are even 'lower'

They argue that play can foster "nostalgia" and "uncritical populism", and "often violently abuses and demonizes weaker, not stronger, social groups — women, ethnic and religious minorities, those who 'don't belong'" (Stallybrass and White 1986, 19). Displaced abjection can partly be understood as identity making through the constitutive exclusions of others. However, for Butler (1997b, 386), while at times "a fatally unsubversive appropriation takes place", carnivalesque elements of imitation can go beyond mere parody or displaced abjection to dispute hegemonic identity claims of "naturalness and originality" (1997b, 384). She views carnivalesque appropriations as *sometimes* also contesting identities from a position of little existing power at the same time.

Stallybrass and White (1986) question and problematise the utopian potential of the carnivalesque. Yet even in temporary venting and escapism, there is room for taking on and trying out roles, proposing alternatives and voicing dissent that exercises the potential for other forms of resistance and action. Practicing roles of empowerment and legitimacy (practicing "passing" (Butler 1997b, 387)) is more permitted in carnival situations. The technologies and social structures of collective organising can be claimed and used within the space that carnivalesque play can allow. Such practice equips participants with a greater awareness of the power infrastructures taken on, and literacy to read and enact (even if at first only performatively) these functions themselves. Forms of public gathering leave open the possibilities of resistance that Turkle (1995) identifies.

The durational and located aspect of carnival should be emphasised. The discrete span of a carnival helps to sustain audience engagement, while reducing the potential for regulation or external suppression. As carnivals are periodic and habitual, often defined by and shaping specific places and seasonal patterns in the year, a parallel can be drawn to the conventions of anonymous pseudonyms, that are nearly always each used for a finite period before being claimed, revealed or abandoned.

Identity play and playing mas

I read carnivalesque through the practices and literatures of *playing mas* which better acknowledge the hybridity, shifting sites of power and ongoing historical context of carnival (Hill [1972] 1997; Aching 2002; Zobel Marshall 2016). I want to recognise the wider practices and expertise of identity play globally, particularly in the disparate cultures of the African continent and the breadth of masking traditions and identity communication technologies that are entangled throughout the Greco-Roman European histories of carnival. I note the ways that European carnival has been first colonially imposed, and subsequently taken on and developed, across many cultural contexts. Furthermore, Ito argues that participatory research should "start from a place of valuing the existing capacities of nondominant communities" when seeking "new interventions and technologies" (Jenkins, Ito, and boyd 2015, 79).

The Trinidad carnival notion of *playing mas* offers contemporary understandings of the carnivalesque as an iterative hybrid form of contesting hierarchy, gathering and roles.[145] It represents the "Trinidadian transformation of Carnival from a celebration of the European plantocracy to the African-inspired Carnival of Emancipation" (Martin 1998, 227). For Aching (2002, 155) "to play mas'" is both "taken literally to mean to participate in carnival" and playing around with carnivalesque patterns of "confusion, casualness, or deception". Martin (1998) too emphasises a state of exploration and collective empowerment through participation.

The concept of playing mas takes account of the historical framings carnival draws from seasonal and social forms of masking and festivity and a post-colonial understanding of carnival forms. The Trinidad carnival underwent a "metamorphosis" through particular "ancestry" and "historical and social pressures" to produce "a local product in form, content, and inner significance" (Hill [1972] 1997, 5). Where European carnival traditions have waned, playing mas has better adapted and sustained forms and functions of carnival role inversion and identity play. As with other carnivalesque spaces, playing mas too, is constituted through ongoing contestations over time (Zobel Marshall 2016; Aching 2002). The contested claims of authenticity and legitimacy between "'beads and bikini' mas" and "old mas" can be

145 "The word *mas'* resembles the term for the Catholic religious service, "mass," but is mostly derived from the French *masque*." (Aching 2002 155).

understood as part of longer histories of contested agency (Zobel Marshall 2016, 215). For me, this is the definition of the carnivalesque: the process through making space for gatherings, of contesting public space and identity design agencies, bound up in claims of authenticity, indeterminacy and control of identity play apparatuses and phenomena.

Ethical considerations. Facing one's own assumptions and privilege

My research has largely drawn on and framed identity play within Anglo-(post)colonial, white, urban, capitalist, affluent practice, histories and theorists. This is shaped by the funding priorities and institutionalised inequalities of the UK-based Arts & Humanities funders and institutions, and CX consortia of UK academics, practitioners and institutions, and their audiences, and the assumptions of many of the practitioners and theorists on which I have drawn. It also perpetuates my own European (post)colonial heritage and upbringing. As a result, for the large part, the traditions of identity play I discuss are interpretations of global histories of masking and identity performance filtered through Anglo-(post)colonial contexts (specifically in England, wider Europe and the USA). I have tried to include in my research an awareness of the contemporary expertise in identity play found in wider contexts and resist re-making tropes of the 'exotic other', while questioning but remaining largely bound up in an Anglo-colonial framing. In particular my assumptions of technology affordability, digital network access, and relative freedom to openly resist hierarchies of power while by no means easily demarcated on geographic (East/West, North/South, First/Third world) boundaries, are still all couched in the island of privilege I find myself, my funders, my collaborators and my institutional partners.

Like the work of a traditional identity design agency, identity play entails an active (intentional) form of identity creation practice. However, because the boundaries of play can be usefully indeterminate, it allows for oppressed and excluded people to potentially make use of it, in addition to more overt forms of playful action. Identity play also critically acknowledges collective negotiation, contesting of roles, and belonging, in a way that identity design often omits to recognise.

Inversions: Taking on the network

The inversion of taking on the network seeks to sustain a productive superposition of

identity states, or to collapse them on our own terms, implicating networked publics as more active parts of a new identity apparatus. The cloud is a powerful model of indeterminacy. Taking on the network is contesting where indeterminacy is situated, shifting methods of clouding from the centralising commerce and governance models of the cloud to the redistributed ambiguity of decentralised network apparatuses of anonymous pseudonymity. Reading taking on the network through Barad's (2007) entangled intra-actions: observation enacts cuts, always leaving its mark on the bodies it co-constitutes. This means that covert cloud models, in attempting to construct surveillant observation, open themselves up to accountability. Even these cuts to public bodies agentially produce new possibilities of resistance.

Adopting a function within the network in order to get to grips with it often brings about an exchange of roles. When we played out the process of calculating and storing a tracking cookie, or walking the route of a packet of data through the city, we were turning the cloud apparatuses of tracking and mapping back on the network itself. These are a superposition of infrastructural inversion and carnivalesque inversion, of the playful and resistive, to produce responsibility and literacy.

In the gestures of an inversion pulling down a cloud role or process with one hand implies offering up with the other hand. When a public take on the pattern of clouding and obfuscation, they are taking control of identity apparatuses while taking up responsibility for accountability. Inverting the logic of the cloud is to redistribute it and make it tangible. Inverting the functions or patterns of the cloud is to take on the possibility to obfuscate while taking responsibility for the maintenance of relational data, hosting or name services.

Taking on the network requires and constitutes a redistribution of network literacy. Definitions of network literacy emphasise reading the network, interpreting its forms and cultures, even when mapping and visualising them (Cramer et al. 2015). When writing to the network is included in the literacies (creation and action), this often focuses on publishing within the constraints of cloud frameworks (Rheingold and Weeks 2012). Jenkins, Ito, and boyd (2015) have theorised network literacy in terms of participatory culture that emphasises relational community engagement, capacity to engage and ethical expectations.

Media and network literacies are a topic of considerable debate in post-Putin/post-Trump networked publics (Papacharissi 2018). Much of the recent work around digital public spaces concludes with calls for greater media and network literacy (Balsamo 2011; Jenkins et al. 2016; Lovink 2016). Calls for literacy can sometimes emphasise an ability to better read and use networked tools, without also encouraging practice with the agencies and forms of the network itself (J. Ito 2016a). boyd (2018a; 2018b) is critical of calls that just emphasise questioning and awareness, without also strengthening ethical *action* aligned with social justice. In my prototype design pattern chapters I have emphasised a hands-on grappling with the network that I have argued is necessary for redistributed identity design practices. Those who are able to make use of anonymous pseudonymity have developed an experience and literacy of identity play over time and through practice.[146]

I understand network literacy in its "expanded sense" (Barad 2007, 474) as a form of *agential literacy* that "recognizes that objectivity and agency are bound up with issues of responsibility and accountability" (Barad 2000, 237). Barad defines agential literacy as "learning how to intra-act responsibly within the world" (Barad 2000, 237). In relation to her understanding of intra-action, beyond an epistemology of knowing about the network, agential literacy is an inherently ethical and ontological practice from within, that seeks to simultaneously conceptualise and constitute phenomena:

> a different material-discursive apparatus materializes a different agential reality, as opposed to simply producing a different description of a fixed observation-independent world. Agential realism is not about representations of an independent reality but about the real consequences, interventions, creative possibilities, and responsibilities of intra-acting within the world. (Barad 2000, 237)

As such, making space for the identity play of networked publics can be understood as developing agential network literacies that contribute to a public critical infrastructure, sustaining public responsibility and resistance within the network.

146 For example Romain Gary had been changing name and persona throughout his life in the context of the politics of being a Jewish Russian-European migrant before continuing to fabricate identities for his writing, creativity and profession (Ciuraru 2011). More recently, street artist Banksy is clearly someone (or group of people) who honed their discretion and obfuscation through the illegality and persecution threat that is part of the culture and practice of graffiti (Ledesma 2013; Ferrell 1996). Similarly, the Brontës were well practised, having played at masking and self-publishing as children (Ciuraru 2011; Brontë 1829).

Chapter 8 – Conclusions

In this final chapter, I provide a summary of the key findings of this thesis and outline the theoretical and methodological contributions it has made. Ultimately, this thesis has sought to identify an intra-active understanding of the activity of identity design by networked publics. It has used research through design to engage with the inseparably material-discursive nature of identity design and the rigour of a grounded theory approach to diffractively theorise the practices of design that mutually constitute identity designs and spaces for identity design together. This thesis has concluded that for publics to engage in their own identity designs, rather than designer-researchers focusing on designing identities or identity interfaces for publics, we should instead make space with publics for identity play to emerge through network literacies and participatory spaces of anonymous pseudonymity culture.

An understanding of identity design as intra-active and agentially performative led me to make connections with the traditions and conventions of anonymous pseudonymity and identity play. In researching how networked publics can design identities themselves I have read together literatures of anonymous pseudonymity cultures, cryptographic anonymity, social machines, and critical social theory. Following theoretical leads I have engaged in design conversations with Creative Exchange (CX) infrastructures and participants across a diverse spectrum of organisations and settings. Adopting the constant comparative analysis and theoretical sampling of grounded theory has meant questioning my own assumptions - and those of my participants - to develop a theory of collective identity play rather than reproducing assumptions that treat identity as distinct and design for identity as neutral or external.

Theoretical and methodological contributions of the thesis

This thesis has aimed to make several significant contributions to better understanding identity design practiced by networked publics themselves and how to make space for it. First, I have defined *taking on the network* as a prototype design pattern for making space for

the identity play of networked publics. Two constituent design patterns are articulated within it – *sticking together* and *fashioning our own belongings*.[147] All three design patterns bring together practices of identity design, networked public participation and design-research.

Second, this thesis has elucidated a design space for identity play. It frames anonymous pseudonymity as the history of public identity design that entails identity play. The design space requires a superposition of: (1) identity design practices of anonymity agency and performative reputation; (2) networked public participation through topologies of participatory connectivity; and (3) design-research approaches to network literacies that emphasise active comprehension of identity apparatuses. In my prototype design patterns I have focused on: masking signatures; growing anonymity sets; making identity design commonplace; creating reputation, authenticity and belonging; and sustaining infrastructural common goods.

Third, this thesis has generated a prototype design pattern form that can describe multiple simultaneous intersecting roles and practices to make space for a phenomenon. Prototype design patterns, like those I have produced in this thesis, set out situated, iterative actions for change. I frame these design patterns as a form of middle-range theory produced through material-discursive conversations with a specific intra-active phenomenon, suited to the pattern language conventions of design research. I have produced prototype design patterns through a superposition of meanings of a practice read through one another, to develop a conceptual apparatus grounded in directed design conversations. This diffractive pattern form has been produced as part of articulating and conducting constructivist grounded theory research through design. I have used a diffractive methodology to read together constructivist grounded theory methods and research through design methods in practice, and to build upon the stance of a constructivist reflective practitioner towards an agentially diffractive one.

Finally, the thesis has aimed to offer a significant contribution to the discipline of identity design in taking an intra-active interpretation that emphasises the ways that identity design agencies have always been mutually constituted and contested within networked

147 Two patterns is the minimum sufficient to illustrate how they sit within the larger pattern framework and the similarities and differences between them.

publics, and beyond the limits of centralising and commercial models. This interpretation emerged from coming to understand identity design enacted by publics themselves through the literatures and practices identity play and anonymous pseudonymity.

Using these contributions

A designer-researcher[148] wishing to make space for the identity play of networked publics can follow the pattern of taking on the network, including sticking together or fashioning our own belongings within it, or an intersection of these two. For example, a designer taking up the Tor Toys project workshops would be making space for identity play in the superposition of actions the participants engage in. Those making and using a Tor Toys scanner are taking responsibility for their own zine infrastructure, while also taking on, and challenging, cloud models of centrally authenticated publishing. The Tor Toys scanner also begins to prototype how sticking together and fashioning our own belongings can intersect within an identity design workshop event and apparatus.

Key to making use of these patterns is the ways they superimpose multiple meanings and practices together. The assemblage of anonymity tools and playful events are key to producing the agencies and indeterminacies necessary for public practices of identity design. Focusing on one facet of the design patterns of this thesis alone, such as just learning existing anonymity tools, or just campaigning to leave cloud social networks, is much less effective that practicing a balanced superposition of the various meanings of each of the patterns together. Telling someone who needs the power of anonymous identity design, for critique or creativity for example, how to install Tor anonymity software is not enough as it does not produce an ambiguity of use or large enough anonymity set within which to practice these new literacies. Carnivals of network literate, infrastructure and identity creation play are needed, as *taking on the network* describes.

The identity play design space set out in chapter 4 of this thesis provides a reference, or design brief, for those wishing to make space for public practices of identity design. It not only documents key practices, patterns and infrastructures required for anonymous

148 Recall that I use this term to encompass the traditional practitioner roles of identity design, including aspects of fields such as graphic design, user interface design and communication design, as well as the academic disciplines of design research through design that theorise the traditions and practices of identity design.

identity creation and network literacy, but also points to the importance of drawing on longer traditions and genealogies of anonymous pseudonymity cultures and identifies key literatures.

Designer-researchers seeking to produce their own patterns of action following the prototype design pattern form generated here should attend to the way that such diffraction patterns superimpose multiple actions, and multiple roles. For example, the way that sticking together is simultaneously: a design practice of collage; an apparatus building practice of assemblage; and a public participation form of call to assembly. I do not think these patterns have to be produced through grounded theory research through design, or through explicitly diffractive methods. However, the emphasis, found in constructivist grounded theory, research through design and diffractive methodologies, on situated, reflective/diffractive and critical research iterations, in conversation with phenomena, makes them well suited to the production of such patterns. This form of diffractive design pattern invites designers and researchers to recognise their privileges and relationships within specific intra-actions, and their ongoing responsibility to take part in making certain possibilities possible and to exclude others.

Practicing identity designers may not be comfortable with shifts towards participatory models of design, particularly ones that seek to shift the role of the designer to making space for others to carry out the process of creating and sustaining new identities and reputations themselves. However, this thesis underpins this proposal with an understanding of identity design as having always already been intra-actively constituted. In such a stance, the designer is able to better consider their privilege and design agency, and to respond to questions of power and ethics understood to be inherent in all identity design. The power of identity design is always contested. Each act of identity design is at the exclusion of others, and choices to use certain forms of centralising cloud model and identity apparatus in this work enact cuts and boundaries of participation and benefit. Making an effort to design for public playfulness and response-ability simultaneously creates new possibilities of holding power to account.

Research limitations

A key matter in this research has been the people who made up the CX consortia – my participants are the CX designer-researchers and their networked audiences. In my research process I have not had the opportunity to involve specific audiences practicing critical aspects of identity play in more participatory design ways. This constraint is recognised through the term *prototype* that acknowledges that the prototype design patterns have had limited application in practice. The CX Hub model with all of its opportunities did selectively constrain their further development and this suggests scope for future work.

While perhaps a strength rather than a limitation, many of my participants are also practicing researchers, and their varied literatures became entangled within our design conversations. The distinction between drawing on extant literature and drawing on examples and quotes introduced by participants is not a clear division. Papers and projects produced by CX participants during the time of our design projects became examples and part of the literatures in my analysis. This complicates a distinction between the two usually drawn in grounded theory processes.

As a form of situated middle-range theory, my prototype design patterns describe how design-research practitioners within the CX consortia can make space for identity play of their particular topologies of networked publics. The focused site of my research has an Anglo-colonial European-American context further bounded by AHRC Knowledge Exchange Hub funding scoped to UK research participants. The CX stated an initial "primary geographic focus" of the Northwest of England (Cooper 2012, para. 2). The funding for projects followed a 'seed' model in which matched contributions were expected from organisational partners. This implied privileged participants who were able to allocate time and resources to such exploratory research. As such, the participants were demographically skewed to white men.

This thesis relies on the artefacts and documentation forms of projects, prototyping and tacit design knowledge to undertake the majority of the design conversation data collection and constant comparative analysis. While there is a significant research through design literature recognising the validity of this approach, compared to traditions of textual data

collection, coding and analysis, research through design requires a more involved process of translation and construction of a written thesis form, with a less straight forward trail of documentation of process. Examples of undertaking grounded theory methods through design research have remained under-documented. I have found the process of 'quoting' projects within the theoretical categories and concepts that make up my design pattern chapters is less familiar for both writer and reader. Building on the examples in this thesis of grounded theory research through design in practice, future work is required to more explicitly document as grounded theory methods the aspects of research through design that undertake the attentive fragmentation, sorting and categorisation functions of coding and memo making I have identified in my studio model of projects, prototyping, sketches and crits.

Because the work of translation to textual codes, concepts and categories was required later in the research through design process than the immediate transcription used in traditional grounded theory, there is a heightened risk of "overloading […] work with clumsy jargon" (Charmaz 2006a, 159), particularly where a strong design gesture or artefact has no easy translation into written form. This limitation suggests future explorations into using non-written forms of design documentation more directly in the text, following the design practices of Richard Hollis in *Ways of Seeing* (Berger 1972) for example.

While I am aware of and have reflected on the contested political space in which anonymity software and critical identity play is produced, I risk implying my design patterns are a conclusive 'solution', rather than ongoing processes of contestational design and counter-design. I also risk reproducing the subcultural and illegitimacy signifiers that are so often employed to excite audiences within privacy, design and art research into cloud infrastructures and identity play, where that frisson simultaneously excludes wider adoption.

Important learning and challenging assumptions

I found my identity as a design-researcher continuously challenged by following the emerging patterns of my design conversations and analysis. I had assumed my importance as a designer with authorial intent involved proposing and envisioning design objects and

experience design interfaces. However, the power of edgy and seamlessly beautiful speculative design approaches, for example, sat at odds with the resistive participatory literacies and responsibilities of making identity play more commonplace that taking on the network came to demand.

My intentions to design and make new identities, in the form of telepresence robotics and performance interfaces, were disrupted by the more participatory and collective commoning required by growing anonymity sets and sustaining reputational apparatuses.

The rapid prototyping and pilot projects I employed from the CX model were at odds with the slower, harder, and more mundane work of movement building, infrastructural maintenance and sustainability required by meaningful publics.

My research process fundamentally shifted my understanding of identity play from one of choosing masks, keeping personal data private, and the interfaces and robotics of telepresence avatars, to an emphasis on collectively playing at masking, taking part in network apparatuses, and sustaining reputation and anonymity collectively. In this shift, I found the onto-epistemology offered by Barad and the way it shifts thinking towards co-constitution a particularly productive underpinning.

In asking what ways identity design can be understood in agential realist terms, the conceptualisation and practices of contestational design have also been particularly fruitful.

Cutting identity design apart-together

Identity design by networked publics entails the material-discursive questions of who gets to matter. These questions are found in the agencies of determining pseudonymous reputation relations and exclusions required to sustain anonymity. Questions of mattering are also found in the network infrastructure materiality of what possibilities of indeterminacy, connectivity and reconfiguring of topology are possible, and for who.

I have used Barad's notion that diffraction patterns are the fundamental conceptual apparatuses and situated phenomena that constitute the world to produce my design patterns and frame my analysis. Barad uses diffraction to understand 'objects' and 'agencies' of intra-action as mutually constituted rather than preexisting and separate, and

boundaries, not as distinct, but patterns of construction and deconstruction. I use this to question the presumption that there are distinct boundaries to when identity design is being done, and by whom, by including practices of identity design within the more collective, transgressive and ambiguous tenor of identity play. This ambiguity is more than a way of better understanding identity design: it reconfigures the distribution of identity design agencies, particularly through anonymity practices, more equally into the hands of participating networked publics.

Constructing a specific conceptual apparatus enacts a cut producing and separating apparatus and phenomenon. From the productive indeterminacies of superposition, what becomes determinate and what possibilities are opened up in indeterminacy depend on which cuts and apparatuses are made. While the production of identity apparatuses is itself an intra-active phenomenon in which agencies are to be understood as mutually co-constituted rather than inhering in particular objects or subjects of power, the distribution of agency to enact the boundaries of these apparatuses of observation are unequal. For identity design by networked publics, this means that in order to enact productive indeterminacies required for anonymity and pseudonymous creativity, publics as identity designers must also take on greater responsibilities for reconfiguring apparatuses of observation themselves, by comprehending networked identity infrastructures and holding clouds to greater accountability. I do not claim to map quantum dualities of in/determinacy onto social worlds wholesale, but rather recognise the possibilities of contesting access to productive indeterminacy by taking on roles of determining identities, infrastructures and projects of accountability.

Where next? What design research might follow?

The next step for this research is to undertake a project to make space for the identity play of a particular networked public or site of critical identity play. By engaging prototype design patterns in participatory processes with networked publics, the resulting design conversations can hone diffractive design patterns in practice. This continues the process I have identified of recognising the designer-researcher as implicated within the networked publics to which they intend to contribute, while also recognising the authorial, intentional

stance of designers to initiate new actions and spaces. Of particular importance to this future work is the intra-active ethico-onto-epistemological conceptualisation of response-ability that Barad (2007; [2012] 2017) offers, and the etymological nuance of 'together witnessing' that I see contestational design bringing to critical practice (Hirsch 2008; Pierce et al. 2015; Hirsch 2016).

