



THE FORENSIC WALL

how ambiguity and affinity
are enacted to perform
interaction design

Jeremy Yuille

Doctor of Philosophy

2012

RMIT

The Forensic Wall

how ambiguity and affinity are enacted to perform interaction design

An exegesis submitted in (partial) fulfilment of the requirements for
the degree of Doctor of Philosophy

Jeremy Yuille
M.Des

School of Media and Communication,
Design and Social Context Portfolio

RMIT University
October 2012

Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the exegesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

A handwritten signature in black ink, appearing to read 'J Yuille', written in a cursive style.

Jeremy Yuille
May 2 2012

Acknowledgements

This is a work of toil and late nights, but above all the help and inspiration of others. Forensically speaking, there are many fingerprints on all the work contained herein, and those traces reveal a deeper story that I cannot hope to do justice in a few pages. But I'll try to sketch an impression, starting at the beginning...

Thank you to John and Bing for accepting, encouraging and believing in my abilities, however much I demonstrated to the contrary. My grandparents, for their example of what you can achieve with determination and courage.

I would not be writing this without the support of my colleagues at RMIT school of Media and Communication—and its predecessor Applied Communication—for their support to undertake and complete this research.

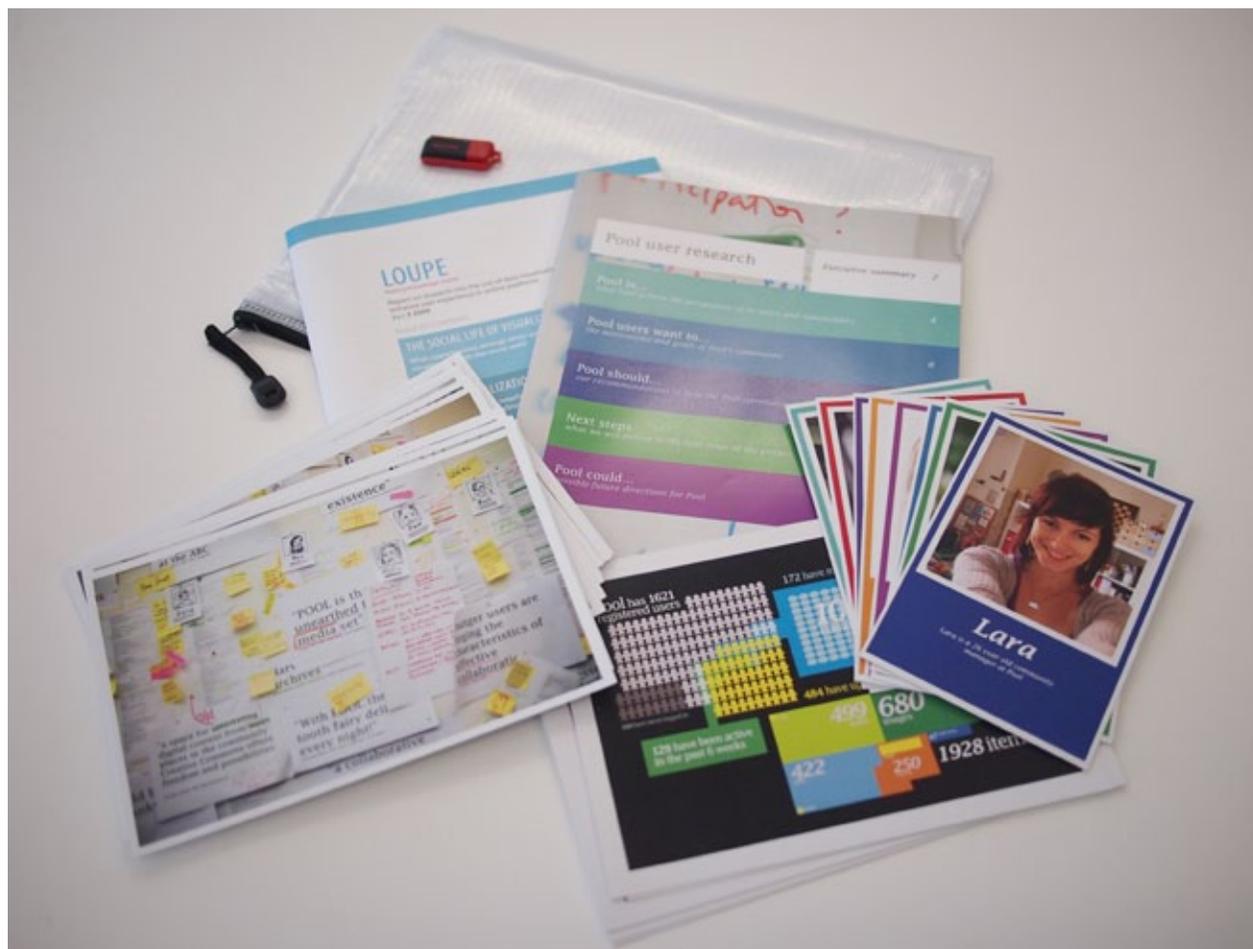
Two of my projects would not have been possible without the support of the Commonwealth Government, via the Australasian CRC for Interaction Design (ACID). I particularly want to thank ACID management for the opportunity to collaborate with many wonderful colleagues from across the Australasian interaction design research community.

Neither of those projects would exist were it not for their respective industry partners Deloitte Digital and the Australian Broadcasting Corporation (ABC). Specific thanks to Pete Williams and Bevan McLeod from Deloitte Digital; Sherre DeLys, John Jacobs and Katie Gauld at ABC Radio National for their trust, energy and willingness to explore.

Without the support of the Interaction Design Association (IXDA) I would never have gained a global and professional perspective on interaction design. Thank you to my IXDA colleagues for their continuing encouragement and stimulating argument on the nature, state and future of interaction design practice. Particular thanks to Jon Kolko for feedback on some of the early ideas contained in this exegesis.

Many thanks to professional colleagues Dan Saffer, Indi Young, Nathan Shedroff, Danny Stillion, Jamin Hegeman, Jesse James Garrett, and Steve Portigal for taking the time to meet with me and discuss interaction design practice. I want to particularly thank Kim Lenox, Dani Malik and Adaptive Path for hosting a lunchtime workshop exploring my research. Thank you to Professor Terry Winograd and Bill Verplank for their generosity both with time and insight. Continued thanks and respect to Professor Mark Amerika for allowing me to jam with his students, and to Professor Alec McHoul for among other things, recognising interaction design as an ongoing conversation between Aristotle and Wittgenstein.

Interaction design is no solo calling: I am fortunate to have worked with many wonderful research colleagues at RMIT and other universities, and particularly want to thank Marius Foley for his collaborative verve and enterprise in bringing the Pool project together and seeing it through to the end. Chris Marmo, Hugh Macdonald and Nifeli Stewart for their wonderful collaboration on the Pool and Loupe projects, particularly for going along with me when they must have thought I was making it up as we went. I often was.



Included in this submission are a UBS memory stick with video files from the Affinité project, one report, and a set of workshop materials from the Pool Project and one report from the Loupe project.

Contents

<i>Abstract</i>	vii	
Introduction	1	
Interaction Design: <i>a tale of two disciplines</i>	5	
Defining the Intersection	12	
The Turn to Experience	20	
Communicating Experiences	25	
Research Design	27	
Inquiry and Questions	30	
Research Design	35	
Loupe and Pool	38	
Insights from the Field	40	
Affinité	43	
Using Ambiguity	45	
Performative Ambiguity	46	
Pool: <i>designing a shared enterprise</i>	49	
Perceiving Affinity	89	
Splicing in the Affinity Gene	91	
Loupe: <i>the social life of visualisation</i>	95	
The Forensic Wall	133	
The Forensic Wall	134	
Affinité: <i>designing a digital wall</i>	137	
Performing Design	163	
A Design Fiction	166	
Conclusion: <i>the designer's choice</i>	168	
References	173	

Abstract

Through a methodology incorporating design *practice, studies and exploration* (Fallman 2008), this research has examined the emergent field of interaction design.

Integrating discourse and literature from both academic and professional arenas with critical reflection on two projects for clients and one self-initiated project, I propose a model of how interaction designers work with artifacts, spaces and people to design for the intangible material of experience.

I bring together theories of perception and experience (Dewey 1934, Merleau Ponty 1945/1962), enaction and distributed cognition (Hutchins 2005, 2011), design practice (Schön 1983, Löwgren & Stolterman 2008), and performativity (Austin 1962) to reframe interaction design as a set of practices that draw on the designer's ability to *perform* ambiguity and *perceive* affinity between different elements and stages of a design process.

This research contributes to the understanding of interaction design practice in the following ways:

I bring professional and academic perspectives together to present a interaction design practice as being made up of *pragmatic, critical, and enterprising* approaches to *performative ambiguity*.

I illustrate how interaction designers modulate their ability to perceive similarities: *seeking, spotting* and *making* affinity between elements in a design situation.

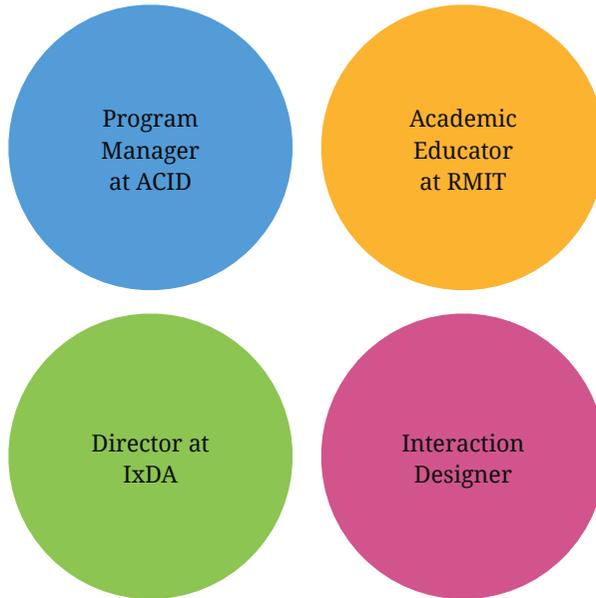
I identify and name a key site and method for this performance of design: the *Forensic Wall*.

Finally, I reflect on these discoveries and propose that designers perform design by choosing to *excise* or *exercise* ambiguity in the situation of concern.

Introduction

Interaction design and the turn to experience

Introduction



My inquiry has been undertaken as an embedded practitioner, framed by four interrelated but distinct roles:

Academic educator at RMIT University, *Director* at the Interaction Design Association (IxDA), *Program manager* at The Australasian CRC for Interaction Design (ACID), and *Interaction designer* in a range of design research projects

This research was prompted by a multiplicity of positions I saw in the contemporary discourse around the practice of interaction design.

The range of different opinions on what made someone a good, or even competent, interaction designer stimulated my interest, and led my inquiry.

I frame interaction design as a *performative* practice that uses *ambiguity* to modulate perceptions of *affinity*. I present the *forensic wall* as a place and activity where these practices of design are performed.

Using collaborative research projects undertaken for the Australian national public broadcaster, a professional services firm, and exploration of my ideas, I demonstrate how these performative practices emerge in the course of everyday interaction design work.

This framing of design—and interaction design in particular—contributes to the field by presenting the practice of design as a performative act, breaking down the perceptual and actioned capacities that constitute that performance.

In framing design as performative I connect with Schön (1983) and subsequent accounts of reflection-in-action with constructionist models of Wenger (1999) and linguistic theories of Austin (1962). My analysis of interaction design in this performative light transcends the analytic and continental philosophical divide in contemporary design discourse, presenting design as a practice of performing the *ambiguous* and perceiving different *affinities* between these performances.

In chapter one I locate interaction design within a larger turn toward experience as a way to frame design situations.