A common criticism of carnivalesque interpretations of identity play is that the literature on Bakhtin has tended to concentrate on a mythic or nostalgic construction of European carnival, market and fair cultures that are no longer practiced (Stallybrass and White 1986; Webb 2005). I see great value in turning further to the post-colonial research readings of carnival, particularly the creative and critical hybridity of playing mas (Zobel Marshall 2016), and to the living expertise of the organiser-performer-audience-publics of contemporary carnival cultures.

I see considerable scope for further research into both anonymous pseudonymity traditions and intra-active interpretations of identity design. Future work is required to construct a mapping of the longer and broader genealogies of anonymous pseudonymity as a tradition of conventions and cultures and particularly a reading across periods of rich identity play that draw out material-discursive aspects of those practices. I believe it would be productive to take an agential realist reading of identity design that engages the histories of hidden labour, contestational design and publics as co-constitutive participants in identity design agencies and the enactment of trust marks on corporate bodies. I also look forward to reading my findings on the productive indeterminacy of carnivalesque spaces of identity play through Barad's (2012b p12) recent and ongoing hauntological-quantum-field-theory theorising of "the conditions of im/possibility for non/existence" and the liveliness of "indeterminacies-in-action" in the virtual quantum fluctuations of all spacetimematterings (Barad [2012] 2017).

I have included fashioning as a key point of reference in understanding crafting discursive belonging and material belongings together. Further work drawing on the rich literatures of fashion and fabric craft would contribute productively to questions of making and sustaining collective participation and the relationship to legitimacy in identity play.

Shifting contexts from project inception to completion

The critical possibilities of identity play seem more urgent and closer to home in the current political climate than when I began my research. While it could be argued that identity play is a frivolity that must be deferred for less contested times, the traditions of anonymous pseudonymity suggest the opposite: that identity play offers a vital aspect of political discourse and *justice-to-come* (Barad 2017b).

In 2017, Donald Trump took the office of president of the United States of America. The post-Trump, post-Putin era of politics, and the rise in visibility of well funded and motivated right-wing parties across Europe, marks a shift in questions of resistance and responsibility. The examples of danger associated with resistance and critique emerging have shifted the inflection of anonymous pseudonymity in my research from an emphasis on traditions and creative possibilities, to more urgent and wider participation in critical infrastructures of anonymous pseudonymity made possible *within* these traditions and creative possibilities.

Several key public commons and anonymous infrastructures that were still widely taken for granted at the start of my research are now much more greatly limited. The introduction to this thesis focused on the BBC's vision of digital public space and Tony Ageh's (then Controller of Archive Development at the BBC) address at the CX launch event. The BBC's vision of digital public space today appears curtailed by the imposition of ideological austerity and political editorial pressure. The promise of those digital public spaces have remained a periphery.

The cloud model has expanded to gate-off and envelop identity apparatuses such as payment and boundary control through authentication apps. When I began this research, the cloud model and mobile device were still largely separated from a number of identity apparatuses that they are now increasingly enclosing (certainly within the UK). Up until this point, the cloud model centralisation of identity apparatuses has almost exclusively been enclosed within the domain of the US, encompassing not only the dominant cloud corporate and governmental bodies, but also the design of the material infrastructure of processors at the heart of each networked computational device. However, with the further growth of a

China-based network tech industry, we are perhaps witnessing the cusp of Chinese state power taking up the dominant position in infrastructural centralisation from the US, or at least trying to. With clouds framed as both the feudal security gatekeepers and the growing surveillance threat, the design patterns of my research may appear increasingly nostalgic, in harking to a time almost already past in which a networked computer can/could be reconfigured meaningfully by a user.

An awareness of pervasive cloud model signature tracking overreach is now held by a broader population of networked publics. In the summer of the first year of my research, whistleblower Edward Snowden released evidence of ravenous networked tracking, surveillance and identity dossier collection by Anglo-American governments and corporations. This has been followed by a series of disclosures of political manipulation through cloud advertising apparatuses, and data losses by cloud companies. While the assumption of illegal bulk data collection and use was already widely accepted within networking and privacy research communities, the international reporting that followed Snowden's disclosures significantly reconfigured public knowledge and practices. However, widespread acute awareness without a sense of how to respond replicates an impotency that I also saw emerging within the dystopian-themed surveillance art, design and research audiences at the beginning of my research. Identity designing publics are perhaps less likely now to make incorrect 'common sense' assumptions about using anonymous pseudonymity, but have remained just as unlikely to feel able to begin participating in anonymous pseudonymity conventions or traditions.

As pundits and theorists of networked publics are coming to terms with the ways that totalitarian cloud enclosure is intersecting with more traditional monopolies of power, the technological optimism found in accounts of the 'Arab spring' and 'Occupy' movements has been replaced by a more sober reticence of the role network topologies play. Doctorow (2018, paras. 20–23) argues for anonymity apparatuses primarily as a private infrastructure to organise hidden resistance in the face of domination:

> You can't use the internet to obviate the need to effect political change. […] The internet – a universal network with universal computing endpoints that can send and receive secure messages – is a tool that can crack open a space in even the most totalitarian of regimes, a place where reformers and revolutionaries can organize, mobilize, and fight back. It's a

> forum for whispering dissidence in secret and for blasting the shameful secrets of the powerful at full volume.

Making space through even the smallest cuts, and taking on accountability, both feature in Doctorow's call, but missing is the role of ambiguity of use and commonplace practice needed to more safely develop active and participatory forms of network literacy. For that we can read Doctorow's vision of the internet through current debates around network literacy (boyd 2018b), and the expert practices of playing mas (Aching 2002; Zobel Marshall 2016). My thesis has responded to the call for action to take on the network and as Barad (2007, 235) reminds us:

> in its iterative materialization [...] the future is radically open at every turn [...] it is inherent in the nature of intra-activity—even when apparatuses are primarily reinforcing, agency is not foreclosed

Appendix A – Project appendix

The projects, prototypes, events, sketches and crits used in my analysis are listed here alphabetically.[149] They are also listed by date in the *Introducing the data analysis: a note & an appendix of the data set* section that precedes chapter 4.

Accept Cookies

My Accept Cookies project was a software and artwork performance at the AHRC Digital Transformations Moot (an academic event about digital culture with an arts and humanities research audience) as response to a call by Bronać Ferran, in London and the AND Abandon Normal Devices festival (an art and technology event with a public audience hosted at FACT gallery) coordinated by Florence Dent in Liverpool. Methods: speculative design, arts performance and critical making.

I created a stall where people could submit their web browser cookies for analysis, and made a human-printed version of those. I generated a super-tracker web hash of an individual's mobile device, created a unique visual pattern of it, then baked and iced that representation into a physical, edible cookie, that they could take away or eat and destroy.

During its development I consulted computer security research at Imperial College, and the rapid fabrication labs at both the RCA and Imperial. I was inspired by EasyBake ovens and PickNPlace electronics robots. I modified Matteo Spinelli's Cubiq Underpants demonstration of browser tracking hash generation, wrote a Paper.js cookie pattern script, and made a Pepparkakor cookie recipe. .

AcrossRCA Private Clouds, Public Good

This Walk in the Parkp.319 workshop was part of AcrossRCA, an annual, week-long interdisciplinary postgraduate research program at the Royal College of Art, and was co-developed with Benjamin Koslowski. It offered an opportunity to expand on the first workshop over five days, investigating in more depth the potential forms of personal cloud

149 All activities, except where noted, were supported in part by the AHRC Knowledge Exchange, Creative Exchange Hub, AH/J005150/1. Digital appendix network diagram, thesis archive and errata can be found at: http://noii.net/takingonthenetwork/projectappendix

design. Interdisciplinary teams were formed from fifteen participants selected from sculpture, architecture, innovation design engineering, fashion, and printmaking practices.

Benjamin Koslowski and I first established the context of personal clouds. Max Van Kleek and David Alexander presented the two case-study personal data stores, Mydex and INDX, and their Walk in the Park prototyping. We used a format of presentations and crits to design and explore speculative future personal data stores, with an emphasis on parameters by which participants can best gauge requirements and success of the proposed forms of personal clouds.

A number of forms and metaphors were explored. Interface and system design played a key part in the discussions. Negotiating data processing and interaction in decentralised systems of personal data stores is more complicated and nuanced then in current centralised cloud systems. Criteria emerging with which successful personal clouds might be gauged included tangibility, practicality, intimacy, longevity, mythology and ritual.

Many designs emphasised tangible forms of data ownership including intimate objects and naturally long-lived materials. Physical security in locks and strong boxes provided useful metaphors for safety. Tokens of trust such as keys, handshakes and jewellery related to personal authentication. Mythology emerged as an interface for more ephemeral systems of personal data storage. Data ghosts were imagined that moved through physical architecture. Daemons were proposed as caretakers of data, providing nuanced interfaces to access data, and presenting authentication riddles to those seeking access. A staff and wand offered personal object forms with suitably magical data interactions. Practicality and ritual emerged as conflicting tensions in designs. Arduous rituals was seen as a means of deterring unwanted personal data access, such as data stored at the centre of a long ball of string . One design involved an annual family retreat to a personal data island far out to sea, another envisaged data storage in a carefully maintained zen garden in which access would be easily seen. Ritual offered a means of maintaining a lifetime of daily personal data processing. Private mantras and prayers formed interfaces of authentication. Other designs envisaged seamless practicality in which interfaces became 'second nature'. Permanently wearable or biologically implanted data storage emphasised the intimacy of personal data. Sharing personal data between close family suggested intimate interfaces. The longevity of a

lifetime of personal data was a reoccurring aspect. Discussions covered family heirlooms and familiar treasures like mascots and cabinets of curiosity, and traditional 'safe places' like biscuit tins under the bed and teapots on the top shelf. Industrial longevity, such as airplane blackboxes, provided a source of inspiration.

The variety and invention encountered in these personal cloud design workshops suggests a challenging set of expectations and requirements in trying to establish meaningfully secure and private networked data storage, and a rich space for further research. They suggest that a diversity of interfaces and forms may be needed, rather than a singular form.

ASCII-Key

A short creative exploration of letterpress moveable type with The Letterpress Monster (Ian Gabb) in the print workshops of the RCA. Method: auto-ethnographic apprenticeship, materials and making (Rosner 2012). Audience: workshop participants.

I developed stereograph and ascii art images through fixed-width typefaces. This explored digital forms of visual representation re-cast back into traditional forms of typesetting. Considering the anonymity of constrained text forms, the ascii of early Usenet forum pseudonyms such as Biff (Sexton 2010) and Kibo (KIBO 1994), and the signatures inherent in physical processes like moveable type (North 2003), this exploration drew inspiration from prolific BBS, Usenet and demoscene text artists (Carlsson 2009), earlier typewriter artists including Ruth Wolf-Rehfeldt (2016), and layering early PLATO computer characters to make emoticons (Dear 2002). The physical postcards produced, containing long strings of characters, explored the distribution of cryptographic keys.

Authenticity & 'Real'? Bodies

I was invited by Shehnaz Suterwalla to take part in a symposium on authenticity and self at the Institute for Contemporary Art (ICA) in London alongside Leslie Kulesh, Onkar Kular and Noam Toran.

I contributed to a collaborative performance lecture with Onkar Kular and Noam Toran, in which we explored issues of authenticity and identity fabrication. We divided our lecture into short sections, augmenting each other with a second screen of 'visual footnotes'. I

explored the history of Venice masking, and the relationship between lock picking and feminist literatures of identity.

Autonomous Labour

I talked about uncanny networked objects as part of the Autonomous Labour event at Arebyte Gallery, London on Nov 3rd 2015, alongside Nelmarie du Preez and Patrick Tresset. I was invited to contribute by Bronać Ferran. Further documentation: https://www.eventbrite.co.uk/e/autonomous-labour-tickets-19039154624.

Barrow Woodwose

Drawing inspiration from the traditions of carnivalesque woodwose or wild man costumes still used across Europe in a range of festivities, I sketched — during a Digital Media Lab art research residency hosted by Full of Noises in Barrow-in-Furness — a woodwose costume for use in the local park space made from 'modern wilderness' materials from local discount, surplus and charity shops. I recorded several performances using the costume, using binaural microphones and multiple portable video cameras.

This work was inspired by the exhibition by Open Eye Gallery in Liverpool of Charles Fréger's photography documenting contemporary European Wildermann traditions, and my earlier research to support the Crafting Urban Camouflage[p.295] project with Karen Martin into Sabina Keric and Yvonne Bayer's Urban Camouflage project, RAMM:ΣLL:ZΣΣ and Lucy Mcrae. I worked with photographer Benedict Phillips to document my development process during the residency, and the final costume in the style of Fréger's photography.

I presented the work in blogs on the DMLabs and RCA sites, in the Digital Media Labs Artists' Talks, and in an essay in the residency book (Dalton 2015).

Following the residency, I made a Youtube playlist video essay Murine Mouse on folk masking and power relationships, later shown at the RCA 2016 research work-in-progress show.

I explored ways of showing the costume in the RCA School of Communication Work In Progress exhibition 2015, at the QCon London 2015 software development trade show and at the CX Designing Digital Now Exhibition[p.296] at FACT in Liverpool. Methods: art

performance, critical making and collaborative arts residency. Audience: public in the park in Barrow-in-Furness, and artists within the region.

See the coding of the research process of this project in Appendix B.

BBC R&D

We conducted our Where do you go to?p.320 co-design workshops in Salford with the BBC R&D team, before returning with our prototype Desk Snapp.300 app for a field trial and follow up interviews.

I returned to the BBC for a day-long BBC Connected Studio Creative Development Session to develop a final proposal for our winning 'White Rabbit' Place Playlistp.313 design.

My time at the BBC was supported in particular by Ian Forrester and Jasmine Cox.

Berghs Interactive Communication Prototyping

I created an Interactive Communication Prototyping workshop on creative code and identity design, exploring forms of puppetry and identity literacy in digital and physical characters for the students at Berghs in Stockholm. I was invited after the Rethinking Real-Time Prototonp.315 event by its co-curator Joe Coppard.

Bio Futures Idea Scope

February 2013 CX Research Meetings event orchestrated by Veronica Ranner. Included the sketch of a bio futures personal pet.

Bundle Publishing

The Bundle Publishing proposal was developed to further investigate making space for the use of anonymity tools and literacies. I developed it through project discussions with Paul Emery and Mark Fell, before presenting bundle publishing platform designs at the artist, scientist and maker platform Superpositionp.316 #005: Magic, illusion and perception 10 March 2014, leading to further discussions in a science, art and making context.

The Bundle Publication proposes a monthly bundle of files of 1Tb in size, distributed by its audience through bittorrent. The bundle is designed to contain a curated digital publication, but also a set of anonymous pseudonymity tools, such as those from the Tails

project, as standard in every issue. The form of the bundle emerged from considering what file size of content would warrant including standard anonymity tools as an insignificant addition, but also challenges of trust in distributing software and subtle issues of identity signatures in the software versions used to anonymously communicate online.

The Bundle Publication format draws on a history of curated magazine, particularly the Aspen magazine, which took the format of an art box. It also draws on the digital bundle format popularised by the Humble Indie Bundle. I see connections to the media archiving clubs, that posted hard-drives of high-resolution media collections to each other (Shirky 2005), and the 'cover disks' culture of computer magazines, that curated a selection of files, programs and other digital experiences every month. The software experiment disks and early computer font disks of Neville Brody and Jon Wozencroft's FUSE magazine are also an influence. After developing and presenting the Bundle Publication proposal in a number of events, I discovered the El Paquet project (Harris 2015).

Outputs include: http://www.thesuperposition.org/005magicperception/.

Chaos Communication Congress

I presented my work on the noPayPhonep.311, and ideas of commons infrastructure and social data chaff obfuscation at the Chaos Communication Club's 31st annual Chaos Communication Congress (31C3) in Hamburg in their Art & Culture track.

My talk *Superheroes Still Need Phoneboxes on the art of making a free phonebox and the culture of anonymous communication* considered the role of public space in digital pseudonymity, on the 28th December 2014. Audience: Technology, computing, art and security researchers and practitioners attending the conference.

The CCC is a world renowned meeting place for discussions and research in computer security, including infrastructures and topics that have influenced my prototyping, including anonymity technologies including Tor, free software development, lock picking, and distributed networked commons. It was invaluable to test ideas and continue discussions with this expert audience.

Chattr

Originally entitled 'Chatter - In sync with digital public space'. Initiated as a *pilot project* in collaboration with Lancaster University and FutureEverything festival, I joined the project as a doctoral researcher just as it was moving from wider explorations of the social intimacy and identity signature analysis of linguistic style matching (LSM) in networked conversations with Kyle McDonald, Drew Hemment, Mel Woods and Paul Taylor, towards a final performance project in the FutureEverything festival. Drew Hemment asked me to take the role of lead artist and to design the project experience. I worked with Elliot Woods from Kimchi & Chips and Joeli Brearley from FutureEverything to prototype the recording and transcription processes as a cafe space at the festival. I led the development of the framing of cloud data use policies, drafted the ethical consent, the brand identity, and the continuation of the project in an extended form at Today's Art[p.318] festival in Den Hague. The performance and analysis of this project was a collaboration with FutureEverything, Kimchi & Chips, Today's Art, Mel Woods, Lara Salinas, Joel Porter, Tom Higham, Joeli Brearley and Hwa Young Jung. Kyle McDonald who had pitched an original idea of infrastructure provocation for Chattr, returned to that in his fork of the project Conversnitch.

I led both iterations of the project, co-developing the performative process and cafe space for the first installation, and producing a new form, software and objects for the second. In its first manifestation at FutureEverything[p.304] festival in Manchester, we created a dystopian privacy violating social space — with a social cafe perk — which visitors to the arts conference could only access by acquiescing to a long and abusive data use policy agreeing to recording, transcription and public publishing. We used a performative, prototyping and speculative future approach. In the second venue, I extended my exploration of the recording objects and the visual manifestation of the transcribing process, using guinea pig brand objects (modified garden ornaments from Vivid Arts supplied by Alexander Palace Garden Centre), an app (Cordova app running on Blackberry tablet computers) and live transcription screens (using modified Sublime text editors) to negotiate audiences accepting the terms and conditions, and real-time transcription screens in addition to online publishing for the spoken records.

Paid transcribers Catherine, Tiffany and Laura at FutureEverything and volunteer

transcribers at Today's Art made the project possible, as did the support of the teams at both festivals, particularly Tim Terpstra and Joeli Brearley.

Outputs include: http://todaysart.nl/2013/program/chattr/ and a paper by my collaborators (Salinas, Coulton, and Dunn 2016).

Communities & Culture Network+

I joined the CCN+ after being invited to present at their Mediating Heritagep.308 workshop in 2012. The EPSRC funded Digital Economy Network was led by Helen Thornham at the University of Leeds.

My thinking about community and culture in relationship to digital public space has been shaped by the network's research and events. I returned to work with the network on a short exploration of smart cities, messiness and tact in the Manifesto for Digital Messinessp.307 project (seed funding by EP/K003585/1), and as a guest participant in their support of the 2015 Digital Media Labs.

Crafting Urban Camouflage

Karen Martin and I developed and ran a one-day workshop that took a playful approach to exploring how low-cost materials and tools can be used to manage personal visibility in monitored public space by designing and testing prototypes for rendering people invisible, using craft and physical hacks to explore the limits of computer vision tracking systems. We used real-time feedback from openCV gait and face tracking and the Kinect body tracking system to allow participants to see how their costuming experiments worked in relation to the computer vision systems. We were joined by a number of practitioners, including knitter Anna Maltz, computational designer Paul Emery and over video call by CV Dazzle artist Adam Harvey.

We were influenced by advances in computer tracking systems infrastructure and the relation to visibility agency in public spaces, and by artists including Sabina Keric and Yvonne Bayer's Urban Camouflage project, Adam Harvey, RAMM:ΣLL:ZΣΣ, Lucy Mcrae, Desiree Palmen, Aya Tsukioka and Meike Harde.

This workshop extended our work on the EPSRC Shades of Grey IDEAS Factory - Detecting

Terrorist Activities[p.305] project, and discussions with Matt Jones and our wider research consortia on that project. It was hosted by the Culture Lab in CX partner institution Newcastle University as part of Designing Interactive Systems (DIS 2012) conference.

Outputs include: "Crafting Urban Camouflage." (Martin, Dalton, and Jones 2012) and "Participatory Epistemic Action." (Dalton and Martin 2016).

CX Designing Digital Now Exhibition

In this final exhibition of CX work at FACT in Liverpool in Jun 2016, I exhibited my Barrow Woodwose[p.291] costume and Elvis is in Everything[p.302] t-shirt shop projects as two *Invisibility Design Experiments*.

My urban Woodwose[p.291] outfit, and my range of algorithmic t-shirts patterns[p.302] were exhibited and the t-shirts were also on sale. These experiments contrast forms of computer vision invisibility to explore how identity is constructed, made explicit or actively designed within the contexts of audiences and networked publics. The Woodwose outfit is a piece of personal camouflage that grants its wearer invisibility at the cost of social interaction, while the t-shirts in contrast offer a form of invisibility through social networks of use.

I ran five events as part of the exhibition. An *Artist's T-Shirt Shop* at the private view (16th Jun 2016), a *Tor Toys* workshop at Dinky at DoES Liverpool (20th June 2016), a DIY *eZines workshop — empowering self-publishing on the web* in the FACT Media Lab (21st June 2016), a psychogeographic walk *Cloud Dowsing walk — hunting for the hidden internet* (24th June 2016) and a mapping walk *The New Cloud Atlas — a day of mapping the internet in Liverpool* (25th June 2016).

At the DoES hackspace workshop Ross Dalziel presented some of his previous work with Glenn Boulter using text adventure software and local wifi networks. The zine workshop at FACT benefitted from a breadth of participant perspectives including practicing zine makers and designers. The internet mapping walks collected data for the New Could Atlas project, using modified OpenStreetMap tools and processes developed by cartographer Tim Waters. Methods: psychogeography, GPS and paper-based mapping walks, hackspace and media lab workshops, art performance. Audiences: publics at the FACT gallery. DoES maker

space. Maker Faire Liverpool participants.

CX Launchpad

Launch event for the Creative Exchange at the Museum of Science and Industry (MOSI) in Manchester, in conjunction with FutureEverything (16th May 2012).

I was invited to joined the CX academic network at the CX Launch event in May 2012. The launch event was partly a scoping and consortia building process carried out by CX investigators which developed themes of the CX Hub through visual-spoken interviews with creative technical industry companies (completed by April 2012), and then with the academic network during the launch event in May.

I listened to Tony Ageh outline the BBC Digital Public Space, among a range of speakers and research activities. Further documentation: http://www.thecreativexchange.org/launchpad.

CX PhD symposium

During this July 2014 CX Research Meetingsp.297 event we drafted a Facebook workers bill of rights. Discussions during the day included contributions from Bettina Nissen, Clara Crivellaro and John Bowers.