In chapter two I introduce the projects and activities that I have undertaken and critically reflected on in order to be able to reframe the practice of interaction design in a more coherent fashion. I present my research in terms of Fallman's (2008) triangle of design *studies*, *practice* and *exploration*, introducing a framework of *ambiguity*, *affinity* and *performativity* that I have used to examine and discuss each of the three projects I report on in this exegesis.

In chapter three, I use the Pool project to illustrate what I call *performative ambiguity*, or different ways of using ambiguity.

In chapter four I use the Loupe project to present perception as a performative act, illustrating the ways that designers activate their perceptions of *affinity* in the course of experience-led design projects.

In chapter five I use the Affinité project to introduce and examine the *forensic wall*, a place where these two ways of performing design are performed, or enacted.

I then integrate my theories on ambiguity, affinity and performativity in chapter six, discussing the implications of this way of framing interaction design.



Interaction design

a tale of two disciplines

In this chapter I give a critical account of contemporary interaction design, discussing professional and theoretical views on the formation of this multidisciplinary field. Drawing on academic and professional descriptions of the field, I position interaction design inside a wider move or turn towards *experience* as a way to frame products and services, and communicating experiences as a primary concern for interaction designers. I describe different approaches to *being* an interaction designer, connected to the ways that designers engage with ambiguity, and identify interaction design *practice* as one of the foundations of my research.

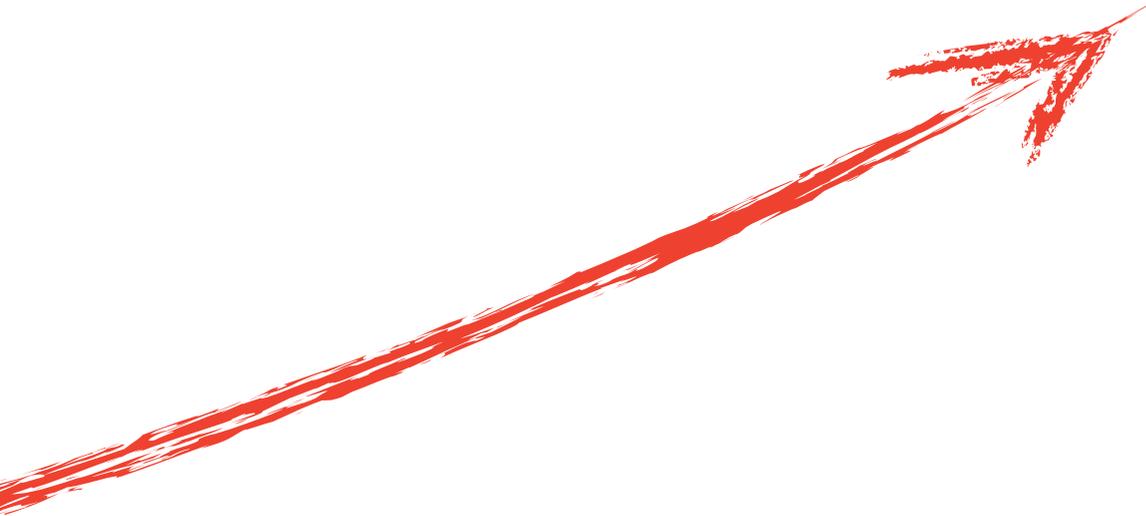
“In the next fifty years, the increasing importance of designing spaces for human communication and interaction will lead to expansion in those aspects of computing that are focused on people, rather than machinery. The methods, skills, and techniques concerning these human aspects are generally foreign to those of mainstream computer science, and it is likely that they will detach (at least partially) from their historical roots to create a new field of *“interaction design.”*”

– Terry Winograd’s 1997 essay, *From Computing Machinery To Interaction Design* in the book *Beyond calculation: The next fifty years of computing*



“If I were to sum up interaction design in a sentence, I would say that it’s about shaping our everyday life through digital artifacts – for work, for play, and for entertainment.”

– Gillian Crampton Smith, in the introduction to Bill Moggridge’s 2007 monograph, *Designing Interactions*



Two definitions.

Two views of a field of practice.

These quotes by two key thinkers and researchers in interaction design demonstrate two approaches to, and understandings of, interaction design. They look at the field from differing positions in time and disciplinary perspective. Winograd casts forward half a century from a disciplinary home of Computer Science at Stanford University (Winograd 1997). A decade later Crampton Smith reflects on what the practice has become, as a designer and director of IVREA: one of the earliest schools dedicated to teaching interaction design (Moggridge 2007). I have included these quotes to demonstrate how interaction design can be understood in different ways. These understandings have evolved over time as more people identify aspects of what they do as interaction design and attempt to build a coherent description within which to describe their practices to the world.

In 2008, in his definition of the field for interaction-design.org, Jonas Löwgren describes how interaction design can be understood in two broad ways: as a design discipline and as an extension of Human Computer Interaction (HCI). This description of interaction design being at the intersection of design and HCI is a useful starting place for the context of my research. Both design and HCI are composite fields that have created their own bodies of knowledge and disciplinary understandings, while also relying on the practices and disciplinary knowledge of other fields. In order to build a clearer understanding of my research into contemporary interaction design, I now discuss my approach to and understanding of design and HCI.

design

Design is a *slippery* term: equally comfortable
as a verb describing a process
— I *design* the iPad application

...or a noun describing the outcome of a process
— here is an iPad application *design*

Design has a long history of discourse around the processes
that designers undertake and the artifacts that are used
and produced in those processes. My research is interested
in both of these framings of design, particularly in ways
that the act of *designing* can be influenced by *designs*.

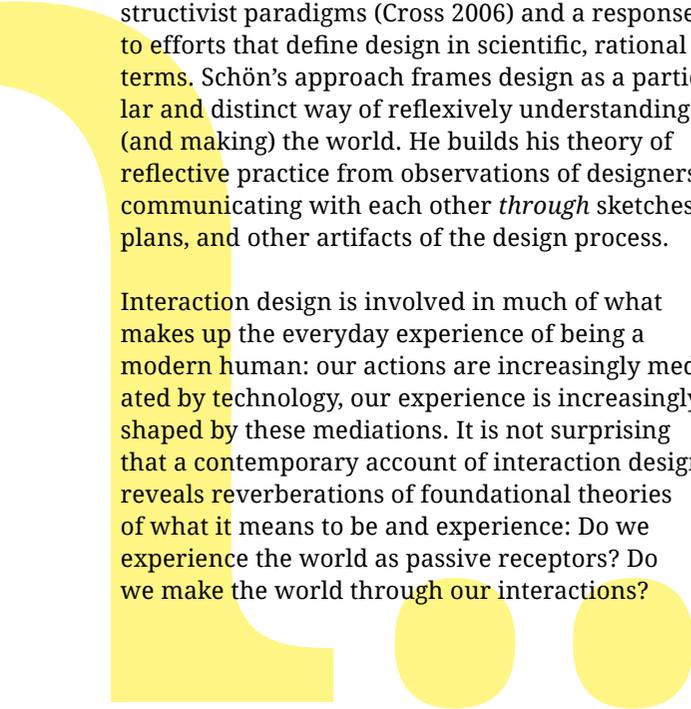


In this section, I examine the long discourse on the relationship between design and other disciplinary fields such as science, philosophy and the humanities or liberal arts. This discourse helps to distinguish design as a practice that draws on knowledge from other disciplines, while also having a strong sense of its own ways of understanding and acting in the world.

For example, design can be seen as a practice that emerged from the industrial revolution to address the complexity created as a result of mass communication and production. Richard Buchanan (1992) describes symbolic communication and material objects as the concern of his first two orders of design, giving rise to the professional fields of graphic and industrial design respectively. He positions interaction design as the third order of design, where design extends its concern to incorporate notions of activities and organised services. I will build on this perspective in subsequent sections, exploring the implications of this shift in the way designers use artifacts to do design work.

Herbert Simon (1969) defined design as any course of action that aims to change “existing situations into preferred ones” (p111) and extended this generalisation into naming design the “core of all professional training ... the principal mark that distinguishes the professions from the sciences” (p111). At the same time, Simon argued that because design is so important it should be more rigorously and rationally organised, as a science of the artificial in order for it to be taken more seriously by the scientific community. He also argued for design to be more methodically understood and taught.

Simon’s positivist framing of design has much in common with other attempts to systematise and rationalise the activity that designers undertake. Similarly, design, as framed by Jones (1970) and Alexander (1977) is a form of engineering or scientific endeavour, albeit with different and often undefined parameters that coexist in a complex relationship with one another, leading to varying permutations of outcome. The problem of design becomes one of generating requisite variety (Ashby 1956, Beer 1979) and defining enough parameters so that the design problem might be *satisfied* (Simon 1963). This rather mechanical and generalised view of design, framed as a science, can be contrasted with views of design that concentrate on the way design creates knowledge, and the social interactions that occur inside design processes.



Donald Schön describes design practice as a “reflective conversation with the materials of a situation” (Schön 1984) and also believes that design constitutes the core of professional expertise. We can see Schön’s work as a major turning point in the emergence of the idea of design as a discipline or *practice*, representing a shift from positivist to constructivist paradigms (Cross 2006) and a response to efforts that define design in scientific, rational terms. Schön’s approach frames design as a particular and distinct way of reflexively understanding (and making) the world. He builds his theory of reflective practice from observations of designers communicating with each other *through* sketches, plans, and other artifacts of the design process.

Interaction design is involved in much of what makes up the everyday experience of being a modern human: our actions are increasingly mediated by technology, our experience is increasingly shaped by these mediations. It is not surprising that a contemporary account of interaction design reveals reverberations of foundational theories of what it means to be and experience: Do we experience the world as passive receptors? Do we make the world through our interactions?

From these fundamental perspectives we build layers of theory to eventually give us methods and tools for understanding and—perhaps—changing the world. Foundational differences result in vast divergences in approach, making it difficult to see how such diverse approaches can belong in a coherent field of endeavour, let alone a profession or, as some would have it, a discipline.

Having given a brief overview of the way I approach and understand design. I now address the second tradition that makes up interaction design: human computer interaction, or HCI.

HCI

Human Computer Interaction

Human Computer Interaction (HCI) is a field of related disciplines that are closely identified with empirical methods and philosophies of science. Consequently, HCI's family tree is a more explicit taxonomy of disciplinary fields, with clearly defined knowledge domains. This includes fields such as Cybernetics, Cognitive Psychology, Ergonomics, Human Factors, Information Sciences, Computer Science and Software Engineering. HCI exists as a field in the overlapping areas of interest between these disciplines. These overlaps have emerged as a product of increasingly ubiquitous presence of technology and the subsequent increase in digital mediation of human interactions. Increasingly, people are interacting with other people through technology, and the fields that theorise, design and study that technology have built a discourse with the fields that theorise, design and study the way humans interact with one another and with artifacts. Human Computer Interaction is one way of framing the resulting field of knowledge and research.

Interaction design is not the only domain where HCI and design meet. Both fields share many common concerns and even disciplinary inputs, and there are traditions of design in HCI and vice versa dating back to the post war work done in fields such as Operations Research and Cybernetics. One way design and HCI distinguish themselves from one another is the way they interpret and adopt knowledge from other disciplines: the scientific foundation of HCI leads it to privilege rigorous and rational descriptions and applications of knowledge from other disciplines. Design has a history of using whatever works: driven by how the new knowledge helps the design, whether it satisfies or optimises the design process (Simon 1963). One way design and HCI meet and intersect is reflected in the increasing importance of context and situation in their respective practice: both design and HCI have grown interested in human experience, particularly in ways to use an understanding of experience to help their respective practices create strategic changes in the world (Evenson 2008, Forlizzi 2008, Zimmerman 2007). This intersection of design, HCI and experience is where we find the aspect of interaction design that most interests me, and is most relevant to the research reported here.

Defining the Intersection

Positioning interaction design at the nexus of these two disciplines that are themselves collections of disciplinary approaches and practices highlights the diverse nature of the field itself, and goes some way toward explaining the many different approaches and discourses that relate to interaction design.

One way of viewing this intersection is as a meeting of the techno-rational ground of science – prevalent in HCI, and the messy swamp of design practice. Donald Schön (1990) describes these two ways of framing the different forces that practitioners face: the rational world of technology and science, and the messy world of practice. One of the growing challenges within the interaction design field has been to create a coherent practice and discourse from these often conflicting perspectives. This challenge is reflected in a growing divergence in the discourse around interaction design, particularly as published in the literature and attempts to define the field.

To demonstrate this divergence, and how my research fits within it, I will expand and explain my perspective using four recent definitions of the field.

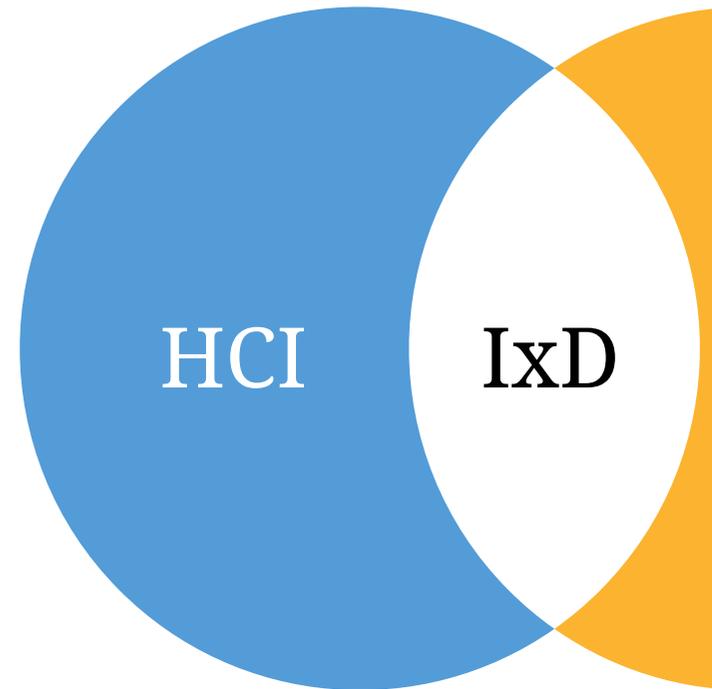


Figure 1 Interaction Design—often abbreviated to IxD—can be located between design and human computer interaction

“Interaction Design defines
the structure and behavior of
interactive products and services”

— *Interaction Design Association (IXDA)*, 2009

Between 2008 and 2010 I was a member of the Board of Directors of the Interaction Design Association (IXDA), a global organisation whose goal is the advancement of interaction design as a professional activity. During this time some of my duties with the organisation were to build and maintain organisational connections between the IXDA and the broad range of institutions that teach interaction design. I worked with places that taught new interaction designers, and discovered that there were a lot of different ways that interaction design was addressed in curricula. Students could study interaction design from many different perspectives in the educational system, ranging from majors in IT and Computer Science within University departments (eg Stanford d-School, Illinois Institute of Technology HCI program, University of Queensland IT & Electrical Engineering) to specific programs in colleges of art and design (eg Umeå, School of Visual Arts, Royal College of Art, California College of the Arts, Copenhagen Institute of Interaction Design), to entire schools specifically formed around the field of interaction design (eg IVREA Institute, Austin Centre for Design).

interaction design is a
nascent field, still working
out what it does, what it is
called, and who's a member

This definition adopted by the IXDA reflects a wide diversity of educational and professional pathways that lead to being an interaction designer and the range of different types of stakeholders in the profession. Compared with professions such as medicine or architecture, interaction design is very young, and many interaction designers have ‘stumbled’ into their roles from other fields. This very generalised definition adopted by the IXDA focuses on creating an umbrella under which many different views of interaction design can coexist. This generality is, however, laden with implied meaning: words such as *structure* and *behavior* speak directly from the HCI background of the field, while terms like *products* and *services* borrow from design.

My time as a director of the organisation led me to believe that IXDA defines itself as being *practice* or *practitioner* led, in contrast to *academic* or *theory* driven: a view that many of its members hold of the Association for Computing Machinery, its HCI counterpart. This dialectic of practice vs theory resurfaces continually in interaction design discourse, and I will return to it later.

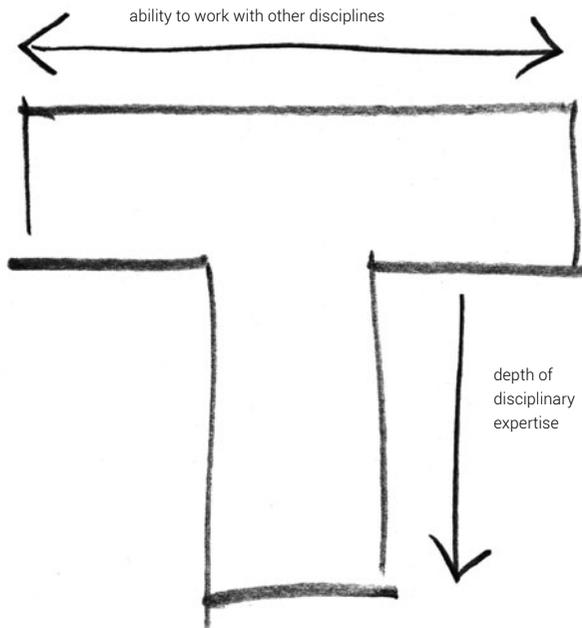
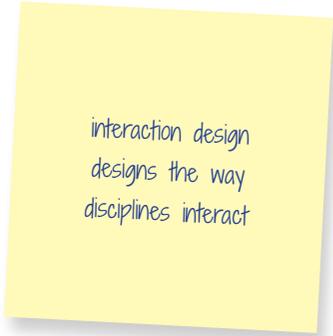


Figure 2 Many descriptions of transdisciplinarity use a model of "t-shaped people" described as someone who "has a breadth of knowledge in many fields, but also depth in at least one area of expertise" (Kelley 2005:75)

“Interaction design refers to the shaping of interactive products and services with a specific focus on their use”

— *Jonas Löwgren, 2008*

Building on Prof. Pelle Ehn’s work in early participatory design (Ehn 1990) and shaped by his Manifesto for a Digital Bauhaus (Ehn 1998), the School of Kunst Kultur & Kommunikation (K3) at Malmö University set up a series of atelier styled postgraduate research programs that used interaction design to integrate the respective disciplines represented in the school. Similarly, Richard Buchanan and others at Carnegie Mellon University, positioned interaction design as the logical way of framing postgraduate study that extends industrial design and communication design undergraduate programs (Buchanan 2001). These academic moves position interaction design as a lingua franca between diverse disciplinary backgrounds and practices, and it is from this situation that Löwgren’s statement is most usefully read.



interaction design
designs the way
disciplines interact

According to Löwgren, interaction design represents a move to *use* as a way to frame products, and *shaping* as a way to understand the practice. Most interaction designers would view the focus on use and users as obvious, but the latter—the change in the nature of the practice—is equally important. In this definition, Löwgren picks up from Schön (1984) and Dourish (1993): instead of defining what interaction design is or produces, Löwgren frames the definition in terms of what interaction designers *do*. This shift allows us to move towards the experience of *being* an interaction designer, to address the role of perception in interaction design practice, rather than overlooking it “in favour of the object perceived” (Merleau-Ponty 1962).

Approaching interaction design from the perspective of being an interaction designer, from inside the practice, is a useful way to discuss the way interaction designers work with other disciplines. Working as an interaction designer often involves the design and development of a product, and being part of a team made up of people from other disciplines. Members of the team might include people who know about how the product will be put together or *implemented*, such as engineers and developers, and people who know

how the product will be *delivered* or sold, from disciplines such as marketing or communications. On larger projects the team might include anthropologists and graphic or industrial designers. Interaction designers often perform roles that incorporate these practices, but the educational examples described earlier, and work by Dourish (1993) in particular, positions interaction design as a practice that also facilitates understanding between these different disciplinary fields.

While an interaction designer might be expected to demonstrate multidisciplinary skills by undertaking anthropological methods, understanding technical constraints, communicating aesthetic directions, or aligning to business strategy, there is an increasing awareness that interaction design is a way of framing the intellectual space where different disciplines meet and interact with one another. Subsequently, this has developed an expectation that interaction designers act in a transdisciplinary fashion.

Figure 3 Hydrogen Energy Future – Contract Birthday Card.
 From IS THIS YOUR FUTURE? 2004
 Used with permission ©Dunne and Raby 2004



Figure 4 Blood/Meat Energy Future – Teddy Bear Blood Bag Radio.
 From IS THIS YOUR FUTURE? 2004
 Used with permission ©Dunne and Raby 2004



Figure 5 EM Listeners: High Visibility Spectrum Policing 1
 From BETWEEN REALITY AND THE IMPOSSIBLE, 2010
 Used with permission ©Dunne and Raby 2010 Photo: Jason Evans

“Instead of a need being purely functional, we are looking at the idea of a more emotional and psychological need”

— Tony Dunne and Fiona Raby, in Moggridge 2007

Of all the quotes I use to describe the landscape of my research and interaction design, this one by Tony Dunne and Fiona Raby is the most personal and least essentialist. Dunne and Raby label their work *critical design*, highlighting the way they design to critique an understanding of a situation rather than purely solve a functional problem. Their work relies heavily on ambiguity, aesthetics, and communication to represent the intersection of technology with everyday situations and artifacts so that they may be engaged in a more critical way. Figures 3-5 on the facing page depict some products of Dunne and Raby's work.

Critical design reframes the design situation in order to approach a solution: foregrounding the change in perception of what a design situation represents, or what Schön (1984) calls “the problem of the problem”. One important aspect to consider alongside this statement is that Dunne and Raby also teach at the Royal College of Art (RCA) in London, and that this situation reflects a difference I have observed between the way interaction design has grown and is currently understood in different sectors of the global interaction design community.

It has been interesting to see distinct styles or directions of interaction design develop independently of one another, often as offshoots of different theoretical approaches to the field. Critical design can be seen as a product of an interpretation of interaction design that builds on continental philosophical foundations. Characteristics of this approach include a greater emphasis given to artifacts as a site of continuing dialogue, being comfortable with ambiguous outcomes, and having a design process that is more focused on a users perception rather than a solution of a functional problem.

Other approaches to interaction design can be represented by *pragmatism* demonstrated by designers identifying with professional practice and *negotiation* demonstrated by designers identifying with participatory approaches to interaction. I will expand on these more in chapter three, but the important thing to note here, and the reason that I have included this definition of interaction design, is that each of these different theoretical approaches to interaction design has a distinct way of using artifacts and responding to ambiguity.



there is more than
one kind of
interaction design

“There are no information architects.
There are no interaction designers.
There are, and only ever have
been, user experience designers.”

— Jesse James Garret, 2009

I have included this statement by Garret for two reasons: it gives another perspective of the tensions that exist within the professional community, and also introduces user experience design (UX) as the next potential umbrella term to unite related but historically different practices. Information architecture is a related professional term given to people who work with understanding and presenting the structure of content, particularly interactive content presented onscreen. This statement—from Jesse Garrett’s closing plenary at the Information Architecture Institute’s 2009 conference—reflects the confusion that exists around what to call these related practices, and is a good example of the political aspects of cultural capital at play in the wider design profession (Bourdieu 2008).