CX Research Meetings

During our research programme, we conducted numerous events, visits and crits. These included:

- CX Launchpadp.297
- Bio Futures Idea Scopep.292
- CX PhD symposiump.297
- CX Showcase BBCp.297
- CX Student Gatheringp.298

CX Showcase BBC

The CX Showcase 2013 was a research update event hosted with the BBC at Quay House in Media City UK on the 27th September 2013. Claire and Bridget presented our Where do you go to?p.320 app prototyping through a table-top demonstration of distributed workplaces I

devised using theatre design scale models of furniture to invoke a series of office, home and travel workplaces. The Desk Snapp.300 app was displayed on a series of Android and Blackberry devices, allowing the showcase audience to take and share images of desks.

CX Student Gathering

At this December 2014 CX Research Meetingsp.297 research update, I proposed a zine making workshop as a way of capturing our research work in progress. We collaboratively edited and scanned a series of pages representing the people and projects of the Creative Exchange.

Data is Political

A collaborative artistic research project, initiated by Amber Frid-Jimenez and directed by us both. We held a symposium on the 15 March 2012 in Bergen. The symposium was on art, design, and the politics of information. Designers, artists, scientists discussed the aesthetic, ethical and spatial dimensions of information and its relation to power, the production of knowledge, and construction of urban spaces. Our contributors were Philippe Rekacewicz, Peter Sunde, Nomeda & Gediminas Urbonas, Max Van Kleek, Daniel van der Velden, Steven Dixon, Jill Walker Rettberg and Michelle Teran. The project was hosted by Kunstøgskolen i Bergen / Bergen National Academy of Art & Design (KHiB) in collaboration with the Jan van Eyck Academie, and the University of Bergen with support from the Verdikt programme of the Norges Forskningsråd, KHIB Research Council, and KHIB Departments of Design and Fine Art.

Preceding the symposium, Amber and I collected an archive of recorded conversations we made with artists, designers, and scientists including contributions from Ron Burnett, Amanda Cox, Philip DeCamp, Benjamin Mako Hill, Francis Irving, Marcell Mars, Dietmar Offenhuber, Casey Reas, Florian Schneider, Fernanda Viegas & Martin Wattenberg, Usman Haque, Jose Luis de Vicente and Jeff Warren.

Following the symposium, we presented further work at Sensuous Knowledgep.316 in January 2013, in collaboration with Joe Dahmen, proposing future uses for the physical architecture of data storage soon to obsolete, and investigating the geopolitics of data by leveraging crowdsourcing on the web to create a working map of data centres on a global scale. This

would go on to inform the New Cloud Atlas[p.309] CX project.

Outputs include http://dataispolitical.net/, "Kayla: Charisma and Anonymous" (Dalton 2012), "Data Is Political: Investigation, Emotion and the Accountability of Institutional Critique." (Dalton and Frid-Jimenez 2013) and "New Cloud Atlas" (Dahmen, Dalton, and Frid-Jimenez 2017).

Decode FACT

In the Decode FACT workshop, we built a collaborative map with the visitors to the FACT gallery, pinpointing where they were digitally connecting around Liverpool, the UK and the world.

The Desk Snap[p.300] images of cafes that pop-up in the Where do you go to?[p.320] timeline exhibited at FACT made us think about the work that happens in FACT, in the temporary co-working space, and elsewhere in the cafe, cinema and gallery. Every worker in a public space like FACT is actually connected digitally to many collaborators in other places. The office has become many different physical locations at once, linked or 'overlayed' through unseen digital space.

Our drop-in workshop (Thursday 6 Feb 2014) looked at decoding how big the FACT workspace really is. We asked visitors to help us build a map of all the places in the city, country and world that FACT connects to through the individual work people are doing in the building. We mapped where each email, each document, each amazon order, each podcast connects to in the world. Liverpool has always been a city of work built on connections around the world. The traditions of global trade have shifted from docks, to desks, to digital space, and continue to define the city's outward-looking focus in the digital age.

For our workshop I developed a method of collaboratively discussing and mapping digital networks and connections using pushpins (Butera 2002; Lifton et al. 2002) and colour coded connections (Arıkan 2013). The backdrop to our digital space map for this workshop was a series of abstracted images showing outlines of the world, UK and Liverpool regions, all centred on the FACT gallery (based on the Dymaxion map projection), rendered in different

colours of temporary masking tape, and labelled with paper tags.

Design Without

Design Without is a tutorial and crit format developed by Neville Brody in the School of Communication at the RCA. I both participated in and led sessions in the Design Without series, using the discussions and prototype sketches to explore and return to ideas emerging from my projects and prototyping. My sketches included:

- Alternative encryption key visualisations – developing orthogonal alternatives to the 'drunken bishop' text art (see for similar work Tan et al. 2017)
- Tamagotchi charity object
- Collaborative Twitter interface
- HSBCoin .onion site
- Personal recording NSA archive
- Street furniture identities
- Tracing the internet video

Desk Snap

In the Where do you go to?p.320 prototyping at the BBC research and development lab at Salford MediaCity, we aimed to create a way for people to share context in collaborative groups in the environment of hot-desking and distributed teams at the BBC, where many of the collaborators were not physically in one office and one location for much of the time. We set out to design for a *sense of place* through the process of each person taking photos of their work spaces — their desks where ever that might be at that moment — and sharing them with a group of collaborators.

The app was a prototype designed to let small groups of people who work together share images of where they are working. The aim of the app was to make a working 'status update' that isn't about written notes or pictures of faces.

We tested the app with several work teams including the Creative Exchange group designing the co-working space and researchers at the BBC R&Dp.292 lab in Salford. These teams were rarely in the same room at the same time, so much of their collaboration happens through digital spaces. Our research suggested they were lacking a 'sense of place'

while working together. In digital space, 'wandering past' is harder, a video call must be scheduled, or a specific question edited in to an email and added to the ever increasing inbox pile. We set out to design a 'desk sharing' app prototype to see what happens when collaborators can share 'where they are' rather than just 'what they want'.

Digital Economy DIY Researchers Colloquium

A *new collaborative initiatives* event hosted by Andreas Reiter of the EPSRC-funded RCUK Digital Economy Horizon CDT Network in Newcastle Culture Lab and MakerFaire UK on 25 April 2014. I contributed to the workshop discussion about research into DIY, making, crafting and hacking.

Digital Media Labs

In 2014 I was selected as a nominated artist for a week-long Digital Media Labs residency hosted by Full of Noises (formerly Octopus Collective) on Cumbria's Furness Peninsula, supported by the Arts Council England and Full of Noises. There I developed the Barrow Woodwose[p.291] costume and performance.

Digital Media Labs is directed by Benedict Phillips, Glenn Boulter and David Lynch, and nominating arts organisations including AND[p.288], FACT[p.303], Superposition[p.316] and the National Football Museum. I was technical advisor on the first Digital Media Labs in Hull, 2010 investigating touch screen technology, and returned as a guest participant to Cumbria in 2015 for the exploration of *digital outsiders*, supported by the CCN+[p.295].

Editorial Design Group

Led by Anna Gerber, art director and co-founder of publisher Visual Editions, the Editorial Design Group explored the future of books and publishing forms through a tutorial and crit format. My sketches and activities included:

- Shattered ceramics
- Reality Hunger - A Manifesto remix
- Layered typography faces
- Scrolling quote writing interface
- Visting MayDay Rooms

- Memory of the World[p.308] – visits, presentation and interview with Marcell Mars

Elf Protest

I devised the elf protest workshop to meet several criteria. One was responding to Jeremy Myerson's editorial theme of work, and to the themes of the Time & Motion exhibition[p.318]. The second was Mike Stubbs' call for a workshop for families visiting FACT as part of their ongoing workshop schedule.

Participants were invited to select an elf of their choosing. They were told that we don't really know much about what elves do, but we do know that they are known for working on making Christmas presents. The discussion generally move to a short overview of how the elves were protesting for better working conditions. The aim of the workshop was to work out what each elf in particular was unhappy about in their work and how they might want to work in the future. Then protest signs were made, and the participant could take the elf home or place it in the gallery or city, where other elves might see the protest.

The elf images were sourced from the public domain archives of the Project Gutenberg library book scanning, printed on card and cut out. The protest signs were made from bamboo skewers and pieces of card, and decorated with coloured pencils, felt tips, and small rubber stamping kits. My workshop format of devising protest signs for characters draws on Paula Singleton's use of Barbie and Ken dolls in her *Feminist Killjoy Dolls* body image and identity workshops, where participants design their own doll identities as well as sometimes making placards (Singleton 2014; Singleton 2018), as well as RTMark's *Barbie Liberation Organization* (Firestone 1993).

Elvis is in Everything

Originally entitled 'False Faces', this prototype, art installation, and pop-up shop was initially inspired by a paper on face detection of seemingly anonymised images, such as pixelated faces in newspapers (Newton, Sweeney, and Malin 2005), and a call for participation in the 2013 biennial RCA doctoral exhibition on the theme of "Disruption".

I inverted the logic of algorithmic detection of faces even in images humans can't tell as faces. Decorative patterns derived from face biometrics appear to humans as abstract forms but can trigger some face-detection systems to record 'false positives' as if a face was there.

This project presented patterns that a face recognition algorithm classifies as Elvis Presley. False faces could be spread globally by using such a pattern in high fashion and popular clothing designs. Flooding face-detection systems in this way offers a form of machine invisibility that does not rely on hiding the face, but on algorithmic over-stimulation. Such data chaff is designed to lie at the heart of networked face tracking systems (beloved by big business advertising and data perverts) while not interrupting everyday life. Get the T-Shirt now!

I made the prototype using the OpenCV (opensource computer vision library) face detection software running on a Raspberry Pi computer. I used public archive images of Elvis to train the Haar Cascade face detection. My script then automatically collected images online from the Project Gutenberg library book scanning and Flickr Commons library collections, and analysed each one in turn for the face of Elvis. I then manually removed any detected faces in images containing human faces, leaving only Elvis faces found in patterns and objects. I ran the search for faces twice, once using a greyscale t-shirt print quality, and again filtering images first into monochrome screenprint t-shirt patterns. I then printed t-shirts using both printing processes to sell in a pop-up shop in the Why Would I Liep.321 RCA biennial exhibition and again in the CX Designing Digital Now Exhibitionp.296.

FACT

The gallery, lab and venue were an important site for our workshops, residencies, lab and exhibitions. I was supported in my exhibitions and workshops at FACT by director Mike Stubbs and Ana Botella, Emily Gee, Lesley Taker, Mark Murphy and Roger McKinley.

- Time & Motion exhibitionp.318
- CX Designing Digital Now Exhibitionp.296

Future Engineering

I conducted a series of early exploratory interviews in 2012 with experimental roboticists and artists, including Andrew 'bunnie' Huang, Cory Kidd, Dan Paluska, David Merrill, Joe Dahmen, Jeff Lieberman, Jeff Weber, Saul Griffith and Marius Watz. These discussions informed my understanding of telepresence and robotics, including Dan Paluska's video booths and Bunnie Huang's discussion of heirloom technology and his contributions to the

Safecast distributed geiger counter project.

FutureEverything

FutureEverything is a Manchester-founded annual arts, music and technology festival, directed by Drew Hemment, which collaborated with the CX Hub on initiating and hosting a number of projects.

- Chattrp.294
- noPayPhonep.311
- Place Playlistp.313 BBC Connected Studio event

Gnome Street Gnome

A family friendly one-day event as part of Leeds Digital Festival, by Emma Bearman of Playful Anywhere and the Open Data Institute (ODI) Leeds, seeking to "enchant the everyday humdrum objects we encounter in our streets, to bring them to life, to speak to each other & to reward those discovering them with a playful pause". The day was supported by Ross Dalziel and Andy Clark, and a continuation of a Digital Catapult Data City Internet of Things Boost.

I worked with family teams to use my early Tor Toysp.318 prototypes as a starting point for sketching a number of Raspberry Pi gnomes, and other objects.

Graph Commons

I collaborated with Burak Arikan to adapt and present his Graph Commons workshop for the Time & Motion exhibitionp.318. He contributed workshop materials and the open network mapping software he has developed. Participant mappings included an exploration of the historical makers and collectors of cabinets of curiosity. Our workshop began with discussions of network topologies and grass-roots mapping, before turning to mapping with craft materials. We then produced web-based digital network maps.

Hashtag Radio

Originally entitled 'Hash Radio', this proposal developed from discussions at the Modelling Digital Public Spacep.309 lab between Priya Prakash (Changify), Ed Baxter (Resonance FM) and Maxine Glancy to bring "the tools which characterize radio broadcast to highly localised

'street' scenario (macro-community to micro-community)" (lab proposal document) galvanising a "reacting coherent critical mass". I joined Priya and Ed as they developed the proposal, particularly contributing discussions around existing technologies, to design a local wifi radio platform associated with a particular locally trending social media hashtag.

Hidden/Deviant Labour

In the Time & Motion exhibition[p.318] workshop, initiated by Georgina Voss, we approached tracking and accountability from the perspective of consumers (tracing spime-like (Sterling 2005) product histories), collaborating to make a wall-collage global topology visualisation of hidden labour in the production and use of a sex toy. I contributed stereotype images for cutting up and reassembling.

Hybrid Lives

Originally entitled 'The House of Poly Social Reality', I contributed to the one-day event discussion with Luke Connoley, Karen Ingham and Peter Bosson looking at the many simultaneous roles that digital connectivity brings to the lived experience of built architecture and organisations. John Fass took on the doctoral role in this project. As it evolved into a co-working space for the Time & Motion exhibition[p.318] at FACT, I returned to it to develop and contribute three workshops to be carried out in the interior architecture space designed by Benjamin Koslowski.

IDEAS Factory - Detecting Terrorist Activities

During the first year of my CX research, I completed work funded by an EPSRC grant as one of eleven co-investigators on the IDEAS Factory - Detecting Terrorist Activities Shades of Grey project EP/H02302X/1. I was researching the relationship of temporary digital and physical playful interactions with public spaces in relationship to public safety and resilience, and the detecting terrorist activity agenda. My work with Marialena Nikolopoulou and Karen Martin from the University of Kent school of architecture informed my interpretations of contested digital public space and my use of architecture and science and technology studies literatures. During the period of my doctoral research we reflected and wrote about our work.

Outputs include "Art as a Means to Disrupt Routine Use of Space." (Martin, Dalton, and

Nikolopoulou 2013), "Designing Visible Counter-Terrorism Interventions in Public Spaces." (Dalton et al. 2015) and "Shaping Pedestrian Movement through Playful Interventions in Security Planning: What Do Field Surveys Suggest?" (Nikolopoulou, Martin, and Dalton 2016).

Janez Janšas

The documentary *My name is Janez Janša* is a film about names and name changes, focusing on one particular and rather unique name change that took place in 2007, when three artists officially changed their names into the name of the Prime Minister of Slovenia, Janez Janša. The screening was followed by an audience Q&A with Janez Janša, Janez Janša and Janez Janša, the director and artists featured in the film.

The special screening was part of a body of work in to pseudonymity at the Royal College of Art by Emma Brasó and I, and was supported by the Royal College of Art Film Night Series, the University for the Creative Arts and the AHRC. The film night marked the beginning of a week-long residency by Janez Janša, Janez Janša and Janez Janša at the Herbert Read Gallery, University for the Creative Arts, Canterbury and at Turner Contemporary, Margate.

Emma Brasó's research looks at collaboratively produced parafictional artists within the art world as forms of curatorial understanding. Her work introduced me to many brilliant examples of identity design in art contexts.

I interviewed Janez Janša, Janez Janša and Janez Janša about their work and processes of identity construction. Further documentation: https://www.rca.ac.uk/news-and-events/events/my-name-janez-jansa-screening/.

KHiB

During the first year of my Creative Exchange research, I continued as a guest professor at the Kunstøgskolen i Bergen / Bergen National Academy of Art & Design (KHiB). I was first invited to teach at KHiB by Amber Frid-Jimenez on topics including coding in arts and design practice and locative media technologies, and to join her in a joint artistic research project that became Data is Political$_{p.298}$ and later informed the New Cloud Atlas$_{p.309}$. My teaching discussions around data and mapping informed my design work with the cloud

atlas, and introduced me to new perspectives in identity design. It was Amber who first encourage me to consider my interests in everyday telepresence and robotic daemons in terms of the politics and charismatic power of anonymity and pseudonymity more directly.

Making the Digital Physical

I participated as a doctoral representative of the RCA in the one-day lab event led by Lancaster University at the Lowry Centre in Salford exploring the possibilities of making the digital (more) physical. I contributed to the Physical Playlistp.312 proposal.

I returned to the Making the Digital Physical research theme to take part in the Numbers that Matter hackathonp.311.

Manifesto for Digital Messiness

A short research project funded by the Communities & Culture Network+p.295 between April and July 2015, led by David Harte. I contributed writing about uncanny street objects and tact in smart cities. Further documentation: http://www.communitiesandculture.org/.

Mapping Post-Digital Futures

The Walk in the Parkp.319 prototypes and themes were presented and explored with design-researchers in the Mapping Post-Digital Futures symposium in the Interactive Experience Design research group at the Royal College of Art.

Participants were selected from invited attendees at a one-day symposium, and were made up from designers, technologists, artists and students. The workshop was repeated twice during the day with two groups of twelve people. The workshop started with an introduction in to personal clouds. I presented the two PDS systems, Mydex and INDX as case-studies. A group discussion followed exploring the negotiation between private data and public good in the digital commons. Participants were then asked to sketch designs for physical and digital prototypes of personal clouds. These were a combination of rapid drawings and craft tools including cardboard connectors, modelling clay and construction kits. The designs were then discussed, with an emphasis placed on determining 'criteria for success' of the systems, objects and interfaces imagined.

Masked Soapbox

I took the ideas of a public video broadcasting civic infrastructure developed by artist and engineer Dan Paluska and tested it within an arts festival context of LightNight in Leeds, UK. A project that reflected my planning workshop conversations about views from the street, but inverted the publishing so recordings were produced at a physical city location, rather than embedded through augmented reality into it.

In our discussions Paluska introduced me to public publishing as an experiment in sustainable business and community models in the arts, and who has conducted self-publishing experiments about uncertain identity ownership.

The tool for publishing took the form of a soap box and recording booth that simply and easily trigger a video recording. A number of familiar masks were ready to take and use around the edge of the booth. A screen in the booth displayed back the currently recorded image, allowing people to see and reflect on their own performances as well as performing to others in the street and the unknown potential audience of the internet. The Masked Soapbox gives a city location a Youtube channel of its own.

Mediating Heritage

In September 2012 was invited to talk at a day-long *Mediating Heritage* event organised by Marialena Nikolopoulou and Karen Martin, hosted by the Centre for Architecture and Sustainable Environment at the University of Kent School of Architecture, as part of the Communities & Culture Network+. The event explored the creative use and re-use of cultural inheritance and the intersection between cultural heritage, digital technologies and the built environment. I spoke about *Incidental Psychogeography: Motivating atypical audiences in urban heritage exploration*, drawing on examples from my own work with located media development for an HP funded project, and my research into smart architecture sensor networks. Further documentation:
http://www.communitiesandculture.org/news/mediating-heritage-workshop/.

Memory of the World

The Memory of the World project is a public library digital space that focuses on DIY archiving and hosting of personal libraries of books by readers themselves. Led by Marcell

Mars (Nenad Romić), the *P2P Public Library* project includes a public website listing the current library archive, a bookscanner pipeline for digitising books, and plug-in to contribute a digital book archive to the library from within the free software Calibre project of e-book librarianship, publishing and reading tools. Marcell has described his work as social software and semantic web in practice. I first encountered Marcell's work during our Data is Political[p.298] project, and subsequently visited him as part of the Editorial Design Group[p.301] during his residency at the MayDay Rooms in Fleet Street, London where he was working on digitisation projects with their archive of "historical material linked to social movements, experimental culture and the radical expression of marginalised figures and groups". Further documentation: http://maydayrooms.org/about/.

Modelling Digital Public Space

I participated in the second RCA CX Lab as a doctoral researcher and group activity leader. I prepared a series of digital model examples as provocations for the day, and a workshop format for a group of the participants. My workshop used paper and craft sketching to explore digital public space models, and over-head projectors to play with scale and situation. I contributed to two proposals:

- Walk in the Park[p.319]
- Hashtag Radio[p.304]

New Cloud Atlas

The New Cloud Atlas forms the basis of a global crowd-sourced effort to catalogue and map the physical infrastructure that makes up digital cloud systems. The premise of the project is that the internet has become a vital part of so much of life that we are heavily dependent on the data warehouses, internet exchange switches and fibre optic cables that sustain it. If identity apparatuses and digital public spaces are to continue to exist online, then we must maintain an accountable public record of the material politics of these commons. The atlas records the physical location of each cloud resource using the Open Street Map project, and renders map tiles of the resulting cloud infrastructure for people to explore. A simple web interface guides people on how to volunteer to log new places in the atlas. The goal is to record each warehouse datacentre, each internet exchange, each connecting cable between

those points. Anything of any physical significance in the operation of the cloud should be observed in some way, and recorded.

The project was proposed as a continuation of the mapping of networked connectivity started in our Decode FACT[p.299] workshop. The idea for a new cloud atlas was initiated within the Data is Political[p.298] project discussions and developed for my Sensuous Knowledge[p.316] talk with Amber Frid-Jimenez and Joe Dahmen. The New Cloud Atlas website, cartography and volunteer mapping tools were developed by Tim Waters, using the Open Street Map infrastructure and contributing back to their open map data.

The New Cloud Atlas dérive at CX Designing Digital Now Exhibition[p.296] was two psychogeographic walks around Liverpool using the new cloud atlas tools at http://newcloudatlas.org/ to log physical aspects of 'the cloud'. We sought out datacentres and network switches along with the mundane infrastructure of fibre optic street boxes, telephone exchanges and cell phone towers. Digital signals and data are stored and processed in buildings and electronics produced and owned by large companies and organisations. Cables in mud, boxes on street corners, warehouses in barren industrial landscapes. The atlas and mapping walks asked: Where is 'the cloud'? Who owns it? Can we follow the path of our data?

This walk (performance/workshop) involved a group of people walking and mapping together, using Stamen Design's Field Papers and OpenStreetMap's GPS mapping tools modified for our purposes, and later data entry in the FACT Media Lab. We were supported by digital cartographer Tim Waters, who developed the New Cloud Atlas map, and has a wealth of experience with mapping walks and psychogeography. I collaborated with Tim Shaw to coordinate his sound performance walk Ambulation with the mapping activities. In particular we sonified the electromagnetic patterns surrounding cloud street furniture and cabinets.