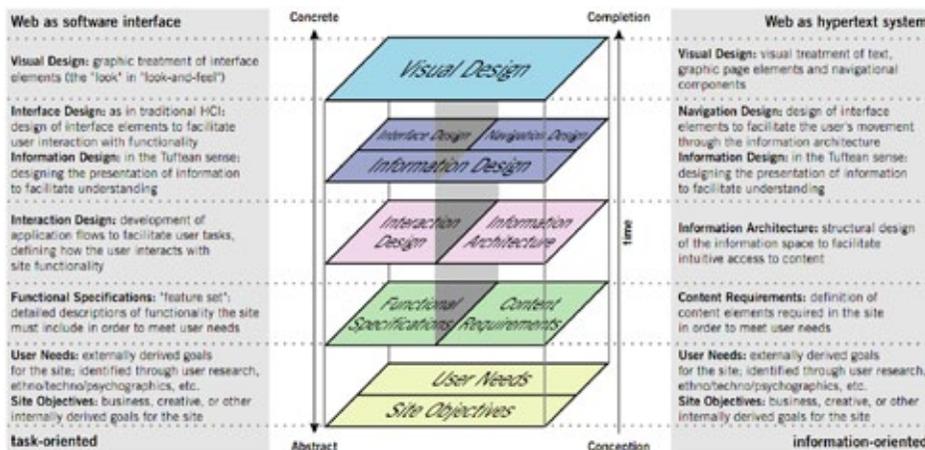


Figure 6 The Elements of User Experience. Garrett (2002) Image: Jesse James Garrett

In the above quote, Garret refers in part to figure 6. This is an illustration from his 2002 book that describes different roles in the design of web products that function predominately as hypertext systems or software interfaces.

interaction design is ultimately concerned with human experience

Interaction design has emerged in the spaces between these different fields, and the names for these spaces have changed over time. Saffer (2006) proposes another perspective on this topic of user experience (UX) design and the relationship of its constituent parts. He uses the diagram shown in figure 7 to describe the different disciplines that make up UX design, suggesting that UX shares many qualities of coordinating design roles like creative direction.

These different accounts of the field both imply there are tensions that exist in the practitioner community, and identify experience as a holistic way of thinking about interaction design, information architecture, and the disciplinary composite from which these and other practices have evolved.

The four perspectives that I have just examined identify a move away from *products* and *media* and a turn toward *experience* as an organising principle for interaction design practice. In the next section I will expand on this turn and present it as a way to understand the focus on communication, artifacts and practice in my research.

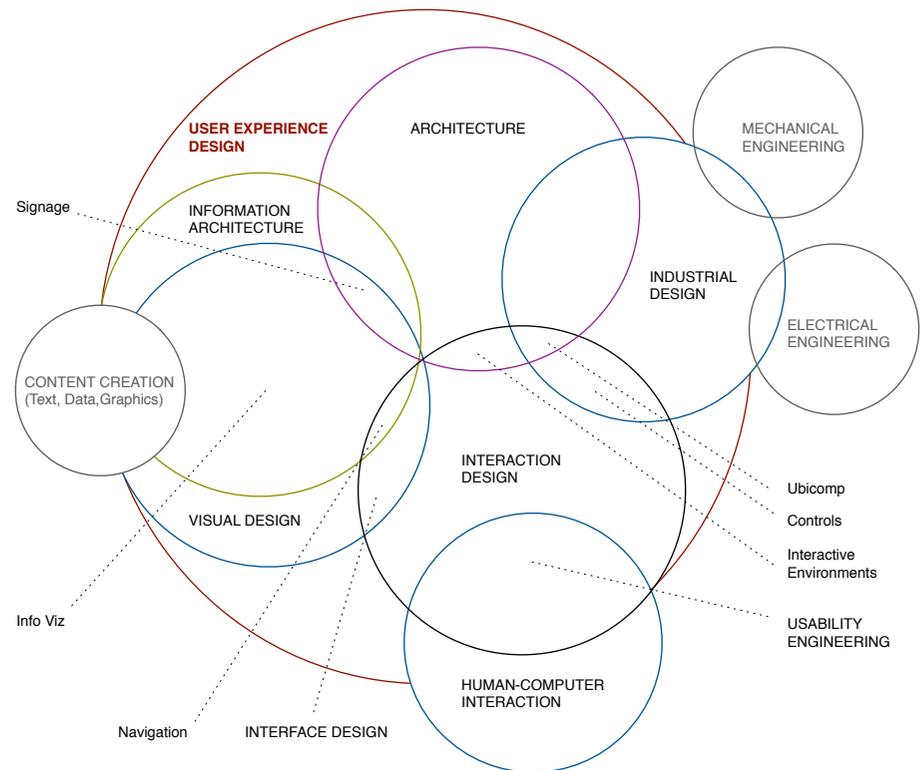


Figure 7 The Disciplines of User Experience. Saffer (2006) Image: Dan Saffer



The Turn to Experience

Another way to view interaction design is to look at the turn to *experience* as a way to frame what it is that interaction designers do. This shift from thinking about design as a process of making things to design as a way to support people's experiential needs can be seen across business (Cain 1998) design education (Davis 1999), HCI research (McCarthy & Wright 2004) and wider professional practice, evidenced by the identification of mental models as a key factor in interaction design (Young 2008, Norman 2002 & 2005, Cooper 1995) and the rise of terms like *user experience design* or *UX* referred to in the previous section.



Figure 8 the foregrounding of experience as an organising principle of interaction design has changed the way designers communicate what it is they have perceived

The work of John Dewey is closely associated with ways of framing experience in the context of design, particularly design education in the United States. Dewey's 1934 book, *Art as Experience* was a compulsory text set by Moholy-Nagy at the Institute for Design in Chicago (Findeli 1990). In particular, the chapter *Having an Experience* formed a cultural backbone to the interaction design program at Carnegie Mellon University (Buchanan 2011). This adoption of Dewey's ideas by two major design schools in the US, coupled with the strong influence Dewey had on American pedagogical thought (Schön 1992), make *Art as Experience* a foundation of how interaction design in the United States understands and has turned towards incorporating experience as a guiding principle.

Dewey's model of experience opens the way for subjective and constructivist approaches to understanding the world. He frames experience as a perceptual act, where the person having the

experience perceives a relationship between what they do, and what that means, or in Dewey's words: the perception of a relationship between *doing* and *undergoing* (p44). Framing experience in this way introduces levels of abstraction between the person having the experience and their material reality: to experience, I am perceiving a *relationship* between something I have done, and what that doing does to me. The doing and undergoing can be nicely grounded in actual physical things in the world, but, according to Dewey, the relationship between them is constructed by my perception. Perception is *created* by the beholder (p54).

A constructive perceptual framing of experience is particularly relevant to interaction design practice when we begin to discuss artifacts for communicating experience.

Dewey frames experience as construction, involving “both action and its result” (p82). Concentrating on the result side of this framework he examines the *thingness* of expression, or how experience manifests in artifacts of human activity, or what he refers to as objects. He distinguishes between *statements*—objects that communicate “the conditions under which an experience of an object or situation may be had” (p84), and *expressions*—objects that *are* an experience. In doing so, Dewey hints at the different kinds of agency that artifacts command in a situation, foreshadowing ideas of non-human agency at the core of actor network theory (Latour 2005), and material hermeneutics of Verbeek (2005) that were to emerge much later.

The important aspect of this turn to experience is the explicit move toward incorporating experience as a conceptual model for understanding design situations. Experience driven approaches have always been an important part of design practice and education: Schön (1983) describes how a designer “anticipates the experienced felt path of a user” (p95) as a way to frame reflection-in-action. Both these examples refer to an intuitive leap being made by the designer, resulting in an appreciation of the experiential perspective held by the people for whom the design is being designed: the people that HCI and design often refer to as the users. The turn to experience that I refer to, and its implications on the practice of interaction design in particular, is more deliberate and methodical in the way it approaches human experience.

The social sciences are one place that HCI and design turn to for theoretical perspectives on understanding and representing experience (Forlizzi and Battarbee 2004, Kimbell 2011). The incorporation of theory and methods from fields such as anthropology introduces more ways for interaction design to understand experience. Geertz (1973) uses *experience-near* and *experience-distant* concepts as a framework for understanding the difference between accounts of a situation that the inhabitants of that situation might “naturally and effortlessly use to define what he or his fellows see, feel, think, imagine” and accounts of the same situation that communicate what an expert or specialist might use to “forward their scientific, philosophical, or practical aims” (p57). Either approach to experience has its pitfalls, from being drowned in a sea of highly contextual detail, to being divorced from the situation of concern by professional terminology and abstract concepts, but this framework is useful when thinking about communicating experience in interaction design practice.

It is important to remember that interaction design draws from anthropology and its relatives, using understandings drawn from social science methods to inform action. Buchanan’s (1992) third order of design draws on the artifacts of second and first order design to do its bidding. While interaction design creates artifacts from communication and industrial design (visual, printed, software, hardware, hierarchy, topography, colour etc), the outcomes of interaction design are not in these

artifacts. The outcomes of interaction design are seen in the networks of *actions* that surround these artifacts, and the people who undertake these actions. Interaction design is a practice concerned with the connections between the experiences people have in a situation and the things that people make to change that situation: between *behaviour*—what people do—and *artifacts*—what people make. Interaction design is concerned with the interplay of human behaviour and artifacts.

Behaviour, like experience, is an interesting material of concern: it's also slippery, or devoid of material qualities. Like a fish out of water, behaviour is hard to grasp firmly, and means little when removed from its context. Like the fish, very little behavioural sense can be made by observing an individual. Designers cannot design behaviour, but they can influence its actions, by understanding the things that motivate certain behaviour.

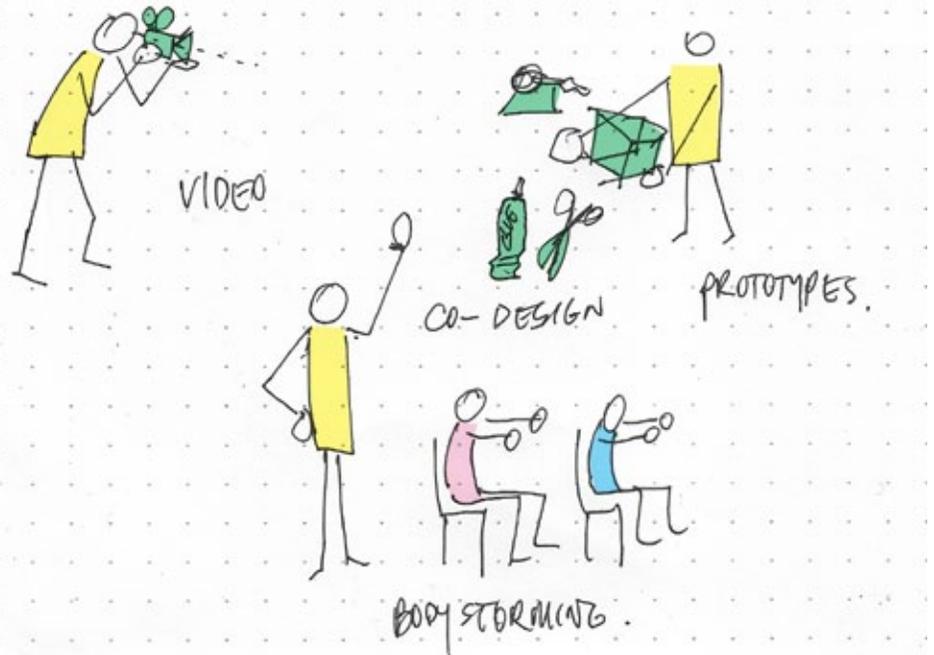
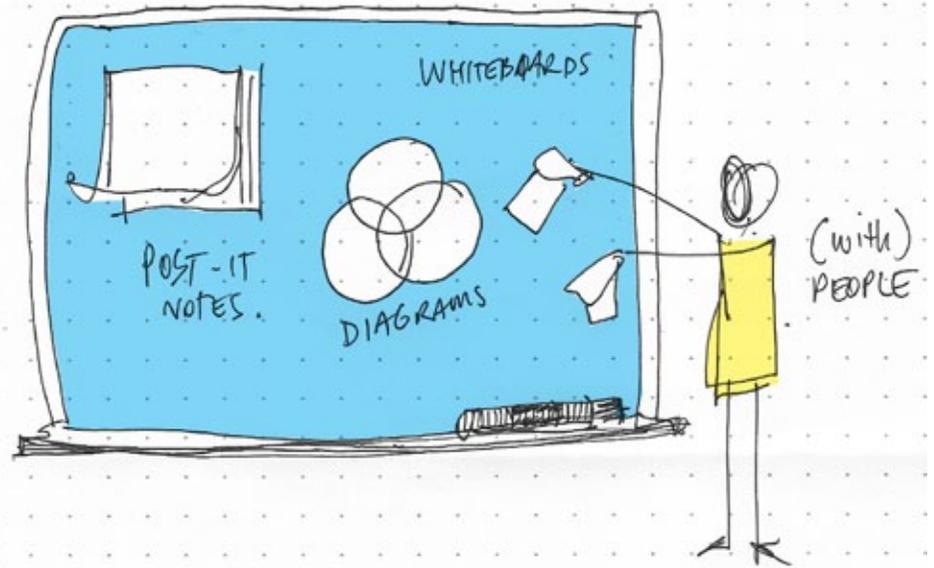
One way we try to reframe and understand behaviour is by projecting ourselves into its corollary: *experience*. An external view of people in a situation might describe their behaviour, and this behavioural understanding might help a designer decide on a direction to take. Knowing *why* that behaviour exists will help the designer even more, and to really know the why of that situation we need to understand the experience of the people in it. There's a world of difference between the observation that a certain demographic is attracted to a particular type of object and people describing their feelings about their experience of that particular object.