The New Cloud Atlas was presented as part of the Information+ Interdisciplinary Practices in Information Design and Visualization conference and Information Everything exhibition at Emily Carr University of Art + Design in Vancouver from June 17 - July 30, 2016. For outputs see Data is Political[p.298].

noPayPhone

I first proposed the noPayPhone in a response to Drew Hemment's call for infrastructure projects for their future vision of City Fictions at the 2014 FutureEverything[p.304] festival in Manchester. My involvement in the City Fictions was orchestrated by Mat Steel.

The noPayPhone offers a free public phone. Anyone can simply call a landline or mobile number from the phone by dialling the number. The phone works by asking people with inclusive mobile phone plans to donate some of their free minutes by connecting to the noPayPhone as a bluetooth handset. Each call is randomly routed through one of the nearby donor phones. By donating free minutes the public are helping to build an open, ad-hoc community resource. Virtually lending a mobile to strangers also means adding unknown calls to each mobile phone bill. This helps to confuse targeted advertising and profiling by mobile phone operators and any third-party surveillance of call 'metadata'. A free phonebox that randomly assigns calls made to one of the participating mobiles nearby acts a little like a low-tech remailer (mix network node). The PayPhone box has always been a symbol of privacy, a place for Clark Kent to hide while changing identity.

I made the prototype using a computer running Debian to connect a USB handset to one of a number of 'donor' mobile phones by acting as a bluetooth handsfree headset to each of the mobiles. The project is based on No Hands a GPLv2 implementation of the Bluetooth HFP 1.5 Hands Free Protocol.

Since my noPayPhone project and talk I have observed a number of related telephone infrastructure initiatives. Much like the noPayPhone box, BT have introduced an interface for making free calls into the digital advertising screens they are currently replacing phoneboxes with (via your own mobile device or the street furniture itself). Under their EE brand, BT have also advertised the possibility of "data gifting" free digital possessions, albeit only the pooling of download data allocations between family members on the same contract, under a "Who says you can't?" slogan that could almost be a direct response to my CCC talk critique of unshareable 'free minutes'.

Numbers that Matter hackathon

Bettina Nissen and I worked on rapid prototypes for the Numbers that Matter Hackathon

(we were participants in the event and formed a team). Our team 'Data Tumours for a Better Society' won the Audience Choice award at the final day of the event. We experimented with wearable manifestations of urban data burdens, such as a wearable growth for taxidrivers to display the current pollution levels in the city of Manchester, with input from Lloyd Henning and Peter Sutton of Foxdog Studios on networked objects and prototyping, and Hwa Young Jung and Dave Mee.

Open Planning

Developed out of discussions around empowering publics in the planning of new buildings to propose digital tools to "allow people in an area to engage more with the planning process", in particular planning notices. Initially authored by Richard Koeck and Gareth Langley, I contributed to our one-day event round table discussions focusing on augmented reality and participatory planning with school children. This went on to be a project exploring digital open planning processes.

Physical Playlist

In our one-day Making the Digital Physical$_{p.307}$ event round table material prototyping discussions, I pitched the idea for a way of associating significant objects with music played to them, so that they serve the function of mixtapes, a physical manifestation of the labour of choosing and playing music that can then be shared with friends. I developed the idea to include a bracelet of 3d printed RFID tracked miniatures of the objects in discussion with Ian Forrester. This proposal went on to be the foundation of a project and mechanical playlist player prototype by Adrian Gradinar, Dan Burnett, Joel Porter and Paul Coulton.

Pinky Show

Pinky was an interview respondent talking to me over email about her part in her Pinky Show project. The Pinky Show is a series of video essays, comics, zines and artworks produced by a collective of cartoon cats, Pinky and the other Associated Animals Inc, aiming to "design and create work that cultivates compassion, fairness, and healing through a deeper understanding of the world". Pinky (2013) documented how her collaborator Bunny died of cancer in 2013, which was before I contacted her in 2014 for interview. I only discovered this through one of her earlier zines long after loosing contact with Pinky.

Place Playlist

Together with Ian Kelly and Steve Forshaw, I proposed White Rabbit in the BBC Connected Studio event at FutureEverything[p.304]. It proposed that we think of places and activities in the form of a playlist.

One of the core activities of the BBC has always been programming schedules of experience. Traditionally this has been focused on selecting what we could call 'mass playlists' for the main radio and TV channels. With a digital shift away from large, real-time audiences, to personalised experiences, the BBC is quickly becoming a site of expertise and experimentation for other kinds of playlists. The BBC Playlister, for example, demonstrates the shifting expectations of audiences as Youtube 'favourites' and Spotify 'recommendations' become central parts of how we experience media. The BBC's role in editorial, production and commissioning is shifting to encompass on-demand experiences and algorithmic personalisation.

Our Studio Sprint proposal was to take this growing BBC expertise with playlist models, and apply it to physical places and activities. We returned to BBC R&D[p.292] for a Creative Development Session, and successfully submitted a Sprint pitch document before my parental leave. BBC process supported by Robin Cramp.

Public Practice Studio

Two week residency visiting the Public Practice Studio in the School of Art + Art History + Design at the University of Washington, Seattle. Supported in part through the award of an AHRC Research Training Support Grant for International Study Visits. My time in Seattle was spent in research discussions with the Public Practice Studio around themes of pseudonymity and contestational design, using archives at the university to build notes on historical cases of pseudonymity and identity design, and developing a computer vision prototype around ideas of data chaff and algorithmic invisibility. The prototype, a raspberry pi computer with camera attachment running openCV face detection software, would go on to form the basis of the Elvis is in Everything[p.302] software which was first exhibited in the Why Would I Lie[p.321] RCA Research Biennial. I gave a talk on *Designing for Digital Pseudonymity - Co-Performance as a Potential Form of Anonymity* (https://vimeo.com/119157252) in the DUB

(DesignUseBuild) seminar series. During my visit, I interviewed Tad Hirsch about the Institute of Applied Autonomy (IAA), which was a group of activist designers and engineers. I travelled to Vancouver to meet with Data is Politicalp.298 research collaborators Amber Frid-Jimenez and Joe Dahmen.

Public Service Innovation and Democracy

The first of six CX Lab events held on the 27th September 2012 in Manchester, following a one-day 'sandpit' format with invited participants from the CX consortia of academic, organisational and practitioner partners. I attended as part of the CX academic network, and contributed to the Open Planningp.312 proposal.

Rapidly Syncing Clouds

A collaborative video essay prototype in which I invited rooms of people to contribute to the format of a lecture. A seminar event explored the potential for collectively curated web video as a format for research dialogue. Participants in the seminar were asked to bring their own web devices and to submit nominations for what to show next throughout the progress of the seminar. A live cueing system was used to slice together disparate suggestions from across all possible web video content to create a live discussion of sound and moving image. They were able to suggest content to the system through a Twitter hashtag. A modified command-line script for VLC player selected tweeted videos to seamlessly download and play. A primitive voting mechanism through the Twitter backchannel allowed for the audience to further shape or skip the selection of the videos as they progressed.

Building on the institutions of the RCA Sound Seminars and RCA Film Seminars, Syncing Clouds explored the presentation of web media in a seminar format. Shaped by the materials and conventions of the internet, Syncing Clouds was audience-crowdsourced, real-time, fragmented and navigating the subcultural spaces of Youtube's 'long tail'.

A seminar event provided a space for testing the prototype, supported by Martina Margetts and funding from the RCA Research Methods Course, with introductory talk and video performance from artist Michelle Teran. Poster designed by Hans-Joerg Pochmann.

RCA

My home institution as a CX doctoral researcher, situated within the CX studio and in relation to the School of Communication and the Helen Hamlyn Centre for Design (see Acknowledgements for further details of my colleagues). I conducted interviews with discussants about identity design that informed my research questions, including Dave Housman, the Janez Janšas, Lauren Mcarthy, Marcell Mars, Paul Granjon and the Pinky Show. Thanks to Nina Conti for her communications. Events at the Royal College of Art included:

- AcrossRCA Private Clouds, Public Goodp.288
- Modelling Digital Public Spacep.309
- Tata Consultancy Services workshopp.317
- Time & Motion Symposiump.318
- research events including Janez Janšasp.306 screening, Rapidly Syncing Cloudsp.314 and work-in-progress shows including Why Would I Liep.321.
- two Methods of Intent talks I arranged on grounded theory research through design with contribution from Tony Bryant
- various CX Research Meetingsp.297

I contributed as a visiting tutor to guest sessions exploring my research in Design Withoutp.300, Digital Directions and Information Experience Design.

Redefining Working Life

The second CX Lab, run by the RCA and hosted at FACT in Liverpool, on the 8th October 2012. I was involved as a doctoral researcher, attached to an emergent group within the day's participants, and as a discussant with wider projects and participants. I collaborated on three proposals:

- Hybrid Livesp.305
- Where do you go to?p.320
- Return on Investmentp.316

Rethinking Real-Time Protothon

I attended a one-day hackathon event looking at the open WebRTC networked media

technology API, particularly around realtime sound and video connectivity through the browser. Working with Marcin Ignac, Daniel Tauber and Addi Zakaria (Team Purple Diamond), we made a Google search daemon that types false search terms when the user looks away, and real-time Facebook profile videos plugin prototypes. Hosted at Google HQ London. Invited by Clara Terne and Joe Coppard of Protothon. Further documentation: http://marcinignac.com/blog/protothon-rethinking-realtime/.

Return on Investment

The Return on Investment project set out to "play with the taboo of art and money" and "transaction value" (lab day proposal form) in public art in the setting of FACT gallery. The project proposed collecting commentary for the Time & Motion exhibitionp.318 at FACT from a broad range of stakeholders, both professional perspectives such as curators, art historians and funders, and other publics, including local schools, businesses and audiences. By re-recording the audio guide using a single narrator the contexts of the participants are collapsed into a single gallery visitor guide listening experience. The co-authored recording constructs a shared reputation but also anonymises the individual contributors.

Originally entitled 'Payment Pilot for Public (art) Space', this proposal by Tuur Van Balen, Shelley James and Mike Stubbs asked what work, currency, payment and reward meant in light of precarity of digital work and the arts. I joined Tuur and Shelley after the event in their discussions and we collaborated on designing a proposed exhibition artwork for FACT gallery.

Sensuous Knowledge

I presented work emerging from the Data is Politicalp.298 Symposium at the 7th Sensuous Knowledge conference on January 23rd 2013 in Bergen, a collaboration between The Art Museums of Bergen and Bergen Academy of Art and Design. My collaborative design work with Amber Frid-Jimenez and Joe Dahmen, my presentation and subsequent discussions led to the New Cloud Atlasp.309 project. For outputs see Data is Politicalp.298.

Superposition

I am a member of The Superposition, an art, science and making collaborative community

in Yorkshire. I presented my designs for the Bundle Publishing[p.292] project at a Superposition event in 2014, in a productive space for discussing potential design, technology and audience considerations of the project.

I have written a contribution on my conceptualisation of the design research methods of the diffractive practitioner for their forthcoming Superposition book: "A Diffractive Practitioner" (Dalton 2019). Further documentation:http://www.thesuperposition.org/.

Tata Consultancy Services workshop

Co-led a Design Re-imagination Workshop with Neville Brody for participants from the Tata Research Development & Design Centre in December 2014. Tata researchers at the event introduced me to their Privacy Crystal Ball technical demonstration. Thanks to Vijayanand Banahatti for sharing his writing about the project.

The workshop led me to consider how tools for the approval of data access are not just a system development challenge, they are a new communication medium that must be designed. As corporations adopt trust and transparency tools like the TCS Privacy Crystal Ball, they will need to consider this new communication medium as part of their branding and customer relations strategies. Digital publication and connectedness accelerates and fragments the customer-organisation interaction. Brands must be designed in terms of ongoing strategies, characterising tone of voice and design grammars.

Theory & Practice of Social Machines

I joined Walk in the Park[p.319] researchers and their wider SOCIAM (The Theory and Practice of Social Machines) collaborators and social machines research community at the World Wide Web (WWW2013) conference in Rio de Janeiro, Brazil. I presented a paper on *Pseudonymity in Social Machines* within the *Theory & Practice of Social Machines* strand of the conference, and benefitted from a number of conversations about mapping and prototyping social machines. The social machines strand and my Walk in the Park[p.319] participants were supported by the SOCIAM Project, funded by the UK Engineering and Physical Sciences Research Council (EPSRC) EP/J017728/2 and comprising the Universities of Southampton, Oxford and Edinburgh. Outputs include: "Pseudonymity in Social Machines" (Dalton 2013).

Time & Motion exhibition

Time & Motion: Redefining Working Life was an exhibition in FACT, Liverpool between December 2013 and March 2014. The exhibition included a collaborative co-working space, a series of salon and workshop events, and a high-profile art exhibition.

- Elf Protestp.302
- Where do you go to? Exhibitionp.321
- Hidden/Deviant Labourp.305
- Graph Commonsp.304
- Decode FACTp.299

Time & Motion Symposium

Symposium and book launch for our Time & Motion research theme, 6 March 2014 in London. I gave a talk about shifting work identity in digital public space. Invited speakers included artists Ellie Harrison and Sam Meech, and Anna Coote of the New Economics Foundation (NEF). Further documentation: https://www.rca.ac.uk/news-and-events/events/time-motion-redefining-working-life/. Outputs include: "Work and Wellbeing in Digital Public Space" (Dalton and Fass 2013).

Today's Art

Installed the second major performance of the Chattrp.294 cafe at the annual Today's Art festival in the Hague, with newly designed guinea pig recording objects and new identity design branding. I talked about the project at the Creative Code symposium. While there I participated in the Your Art Party workshop by artist Aram Bartholl. Further documentation: http://todaysart.nl/2013/program/chattr/ and http://todaysart.nl/2013/program/creative-code/.

Tor Toys

The Tor Toys are self-publishing objects, that embody network infrastructure for communicating with an audience. The project involved guided sessions on making personal publishing platforms drawing on DIY punk publishing zine cultures that uses cheap, pervasive computing and networking technologies. The workshops demonstrated how to modify a Raspberry Pi computer and Tor network to be a personal publishing server, and

focus on the digital materiality of self-publishing. It sought to draw attention to the power politics of clouded private-public spaces and the history of self publishing as a form of positive empowerment and contestational design.

Originally entitled 'Publisher Persona', this project began as an exploration of how "reputation must be written in to existence" and publishers and publications build "reputational systems" that allow authors to "experiment with styles, genres or critique" (original proposal document). The project emerged from my discussions in the Editorial Design Groupp.301 as a proposal for the RCA Book Test Unit. Through developing the design of reputational systems, in discussion with the proposal academic partners, Paul Emery and Mark Fell, I began to prototype DIY publishing objects. I tested these at Gnome Street Gnomep.304. From this, I developed a proposal for a series of prototypes and workshops at the CX Designing Digital Now Exhibitionp.296. The Tor Toys are Raspberry Pi computers running Tor and nginx, with python scripts to add specific functions such as the USB document scanner buttons.

My CX Designing Digital Now Exhibitionp.296 Tor Toys workshops at FACT were orchestrated by Radamés Ajna, and at DoES with Ross Dalziel and Adrian McEwen.

Walk in the Park

Initiated in discussions at the Modelling Digital Public Spacep.309 lab, I worked with Phil Booth and Max Van Kleek to develop a proposal to "explore the creation of a 'commons' around self-curated journeys or 'trails' through digital media" using existing personal data projects including Mydex's Personal Data Store (PDS) platform, and taking parks as a public space model for "inspired centers of civic life and the physical manifestation of the common good" (James Howard Kunstler quoted in the Walk in the Park proposal). The project worked with Phil Booth, and David Alexander and Chris Adams from Mydex CIC, and through Van Kleek, the SOCIAM (Theory & Practice of Social Machinesp.317) researchers.

During the project, both the Mydex and INDX personal data stores developed and presented features of visualising and exploring personal web history data. We then took these interfaces and prototypes as the starting point for a series of speculative design workshops with designer-researchers exploring the future of life-long personal data stores.

Where do you go to?

Originally entitled 'I'm working here now', this project proposed to "visualise the dispersed 'workplace', making the network visible and a sense of knowing each other, of intimacy and community" (proposal document). Developed at the Redefining Working Life lab by Claire McAndrew (The Bartlett, UCL) and Bridget Hardy (Integrans Consulting), with Gail Ramster, Louise Cunnington, Nick Taylor and Adrian Woolard, I joined Claire and Bridget early in their planning discussion, and we developed the proposal for funding to design a digital tool for freelance and hotdesk workers to share a sense of place and connectedness. Inspirations included Laptop Reflections by Conditional Design (Maurer et al. 2010). We developed prototypes through visits, workshops, interviews, prototype fieldtrials and conversations with BBC R&Dp.292. Our focus on creative research and freelance workers included conversations with FutureEverythingp.304 network after Chattrp.294. I prototyped early ideas for desk sharing, and then developed the Desk Snapp.300 app. We then reflected on this app in use, and exhibited outcomes CX Showcasep.297 and Where do you go to? Exhibitionp.321. We followed this with the Decode FACTp.299 workshop. Describing the project we wrote:

"Although digital tools have enabled a work-from-anywhere approach, local physical surroundings remain a large part of individuals' sensory contexts. With a sense of belonging and purpose grounded in personal attachments to physical space, how can a sense of place be reinstated in digital public space?"

"Seeking to (re)connect physical place with digital public space, our approach is underscored by two core objectives: (1) to scope the potential for creative visualisations of physical workspaces in digital public space; and (2) to generate new empirical knowledge of the social and economic benefits of a sense of 'connectedness' and 'knowing' via a prototype digital visualisation. The arrangement and use of working spaces (whether they be situated as a desk, kitchen table, train seat, library or café) are viewed as a subtle representation of work-state and self-identity – something which would be difficult to conceptualise and formally enter into a work rhythms survey and would be hard to distinguish from the low-bandwidth communication counterparts in digital social spaces at present. Capturing the subtlety of the physical workplace, this research seeks to explore tools to present visual

summaries of personal workspaces to distant collaborators, without losing the richness of their meaning, or the privacy of each working environment."

Outputs include: "Where do you go to…? Designing 'Connectedness' in Digital Public Space" (McAndrew, Dalton, and Hardy 2013) and the unpublished "Workplace Matters: Re-materialising Work Identity" (McAndrew, Dalton, and Hardy 2015).

Where do you go to? Exhibition

At one end of the 'Hybrid Lives' co-Working space as part of the Time & Motion exhibitionp.318 in the foyer of FACT is a tall, thin wall. Pinned to the wall are photos of desks and other spaces of work. If you look at the photos at eye-level, you see someone has been working at a cafe table, a garden, a train table, the step of a house, public spaces. If you look further up the wall, you can see office desks and workshops. Higher still, and you can glimpse kitchen tables, bedroom desks, private spaces. The photos were taken using the Desk Snapp300. app. The app is a prototype, designed to let small groups of people who work together share images of where they are working. The aim of the app is to make a working 'status update' that isn't about written notes or pictures of faces. The images are displayed on a timeline of work across the wall, and sorted by privacy up the height of the space.

Why Would I Lie

RCA doctoral research biennial exhibition, in which I first showed my Elvis is in Everythingp.302 algorithm invisibility experiments. I installed a mannequin holding a mini projector that projected a series of t-shirt designs calculated from online image archives that match the face of Elvis. I also ran a t-shirt pop-up shop, selling the t-shirts, as an exploration of how a data chaff anonymity set might be built. The organising committee were Manca Bajec, Helena Bonett, Susannah Haslam, Benjamin Koslowski, Peter Le Couteur, Carol Mancke, Brigid McLeer, Emily Richardson, Kyuha Shim, Mercerdes Vicente and Natalja Vikulina. Further documentation: http://lie.rca.ac.uk.

Appendix B – Example of coding and memo-making

The Barrow Woodwose Project. A week's residency with Digital Media Labs on the Cumbrian peninsula

Place in the research process: This project's timing came in the middle of my research process. Coding, constant comparative analysis, memo making and emerging concepts.

Initial ideas of *design outcomes*: I expected to produce a *bundle publication* documenting the work of other participants and my own. My contribution was to be an immersive video recording of the public park where we were spending the week. It was my response to the design criteria of the bundle publication which my previous analysis had clarified required media with large file sizes to justify including anonymity tools with every edition.

Research process: I began by experimenting with engaging the residency participants in contributing to a pseudonymous bundle. I started to consider how to make 360° recordings of the park. The design conversations I conducted led to tangling with the complexities of participation in pseudonymity. A film maker's reputation becomes a visible contribution when carrying a panoramic video recorder. My focus became making a *pseudonymous editorial identity* to carry the camera. I began exploring the challenges of making and performing an anonymous pseudonym. (I had already experimented with using existing anonymity and privacy enhancing technology tools, including exchanging research data with collaborators using GPG encryption.)

Memo: I asked what are the implications for the designer within the public space they are designing for? Barad's notion of *intra-action* is useful here - to grasp that I as designer am mutually constituting situated apparatuses and phenomena. This transforms my *designer-research stance*.

Research process: I start experimenting with materials to assemble my costume, drawing on traditions of potential anonymity. I experience the *awkwardness* and complexity of

anonymity in a *material-discursive* way, sharpened through conversations with participants and the public spaces of the park. I experience a loneliness of adopting a costume on my own which draws attention to me.

Memo: The category of *awkwardness* had already emerged from my observations of workshop participants making urban camouflage costumes, and my own (uncomfortable) experiences in an RCA research presentation of performing sock puppets. The off-putting complexity of costuming raises the question of *why bother / bothering*. The loneliness and attention given to the sole performer means that *anonymity requires a crowd who will stick together*.

Research process: The recording device I prototyped with cameras and microphones mounted on a staff, seemed a practical solution. The performative aspects of the staff developed from the material constraints of 360° video capture and binaural audio recording, and also from the traditions of wildermann costumes. While making the staff, I realised the inspiration of Krzysztof Wodiczko's Alien Staff (1992) project.

Memo: Looking at my documentation later, I then see the ways the staff works as a material token of carrying the burden of the complexity of costuming and seeking belonging. This fits with prototypes of data tumours made later during the Numbers that Matter hackathon, manifesting meaningful data in embodied ways and leads me to develop the concepts of *embodied belonging* and *celebrating bothering* both of which became part of *fashioning our own belongings*.

Research process: I re-exhibited the woodwose costume in other galleries and venues and realised that I was re-making the staff each time from new found materials (such as a window opening hooked rod or a cleaner's mop).

Memo: This elaborated my understanding further of *embodied belongings* and *(dis)ownership* in relation to the anonymity practices of disposable 'burner phones' and 'virtual machines' I observed in practice at the Chaos Communication Congress.

Research process: Through the week I continued to follow my design conversations, and examined further the role of costume making in my research.

Memo: I understood assembling materials into a recognisable character as *crafting camouflage*, as decorative anonymity, that had also emerged earlier in my surveillance algorithm invisibility, and pseudonymity traditions. Later I drew these experiences with costuming together with the identity and reputation construction I observed in zine making in a CX research workshop, which led me to develop the key concept of *sticking together as a form of identity design*, a form of intersecting anonymity agency and relational reputation design.

Research process: During the week I experimented with limiting myself to using common 'modern wilderness' materials to make my costume forms. In Barrow-in-Furness this consisted of generic pound-shops, charity shops and military surplus, rather than traditional wilderness materials of furs, animal bells and straw harvest. I understood *constraints* in terms of the emerging category *default settings*. My inspiration came from a code of a photo of European wildermann images by Charles Fréger, and my creative sketches using the default settings in digital software inspired by my research into de-anonymising author signatures.

Memo: The *anonymity of default materials* proved a key category, and I returned to it through further theoretical sampling, and re-examining earlier projects and literature of pseudonymity traditions, to develop the concept of *creative constraints* and *making commonplace*.

References

Ablon, Lillian, and Andy Bogart. 2017. *Zero Days, Thousands of Nights: The Life and Times of Zero-Day Vulnerabilities and Their Exploits*. RAND Corporation. doi:10.7249/RR1751.

Aching, Gerard. 2002. *Masking and Power: Carnival and Popular Culture in the Caribbean*. Cultural Studies of the Americas 8. Minneapolis: University of Minnesota Press.

Adamowicz, Elza. 2011. "Between Museum and Fashion Journal: Hybrid Identities in the Photomontages of Hannah Höch." In *Dada and Beyond*, edited by Elza Adamowicz and Eric Robertson, 187–200. Avant-Garde Critical Studies. Amsterdam ; New York: Rodopi.

Ageh, Tony. 2012. "Digital Public Space." presented at the The Creative Exchange Launchpad, Manchester Museum of Science and Industry, May 15. http://thecreativeexchange.org/CX_Launchpad_Tony_Ageh.pdf.

———. 2014. "A Life Spent Making Lists." In. London: Medium. https://medium.com/storythings-ltd/we-re-not-leaving-this-bar-until-we-ve-come-up-with-such-a-great-idea-that-i-can-t-sack-you-b12ddfd53fa8#.q0rxp94ew.

Ahmad, David Mirza. 2017. *Subgraph OS Handbook*. https://subgraph.com/sgos-handbook/sgos_handbook.pdf.

Alexander, Christopher. 1979. *The Timeless Way of Building*. New York: Oxford University Press.

Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1977. *A Pattern Language: Towns, Buildings, Construction*. New York: Oxford University Press.

Almond, Len. 1987. "Action Research in England Since 1970." In. Trois-Riveres, Canada: Universite du Quebec.

Anderson, Benedict. 2006. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. Verso Books.

Anderson, Nate. 2011. "PirateBox: An 'Artistic Provocation' in Lunchbox Form." *Ars Technica*. January 31. https://arstechnica.com/tech-policy/news/2011/01/piratebox-an-artistic-provocation-in-lunchbox-form.ars.

Andreotti, Libero. 2002. "Architecture and Play." In *Guy Debord and the Situationist International: Texts and Documents*, edited by Tom McDonough. Cambridge, Mass: MIT Press.

Aphex Twin. 2014. "http://Syro2eznzea2xbpi.onion." Tweet. *Twitter*. August 18. https://twitter.com/aphextwin/status/501383043643621376.

Arıkan, Burak. 2013. "Network Intelligence for All." *Leonardo* 46 (3): 268–69. doi:10.1162/LEON_a_00567.

Auger, James. 2012. "Why Robot?: Speculative Design, the Domestication of Technology and the Considered Future." Royal College of Art.

Autistici/Inventati. 2017. *+KAOS. Ten Years of Hacking and Media Activism*. Institute of Network Cultures.

Bachmann, Götz, Paula Bialski, and Marit Hansen. 2017. "The Terms of Anonymity: An Interview with Marit Hansen, German Data Protection Expert." *Ephemera* 17 (2): 421–30.

Bachmann, Götz, Michi Knecht, and Andreas Wittel, eds. 2017. "The Social Productivity of Anonymity." *Ephemera* 17 (2): 241–58.

Bakhtin, Mikhail. 1984. *Rabelais and His World*. Translated by Helene Iswolsky. Bloomington: Indiana University Press.

Balsamo, Anne. 2011. *Designing Culture: The Technological Imagination at Work*. Duke University Press.

Barabas, Chelsea, Neha Narula, and Ethan Zuckerman. 2017. "Defending Internet Freedom Through Decentralization: Back to the Future?" MIT Media Lab: The Center for Civic Media & The Digital Currency Initiative. http://dci.mit.edu/assets/papers/decentralized_web.pdf.

Barad, Karen. 2000. "Reconceiving Scientific Literacy as Agential Literacy: Or, Learning How to Intra-Act Responsibly Within the World." In *Doing Science + Culture*, edited by Roddey Reid and Sharon Traweek. New York: Routledge.

———. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. London: Duke University Press.

———. 2012a. "Nature's Queer Performativity." Edited by Hilda Rømer Christensen and Bettina Hauge. *Women, Gender & Research*, no. 1-2: 25–53.

———. 2012b. *Karen Barad: What Is the Measure of Nothingness: Infinity, Virtuality, Justice: 100 Notes, 100 Thoughts: Documenta Series 099*. Bilingual edition. Ostfildern: Hatje Cantz.

———. 2014a. "Invertebrate Visions - Diffractions of the Brittlestar." In *The Multispecies Salon*, edited by Eben Kirksey, 221–41. Durham: Duke University Press.

———. 2014b. "Diffracting Diffraction: Cutting Together-Apart." *Parallax* 20 (3): 168–87. doi:10.1080/13534645.2014.927623.

———. 2015. "TransMaterialities: Trans*/Matter/Realities and Queer Political Imaginings." *GLQ: A Journal of Lesbian and Gay Studies* 21 (2-3): 387–422. doi:10.1215/10642684-2843239.

———. 2017a. "No Small Matter: Mushroom Clouds, Ecologies of Nothingness, and Strange Topologies of Spacetimemattering." In *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene*, edited by Anna Lowenhaupt Tsing and Nils Bubandt. University of Minnesota Press.

———. (2012) 2017. "On Touching – the Inhuman That Therefore I Am (V1.1)." In *Power of Material/Politics of Materiality*, edited by Susanne Witzgall and Kerstin Stakemeier, 153–64. diaphanes.

———. 2017b. "Troubling Time/S and Ecologies of Nothingness: Re-Turning, Re-Membering, and Facing the Incalculable." *New Formations* 92 (92): 56–86. doi:10.3898/NEWF:92.05.2017.

Bartholl, Aram. 2010. "The Dead Drops Manifesto." http://deaddrops.com/download/deaddrops-manifesto.txt.

Bateson, Gregory. (1972) 1987. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. University of Chicago Press.

Bath, Corinna. 2014. "Diffractive Design." In *Gender-UseIT*, edited by Technik-Diversity-Chancengleichheit, Nicola Marsden, and Ute Kempf. Berlin, München, Boston: DE GRUYTER. doi:10.1515/9783110363227.27.

Bayle, Elisabeth, Brian Moore, Colin Potts, Grant Skousen, John Thomas, Rachel Bellamy, George Casaday, et al. 1998. "Putting It All Together: Towards a Pattern Language for Interaction Design: A CHI 97 Workshop." *ACM SIGCHI Bulletin* 30 (1): 17–23. doi:10.1145/280571.280580.

Baym, Nancy K., and danah boyd. 2012. "Socially Mediated Publicness: An Introduction." *Journal of Broadcasting & Electronic Media* 56 (3): 320–29. doi:10.1080/08838151.2012.705200.

Bedos-Rezak, Brigitte Miriam. 2000. "Medieval Identity: A Sign and a Concept." In *Crossroads in Medieval Studies: Sigillography, Numismatics, and Art History*, edited by Susan Solway.

Benoliel, Jeanne Quint. 1996. "Grounded Theory and Nursing Knowledge." *Qualitative Health Research* 6 (3): 406–28. http://qhr.sagepub.com/content/6/3/406.short.

Berger, John. 1972. *Ways of Seeing*. London: Penguin Books/BBC.

Berki, Eleni, and Mikko Jäkälä. 2010. "Cyber-Identities and Social Life in Cyberspace." In *Social Computing: Concepts, Methodologies, Tools and Applications*, edited by Subhasish Dasgupta, 1:92.

Berners-Lee, Tim. 2012. "This Is for Everyone #London2012 #Oneweb #Openingceremony @webfoundation @w3c." Microblog. *@timberners_lee*. July 27. https://twitter.com/timberners_lee/status/228960085672599552.

———. 2014. "Tim Berners-Lee on the Web at 25: The Past, Present and Future." *Wired UK*, August 23. https://www.wired.co.uk/article/tim-berners-lee.

Berners-Lee, Tim, and Mark Fischetti. 1999. *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web*. New York, USA: Harper Collins.

Berners-Lee, Tim, James Hendler, and Ora Lassila. 2001. "The Semantic Web." *Scientific American* 284 (5): 34–43.

Bernstein, Michael S., Andrés Monroy-Hernández, Drew Harry, Paul André, Katrina Panovich, and Greg Vargas. 2011. "4chan and /B: An Analysis of Anonymity and Ephemerality in a Large Online Community." *Proc. Icwsm2011*, 50–57.

Black, Edwin. 2001. *IBM and the Holocaust*. Crown Publishing Group.

Blum, Andrew. 2012. *Tubes: A Journey to the Center of the Internet*. Ecco.

Blumer, Herbert. 1969. *Symbolic Interactionism: Perspective and Method*. Prentice-Hall.

Boellstorff, Tom. 2008. *Coming of Age in Second Life: An Anthropologist Explores the Virtually Human*. Princeton: Princeton University Press.

Bogost, Ian. 2018. "Brands Are Not Our Friends." *The Atlantic*, September 7. https://www.theatlantic.com/magazine/archive/2018/10/brands-on-social-media/568300/.

Bohr, Niels. 1963. *Essays 1958-1962 on Atomic Physics and Human Knowledge*. Ox Bow Press.

Bolychevsky, Irina. 2018. "How Decentralised Are You." *Redecentralize.org*. August 18. https://redecentralize.org/blog/2018/08/18/how-decentralised-are-you.html.

Bookchin, Natalie, and Alexei Shulgin. 1999. "Introduction to Net.art (1994-1999)." April. http://easylife.org/netart/.

Boon, Marcus. 2010. *In Praise of Copying*. Harvard University Press.

Booth, Phil. 2015. "Access to Anonymised Patient Data: Corners Cannot Be Cut If Patient Confidence Is to Be Maintained." *BMJ*, November, h5817. doi:10.1136/bmj.h5817.

Bowker, Geoffrey C. 1994. *Science on the Run: Information Management and Industrial Geophysics at Schlumberger, 1920-1940*. Inside Technology. Cambridge, Mass: MIT Press.

Bowker, Geoffrey C., and Susan Leigh Star. 2000. *Sorting Things Out: Classification and Its Consequences*. 1st paperback edition. Inside Technology. Cambridge, Massachusetts London, England: The MIT Press.

boyd, danah. 2006. "Friends, Friendsters, and Top 8: Writing Community into Being on Social Network Sites." *First Monday* 11 (12). http://firstmonday.org/ojs/index.php/fm/article/view/1418.

———. 2008. "Taken Out of Context: American Teen Sociality in Networked Publics." Berkeley: University of California.

———. 2010. "Social Network Sites as Networked Publics: Affordances, Dynamics, and Implications." In *Networked Self: Identity, Community, and Culture on Social Network Sites*, edited by Zizi Papacharissi, 39–58.

———. 2013. "How 'Context Collapse' Was Coined: My Recollection." *Apophenia*. http://www.zephoria.org/thoughts/archives/2013/12/08/coining-context-collapse.html.

———. 2014. *It's Complicated: The Social Lives of Networked Teens*. New Haven: Yale University Press.

———. 2018a. "You Think You Want Media Literacy… Do You?" Keynote presented at the SXSW Edu, Austin, March. https://points.datasociety.net/you-think-you-want-media-literacy-do-you-7cad6af18ec2.

———. 2018b. "A Few Responses to Criticism of My SXSW-Edu Keynote on Media Literacy." *Medium*. March 16. https://medium.com/@zephoria/a-few-responses-to-criticism-of-my-sxsw-edu-keynote-on-media-literacy-7eb2843fae22.

boyd, danah, Michele Chang, and Elizabeth Goodman. 2004. "Representations of Digital Identity." *Management* 6: 1–4.

Boyle, James. 2003. "The Second Enclosure Movement and the Construction of the Public Domain." *Law and Contemporary Problems* 66 (1/2): 33–74. http://www.jstor.org/stable/20059171.

Bösch, Christoph, Benjamin Erb, Frank Kargl, Henning Kopp, and Stefan Pfattheicher. 2016. "Tales

from the Dark Side: Privacy Dark Strategies and Privacy Dark Patterns." *Proceedings on Privacy Enhancing Technologies* 2016 (4): 237–54. doi:10.1515/popets-2016-0038.

Bratton, Benjamin H. 2015. *The Stack: On Software and Sovereignty*. Software Studies. Cambridge, Massachusetts: MIT Press.

Brennan, Geoffrey, and Philip Pettit. 2004. "Esteem, Identifiability and the Internet." *Analyse Und Kritik* 26 (1): 139–57.

Brewer, Eric. 2017. "Spanner, Truetime and the Cap Theorem." Google. https://ai.google/research/pubs/pub45855.

Briggs, Pamela, and Patrick L. Olivier. 2008. "Biometric Daemons: Authentication via Electronic Pets." In *CHI'08 Extended Abstracts on Human Factors in Computing Systems*, 2423–32. ACM. http://dl.acm.org/citation.cfm?id=1358699.

Brontë, Charlotte. 1829. *Blackwoods Young Mens Magazine*. Edited by Genius C.B. https://iiif.lib.harvard.edu/manifests/view/drs:6131696$1i.

Brook, Tony, Adrian Shaughnessy, and Sarah Schrauwen, eds. 2014. *Manuals 1: Design & Identity Guidelines*. 2nd edition. London: Unit Editions.

Bruner, Jerome S. 1986. *Actual Minds, Possible Worlds*. Harvard University Press.

Brunton, Finn, and Helen Nissenbaum. 2015. *Obfuscation: A User's Guide for Privacy and Protest*. Cambridge, Massachusetts: MIT Press.

Bryant, Antony. 2002. "Re-Grounding Grounded Theory." *JITTA: Journal of Information Technology Theory and Application* 4 (1): 25.

———. 2009. "Grounded Theory and Pragmatism: The Curious Case of Anselm Strauss." *Forum: Qualitative Social Research* 10 (3).

Bryant, Antony, and Kathy Charmaz. 2007. "Grounded Theory Research: Methods and Practices." In *The Sage Handbook of Grounded Theory*, 1. Sage Publications Ltd.

Burrington, Ingrid. 2014. "3 Network Infrastructures." In *Deep Lab*, edited by Addie Wagenknecht, Allison Burtch, Claire L Evans, Denise Caruso, Harlo Holmes, Ingrid Burrington, Jen Lowe, et al.

———. 2016. *Networks of New York: An Illustrated Field Guide to Urban Internet Infrastructure*. Ill edition. Brooklyn: Melville House Publishing.

Buse, Christina, and Julia Twigg. 2014. "Women with Dementia and Their Handbags: Negotiating Identity, Privacy and 'Home' Through Material Culture." *Journal of Aging Studies* 30 (August): 14–22. doi:10.1016/j.jaging.2014.03.002.

Butera, William Joseph. 2002. "Programming a Paintable Computer." PhD Thesis, Massachusetts Institute of Technology, School of Architecture and Planning, Program in Media Arts and Sciences.

Butler, Judith. 1997a. *Excitable Speech: A Politics of the Performative*. New York: Routledge.

———. 1997b. "Gender Is Burning: Questions of Appropriation and Subversion." *Cultural Politics* 11: 381–95.

———. (1990) 1999. *Gender Trouble: Feminism and the Subversion of Identity*. New York: Routledge.

Büscher, Monika. 2006. "Making the Digital Palpable." In *First International Workshop on Physicality: Position Papers*, 1–2.

Calhoun, Craig J. 1992. *Habermas and the Public Sphere*. MIT Press.

Caplan, Robyn, and danah boyd. 2016. "Who Controls the Public Sphere in an Era of Algorithms? Mediation, Automation, Power." Contemporary Issues and Concerns Primer. Data & Society Research Institute. https://www.datasociety.net/pubs/ap/MediationAutomationPower_2016.pdf.

Carlsson, Anders. 2009. "The Forgotten Pioneers of Creative Hacking and Social Networking – Introducing the Demoscene." In, edited by Sean Cubitt and Paul Thomas, 202.

Cathro, George, dir. 2016. "Nina Conti - Masks." *Artsnight, Series 2*. BBC 2.

https://www.bbc.co.uk/programmes/b06zyhzf.

Ceglowski, Maciej. 2017. "How to Add A Security Key to Twitter." *Tech Solidarity*. https://techsolidarity.org/resources/security_key_twitter.html.

Chalmers, Matthew, and Areti Galani. 2004. "Seamful Interweaving: Heterogeneity in the Theory and Design of Interactive Systems." In *Proceedings of the 5th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, 243–52. ACM. http://dl.acm.org/citation.cfm?id=1013149.

Chandler, Annmarie, and Norie Neumark, eds. 2005. *At a Distance: Precursors to Art and Activism on the Internet*. Leonardo. Cambridge, Mass: MIT Press.

Charmaz, Kathy. 2000. "Constructivist and Objectivist Grounded Theory." In *Handbook of Qualitative Research*, 2nd ed., 509–35. Thousand Oaks, CA.: Sage.

———. 2002. "Grounded Theory: Methodology and Theory Construction." In *International Encyclopedia of the Social & Behavioral Sciences*, edited by N. J. Smelser and P. B. Baltes, 1:6396–9. Amsterdam: Pergamon.

———. 2005. "Grounded Theory in the 21st Century: Applications for Advancing Social Justice Studies." In *The SAGE Handbook of Qualitative Research*, edited by Norman K. Denzin and Yvonna S. Lincoln, 507–36. SAGE.

———. 2006a. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. SAGE Publications Ltd.

———. 2006b. "Grounded Theory." In *The Blackwell Encyclopedia of Sociology*, edited by George Ritzer.

———. 2008. "Constructionism and the Grounded Theory Method." In *Handbook of Constructionist Research*, edited by Jaber F. Gubrium and James Holstein, 397–412.

Charmaz, Kathy, and Richard G. Mitchell. 2001. "Grounded Theory in Ethnography." In *Handbook of Ethnography*, edited by Paul Atkinson, Amanda Coffey, Sara Delamont, John Lofland, and Lyn Lofland, Reprinted. Los Angeles London New Delhi Singapore Washington DC: SAGE.

Chatting, David, David S. Kirk, Abigail C. Durrant, Chris Elsden, Paulina Yurman, and Jo-Anne Bichard. 2017. "Making Ritual Machines: The Mobile Phone as a Networked Material for Research Products." In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems - CHI '17*, 435–47. Denver, Colorado, USA: ACM Press. doi:10.1145/3025453.3025630.

Chaum, David. 1981. "Untraceable Electronic Mail, Return Addresses, and Digital Pseudonyms." *Communications of the ACM* 24 (2): 84–90. http://dl.acm.org/citation.cfm?id=358563.

———. 1985. "Security Without Identification: Transaction Systems to Make Big Brother Obsolete." *Communications of the ACM* 28 (10): 1030–44. http://dl.acm.org/citation.cfm?id=4372.4373.

Chen, Yongxi, and Anne S. Y. Cheung. 2017. "The Transparent Self Under Big Data Profiling: Privacy and Chinese Legislation on the Social Credit System." *SSRN Electronic Journal*. doi:10.2139/ssrn.2992537.

Chertoff, Michael. 2018. *Exploding Data: Reclaiming Our Cyber Security in the Digital Age*. Atlantic Books.

Chew, Monica, and Sid Stamm. 2013. "Contextual Identity: Freedom to Be All Your Selves." In *Proceedings of the Workshop on Web*. Vol. 2.

Cheyne, James Allan. 1989. "Serious Play from Peregrination to Cultural Change: A Bateson–Gadamer–Harris Hypothesis." *University of Waterloo*.

Chow, Rosan. 2010. "What Should Be Done with the Different Versions of Research Through Design." *Entwerfen. Wissen. Produzieren. Designforschung Im Anwendungskontext*, 145–58.

Christian, Brian. 2012. "The A/B Test: Inside the Technology That's Changing the Rules of Business." *WIRED*. April 25. https://www.wired.com/2012/04/ff_abtesting/all/1/.

Chromium. 2018. "Running Custom Containers Under Chrome OS." *Chromium OS Docs*. https://chromium.googlesource.com/chromiumos/docs/+/master/containers_and_vms.md.

Ciuraru, Carmela. 2011. *Nom de Plume: A (Secret) History of Pseudonyms*. 1st edition. New York: Harper.

Clarke, Adele E. 2003. “Situational Analyses: Grounded Theory Mapping After the Postmodern Turn.” *Symbolic Interaction* 26 (4): 553–76.

Clarke, Adele E., Carrie Friese, and Rachel Washburn, eds. 2015. *Situational Analysis in Practice: Mapping Research with Grounded Theory*. Walnut Creek, California: Left Coast Press.

Clarke, Joseph F. 1977. *Pseudonyms: The Names Behind the Names*. T. Nelson.

Cohen, Revital, and Tuur Van Balen. 2013. *75 Watt*. http://www.cohenvanbalen.com/work/75-watt.

Coleman, E. Gabriella. 2013. *Coding Freedom: The Ethics and Aesthetics of Hacking*. Princeton: Princeton University Press.

———. 2014. *Hacker, Hoaxer, Whistleblower, Spy: The Many Faces of Anonymous*. London ; New York: Verso.

Cooper, Rachel. 2012. “The Creative Exchange.” *UK Research and Innovation*. January. https://gtr.ukri.org/projects?ref=AH%2FJ005150%2F1.

Coote, Anna, and Jane Franklin, eds. 2013. *Time on Our Side: Why We All Need a Shorter Working Week*. New Economics Foundation.

Corbato, Fernando J. 2001. “The Origin of the Word Daemon.” October 7. http://ei.cs.vt.edu/~history/Daemon.html.

Corbusier, Le. 1931. *Towards a New Architecture*. Courier Dover Publications.

Corbyn, Zoë. 2018. “Decentralisation: The Next Big Step for the World Wide Web.” *The Observer*, September 8, sec. Technology. https://www.theguardian.com/technology/2018/sep/08/decentralisation-next-big-step-for-the-world-wide-web-dweb-data-internet-censorship-brewster-kahle.