Behaviour and experience are two sides of the same coin, or two ways of describing how a person interacts with the world. To return to Geertz's (1973) framework that I described on the previous page, behaviour is an *experience-distant* concept, describing what a person does, from an external perspective, in terms of what an external, often expert, observer sees and understands of the situation. Experience, on the other hand, is personal, it describes *my* felt experience, and in turning to this way of describing something I privilege subjectivity, but more importantly, I construct and attribute *meaning* (Dewey 1934). In this way, recent moves to frame interaction design in terms of behaviour, in industry (Fabricant 2009) and academia (Dourish 2004, Bødker 2006) can also be seen as part of a wider turn to experience as a way to frame design situations.

This section has described the turn from products to experience as a way to frame interaction design. I have explained how this experience turn has its roots in the pragmatist philosophy of Dewey, the anthropological practice of Geertz, and the analysis of design practice undertaken by Schön. I have also examined the relationship between behaviour and experience, positioning contemporary interaction design practice as a continuation of practices that are interested in how people individually experience the world. To understand the impact this turn to experience has had on design practice we need to examine the ways that designers use artifacts to communicate this experiential knowledge.

Interaction designers use artifacts to materialise the intangible

Figure 9 The turn towards experience has changed the kinds of things designers pay attention to, leading to different ways of communicating experiences



Communicating Experiences

Building on the previous section, I want to propose that the turn toward experience has changed the kind of things that designers pay attention to, and this then changes the way designers communicate what it is they see. As designers become more interested in how people experience a product or situation, they need ways to identify, communicate, analyse and evaluate the intangible concepts that this approach reveals. This has led to different communication and analysis tools and techniques being adopted by designers. Some techniques more germane to this conversation are listed in figure 9.

This shift in focus has resulted in different approaches to the issue of communicating experiences. Many approaches are best described as *cook-booky* (Simon 1963), presenting how-to examples of interaction design projects as demonstrations of best practice. As an example: Dan Brown's (2006) *Communicating Design* focuses on the documentation of design, or the first and second order design deliverables that are used to describe different stages and understandings in a design project.

Other authors combine theoretical views of design with practical methods for undertaking design. Bill Buxton (2007) draws on many sources to make a distinction between *sketches* and *prototypes*, an approach that resembles Dewey's *expressions* and *statements*. Buxton uses this foundation to develop a way of communicating experiences that focuses on the evocative and explorative sketches of design process rather than the didactic or descriptive prototypes associated with design specification.

In a more anthropologically defined example, Indi Young (2008) proposes mental models, a method for analysing and representing how people conceptually understand a situation that bears close resemblance to the hierarchical model of Operations, Actions and Activities proposed in Activity Theory by Leont'ev (Koschmann et al, 1998). Two of my projects used Young's technique to create design artifacts, and I discuss this method in detail in chapters three and four.

Another arm of the discourse directly addresses the material that interaction designers work with: Jonas Löwgren and Erik Stolterman (2004:3) suggest that interaction design is an act of shaping a "material without qualities". Ozenc et al (2010:2513) discuss the way that interaction designers are "challenged by the *immaterial materiality*" of working in predominately digital media. Richard Buchanan (2011) states that "Interaction design has no material of concern", going on to propose that the primary materials that interaction designers work with are the "purposes and desires of the people we serve".

As the material of design becomes more intangible, designers have turned to an increasing range of artifacts to build, represent and communicate their understandings of a situation.

In this chapter I have described interaction design as a nascent field situated between those of *design* and *human computer interaction*. I have used academic and professional descriptions of interaction design to characterise interaction design as a collection of emergent transdisciplinary practices, with more than one coherent model of rationality.

By drawing together theories of human experience (Merleau-Ponty 1945/1963, Dewey 1934), reflection-in-action (Schön 1983), and Bourdieu's *field* and *habitus* (Tonkinwise 2011) I have proposed that interaction design is one manifestation of a wider turn toward *experience* as a conceptual foundation for design.

In the next section I focus on the journey my inquiry has taken me on, introducing my projects, classifying their contribution to my argument, and examining the key iterations of my research questions.

Research design

Methodologies: *questions, frameworks and projects*

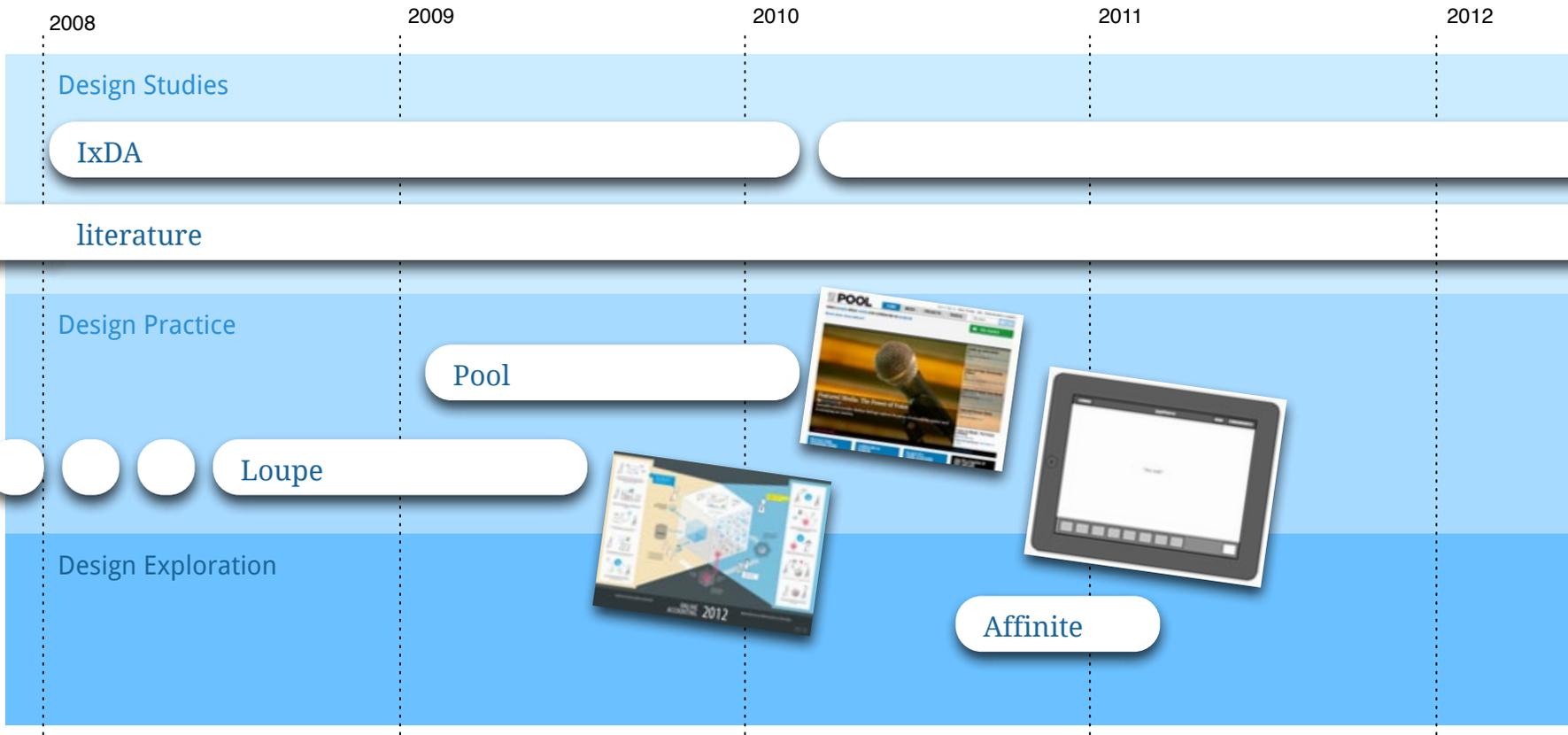


Figure 10 diagram showing a timeline of the projects discussed in this exegesis

In this section I describe my projects and the activities that make up my research:

what I have done,
how I have done it, and
why I did it that way.

I use three projects in this exegesis:

Loupe and *Pool*: two interaction design research projects undertaken with industry partners through the Australasian CRC for Interaction Design

Affinité: an iPad application that I have designed and developed with Reuben Stanton

I also include my engagement with contemporary design discourse, through literature and conversations with designers in the global design community.

I use Daniel Fallman's (2008) framework or research triangle of design studies, practice and exploration to frame my projects, discussing how I am interpreting each project and highlighting key activities and artifacts that I will focus on.

Inquiry and Questions

My research was triggered by a wide variety of ways that interaction designers described both their field and their practice.

I had noted this sense of diversity surrounding interaction design for several years before I decided to formally address it by undertaking a PhD. By the time I started this PhD in 2008, I identified with the term interaction design in three main ways:

As a program manager at the *Australasian Co-operative Research Centre for Interaction Design (ACID)*, where I was managing a range of research projects that engaged with interaction design as part of their field of inquiry or methodology.

As a director and secretary of the *Interaction Design Association (IXDA)*, the global professional association for interaction design, where I oversaw massive growth, interest and identification of the profession.

Finally, as an *interaction designer & academic*, where I undertook collaborative research with colleagues and partner organisations.



Figure 11 a poster describing my research for the May 2008 Graduate Research Conference at RMIT

Each of these situations and roles led to me developing a distinct perspective on the field of interaction design, prompting different avenues of inquiry:

During my work with the Interaction Design Association (IxDA), I was focused on the spaces between the rapidly growing profession of interaction design and places where interaction design was taught. I was amazed at the range of approaches to interaction design that emerged in even a cursory look into where people could study this new field of design. Similarly, I was intrigued at the range of attitudes and understandings of interaction design that surfaced in discourse within the profession.

My role at ACID involved meeting with current and potential research partners from academia and industry. Often I would find myself describing what interaction design was, and how it might relate to their particular research situation. Again, I noticed a range of understandings about interaction design, reinforced in my day-to-day encounters with colleagues inside ACID. I could appreciate the strategic value of an open and inclusive definition, but I wanted to transcend the many fragmented and instrumental ways of framing interaction design.

My practice as an interaction designer had emerged over the preceding decade, as the profession coalesced around the space I had been working in at the intersection of art, performance, design and software development. Through discussions with professional colleagues I found this situation was not uncommon—most had stumbled into being interaction designers, coming from many different backgrounds.

Identifying the emergent nature of the profession led me to reframe the diversity of views I had observed in the professional and educational sector as an artifact of the diversity of these pathways to professional practice. Professional colleagues discussed the challenges of this formalisation: how what had previously been ad-hoc development of skills and knowledge built through practice and life experience was now being taught as subjects, courses and degrees. This was mirrored in the growing call for formal qualifications—degrees and similar—in job advertisements recruiting for interaction design roles. A shift had occurred within the education sector in response to a call from industry to codify the tacit knowledge built over the past decade. Colleagues in senior design positions often remarked they wouldn't have been able to secure even an entry-level position in the contemporary climate.

While the focus of this research is not design education, my inquiry is framed by this aspect of my professional practice: being someone who teaches design. Specifically, *being someone who teaches design in a communication design program in a school of media and communication in an Australian university*. My research has been informed and framed by many forces in the education profession, including a growing requirement for research outcomes, alignment to social and industry concerns, and graduate employability. These forces led me to ponder how to describe and present interaction design in the context of a communication design curriculum, and what capabilities an interaction design graduate might demonstrate.

The formal pedagogical thinking required to position interaction design in a curriculum helped me re-conceptualise the issues I was identifying in my engagement with professional and academic communities. Initially, my inquiry suggested a *gap* between views of interaction design held by the academy and those evidenced in professional practice, using questions such as those in Figure 12 (below).

This academic–professional, or theory–practice dialectic soon broke down and revealed my underlying preconceptions towards both worlds, but a part of this inquiry remained intact, and forms part of the argument of this exegesis: namely, that there are different ways of understanding interaction design, and that an integration of these understandings is a useful contribution to the field.

My research questions shifted and changed in response to critical feedback and reflection on literature and my own design projects. I reframed the place of inquiry as my practice and the academic–industry dichotomy as a location for the outcomes of this research.

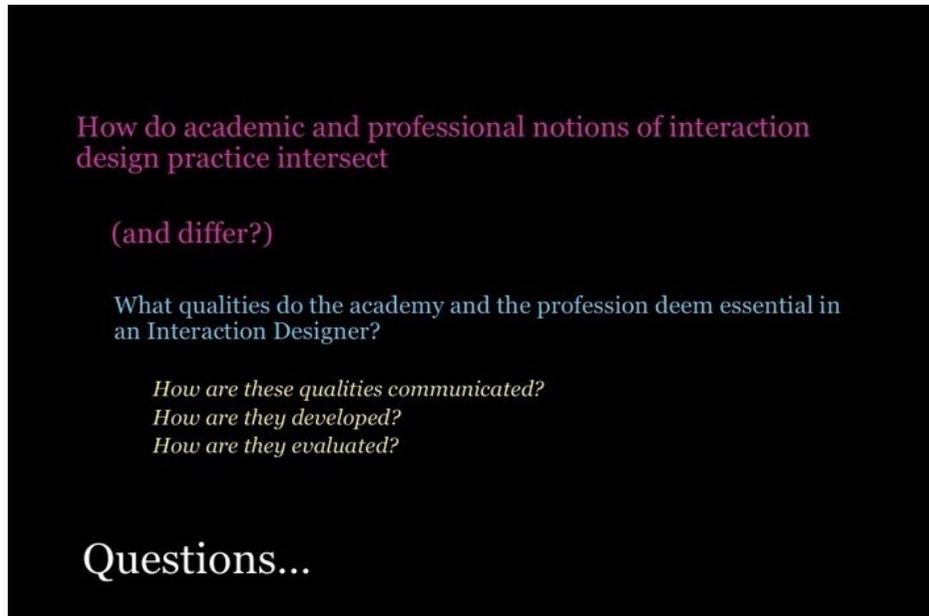


Figure 12 A slide from my October 2008 GRC presentation framing the research in terms of an academic theory–professional practice disconnect

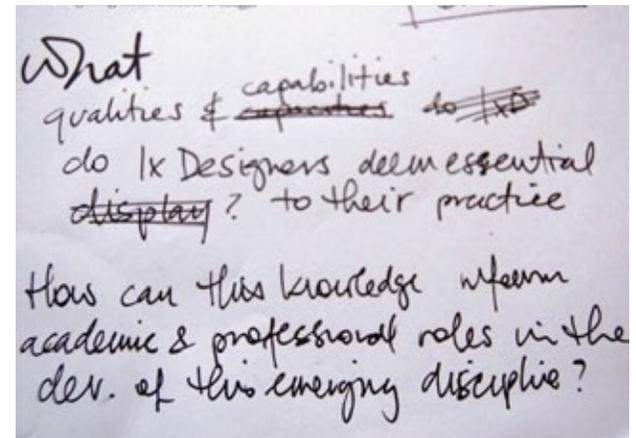


Figure 13 My questions at the May 2009 GRC: inverting the theory/practice framework from the location of the inquiry to the location of the outcomes

Re-casting the inquiry around my design practice was a major turning point in this research. I realised that a definitional tension between theory and practice—already at play across the field of interaction design—was a major cause of the incoherence and confusion that had prompted my research. In order to make sense of the field, and better comprehend the distinct nature of interaction design practice, I had to reframe such a unidimensional ontology.

Between mid 2009 and mid 2010 my inquiry began to reflect the understandings I was building through critical reflection on my projects. As I examined my practice in more detail, hints of distinct approaches to interaction design emerged, particularly around the use of artifacts, the designer's attitude to ambiguity, and their perception of affinity. I explored these approaches as individual notions of practice, process and production, as shown in Figure 14 (right).

As I concentrated on my design projects, I was able to more closely examine my design actions. I identified *ambiguity* and *affinity* as key qualities and attitudes of my design practice, and set out to examine their role in my design more specifically.

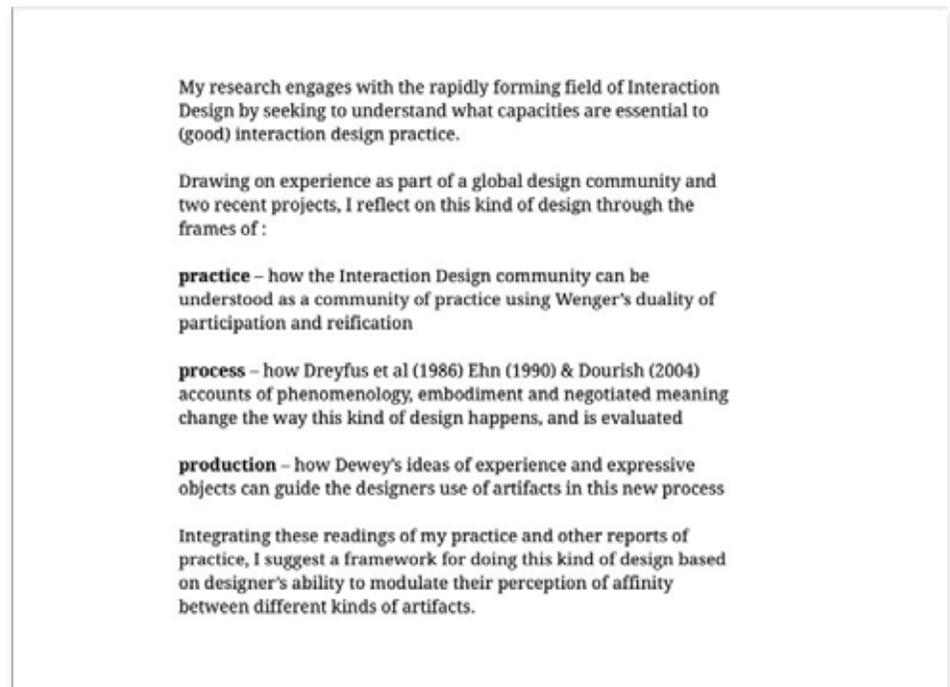


Figure 14 Questions presented at Jun 2010 GRC: the first attempts to integrate parallel inquiries into affinity, ambiguity, and artifacts with theoretical understandings of Phenomenology, Constructivism, and Pragmatism.

Using a framework of *ambiguity* in design artifacts and a designer's perception of *affinity*, I focused on the places where these aspects of design practice met. I identified the arrangement and discussion of design artifacts on walls for multimodal sense-making and designerly conversation (Cross 2006) as a particular method in my practice that was also evident in the wider interaction design community. Through the exploration of this particular design method, particularly reflecting on the affordances and practices that emerged in the design and use of a digital version of these walls, I began to frame this kind of design as a performance, and name the places where this performance is undertaken as *The Forensic Wall*.

I use *performance* in the same way that Austin (1962) uses performativity. Austin asserts that certain types of speech acts, that he calls *performatives* (p6), do not just state something, they perform an action: the utterance and the action are one and the same. I propose that some design artifacts share this quality; that they do not merely state a fact or represent an idea, they *perform* a design action. I demonstrate this in my analysis of the Pool and Loupe projects in chapters three and four.

Influences of Austin's work on design include Andy Dong's *theory of the performativity of the language of design*. Dong introduces the terms *aggregation*, *accumulation* and *appraisal* as performative aspects of the design language (Dong 2007) using these aspects to aid automated linguistic analysis. Dong's terms describe the behaviour of the designers uttering these performatives from the perspective of linguistic theory, and are decidedly *experience-far* (Geertz 1973). In contrast to Dong's work, I was interested in a description of these performatives that retained an *experience-near* quality.

Artifacts used in my design practices are performative in different ways, having different styles of effect on the design process. I examined what a performative framing of design means for the people bringing these artifacts into the world: their *designers*.

I then reframed my projects and their artifacts with respect to performativity and re-cast the practice of design as a performance. This conceptual shift helped me gain enough critical distance from my projects and my practice that I began to see ways to address the multiplicity of perspectives on interaction design that had inspired this research.

By critically reflecting on the different styles of performances I had given and witnessed in my projects I reframed my theory of *The Forensic Wall* and its associated elements in terms of *performative ambiguity*; a theory of how designers use ambiguity. I expand on this theory in chapter three.

Research Design

The impetus for this research came from my experiences working on interaction design projects with ACID, getting to know the wider professional face of interaction design with the IxDA, and my own teaching practice with RMIT University.

I saw a “gap” between the academic and professional definitions and understandings of interaction design. As I discussed in the previous chapter, professional discourse privileged how-to, or know-how, practical techniques and methods over more theoretical views of the field. Academic discourse seemed to take the opposite approach: upholding rigour, preferring methodological discourse over methods, theory over practice. *Know-how* and *Know-what* (Davis 2008) fought for the high ground in defining the discipline.

I also thought interaction design lacked a coherent framework for understanding its own practice. Accounts of interaction design that originated from the profession were very practical, but I had trouble integrating the scientific perspective of HCI with the messy practices and approaches associated with design. Academic accounts of interaction design tended to be more polarised in their framing of the topic, describing things from the perspective of their home discipline. Books by Dourish (2001), Löwrgen & Stolterman (2004), Kolko (2007, 2011) and most notably, Koskinen (2011) began to describe this gap between practice and academia.

Driven by the way Dourish (2001) frames the changing role of the designer, and inspired by Fallman’s (2008) model of interaction design research,

I looked at my roles as a designer and an academic and saw multiple ways to approach my inquiry. I used the projects I was involved in as part of ACID to “try to get at the tacit knowledge and competence that are involved in the discussions and critiques that eventually lead up to a final artifact.” (Fallman 2008:6).