Corneliussen, Hilde, and Jill Walker Rettberg, eds. 2008. *Digital Culture, Play, and Identity: A World of Warcraft Reader*. Cambridge, MA: MIT Press.

Cornell, Lauren, and Ed Halter. 2015. “Hard Reboot: An Introduction to Mass Effect.” In *Mass Effect: Art and the Internet in the Twenty-First Century*. Critical Anthologies in Art and Culture. Cambridge, Massachusetts: The MIT Press.

Costa, Nina, Lia Patrício, and Nicola Morelli. 2018. “A Designerly-Way of Conducting Qualitative Research in Design Studies,” June, 13.

Coulton, Paul, and Alan Hook. 2017. “Games Design Research Through Game Design Practice.” In *Game Design Research: An Introduction to Theory & Practice*, edited by Petri Lankoski and Jussi Holopainen, 97–115. Carnegie Mellon University: ETC Press.

Cramer, Catherine, Mason A. Porter, Hiroki Sayama, Lori Sheetz, and Stephen Uzzo. 2015. “Network Literacy Essential Concepts and Core Ideas.” NetSciEd.

Crivellaro, Clara, Alex Taylor, Vasillis Vlachokyriakos, Rob Comber, Bettina Nissen, and Peter Wright. 2016. “Re-Making Places: HCI, ‘Community Building’ and Change.” In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems - CHI ’16*, 2958–69. Santa Clara, California, USA: ACM Press. doi:10.1145/2858036.2858332.

Cross, Nigel. 1982. “Designerly Ways of Knowing.” *Design Studies* 3 (4): 221–27. doi:10.1016/0142-694X(82)90040-0.

———. 1999. “Design Research: A Disciplined Conversation.” *Design Issues* 15 (2): 5–10. http://www.jstor.org/stable/1511837.

Csikszentmihalyi, Chris. 2012. “Sixteen Reflective Bits.” In *Critical Making: Manifestos*, edited by Garnet Hertz, Version 2012-11-14-1225, 2:23–32. Hollywood California USA: Telharmonium Press. http://www.conceptlab.com/criticalmaking/.

CX. 2016. “The Creative Exchange Final Report to the AHRC.” Lancaster University. http://www.thecreativexchange.org/legacy/files/CX_FinalReport.pdf.

Czeskis, Alexei, David Mah, Omar Sandoval, Ian Smith, Karl Koscher, Jacob Appelbaum, Tadayoshi Kohno, and Bruce Schneier. 2013. “DeadDrop/StrongBox Security Assessment.” UW-CSE-13-08-02. University of Washington.

Dahmen, Joe, Ben Dalton, and Amber Frid-Jimenez. 2017. "New Cloud Atlas." In *Brooklyn Says, "Move to Detroit"*. Detroit: Association of Collegiate Schools of Architecture.

Dalton, Ben. 2012. "Kayla: Charisma and Anonymous." In *La Lucha Sin Fin: On Charisma and Its Persuasive Technologies*, edited by Amber Frid-Jimenez. Maastricht: Jan van Eyck Academie.

———. 2013. "Pseudonymity in Social Machines." In *Proceedings of the 22nd International Conference on World Wide Web Companion*, 897–900. http://dl.acm.org/citation.cfm?id=2488076.

———. 2014. "Superheroes Still Need Phoneboxes." In *Art & Culture*. Hamburg: Chaos Computer Club. https://events.ccc.de/congress/2014/Fahrplan/events/6175.html.

———. 2015. "Creative Exchange." In *Digital Media Labs 2014*, edited by Benedict Phillips, 78–80. PO publishing.

———. 2019. "A Diffractive Practitioner." In *The Superposition 2011-2017*, edited by Dave Lynch. PO publishing.

Dalton, Ben, and John Fass. 2013. "Work and Wellbeing in Digital Public Space." In *Time & Motion: Redefining Working Life*, edited by Jeremy Myerson and Emily Gee, 147–55.

Dalton, Ben, and Amber Frid-Jimenez. 2013. "Data Is Political: Investigation, Emotion and the Accountability of Institutional Critique." In *Accountability Technologies: Tools for Asking Hard Questions*, edited by Dietmar Offenhuber and Katja Schechtner. Walter de Gruyter & Co.

Dalton, Ben, and Karen Martin. 2016. "Participatory Epistemic Action." Unpublished.

Dalton, Ben, Amber Frid-Jimenez, and Joe Dahmen. 2013. "Data as Place: Aesthetics and Geopolitics of Data Centre Architecture." presented at the Sensuous Knowledge conference, Bergen, January.

Dalton, Ben, Karen Martin, Claire McAndrew, Marialena Nikolopoulou, and Teal Triggs. 2015. "Designing Visible Counter-Terrorism Interventions in Public Spaces." In *Hostile Intent and Counter-Terrorism: Human Factors Theory and Application*, edited by Alex Stedmon and Glyn Lawson, 261–76. Ashgate.

Dalton, Ben, Tom Simmons, and Teal Triggs. 2017. "Knowledge Exchange Through the Design PhD." In *Practice Based Design Research*, edited by Laurene Vaughan, 1st ed., 65–76. London: Bloomsbury.

De Filippi, Primavera. 2013. "Flawed Cloud Architectures and the Rise of Decentral Alternatives." Edited by Alexander Von Humboldt. *Internet Policy Review*. doi:10.14763/2013.4.212.

de Oliveira, Pedro J. S. Vieira. 2016. "Design at the Earview: Decolonizing Speculative Design Through Sonic Fiction." *Design Issues* 32 (2): 43–52. doi:10.1162/DESI_a_00381.

Dean, Jodi. 2005. "Communicative Capitalism: Circulation and the Foreclosure of Politics." *Cultural Politics* 1 (1): 51–74.

Dear, Brian L. 2002. "Emoticons and Smileys on PLATO in the 1970s." *Plato People*. September 13. http://www.platopeople.com/emoticons.html.

Debian Wiki. 2015. "RaspberryPi." Accessed March 2. https://wiki.debian.org/RaspberryPi.

Debord, Guy, and Gil Wolman. 1956. "Mode d'emploi Du Détournement." *Les Lèvres Nues*, May.

Deseriis, Marco. 2015. *Improper Names: Collective Pseudonyms from the Luddites to Anonymous*. University of Minnesota Press.

Dey, Ian. 1999. *Grounding Grounded Theory: Guidelines for Qualitative Inquiry*. Emerald Group Publishing Limited.

Dingledine, Roger, and Nick Mathewson. 2006. "Anonymity Loves Company: Usability and the Network Effect." In *WEIS*.

DiSalvo, Carl. 2012. *Adversarial Design*. Design Thinking, Design Theory. Cambridge, Mass: MIT Press.

dj readies. 2012. *Intimate Bureaucracies: A Manifesto.* Punctum Books.

Doctorow, Cory. 2012. "Lockdown: The Coming War on General-Purpose Computing." *Boing Boing*. January 10. https://boingboing.net/2012/01/10/lockdown.html.

———. 2018. “What the Internet Is For.” *Locus Magazine*, November 5. https://locusmag.com/2018/11/cory-doctorow-what-the-internet-is-for/.

Dolphijn, Rick, and Iris van der Tuin. 2012. “‘Matter Feels, Converses, Suffers, Desires, Yearns and Remembers’ Interview with Karen Barad.” In *New Materialism: Interviews & Cartographies*.

Donath, Judith. 1999. “Identity and Deception in the Virtual Community.” In *Communities in Cyberspace*, edited by M Smith and P Kollock, 29–59. London: Routledge.

———. 2006. “The Imperfect Observer: Mind, Machines, and Materialism in the 21st Century.” In. Gulbenkian Foundation.

———. 2014. *The Social Machine: Designs for Living Online*. MIT Press.

Duncome, Stephen. 2009. *Notes from Underground: Zines and the Politics of Alternative Culture*. Microcosm Publishing.

Dunne, Anthony, and Fiona Raby. 2001. *Design Noir: The Secret Life of Electronic Objects*. Springer Science & Business Media.

———. 2013. *Speculative Everything: Design, Fiction, and Social Dreaming*. Cambridge, Massachusetts ; London: The MIT Press.

D’Andrade, Roy. 1987. “A Folk Model of the Mind.” In *Cultural Models in Language and Thought*, edited by Dorothy Holland and Naomi Quinn, 112–48. Cambridge, New York, Melbourne: Cambridge University Press.

Eagleton, Terry. 1984. “Walter Benjamin, or Towards a Revolutionary Criticism.”

EFF. 2014. “Choosing Your Tools.” *Surveillance Self-Defense*. September 17. https://ssd.eff.org/en/module/choosing-your-tools.

Ellison, Nicole B., and danah boyd. 2013. “Sociality Through Social Network Sites.” In *The Oxford Handbook of Internet Studies*, edited by William H. Dutton, 151–72. Oxford: Oxford University Press.

Emerson, Sarah. 2017. “A Conversation with the Rogue National Park Service Twitter Account.” January 27. https://motherboard.vice.com/en_us/article/pgzpj8/alternate-national-parks-service-explains-why-its-twitter-will-remain-anonymous.

Esser, Janet Brody. 1988. *Behind the Mask in Mexico*. First Edition edition. Santa Fe, N.M: Museum of New Mexico Pr.

Evans, Rob. 2017. “How a Met Police Spy’s Fake Identity Was Rumbled.” *The Guardian*, November 28, sec. UK news. https://www.theguardian.com/uk-news/undercover-with-paul-lewis-and-rob-evans/2017/nov/28/how-a-met-police-spys-fake-identity-was-rumbled.

Ezell, Margaret J. M. 2003. *Social Authorship and the Advent of Print*. Johns Hopkins University Press.

Facebook Help Center. 2014. “What Names Are Allowed on Facebook?” https://www.facebook.com/help/112146705538576.

Falciani, Hervé. 2015. HSBC files whistleblower Hervé Falciani: “This money comes from mafia, drug traffickers, blood diamonds and tax evasion” Interview by Nick Francis. Video. https://www.theguardian.com/news/video/2015/feb/13/hsbc-files-whistleblower-herve-falciani-interview.

Farrow, Ronan. 2019. “How an Élite University Research Center Concealed Its Relationship with Jeffrey Epstein.” *The New Yorker*, September 6. https://www.newyorker.com/news/news-desk/how-an-elite-university-research-center-concealed-its-relationship-with-jeffrey-epstein.

Ferguson, Niels, Bruce Schneier, and Tadayoshi Kohno. 2010. *Cryptography Engineering: Design Principles and Practical Applications*. Wiley.

Ferrell, Jeff. 1996. *Crimes of Style: Urban Graffiti and the Politics of Criminality*. Boston: Northeastern University Press.

Ferry, Anne. 2002. “Anonymity: The Literary History of a Word.” *New Literary History* 33 (2): 193–214.

Findeli, Alain. 1998a. "A Quest for Credibility: Doctoral Education and Research in Design at the University of Montreal." *Doctoral Education in Design*, 99–116.

———. 1998b. "Will Design Ever Become a Science? Epistemological and Methodological Issues in Design Research. Followed by a Proposition." *No Guru, No Method. Discussion on Art and Design, UIAH, Helsinki, Finland*, 63–69.

———. 2001. "Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion." *Design Issues* 17 (1): 5–17. http://www.mitpressjournals.org/doi/pdf/10.1162/07479360152103796.

———. 2010. "Searching for Design Research Questions: Some Conceptual Clarifications." In *Questions, Hypotheses & Conjectures*, edited by Rosan Chow, Wolfgang Jonas, and Gesche Joost, 286–303. Berlin.

Finley, Klint. 2016. "Linux Took over the Web. Now, It's Taking over the World." *Wired*, August 25. https://www.wired.com/2016/08/linux-took-web-now-taking-world/.

Firestone, David. 1993. "While Barbie Talks Tough, G. I. Joe Goes Shopping." *The New York Times*, December 31, sec. U.S. https://www.nytimes.com/1993/12/31/us/while-barbie-talks-tough-g-i-joe-goes-shopping.html.

Fischer, Dave. 1994. "Weeks? Hah!!" Usenet. *Alt.folklore.computers,* January 26. https://groups.google.com/forum/#!original/alt.folklore.computers/wF4CpYbWuuA/jS6ZOyJd10s.

Fraser, Nancy. 1990. "Rethinking the Public Sphere: A Contribution to the Critique of Actually Existing Democracy." *Social Text*, no. 25/26: 56. doi:10.2307/466240.

Frayling, Christopher. 1993. *Research in Art and Design*. Vol. 1. Royal College of Art Research Papers 1. London: Royal College of Art. http://researchonline.rca.ac.uk/384/.

———, dir. 2015. *RTD 2015 Provocation by Sir Christopher Frayling Part 2: Designers as Knowledge Generators*. RTD 2015 Provocation. Research through Design (RTD) Conference. https://vimeo.com/129776561.

French, Anneka. 2015. "High Street Casualties: Ellie Harrison's Zombie Walk." *This Is Tomorrow*, June 18. http://thisistomorrow.info/articles/ellie-harrisons-high-street-casualties.

Freud, Sigmund. (1919) 1955. "The 'Uncanny'." In *The Standard Edition of the Complete Psychological Works of Sigmund Freud: An Infantile Neurosis and Other Works*, XVII (1917-1919):217–56.

Fréger, Charles, and Robert McLiam Wilson. 2012. *Wilder Mann*. Stockport: Dewi Lewis Publishing.

Frid-Jimenez, Amber. 2012. *La Lucha Sin Fin: On Charisma and Its Persuasive Technologies*. 200 edition. Maastricht: Jan van Eyck.

———. 2016. *Lightbeam*. https://www.amberfj.com/projects/lightbeam.html.

Fried, Limor. 2013. "Onion Pi." *Adafruit Learning System*. June 14. https://learn.adafruit.com/onion-pi.

Fuller, Matthew, and Andrew Goffey. 2012. *Evil Media*. Cambridge, Mass: MIT Press.

Galloway, Kit, and Sherrie Rabinowitz. 1980. *Hole-in-Space*. http://www.ecafe.com/getty/HIS/index.html.

Galperin, Eva, dir. 2012. *Nymwars: Fighting for Anonymity and Pseudonymity on the Internet*. Decomas. https://www.youtube.com/watch?v=8jDgdkVuH4o.

Gamma, Erich, Richard Helm, Ralph Johnson, and John Vlissides. 1994. *Design Patterns: Elements of Reusable Object-Oriented Software*. Pearson Education.

Garcia, David, and Geert Lovink. 1997. "The ABC of Tactical Media." *First Distributed via the Nettime Listserv*.

Garcia, David, and Marcell Mars. 2014. "Book Sharing as a 'Gateway Drug': Public Library." *New Tactical Research*. February 14. http://new-tactical-research.co.uk/blog/1012/.

Garside, Juliette, and Hilary Osborne. 2018. "'Golden Passports' Threaten European Security, Warns EU Commissioner." *The Guardian*, October 16, sec. World news.

https://www.theguardian.com/world/2018/oct/16/golden-passports-threaten-european-security-warns-eu-commissioner.

Garton, Andrew. 2005. "From BBS to Wireless: A Story of Art in Chips." In *At a Distance: Precursors to Art and Activism on the Internet*, edited by Annmarie Chandler and Norie Neumark, 298–312. Leonardo. Cambridge, Mass: MIT Press.

Gaylor, Brett, dir. 2008. *RiP: A Remix Manifesto*.

Gehl, Robert W. 2013. "'Why I Left Facebook': Stubbornly Refusing to Not Exist Even After Opting Out of Mark Zuckerberg's Social Graph." In *Unlike Us Reader: Social Media Monopolies and Their Alternative*, edited by Geert Lovink and Miriam Rasch, 220–38. Inc Reader 8. Amsterdam: Inst. of Network Cultures.

Gheerawo, Rama. 2016. "Socially Inclusive Design: A People Centered Perspective." In *The Routledge Companion to Design Studies*.

Gibbs, Samuel. 2013. "Mozilla's Lightbeam Firefox Tool Shows Who's Tracking Your Online Movements." *The Guardian*, October 28, sec. Technology. https://www.theguardian.com/technology/2013/oct/28/mozilla-lightbeam-tracking-privacy-cookies.

Giles, Jim. 2004. "Sandpit Initiative Digs Deep to Bring Disciplines Together." *Nature* 427 (January): 187. doi:10.1038/427187a.

Gisin, Nicolas, Grégoire Ribordy, Wolfgang Tittel, and Hugo Zbinden. 2002. "Quantum Cryptography." *Reviews of Modern Physics* 74 (1): 145–95. doi:10.1103/RevModPhys.74.145.

Glanville, Ranulph. 2015. "The Sometimes Uncomfortable Marriages of Design and Research." In *The Routledge Companion to Design Research*, edited by P. A. Rodgers and J. Yee, 9–22.

Glaser, Barney G., and Anselm L. Strauss. 1965. *Awareness of Dying*. Observations. Chicago: Aldine Pub. Co.

———. (1967) 1999. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine Transaction.

Goffman, Erving. 1956. *The Presentation of Self in Everyday Life*. University of Edinburgh, Social Sciences Research Centre.

———. 1959. *The Presentation of Self in Everyday Life*. Doubleday.

———. 1966. *Behavior in Public Places*. Simon and Schuster.

Goldberg, Ian, David Wagner, and Eric Brewer. 1997. "Privacy-Enhancing Technologies for the Internet." In *Compcon'97. Proceedings, IEEE*, 103–9. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=584680.

Goldsmith, Kenneth. 2011. "About UbuWeb." http://www.ubu.com/resources/index.html.

Google+. 2014. "Real Name Policy Change." July 15. https://plus.google.com/+googleplus/posts/V5XkYQYYJqy.

Graff, Vincent. 2004. "Meet the Yes Men Who Hoax the World." *The Guardian*, December 13, sec. Media. https://www.theguardian.com/media/2004/dec/13/mondaymediasection5.

Graham, Stephen. 2004. "Excavating the Material Geographies of Cybercities." In *The Cybercities Reader*, edited by Stephen Graham, 138–42. Psychology Press.

Gray, Sarah. 2014. "This Totally Creepy Art Project Will Make You Think Twice About NSA Mass Surveillance." *Salon*, April 23. https://www.salon.com/2014/04/23/this_totally_creepy_art_project_will_make_you_think_twice_about_nsa_mass_surveillance/.

Green, Dave. 2002. "Confound the Supermakets and Gain A Whole New Shopping Identity at Extreme Computing 2002." Press release. *The NTK/Mute Festival of Inappropriate Technology*. May 30. http://www.xcom2002.com/press020530.php.

Greenberg, Andy. 2014. "An Eavesdropping Lamp That Livetweets Private Conversations." *WIRED*.

April 23. https://www.wired.com/2014/04/coversnitch-eavesdropping-lightbulb/.

Griffin, Robert J., ed. 2014. *Faces of Anonymity: Anonymous and Pseudonymous Publication 1600-2000*. Place of publication not identified: Palgrave Macmillan.

Grugq. 2017. "Twitter Activist Security." *The Grugq*. January 30. https://medium.com/@thegrugq/twitter-activist-security-7c806bae9cb0#.a2ga0im1r.

Grundy, Shirley, and Stephen Kemmis. (1981) 1988. "Educational Action Research in Australia: The State of the Art (an Overview)." In *The Action Research Reader*, 3:321–35.

Guedj, Denis. 1985. "Nicholas Bourbaki, Collective Mathematician an Interview with Claude Chevalley." *The Mathematical Intelligencer* 7 (2): 18–22. doi:10.1007/BF03024169.

Haacke, Hans. 1971. *Systems*.

Habermas, Jürgen. 1991. *The Structural Transformation of the Public Sphere*. Translated by Thomas Burger. Cambridge: MIT Press.

Hadnagy, Christopher. 2010. *Social Engineering: The Art of Human Hacking*. John Wiley & Sons.

Hankey, Stephanie, and Marex Tuszynski. 2018. "Remain Anonymous and Bypass Censorship on the Internet." December 11. https://securityinabox.org.

Hansen, Marit, Peter Berlich, Jan Camenisch, Sebastian Clauß, Andreas Pfitzmann, and Michael Waidner. 2004. "Privacy-Enhancing Identity Management." *Information Security Technical Report* 9 (1): 35–44. doi:10.1016/S1363-4127(04)00014-7.

Haraway, Donna. 2004. "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s." In *The Haraway Reader*. Psychology Press.

———. (1992) 2004. "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others." In *The Haraway Reader*, 63–124. Psychology Press.

———. 2015. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities* 6 (1): 159–65. doi:10.1215/22011919-3615934.

———. 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Experimental Futures: Technological Lives, Scientific Arts, Anthropological Voices. Durham: Duke University Press.

Hardie, Kirsten. 2014. "Fictitious People as Food Brand Icons: Their Role and Visual Representation in Comtemporary International Food Packaging." University of Brighton. http://eprints.brighton.ac.uk/12306/.

Harris, Johnny. 2015. "This Is Cuba's Netflix, Hulu, and Spotify — All Without the Internet." *Vox*, September 21. https://www.vox.com/videos/2017/11/16/16658322/cuba-paquete-internet-netflix.

Harrison, Ellie. 2009. "How Can We Continue Making Art?" *Nottingham Visual Arts*. March 23. http://v3.ellieharrison.com/index.php?pagecolor=7&pageId=press-continuemakingart.

———, dir. 2015. *Ethics: Extremism & Compromise*. Lecture. Artquest's Practice 360° Programme. Camden Arts Centre. https://www.ellieharrison.com/ethics/.

Haslam, Susannah. 2014. "Leeds Creative Timebank Residency." *Leeds Creative Timebank*. May. http://leedscreativetimebank.org.uk/leeds-creative-timebank-residency-may-2014-susannah-haslam/.

Hellqvist, David. 2011. "The Dark Glamour of Transparency." *Dazed*, December 19. https://www.dazeddigital.com/fashion/article/12222/1/the-dark-glamour-of-transparency.

Hendler, James, and Tim Berners-Lee. 2010. "From the Semantic Web to Social Machines: A Research Challenge for AI on the World Wide Web." *Artificial Intelligence* 174 (2): 156–61. doi:10.1016/j.artint.2009.11.010.

Hern, Alex. 2017. "Anti-Surveillance Clothing Aims to Hide Wearers from Facial Recognition." *The Guardian*, January 4, sec. Technology. https://www.theguardian.com/technology/2017/jan/04/anti-surveillance-clothing-facial-recognition-hyperface.

Hertz, Garnet, and Matt Ratto. 2012. "Interview with Matt Ratto." In *Critical Making: Conversations*,

edited by Garnet Hertz, Version 2012-11-14-1225, 5:1–10. Hollywood California USA: Telharmonium Press. http://www.conceptlab.com/criticalmaking/.

Hess, Mickey. 2007. *Icons of Hip Hop: An Encyclopedia of the Movement, Music, and Culture*. Westport Connecticut, London: Greenwood Press.

Hill, Errol. (1972) 1997. *The Trinidad Carnival: Mandate for a National Theatre*. University of Texas Press.

Hirsch, Tad. 2008. "Contestational Design : Innovation for Political Activism." Thesis, Massachusetts Institute of Technology. http://dspace.mit.edu/handle/1721.1/46594.

———. 2009a. "Communities Real and Imagined: Designing a Communication System for Zimbabwean Activists." In *Proceedings of the Fourth International Conference on Communities and Technologies*, 71–76. ACM. http://dl.acm.org/citation.cfm?id=1556472.

———. 2009b. "Learning from Activists: Lessons for Designers." *Interactions* 16 (3): 31–33.

———. 2015. "Explorations + Experimental Constructions." presented at the Tenure and Promotions Lecture, Seattle, October 1. https://vimeo.com/146079415.

———. 2016. "Surreptitious Communication Design." *Design Issues* 32 (2): 64–77. doi:10.1162/DESI_a_00383.

Hirsch, Tad, and John Henry. 2005. "TXTmob: Text Messaging for Protest Swarms." In *CHI'05 Extended Abstracts on Human Factors in Computing Systems*, 1455–8. ACM. http://dl.acm.org/citation.cfm?id=1056940.

Holquist, Michael. 1984. "Prologue." In *Rabelais and His World*, by Mikhail Bakhtin. Bloomington: Indiana University Press.

Hooper, Kristina. 1986. "Architectural Design: An Analogy." In *User Centered System Design: New Perspectives on Human-Computer Interaction*, edited by Donald A. Norman and Stephen W. Draper, 1st ed., 9–24. University of California, San Diego: CRC Press.

Hoyland, Luke, and Chris Fenn. 2017. "Contact the Guardian Securely." *The Guardian*, March 17. http://www.theguardian.com/help/ng-interactive/2017/mar/17/contact-the-guardian-securely.

Höch, Hannah. 1919. *Cut with the Kitchen Knife Dada Through the Last Weimar Beer-Belly Cultural Epoch in Germany*.

Hu, Tung-Hui. 2015. *A Prehistory of the Cloud*. Cambridge, Massachusetts: The MIT Press.

Huang, Andrew bunnie. 2012. "Safecast Geiger Counter Reference Design." March 15. https://www.bunniestudios.com/blog/?p=2218.

———. 2015. "The Death of Moore's Law Will Spur Innovation." *IEEE Spectrum: Technology, Engineering, and Science News*, March 31.

Hughes, Eric. 1993. "A Cypherpunk's Manifesto." March 9. https://www.activism.net/cypherpunk/manifesto.html.

———. 2012. "Putting the Personal Back in Personal Computers." presented at the Amsterdam CryptoParty, Amsterdam, September 27. https://soundcloud.com/jurreb/eric-hughes.

Huizinga, Johan. (1944) 1964. *Homo Ludens: A Study of the Play-Element in Culture*. 4th ed. Boston: Beacon Press.

IAA. 2005. "Engaging Ambivalence: Interventions in Engineering Culture." In *Engineering Culture: The Author as (Digital) Producer*, edited by Geoff Cox and Joasia Krysa, 94–105. DATA Browser. New York: Autonomedia.

IAA, Trevor Paglen, and John Henry. 2007. *Terminal Air*.

Ito, Joi. 2016a. "A Challenge to Reboot the Open Web from Dave Winer." *Joi Ito's Web*. February 21. https://joi.ito.com/weblog/2016/02/21/a-challenge-fro.html.

———. 2016b. *Whiplash: How to Survive Our Faster Future*. New York, NY: Grand Central Publishing.

Ito, Mizuko. 2008. "Introduction." In *Networked Publics*, edited by Kazys Vernelis. MIT Press.

Jacobs, Naomi, Bill Thompson, Jeremy Myerson, and Kasia Molga. 2013. "Taxonomy of the Digital Public Space." In *Digital Public Spaces*, edited by Drew Hemment, Bill Thompson, José Luis de

Vicente, and Rachel Cooper, 22–23. Manchester: FutureEverything.

Jeffries, Adrianne. 2014. "A Lamp Is Spying on New Yorkers and Tweeting Their Conversations." *The Verge*, April 23. https://www.theverge.com/2014/4/23/5643396/conversnitch-spying-lamp-tweeting-new-yorkers-conversations.

Jenkins, Henry. 1992. *Textual Poachers: Television Fans & Participatory Culture*.

———. 2014. "Participatory Culture: From Co-Creating Brand Meaning to Changing the World." *GfK Marketing Intelligence Review* 6 (2): 34.

Jenkins, Henry, Mizuko Ito, and danah boyd. 2015. *Participatory Culture in a Networked Era: A Conversation on Youth, Learning, Commerce, and Politics*. John Wiley & Sons.

Jenkins, Henry, Sangita Shresthova, Liana Gamber-Thompson, Neta Kligler-Vilenchik, and Arely M. Zimmerman. 2016. *By Any Media Necessary: The New Youth Activism*. Connected Youth and Digital Futures. New York: New York University Press.

Jewell, Ralph. 1984. "The Meteorological Judgment of Vilhelm Bjerknes." *Social Research*, 783–807.

Johnson, James. 2011. *Venice Incognito: Masks in the Serene Republic*. Berkeley: University of California Press.

Jonas, Wolfgang. 2015. "A Cybernetic Model of Design Research: Towards a Trans-Domain of Knowing." In *The Routledge Companion to Design Research*, edited by P. A. Rodgers and J. Yee, 23–37.

Juarez, Geraldine, and Domenico Quaranta, eds. 2013. *The F.A.T. Manual*. Brescia: Link Editions, F.A.T. Lab and MU.

Kahle, Brewster. 2013. "Fire Update: Lost Many Cameras, 20 Boxes. No One Hurt." *Internet Archive Blogs*. November 6. https://blog.archive.org/2013/11/06/scanning-center-fire-please-help-rebuild/.

Kent, Beck, and Ward Cunningham. 1987. "Using Pattern Languages for Object-Oriented Programs." In. Tektronix, Inc.

KIBO. 1994. "Kibosig.txt." May 5. http://archive.birdhouse.org/etc/kibosig.txt.

Klein, Julie Thompson. 2017. "The Boundary Work of Making in Digital Humanities." In *Making Things and Drawing Boundaries: Experiments in the Digital Humanities*, edited by Jentery Sayers. Debates in the Digital Humanities. Minneapolis: University of Minnesota Press.

Knuttila, Lee. 2011. "User Unknown: 4chan, Anonymity and Contingency." *First Monday* 16 (10). http://www.ojphi.org/ojs/index.php/fm/article/view/3665.

Konecki, Krzysztof Tomasz. 2011. "Visual Grounded Theory: A Methodological Outline and Examples from Empirical Work." *Revija Za Sociologiju*, August, 131–60. doi:10.5613/rzs.41.2.1.

Koops, Bert-Jaap. 2011. "Forgetting Footprints, Shunning Shadows: A Critical Analysis of the 'Right to Be Forgotten' in Big Data Practice." *SSRN Electronic Journal*. doi:10.2139/ssrn.1986719.

Koskinen, Ilpo. 2015. "Four Cultures of Analysis in Design Research." In *The Routledge Companion to Design Research*, edited by Paul A. Rodgers and Joyce Yee, 217–25. New York: Routledge, Taylor & Francis Group.

Larsson, Alexander. 2016. "Announcing Flatpak – Next Generation Linux Applications." *Flatpak*. June 21. https://flatpak.org/press/2016-06-21-flatpak-released/.

Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge, Mass: Harvard University Press.

———. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Clarendon Lectures in Management Studies. Oxford ; New York: Oxford University Press.

Law, John. 2004. *After Method: Mess in Social Science Research*. London; New York: Routledge.

Lawler, Steph. 2014. *Identity: Sociological Perspectives*. Ed. Cambridge: Polity Press.

Ledesma, Roberto. 2013. "In Re Banksy, Pseudonyms and the USPTO (Better Out Than in)." December 7. http://everythingtrademarks.com/2013/12/07/banksy/.

Leslie, Esther. 2009. "Snow Shaker." In *The Object Reader*, edited by Fiona Candlin and Raiford Guins,

516–8. In-Sight. London ; New York: Routledge.

Levi-Strauss, Claude. 1966. *The Savage Mind*. University of Chicago Press.

Lialina, Olia. 2010. "Vernacular Web 2." July 12. http://contemporary-home-computing.org/vernacular-web-2/.

———. 2018. *Self-Portrait*. http://olia.lialina.work/.

Lifton, Joshua, Deva Seetharam, Michael Broxton, and Joseph Paradiso. 2002. "Pushpin Computing System Overview: A Platform for Distributed, Embedded, Ubiquitous Sensor Networks." In *Pervasive Computing*, edited by Friedemann Mattern and Mahmoud Naghshineh, 2414:139–51. Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/3-540-45866-2_12.

Linebaugh, Peter. 2014. *Stop, Thief!: The Commons, Enclosures, and Resistance*. PM Press.

Lithgow, Michael. 2010. "The Animated Chic of Radical Cats: The Pinky Show Ascending." *Art Threat*. May 24. http://artthreat.net/2010/05/the-pinky-show/.

Livingstone, Sonia M. 2005. *Audiences and Publics When Cultural Engagement Matters for the Public Sphere*. Bristol; Portland, Or.: Intellect.

Lockton, Dan, David Harrison, and Neville A. Stanton. 2013. "Exploring Design Patterns for Sustainable Behaviour." *The Design Journal* 16 (4): 431–59. doi:10.2752/175630613X13746645186124.

Lofland, John, and Lyn H. Lofland. 1995. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Wadsworth.

Lombardi, Mark. 1997. *World Finance Corporation, Miami c. 1970-79*. Pencil on paper. https://www.moma.org/collection/works/96543.

Lovink, Geert. 2013. "A World Beyond Facebook: Introduction to the Unlike Us Reader." In *Unlike Us Reader: Social Media Monopolies and Their Alternative*, edited by Geert Lovink and Miriam Rasch. Inc Reader 8. Amsterdam: Inst. of Network Cultures.

———. 2016. *Social Media Abyss: Critical Internet Cultures and the Force of Negation*. Malden, MA: Polity Press.

Lowrey, Annie. 2012. "Where's _Why?" *Slate*, March 15. http://www.slate.com/articles/technology/technology/2012/03/ruby_ruby_on_rails_and_why_the_disappearance_of_one_of_the_world_s_most_beloved_computer_programmers.single.html.

Maeda, John. 2005. "My Desktop Diary." http://www.maedastudio.com/clog/index.php.

———, dir. 1993. *Human Powered Computer Experiment*. NeoMuseum, Nara, Japan. https://vimeo.com/2745677.

Magnanti, Brooke, dir. 2012. "The Importance of Namelessness." *Belle de Jour's History of Anon*. BBC Radio 4. http://www.bbc.co.uk/programmes/b01pqfq4.

Malpass, Matt. 2013. "Between Wit and Reason: Defining Associative, Speculative, and Critical Design in Practice." *Design and Culture* 5 (3): 333–56. doi:10.2752/175470813X13705953612200.

Manning, Paul. 2013. "Altaholics Anonymous: On the Pathological Proliferation of Parasites in Massively Multiple Online Worlds." *Semiotic Review*, no. 1.

Mansour, Essam, Andrei Vlad Sambra, Sandro Hawke, Maged Zereba, Sarven Capadisli, Abdurrahman Ghanem, Ashraf Aboulnaga, and Tim Berners-Lee. 2016. "A Demonstration of the Solid Platform for Social Web Applications." In *Proceedings of the 25th International Conference Companion on World Wide Web - WWW '16 Companion*, 223–26. Montréal, Québec, Canada: ACM Press. doi:10.1145/2872518.2890529.

Marcus, Sara. 2010. *Girls to the Front: The True Story of the Riot Grrrl Revolution*. Harper Collins.

Marlow, Cameron Alexander. 2005. "The Structural Determinants of Media Contagion." Thesis, Massachusetts Institute of Technology. http://dspace.mit.edu/handle/1721.1/33883.

Martin, Carol. 1998. "Trinidad Carnival Glossary." *TDR (1988-)* 42 (3): 220–35. doi:10.2307/1146693.

Martin, Karen, Ben Dalton, and Matt Jones. 2012. "Crafting Urban Camouflage." In *Proceedings of the Designing Interactive Systems Conference*, 797–98. ACM. http://dl.acm.org/citation.cfm?id=2318079.

Martin, Karen, Ben Dalton, and Marialena Nikolopoulou. 2013. "Art as a Means to Disrupt Routine Use of Space." *Journal of Police and Criminal Psychology* 28 (2): 139–49. doi:10.1007/s11896-013-9130-1.

Martin, Susan, ed. 1996. *Decade of Protest: Political Posters from the United States, Vietnam, Cuba, 1965-1975*. Santa Monica, Calif: Smart Art Press.

Martinson, Jane. 2016. "Are Privacy Injunctions on the Brink of a Comeback?" *The Guardian*, April 23, sec. World news. https://www.theguardian.com/world/2016/apr/23/why-are-privacy-injunctions-back-in-the-news-celebrity-threesome-father.

Marwick, Alice E., and danah boyd. 2011. "I Tweet Honestly, I Tweet Passionately: Twitter Users, Context Collapse, and the Imagined Audience." *New Media & Society* 13 (1): 114–33. doi:10.1177/1461444810365313.

———. 2018. "Understanding Privacy at the Margins," 9.

Marx, Gary T. 1999. "What's in a Name? Some Reflections on the Sociology of Anonymity." *The Information Society* 15 (2): 99–112. http://www.tandfonline.com/doi/abs/10.1080/019722499128565.

Matias, J.Nathan. 2017. "The Real Name Fallacy." *The Coral Project*. January 3. https://blog.coralproject.net/the-real-name-fallacy/.

Matsumoto, Tsutomu, Hiroyuki Matsumoto, Koji Yamada, and Satoshi Hoshino. 2002. "Impact of Artificial 'Gummy' Fingers on Fingerprint Systems." In, edited by Rudolf L. van Renesse, 275–89. doi:10.1117/12.462719.

Maurer, Luna, Edo Paulus, Jonathan Puckey, and Roel Wouters. 2010. "Laptop Reflections." http://www.laptopreflections.org/.

Maxwell, Joseph A. 2012. *A Realist Approach for Qualitative Research*. Sage.

May, Vanessa. 2013. *Connecting Self to Society: Belonging in a Changing World*. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan.

Mboya, Arwa. 2019. "Why Joi Ito Needs to Resign." *The Tech*, August 29, sec. Opinion Guest Column. https://thetech.com/2019/08/29/joi-ito-needs-to-resign.

McAndrew, Claire, Ben Dalton, and Bridget Hardy. 2013. "Where Do You Go to…? Designing 'Connectedness' in Digital Public Space." In. Hong Kong.

———. 2015. "Workplace Matters: Re-Materialising Work Identity."

McCann, Duncan. 2018. "Taking on the Tech Giants." September. https://neweconomics.org/2018/09/taking-on-the-tech-giants.

McDonald, Kyle. 2011. *People Staring at Computers*. http://fffff.at/people-staring-at-computers/.

McIlroy, Malcolm D., E. N. Pinson, and B. A. Tague. 1978. "UNIX Time-Sharing System: Foreword." *Bell System Technical Journal* 57 (6): 1899–1904.

Merton, Robert King. 1957. *Social Theory and Social Structure: Toward the Codification of Theory and Research*. Free Press.

Metahaven. 2011. "Rebrand…or Else!" *Print*, October 5.

Metahaven, and Benjamin Bratton. 2011. "Design and Geopolitics: The Alterglobal, Soft Power, and Disaster Capitalism." *Print*, October 5.

Meyrowitz, Joshua. 1985. *No Sense of Place: The Impact of Electronic Media on Social Behavior*. New York: Oxford University Press.

Miller, Daniel. 2009. *The Comfort of Things*. Reprint edition. Cambridge, UK ; Malden, MA: Polity Press.

Minsker, Evan. 2014. "Aphex Twin Announces New Album SYRO via the Deep Web." *Pitchfork*, August 18. https://pitchfork.com/news/56341-aphex-twin-announces-new-album-syro-via-the-deep-web/.

MIT Media Lab. 2014. "MIT Launches Laboratory for Social Machines with Major Twitter Investment." *MIT News*. October 1. http://newsoffice.mit.edu/2014/twitter-funds-mit-media-lab-program-1001.

Mitchell, William J. 1995. *City of Bits*. Cambridge University Press.

Moradi, Iman, and Ant Scott. 2009. *Glitch: Designing Imperfection*. New York, NY: Mark Batty Publisher.

Mori, Masahiro, Karl F. MacDorman, and Norri Kageki. 2012. "The Uncanny Valley." *IEEE Robotics Automation Magazine*, From the field, 19 (2): 98–100. doi:10.1109/MRA.2012.2192811.

Morris, Robert, and Ken Thompson. 1979. "Password Security: A Case History." *Communications of the ACM* 22 (11): 594–97. doi:10.1145/359168.359172.

Mouffe, Chantal. 2000. "Deliberative Democracy or Agonistic Pluralism."

Mozilla. 2017. "Firefox Multi-Account Containers." *Firefox Add-Ons*. September 5. https://addons.mozilla.org/firefox/addon/multi-account-containers/.

Mullan, John. 2008. *Anonymity: A Secret History of English Literature*. Princeton, N.J: Princeton University Press.

Murray, Padmini Ray, and Chris Hand. 2015. "Making Culture: Locating the Digital Humanities in India." *Visible Language* 49 (3).

Narayanan, Arvind, and Edward W. Felten. 2014. "No Silver Bullet: De-Identification Still Doesn't Work."

Narayanan, Arvind, Hristo Paskov, Neil Zhenqiang Gong, John Bethencourt, Emil Stefanov, Eui Chul Richard Shin, and Dawn Song. 2012. "On the Feasibility of Internet-Scale Author Identification." In *Security and Privacy (SP), 2012 IEEE Symposium on*, 300–314. IEEE. http://ieeexplore.ieee.org/abstract/document/6234420/.

Nath, Chandrika, and Thomas Kriechbaumer. 2015. "The Darknet and Online Anonymity." 488. POST Note. Parliamentary Office of Science and Technology. http://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-488.

Navas, Eduardo, Owen Gallagher, and xtine burrough, eds. 2015. "Introduction." In *The Routledge Companion to Remix Studies*, 1–13. New York: Routledge, Taylor & Francis Group.

Negroponte, Nicholas. 1996. *Being Digital*. New York, NY, USA: Vintage.

Nes, Irene van, and Paul Hughes. 2013. *Dynamic Identities: How to Create a Living Brand*. Bis B.V., Uitgeverij (BIS Publishers).

Newton, Elaine, Latanya Sweeney, and Bradley Malin. 2005. "Preserving Privacy by de-Identifying Face Images." *Knowledge and Data Engineering, IEEE Transactions on* 17 (2): 232–43.

Nikolopoulou, Marialena, Karen Martin, and Ben Dalton. 2016. "Shaping Pedestrian Movement Through Playful Interventions in Security Planning: What Do Field Surveys Suggest?" *Journal of Urban Design* 21 (1): 84–104. doi:10.1080/13574809.2015.1106913.

Nissenbaum, Helen. 1999. "The Meaning of Anonymity in an Information Age." *The Information Society* 15: 141–44. http://www.nyu.edu/projects/nissenbaum/paper_anonimity.html.

———. 2009. *Privacy in Context: Technology, Policy, and the Integrity of Social Life*. Stanford University Press.

———. 2015. "Respecting Context to Protect Privacy: Why Meaning Matters." *Science and Engineering Ethics*, July. doi:10.1007/s11948-015-9674-9.

North, Marcy L. 2003. *The Anonymous Renaissance: Cultures of Discretion in Tudor-Stuart England*. Chicago: University of Chicago Press.

Norton, Michael I., Daniel Mochon, and Dan Ariely. 2012. "The IKEA Effect: When Labor Leads to Love." *Journal of Consumer Psychology* 22 (3): 453–60. doi:10.1016/j.jcps.2011.08.002.

OpenStreetMap Wiki. 2009. "United Kingdom Postcodes." https://wiki.openstreetmap.org/wiki/United_Kingdom_postcodes.

Owen, Gareth. 2004. "Tor: Hidden Services and Deanonymisation." In *31c3*.

Paglen, Trevor, dir. 2015. *Limit Telephotography (SHORT)*. Extended Play. Art21 Exclusive. https://art21.org/watch/extended-play/trevor-paglen-limit-telephotography-short/.

Paluska, Dan, and Jeff Lieberman. 2008. “Boranj.” *Plebian Design*. http://plebiandesign.com/projects/display/boranj.

Papacharissi, Zizi. 2018. “The Importance of Being a Headline.” In *Trump and the Media*, edited by Pablo J Boczkowski and Zizi Papacharissi, 25–32. Cambridge, Massachusetts ; London, England: MIT Press.

Papert, Seymour. 1980. *Mindstorms: Children, Computers, and Powerful Ideas*. New York: Basic Books.

Patel, Vishal M., Rama Chellappa, Deepak Chandra, and Brandon Barbello. 2016. “Continuous User Authentication on Mobile Devices: Recent Progress and Remaining Challenges.” *IEEE Signal Processing Magazine* 33 (4): 49–61.

Pernet, Henry. 1992. *Ritual Masks: Deceptions and Revelations*. University of South Carolina Press.

Pfitzmann, Andreas, and Marit Hansen. 2010. “Anonymity, Unobservability, and Pseudonymity: A Consolidated Proposal for Terminology.” *TU Dresden*.

Phillips, Whitney. 2018. “The Oxygen of Amplification: Better Practices for Reporting on Extremists, Antagonists, and Manipulators Online.” Media Manipulation Initiative. Data & Society. https://datasociety.net/output/oxygen-of-amplification/.

Pickett, Brent L. 1996. “Foucault and the Politics of Resistance.” *Polity* 28 (4): 445–66. doi:10.2307/3235341.

Pierce, James, and Eric Paulos. 2014. “Counterfunctional Things: Exploring Possibilities in Designing Digital Limitations.” In *Proceedings of the 2014 Conference on Designing Interactive Systems - DIS ’14*, 375–84. Vancouver, BC, Canada: ACM Press. doi:10.1145/2598510.2598522.

Pierce, James, Phoebe Sengers, Tad Hirsch, Tom Jenkins, William Gaver, and Carl DiSalvo. 2015. “Expanding and Refining Design and Criticality in HCI.” In, 2083–92. ACM Press. doi:10.1145/2702123.2702438.

Pinky, and Bunny. 2013. “This Cat World Dismantled (26 Things We Learned Doing the Pinky Show).” In *Truth Is Concrete : A Handbook of 100 Artistic Strategies in Real Politics*.