I engaged with interaction designers in the wider community to discuss what was important to them in their day-to-day work. Between 2008 and 2012 I traveled to San Francisco, Vancouver, Savannah, Boulder and Dublin to the IxDA annual conference. I undertook unstructured interviews with professional colleagues and took part in formal and informal discussions around interaction design practice and education.

I also engaged with the contemporary literature around practice and interaction design. I found Fallman’s (2008) model of three traditions and perspectives from which to view interaction design research a useful way to think about this kind of research, and I use it to locate the different projects that I describe later in this section. Fallman uses design *practice*, *studies* and *exploration* as a framework to understand and guide interaction design research. In the next section I will describe how my projects can be understood through this lens.

Fallman's model of interaction design research

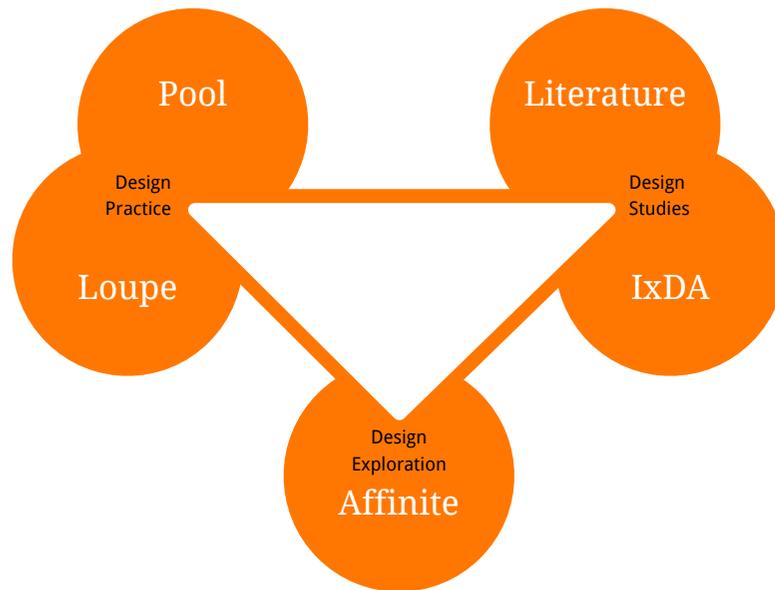


Figure 15 My projects located on the Fallman model of design studies, practice and exploration

Design Practice

In Fallman's (2008) model, research that is framed by design *practice* undertakes the kinds of activities that designers do when they're working for external clients. The researcher is a designer on a project, but they come armed with a specific research question, or a goal of building a specific question in the course of the project. The design is being done for someone else (i.e. not the researcher) and often involves the researcher working as part of a multidisciplinary team. Fallman describes that "learning to communicate with managers, sales people, and engineers; working under strict and suddenly changing budget constraints, negotiating with clients and other stakeholders" (p6) are aspects of design that have equal importance with the more traditionally recognised activities of hands-on designing.

Loupe—a project done in collaboration with Deloitte Digital and ACID—and *Pool*—a project done in collaboration with the Australian Broadcasting Corporation and ACID—are both good examples of interaction design research framed by design practice.

Design Studies

Interaction design research framed by design studies is the most recognisable of these approaches to traditional academic research; it works to analyse and generalise findings into something that builds on *an identified body of knowledge* (Fallman 2008:9). Research through design studies values understanding and describing what designers do, why they do it and how they do it, over the experience of doing design. Research framed by design studies appropriates theory from other disciplines to attempt to understand typical lines of inquiry such as how designers do what they do.

My critical engagement with the literature, my work as a director of the Interaction Design Association (*IxDA*) and my subsequent conversations with designers are best exemplified as interaction design research framed by design studies.

Design Exploration

The third area of Fallman's framework, design exploration, differs from the previous areas of practice and studies in its goals and driving forces. This form of design research is often self-initiated, where the client is "the researcher's own research agenda." (Fallman 2008:7) This kind of interaction design research asks what-if? more than *how*, *what* or *why*. One goal of research driven by design exploration is to reframe or transcend (Ehn 1988) the design problem by designing to "provoke, criticize and experiment to reveal alternatives to the expected and traditional." (Fallman 2008:8)

I did not start this research with an aim of designing something for my own use, but as I moved back and forth between projects for clients and ever widening circles of literature, the focus of my attention moved to a particular meeting of practices, methods and artifacts that I have come to call the *forensic wall*. At the same time, the iPad and other multitouch interaction platforms were becoming available, and I was interested to see what it would be like to translate some of these ideas from physical, and tangible interaction environments into abstract digital touch based interactions. The design and development of the *Affinité* iPad app was driven by a wish to explore what I could learn by attempting to make a digital forensic wall.

Loupe and Pool

Two of the projects in this PhD were supported by The Australasian CRC for Interaction Design (ACID), a Commonwealth funded Cooperative Research Centre (CRC) that ran from 2003 to 2010. Between 2005 and 2010 I managed a program of research at ACID, responsible for the collaboration of multiple projects between four universities in Brisbane, Sydney and Melbourne.

These projects were undertaken with teams made up of industry partners, academic colleagues, research assistants and PhD students. My role in these projects varied, but tended more towards facilitation, management and direction than production. Each project had a different wider team of industry partners and academic colleagues, or Chief Investigators.

Loupe was a project with Deloitte Digital, involving 4 Partner investigators from Deloitte and 12 Chief Investigators coming from Schools of Architecture & Design, Media & Communication, Business, Management at RMIT and IT & Electrical Engineering at the University of Queensland.

The two projects have been carried out under the auspices of ACID. They are part of a wider program of research called Multi-User Environments, and are included under an RMIT Human Research Ethics Committee application # HRESC-A-074-05/08



Figure 16 Loupe artifacts discussed in chapter four

Pool was a project with the Australian Broadcasting Corporation (ABC), with two Partner Investigators from the ABC and two Chief Investigators coming from the School of Media & Communication at RMIT.

The two project teams were quite different: *Pool* was concentrated and focused, while *Loupe* was very diffuse and required more coordination. These different degrees of focus in the teams was reflected the projects themselves. The *Pool* project was a direct response to an identified need: the website was not as good as it should be. *Loupe* was a more speculative project: what opportunities were created by the intersection of reporting standardisation, data visualisation and social computing?



Figure 17 *Pool* artifacts discussed in chapter three

Using available funds I recruited three research assistants to work part time on the projects. Hugh Macdonald worked predominately on *Loupe*, while Chris Marmo and Reuben Stanton worked on both *Loupe* and *Pool*. One of my roles was to coordinate and manage the day-to-day workload of this team. We were all collocated in the studio, an old sawtooth roofed drawing studio at the top of one of RMIT's oldest buildings, the original neo-gothic home of the original Working Man's College.

On a monthly basis I would be responsible for reporting to ACID on the progress of the projects, meeting with project stakeholders to organise activities, and maintaining momentum across a wide and disciplinary diffuse team. On a day-to-day basis I was responsible for directing the design activities of the core team, mentoring young design researchers, undertaking analysis and synthesis of data, deciding which direction to go in next, and where to best spend our energies (and funds). My role in these projects included aspects of traditional design roles such as art director, account manager and studio manager. Many of the artifacts that I refer to in this exegesis were produced by this core team: most often Reuben Stanton played a large part in the final production of these artifacts.

The day-to-day interactions of a design team like this are messy and complex. Concepts such as individual authorship or the origin of an idea are on the one hand extremely important: individual creativity is a highly valued capacity in any member of a design team. At the same time, things that are produced in the course of team interactions—ideas, understandings, artifacts, designs—are usually impossible to connect back to an individual in the group. One person will often undertake production of physical artifacts, like creating a

visualisation, or designing an interview, but the genesis of the idea that inspired and nurtured that finished artifact may be lost or forgotten. My experience with different styles of project management around design research has led me to believe that concentrating on the source of ideas has a detrimental effect on the flow of those ideas, and that the latter is more important to the success of a design project than the former. Where relevant (and possible) I have attributed project artifacts to individuals if they were not produced by the author.

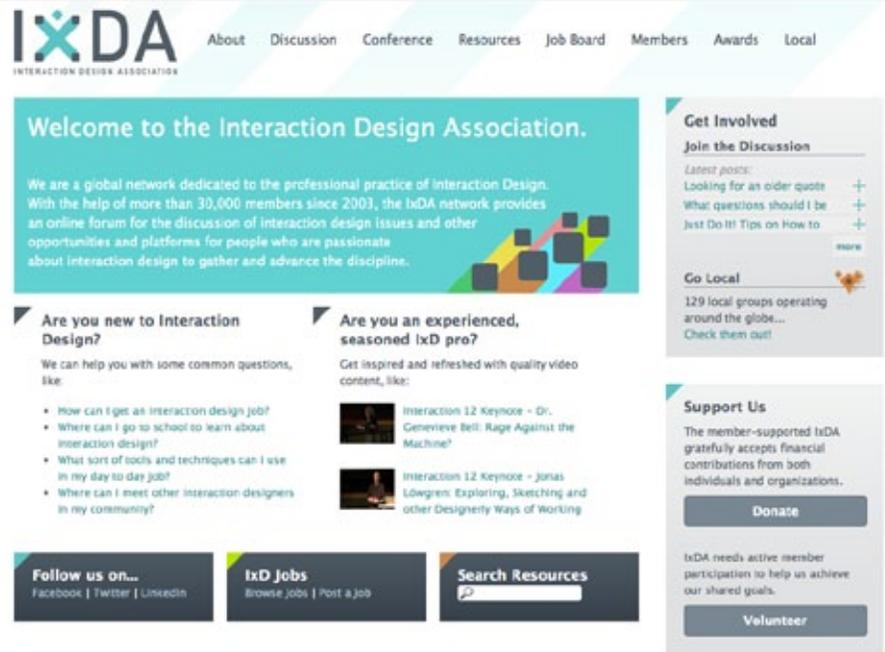


Figure 18 Website for the Interaction Design Association., I was a member of IxDA board of directors between 2008 and 2010. <http://ixda.org>

Insights from the Field

While these projects were running, in early 2008 I was invited to join the board of directors of the Interaction Design Association, or the IxDA. This role created an opportunity to engage with a growing global community of interaction design professionals.

In order to indentify how the field was growing, IxDA membership went from 2000 to over 20,000 in my two years on the board. In that time I worked with other board members to build the profile of the organisation, and “advance the discipline of interaction design” (from the IxDA mission statement)

One aspect of my work with the IxDA is essential for making sense of my research: how the professional and educational communities engage with one another. My directorial bailiwick was education, particularly building a sense of mutual enterprise between professionals and academics. In retrospect, this seems an overly idealistic mission, but it helped me discover and pinpoint the multiplicity of perspectives that triggered this research. Neither professionals nor academics had a uniform approach to understanding interaction design. The growing field was coalescing, and a mighty tussle was on for naming rights.

The sides of this tussle formed somewhat along professional and academic lines, but I also noticed a continental divide emerging around the way interaction designers acknowledged and approached the aspects of practice and design process that were concerned with *ambiguity*.

My roles as director and academic positioned me within the field of leading practitioners, academics and thinkers in the interaction design community. During this time I had many unstructured interviews on the current state of the field, particularly with respect to education and capacities of recent graduates.

One such conversation in 2008 with a director of design at an international design agency really provoked my thinking. After discussing aspects of education, and the kinds of graduates this organisation hired, we started talking about the process new recruits went through as they adjusted to internal company culture. Two comments stay in my mind to this day, and they both relate to the capacity of designers to manage complexity and ambiguity.

Firstly: my host referred to the “extended palette of sound effects” that team members would develop, in order to communicate the time based behaviour of interface elements or things that could not be rapidly represented in a dynamic way.