Poynor, Rick. 2009. “Design Is About Democracy.” In *Design Studies: A Reader*, edited by Hazel Clark and David Brody, 176–79. Oxford ; New York: BERG.

Prado, Luiza, and Pedro J. S. Vieira de Oliveira. 2014. “Questioning the ‘Critical’ in Speculative & Critical Design.” *Medium*. February 4. https://medium.com/a-parede/questioning-the-critical-in-speculative-critical-design-5a355cac2ca4.

Ratto, Matt. 2011. “Critical Making: Conceptual and Material Studies in Technology and Social Life.” *The Information Society* 27 (4): 252–60. doi:10.1080/01972243.2011.583819.

Reiter, Michael K., and Aviel D. Rubin. 1998. “Crowds: Anonymity for Web Transactions.” *ACM Transactions on Information and System Security (TISSEC)* 1 (1): 66–92. http://dl.acm.org/citation.cfm?id=290168.

Renaud, Karen, Melanie Volkamer, and Arne Renkema-Padmos. 2014. “Why Doesn’t Jane Protect Her Privacy?” In *International Symposium on Privacy Enhancing Technologies Symposium*, 244–62. Springer. http://link.springer.com/chapter/10.1007/978-3-319-08506-7_13.

Rettberg, Jill Walker. 2013. *Blogging*. Polity.

Rheingold, Howard. 2007. *Smart Mobs: The Next Social Revolution*. Basic books.

Rheingold, Howard, and Howard Weeks. 2012. *Net Smart: How to Thrive Online*. Cambridge, Mass.: MIT Press.

Rosner, Daniela K. 2012. “The Material Practices of Collaboration.” In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work*, 1155–64. ACM. http://dl.acm.org/citation.cfm?id=2145375.

Roth, Andrew. 2018. “‘We Got Really Lucky’: How Novichok Suspects’ Identities Were Revealed.” *The Guardian*, September 27, sec. UK news. https://www.theguardian.com/uk-news/2018/sep/27/we-got-really-lucky-novichok-suspects-identities-revealed-bellingcat.

Roxburgh, Mark. 2015. "Depiction as Theory and Writing by Practice: The Design Process of a Written Thesis." In *The Routledge Companion to Design Research*, edited by Paul A. Rodgers and Joyce Yee, 346–63. New York: Routledge, Taylor & Francis Group.

Rüst, Annina, Marc Lee, Fabian Thommen, Roman Abt, and Silvan Zurbruegg. 2001. *Tracenoizer - Disinformation on Demand*. http://marclee.io/en/tracenoizer-disinformation-on-demand/.

Salinas, Lara, Paul Coulton, and Nick Dunn. 2016. "Using Game Design as a Frame for Evaluating Experiences in Hybrid Digital/Physical Spaces." *Architecture and Culture* 4 (1): 115–35. doi:10.1080/20507828.2015.1094227.

Sayers, Jentery, ed. 2017. *Making Things and Drawing Boundaries: Experiments in the Digital Humanities*. Debates in the Digital Humanities. Minneapolis: University of Minnesota Press.

Schafer, Mattew L., and Katherine M. Bolger. 2015. "Flowerpot to SecureDrop: Promoting Anonymity While Preserving the Bartnicki Principle." *Comm. Law.* 31: 1.

Schienke, Erich W., and IAA. 2002. "On the Outside Looking Out: An Interview with the Institute for Applied Autonomy (IAA)." *Surveillance & Society* 1 (1): 102–19. http://queens.scholarsportal.info/ojs/index.php/surveillance-and-society/article/view/3396.

Schneider, Joseph. 2005. *Donna Haraway: Live Theory*. A&C Black.

Schneier, Bruce. 2002. "Secrecy, Security, and Obscurity - Crypto-Gram." *Schneier on Security*. May 15. https://www.schneier.com/crypto-gram/archives/2002/0515.html#1.

———. 2012. "When It Comes to Security, We're Back to Feudalism." *Wired*, November 26. https://www.wired.com/2012/11/feudal-security/.

Scholz, Trebor, and Nathan Schneider. 2016. *Ours to Hack and to Own: The Rise of Platform Cooperativism, a New Vision for the Future of Work and a Fairer Internet*.

Schön, Donald A. 1983. *The Reflective Practitioner: How Professionals Think in Action*. Cambridge, Massachusetts: Basic books.

Schuler, Douglas. 2008. *Liberating Voices: A Pattern Language for Communication Revolution*. MIT Press.

Scott, James C. 1990. *Domination and the Arts of Resistance: Hidden Transcripts*. New Haven: Yale University Press.

ScraperWiki. 2016. "About Us | ScraperWiki." https://scraperwiki.com/about/.

Sexton, Richard. 2010. "An Authoritative History of BIFF and No, There Never, Ever Was a 'BIFF Filter'." https://web.archive.org/web/20150619083807/http://rs79.vrx.net:80/works/usenet/BIFF/.

Shadbolt, Nigel, Max Van Kleek, and Reuben Binns. 2016. "The Rise of Social Machines: The Development of a Human/Digital Ecosystem." *IEEE Consumer Electronics Magazine* 5 (2): 106–11. doi:10.1109/MCE.2016.2516179.

Shannon, Claude E. 1948. "A Mathematical Theory of Communication." *Bell System Technical Journal* 27 (July): 379–423 and 623–56.

Shaughnessy, Adrian. 2013. "Why Designers Should Give Branding Back Its Soul." *Computer Arts*, October 29. http://www.creativebloq.com/branding/give-branding-back-its-soul-10135066.

Shaughnessy, Adrian, and Tony Brook. 2014. *Manuals 2: Design & Identity Guidelines*. unit editions.

Shirky, Clay. 2005. "A Group Is Its Own Worst Enemy." In *The Best Software Writing I*, 183–209. Springer.

Siio, Itiro, Jim Rowan, and Elizabeth Mynatt. 2002. "Peek-a-Drawer: Communication by Furniture." In *CHI '02 Extended Abstracts on Human Factors in Computing Systems - CHI '02*, 582. Minneapolis, Minnesota, USA: ACM Press. doi:10.1145/506443.506494.

Simms, Andrew, and Molly Conisbee. 2013. "National Gardening Leave." In *Time on Our Side: Why We All Need a Shorter Working Week*, edited by Anna Coote and Jane Franklin, 155–68. New Economics Foundation.

Simon, Herbert A. 1996. *The Sciences of the Artificial*. 3rd ed. Cambridge, Mass.: MIT Press.

Simonsen, Jesper, and Toni Robertson. 2012. "Participatory Design: An Introduction." In *Routledge International Handbook of Participatory Design*, 21–38. Routledge.

Singh, Simon. 2002. *The Code Book: The Secret History of Codes and Code-Breaking*. New Ed edition. London: Fourth Estate.

Singleton, Paula. 2014. "Activist Doll Workshop." *Super Heroic Dolls*. October 1. https://superheroicdolls.tumblr.com/post/98912272745/from-the-sense-about-sex-day-at-graeae-sept-2013.

———. 2018. "Feminist Killjoy Dolls." *Twitter*. July 12. https://twitter.com/i/moments/1018809143006818304.

Sleeswijk Visser, Froukje. 2009. "Bringing the Everyday Life of People into Design." Delft: Delft University of Technology.

Smart, Paul R. 2012. "The Web-Extended Mind." *Metaphilosophy* 43 (4): 446–63. http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9973.2012.01756.x/full.

Smart, Paul R., and Nigel Shadbolt. 2014. "Social Machines." In *Encyclopedia of Information Science and Technology*, edited by Mehdi Khosrow-Pour, 6855–62. IGI Global.

———. 2016. "The World Wide Web." In *Routledge Handbook of Applied Epistemology*, edited by David Coady and James Chase. New York, USA: Routledge.

Smart, Paul R., Elena Simperl, and Nigel Shadbolt. 2014. "A Taxonomic Framework for Social Machines." In *Social Collective Intelligence*, 51–85. Springer.

Smelik, Anneke. 2018. "New Materialism: A Theoretical Framework for Fashion in the Age of Technological Innovation." *International Journal of Fashion Studies* 5 (1): 33–54. doi:10.1386/infs.5.1.33_1.

Smith, Dorothy E. 1999. *Writing the Social: Critique, Theory, and Investigations*. University of Toronto Press.

SOCIAM. 2012. "SOCIAM: The Theory and Practice of Social Machines | SOCIAM." http://sociam.org/node/1.

Solove, Daniel J. 2006. "A Taxonomy of Privacy." *University of Pennsylvania Law Review*, 477–564. http://www.jstor.org/stable/40041279.

Srnicek, Nick. 2016. *Platform Capitalism*. John Wiley & Sons.

Stallman, Richard. 2015. *Free Software Free Society: Selected Essays of Richard M. Stallman*. Cambridge, Mass.

Stallybrass, Peter, and Allon White. 1986. *The Politics and Poetics of Transgression*. Ithaca, N.Y: Cornell University Press.

Stamatatos, Efstathios. 2009. "A Survey of Modern Authorship Attribution Methods." *Journal of the American Society for Information Science and Technology* 60 (3): 538–56. doi:10.1002/asi.21001.

Stappers, Pieter Jan. 2007. "Doing Design as a Part of Doing Research." In *Design Research Now*, edited by Ralf Michel, 81–91. Board of International Research in Design. Birkhäuser Basel. doi:10.1007/978-3-7643-8472-2_6.

———. 2013. "Prototypes as Central Vein for Knowledge Development." In *Prototype: Design and Craft in the 21st Century*, edited by Louise Valentine, 85–97. A&C Black.

Stappers, Pieter Jan, and Elisa Giaccardi. 2017. "Research Through Design." In *The Encyclopedia of Human-Computer Interaction*, edited by Mads Soegaard and Rikke Friis-Dam, 2nd ed. The Interaction Design Foundation.

Stappers, Pieter Jan, Froukje Sleeswijk Visser, and Adriaan Ianus Keller. 2015. "The Role of Prototypes and Frameworks for Structuring Explorations by Research Through Design." In *The Routledge Companion to Design Research*, 163–74.

Star, Susan Leigh. 1995. *Ecologies of Knowledge: Work and Politics in Science and Technology.* Edited by Susan Leigh Star. SUNY Series in Science, Technology, and Society. Albany: State University of

New York Press.

———. 1999. "The Ethnography of Infrastructure." *American Behavioral Scientist* 43 (3): 377–91. doi:10.1177/00027649921955326.

———. 2007. "Living Grounded Theory: Cognitive and Emotional Forms of Pragmatism." In *The SAGE Handbook of Grounded Theory*, edited by Antony Bryant and Kathy Charmaz, Paperback ed., reprinted, 75–94. London: Sage.

———. 2009. "Introduction: Social Theory and CSCW." In *Social Science, Technical Systems, and Cooperative Work: Beyond the Great Divide*, edited by Geoffrey C Bowker, Susan Leigh Star, William Turner, and Les Gasser. Computers, Cognition and Work. New York: Psychology Press.

Starner, Janet Wright, and Barbara Howard Traister, eds. 2016. *Anonymity in Early Modern England:"What's in A Name?"* Routledge.

Starr, Paul. 2005. *The Creation of the Media: Political Origins of Modern Communications*. Basic Books.

StatCounter. 2018. "Mobile & Tablet Operating System Market Share Worldwide." January. http://gs.statcounter.com/os-market-share/mobile-tablet/worldwide/.

Stauber, John Clyde, and Sheldon Rampton. 1995. *Toxic Sludge Is Good for You: Lies, Damn Lies and the Public Relations Industry*. Robinson.

Steele, Guy. 1983. "The Jargon File." http://jargon-file.org/archive/jargon-2.1.1.dos.txt.

Sterling, Bruce. 2005. *Shaping Things*. Cambridge, Mass: MIT Press.

Sterling, Bruce, Jon Lebkowsky, and The Well. 2012. "State of the World 2013." *The WELL*. http://www.well.com/conf/inkwell.vue/topics/459/State-of-the-World-2013-Bruce-St-page01.html#post3.

Suchman, Lucy. 2011. "Anthropological Relocations and the Limits of Design." *Annual Review of Anthropology* 40 (1): 1–18. doi:10.1146/annurev.anthro.041608.105640.

Sundén, Jenny. 2003. *Material Virtualities: Approaching Online Textual Embodiment*. P. Lang.

Suterwalla, Shehnaz. 2013. "From Punk to the Hijab: Women's Embodied Dress as Performative Resistance, 1970s to the Present."

Sutton-Smith, Brian. 2006. "Play and Ambiguity." In *The Game Design Reader–a Rules of Play Anthology*.

Swartz, Aaron. 2008. "In Defense of Anonymity." *Aaron Swartz's Raw Thought*. October 24. http://www.aaronsw.com/weblog/tor2web.

———. 2011. The Network Transformation Interview by Steal This Film. Video. http://www.youtube.com/watch?v=CzNXDdjtXQI.

Tails. 2018. "Acknowledgements and Similar Projects." *Tails*. https://tails.boum.org/doc/about/acknowledgments_and_similar_projects/index.en.html.

Tan, Joshua, Lujo Bauer, Joseph Bonneau, Lorrie Faith Cranor, Jeremy Thomas, and Blase Ur. 2017. "Can Unicorns Help Users Compare Crypto Key Fingerprints?" In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems - CHI '17*, 3787–98. Denver, Colorado, USA: ACM Press. doi:10.1145/3025453.3025733.

Tanni, Valentina, Smetnjak, and Domenico Quaranta. 2014. *Eternal September. the Rise of Amateur Culture*. Edited by Domenico Quaranta. Brescia: Link Editions with Aksioma.

Taylor, Welford Dunaway, ed. 1991. *The Newsprint Mask: The Tradition of the Fictional Journalist in America*. 1st edition. Ames: Iowa State Pr.

The Wizards. 1996. "LambdaMOO Takes a New Direction." https://www.cc.gatech.edu/classes/AY2001/cs6470_fall/LTAND.html.

Thompson, Michael. 2010. "Humble Bundle: Greatest Sale of Indie Games Ever?" *Ars Technica*. April 5. https://arstechnica.com/gaming/news/2010/05/the-greatest-indie-game-sale-ever-and-how-it-came-to-be.ars.

Tidwell, Jenifer. 1999. *Common Ground: A Pattern Language for Human-Computer Interface Design*. https://www.mit.edu/~jtidwell/common_ground_onefile.html.

———. 2010. *Designing Interfaces: Patterns for Effective Interaction Design*. O'Reilly Media, Inc.

Toffler, Alvin. 1980. *The Third Wave*. Morrow.

Triggs, Teal. 1998. "The Endless Library at the End of Print." *Eye*, Spring.

———. 2006. "Scissors and Glue: Punk Fanzines and the Creation of a DIY Aesthetic." *Journal of Design History* 19 (1): 69–83.

———. 2010. *Fanzines*. London: Thames & Hudson.

Turkle, Sherry. 1995. *Life on the Screen: Identity in the Age of the Internet*. 1st ed. New York: Simon & Schuster.

———. (1984) 2005. *The Second Self: Computers and the Human Spirit*. 20th anniversary ed., 1st MIT Press ed. Cambridge, Mass: MIT Press.

Turkle, Sherry, and Seymour Papert. 1991. "Epistemological Pluralism and the Revaluation of the Concrete." *Constructionism: Research Reports and Essays, 1985-1990*, 161.

———, ed. 2011. *Evocative Objects: Things We Think with*. Paperback ed. Cambridge, Mass.: MIT Press.

Twycross, Meg, and Sarah Carpenter. 2002. *Masks and Masking in Medieval and Early Tudor England*. Studies in Performance and Early Modern Drama. Aldershot, Hants, England ; Burlington, VT: Ashgate.

van der Velden, Daniel, Vinca Kruk, and Marina Vishmidt. 2010. *Uncorporate Identity*. Prestel Pub.

Van Kleek, Max, and Kieron O'Hara. 2014. "The Future of Social Is Personal: The Potential of the Personal Data Store." In *Social Collective Intelligence*, 125–58. Springer.

Van Kleek, Max, Dave Murray-Rust, Amy Guy, Kieron O'Hara, and Nigel Shadbolt. 2016. "Computationally Mediated Pro-Social Deception." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems - CHI '16*, 552–63. Santa Clara, California, USA: ACM Press. doi:10.1145/2858036.2858060.

Van Kleek, Max, Dave Murray-Rust, Amy Guy, Daniel A. Smith, and Nigel R. Shadbolt. 2015. "Self Curation, Social Partitioning, Escaping from Prejudice and Harassment: The Many Dimensions of Lying Online." In.

Van Kleek, Max, Daniel A. Smith, Dave Murray-Rust, Amy Guy, Kieron O'Hara, Laura Dragan, and Nigel R. Shadbolt. 2015. "Social Personal Data Stores: The Nuclei of Decentralised Social Machines." In *Proceedings of the 24th International Conference on World Wide Web*, 1155–60. ACM.

Van Kleek, Max, Daniel Alexander Smith, Ramine Tinati, Kieron O'Hara, Wendy Hall, and Nigel R. Shadbolt. 2014. "7 Billion Home Telescopes: Observing Social Machines Through Personal Data Stores." In *Proceedings of the 23rd International Conference on World Wide Web - WWW '14 Companion*, 915–20. Seoul, Korea: ACM Press. doi:10.1145/2567948.2578840.

Vertesi, Janet. 2014. "Seamful Spaces: Heterogeneous Infrastructures in Interaction." *Science, Technology & Human Values* 39 (2): 264–84. doi:10.1177/0162243913516012.

Vezzani, Roberto, Davide Baltieri, and Rita Cucchiara. 2013. "People Reidentification in Surveillance and Forensics: A Survey." *ACM Computing Surveys (CSUR)* 46 (2): 29. http://dl.acm.org/citation.cfm?id=2543596.

Vincent, James. 2014. "This Lamp Is Secretly Live-Tweeting Conversations from a McDonald's." *The Independent*, April 23. http://www.independent.co.uk/life-style/gadgets-and-tech/this-lamp-is-live-tweeting-overheard-conversations-from-a-mcdonalds-in-new-york-9278464.html.

Vinthagen, Stellan, and Anna Johansson. 2013. "'Everyday Resistance': Exploration of a Concept and Its Theories." *Resistance Studies Magazine* 1 (1): 1–46.

Vitak, Jessica. 2012. "The Impact of Context Collapse and Privacy on Social Network Site Disclosures." *Journal of Broadcasting & Electronic Media* 56 (4): 451–70. doi:10.1080/08838151.2012.732140.

Vlissides, John. 1998. *Pattern Hatching: Design Patterns Applied*. Addison-Wesley.

Von Ahn, Luis. 2009. "Human Computation." In *Design Automation Conference, 2009. DAC'09. 46th ACM/IEEE*, 418–19. IEEE. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5227025.

———. 2015. “Human Computation.” http://ra.adm.cs.cmu.edu/anon/usr/ftp/2005/CMU-CS-05-193.pdf.

Vyas, Tanvi. 2016. “Contextual Identities on the Web.” *Mozilla Firefox*. June 16. https://blog.mozilla.org/tanvi/2016/06/16/contextual-identities-on-the-web/.

w3techs. 2018. “Usage Statistics and Market Share of Operating Systems for Websites, December 2018.” December 24. https://w3techs.com/technologies/overview/operating_system/all.

Waisbord, Silvio, Tina Tucker, and Zoey Lichtenheld. 2018. “Trump and the Great Disruption in Public Communication.” In *Trump and the Media*, edited by Pablo J Boczkowski and Zizi Papacharissi, 25–32. Cambridge, Massachusetts ; London, England: MIT Press.

Ward, Colin. 1988. *Anarchy in Action*. London: Freedom Press.

Warner, Michael. 2005. *Publics and Counterpublics*. New York; Cambridge, Mass.: Zone Books.

Waters, Tim. 2016. “The New Cloud Atlas – Mapping the Physical Infrastructure of the Internet.” *Thinkwhere*. August 17. https://thinkwhere.wordpress.com/2016/08/17/the-new-cloud-atlas-mapping-the-physical-infrastructure-of-the-internet/.

Weaver, Nicholas. 2013. “Hear Ye, Future Deep Throats: This Is How to Leak to the Press.” *WIRED*. May 14. https://www.wired.com/2013/05/listen-up-future-deep-throats-this-is-how-to-leak-to-the-press-today/.

Webb, Darren. 2005. “Bakhtin at the Seaside: Utopia, Modernity and the Carnivalesque.” *Theory, Culture & Society* 22 (3): 121–38. doi:10.1177/0263276405053724.

Weiser, Mark. 1993. “Hot Topics-Ubiquitous Computing.” *Computer* 26 (10): 71–72.

Wheeler, Brian. 2008. “The Campaign Group: No2ID,” February 11. http://news.bbc.co.uk/1/hi/uk_politics/7137966.stm.

Why the Lucky Stiff. 2013. *CLOSURE*. https://viewsourcecode.org/why/.

Williams, Kaiton. 2012. “Tun Yuh Han Mek Fashion.” In *Critical Making: Introduction*, edited by Garnet Hertz, Version 2012-11-14-1225, 21–22. Hollywood California USA: Telharmonium Press. http://www.conceptlab.com/criticalmaking/.

Wodiczko, Krzysztof. 1992. *Alien Staff*.

Wolf, Asher. 2012. “I Want a HUGE Melbourne Crypto Party! BYO Devices, Beer, & Music. Let’s Set a Time and Place :) Who’s in?” Tweet. *Twitter*. August 22. https://twitter.com/asher_wolf/status/238224764739653632.

Wolf-Rehfeldt., Ruth. 2016. *Signs Fiction*. Motto Books.

Wolff Olins. 1996. *The New Guide to Identity: How to Create and Sustain Change Through Managing Identity*. Routledge.

Wu, Tim. 2018. “The Tyranny of Convenience.” *The New York Times*, February 16, sec. Opinion. https://www.nytimes.com/2018/02/16/opinion/sunday/tyranny-convenience.html.

Zimmer, Michael. 2010. “Facebook’s Zuckerberg: ‘Having Two Identities for Yourself Is an Example of a Lack of Integrity’.” *MichaelZimmer.org*. May 14. http://www.michaelzimmer.org/2010/05/14/facebooks-zuckerberg-having-two-identities-for-yourself-is-an-example-of-a-lack-of-integrity/.

Zimmerman, Eric. 2003. “Play as Research: The Iterative Design Process.” In *Design Research: Methods and Perspectives*, edited by Brenda Laurel, 176–84.

Zobel Marshall, Emily. 2016. “Resistance Through ‘Robber-Talk’: Storytelling Strategies and the Carnival Trickster.” *Caribbean Quarterly* 62 (2): 210–26. doi:10.1080/00086495.2016.1203178.

Zuboff, Shoshana. 2015. “Big Other: Surveillance Capitalism and the Prospects of an Information Civilization.” *Journal of Information Technology* 30 (1): 75–89. doi:10.1057/jit.2015.5.

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