The second comment came as we toured their studio: I remarked on a set of glass walled rooms that ran along one side of the large work space. These rooms were full of design artifacts attached to walls, and my host said to me “this is as far as I can take you, I’m sorry”. The *project rooms* had confidential material in them and that I couldn’t go closer unless we were covered by legal agreements.

It didn’t really occur to me at the time, but on reflection, both these comments pointed to the deep practices that interaction design required and afforded—lexicons for materialising the intangible, and methods for bringing these materials together to have a reflective conversation (Schön 1983) with the situation of concern.

After engaging with different ways of characterising interaction design, I started to view my project work differently. I began to distinguish between different approaches, and their antecedents, and how they were apparent in my work. For instance, the influence of Herbert Simon is widespread throughout interaction design in the United States, particularly combined with the ideas of John Dewey through Richard Buchanan’s work at Carnegie Mellon University or the phenomenology of Martin Heidegger via Terry Winograd’s work at Stanford University. European interaction design often leans towards the continental philosophy of Heidegger and Merleau-Ponty. While the UK seems to have moved in a more de-materialised direction of service design, in the Netherlands there is a strong tradition of designing objects under the influence of Philips and more widely across the northern European manufacturing belt. Scandinavian participatory traditions often call on Heidegger, Marx and Wittgenstein particularly through the work of Pelle Ehn (1990).



Figure 19 late 2010: Project artifacts to date, assembled on the wall

Affinité

Back in the studio, I employed interaction design methods to help me make sense of my research data. I constructed assemblages on the walls of my office using artifacts that represented some of the key concepts from the literature I had read, professional and academic conversations I had with colleagues, and my experiences in the Loupe and Pool projects.

I left these assemblages up for a few months, as ambient representations of my research, incubating the ideas and meaning that these artifacts held. Willing them to coalesce into recognisable patterns in my subconscious, through the passing of time.

In late 2010 I began to organise and critically evaluate my work to date, and began to focus on the ways I had been working on, with and through walls. The forensic wall emerged as a key term in my research, and I embarked on an exploratory project in collaboration with Reuben Stanton to design and develop a digital forensic wall. This project led to the design and development of Affinité, an application for the iPad that lets you explore and present ideas using elements arranged on a virtual wall or canvas.

Affinité explores the concept of the *Forensic Wall*. Positioning it alongside presentation software such as *keynote* or *powerpoint*. I examine how a spatial interface affords storytelling, sense-making and collaborative designing; how *Forensic Walls* support both the presentation of ideas, and the process of constructing those ideas.

In chapter 5, I critically reflect on this project as a way to explore the way designers use *performative ambiguity* to support a design process, and *Forensic Walls* as the site of this design performance.



Figure 20 Affinite artifacts discussed in chapter five

Over the next three chapters I give an account of my projects, describing the activities my collaborators and I undertook. I punctuate these accounts with description of particular design artifacts that exemplify the different approaches to communicating experiences I have discovered through critical reflection on these projects. In particular, I frame the project artifacts in terms of designerly approaches to *ambiguity*, perception of *affinity*, and design *performance*.

In reviewing these projects I paint a picture of the circumstances of each project and the different forces at work across the project teams. These accounts are not intended to be exhaustive, or in any sense objective (if that were at all possible). My aim is to use these projects to explain my theories of *ambiguity*, *affinity* and *performance* in interaction design practice.

I begin each chapter with an overview of each theory, followed by a reading of one project through the lens of that theory.

I use the *Pool* project to illustrate different approaches to the use of *performative ambiguity* in interaction design.

I use the *Loupe* project to demonstrate different ways that interaction designers activate their perception of *affinity*.

Finally, I use the *Affinité* project to demonstrate the way that these approaches to ambiguity and affinity come together at the *Forensic Wall*.

Using Ambiguity

Pool: designing a shared enterprise

Performative Ambiguity

In chapter one I characterised interaction design in three broad ways, correlating to the way designers use ambiguity in their design practice. In this section I expand on this framework, discussing three strategic approaches to ambiguity. I identify these as *pragmatic*, *critical*, and *enterprising* approaches to the use of ambiguity in design. I then describe the Pool project and critically reflect on it to illustrate how these different types of interaction design practice work together and manifest in design artifacts.

To outline this theory, I begin with pragmatism, an attitude that resonates with interaction designs origins in HCI, and the widely held perception that the purpose of design is to *solve* problems.

A pragmatic approach to interaction design seeks to reduce and *excise* ambiguity. Designers who use this approach aim to minimise the effects of cognitive load and reduce conceptual friction or dissonance in order to design things that are intuitive and usable.

I use the term *pragmatic* for two reasons: firstly, this approach to design is ultimately interested in fitting a design to its intended use, and users. There is a pragmatism associated with this approach that acknowledges design has a job to do, and that job is best accomplished by designing things to be as unambiguous as possible. This approach is related to a modernist aesthetic of rational simplicity, and the removal of complexity. Its agenda is the excision of ambiguity, often through understanding the user.

Secondly, theorists and practitioners of this approach often refer to Dewey for models of experience and perception. Interaction design literature that supports this approach has a strong HCI background using models derived from perceptual psychology and cognitive science (McCarthy & Wright 2004, Buchanan 1992, Norman 1988, Cooper 1995)

“We must recognize the indeterminate as a positive phenomenon. It is in this atmosphere that quality arises.”

Merleau-Ponty (1945/1962:5)

Moving on, a *critical* use of ambiguity seeks to use or *exercise* ambiguous outcomes of a design project, often to draw attention to the role of the designed artifact in relation to its context. This approach re-frames design as an agent of critical reflection, where artifacts are intentionally designed to be ambiguous, in order to encourage people to interpret the artifact and situation for themselves (Gaver et al. 2003). The re-frame, or using a design to redefine its own boundaries of agency, is one core design move of a critical approach.

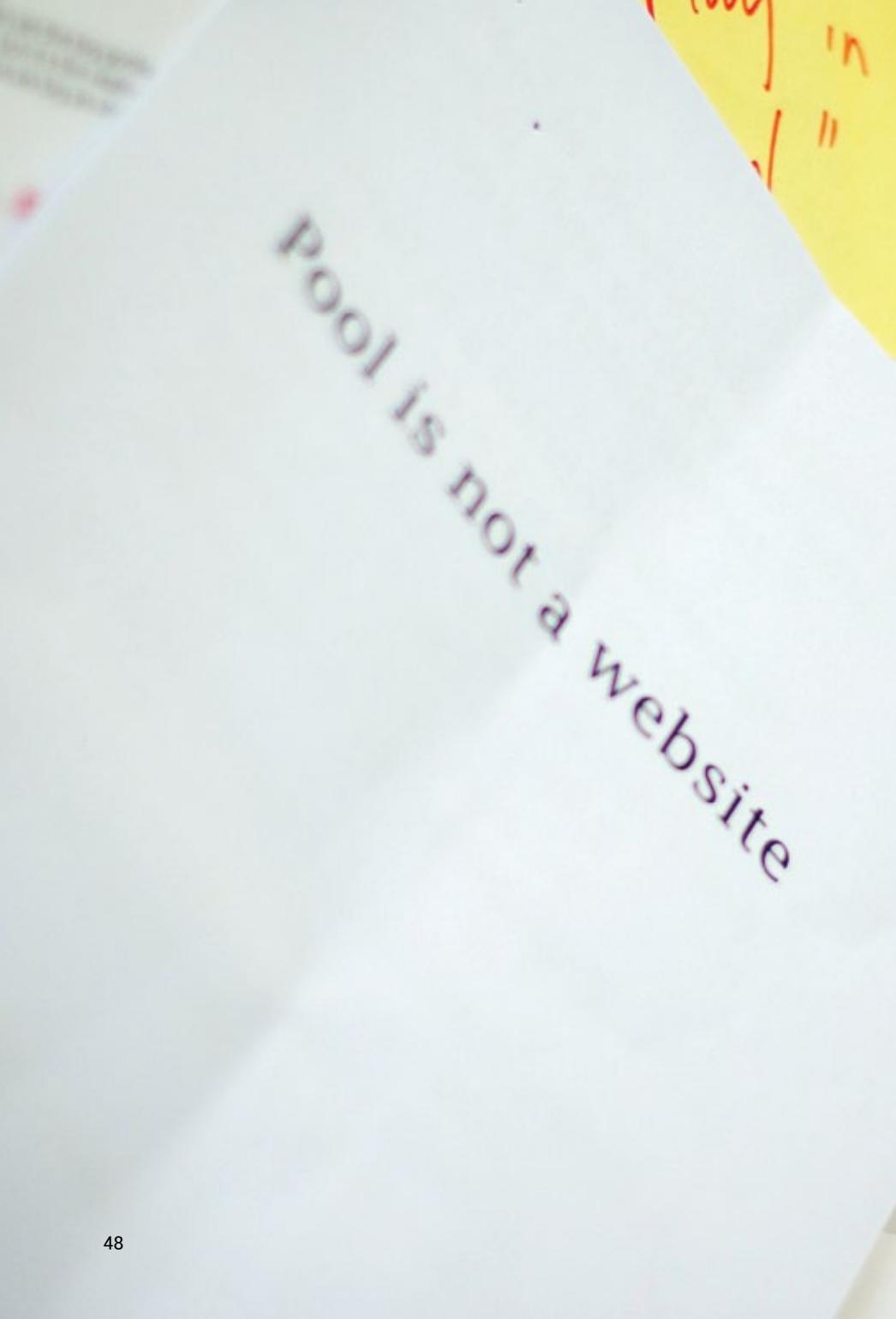
I take the name *critical* from Dunne & Raby’s Design Noir (2001) in which they propose critical design as a strategy of using design to “...stimulate discussion and debate amongst designers, industry and the public about the aesthetic quality of our electronically mediated existence.” (p58). A critical approach to ambiguity aims to make questions where none were perceived before, either to critique the situation or lead to a deeper conceptual appropriation (Gaver et al 2003) of a designed artifact.

The third approach uses the second to achieve the first. An *enterprising* approach to ambiguity employs the ambiguous to scaffold mutual engagement in a shared goal. It uses ambiguity as an invitation to negotiate and construct meaning between different stakeholders in a design project.

I use the term *enterprising* as a reference to the work of Etienne Wenger, and his models of shared enterprise, mutual engagement and the duality of *participation* and *reification* (Wenger 1998). I have deliberately avoided using a term like *participatory*, because of the disparate and potentially confusing connotations that this term implies. The term *participatory* is part of the technical discourse of participatory design, and refers to a paradigm of practice that differs from the work contained in this exegesis.

These three strategies for performing the ambiguous in design aren’t mutually exclusive. Adopting each of these approaches could produce many different ways of describing how they relate to one another: from a rational model of a continuum or venn diagram to examples & case studies that exemplify these three approaches.

I propose that these three strategies for using ambiguity in design are useful ways to think about the performative potential of ambiguity, and reflect on how to *use* it in design practice.



Pool is not a website

In the next section I describe the first of my projects: the redesign of the Pool website for the Australian Broadcasting Corporation. I focus on specific design artifacts and activities to illustrate different attitudes to using ambiguity in interaction design.

To refer back to the diagram of ambiguity throughout my projects, and places where I have described these projects, I see that a growing appreciation for the role of ambiguity in engaging people during the design process.

When I describe the Pool design workshop on page 77, saying that a mental model diagram complimented the photographs of the forensic wall, there is an implicit understanding in that statement that acknowledges the role ambiguity plays in helping people engage with the unknown, and framing that engagement.

Pool

In 2009, I collaborated with Marius Foley on the evaluation and redesign of an existing social media website called Pool. Pool had been conceived by people at *Radio National*, a part of the Australian Broadcasting Corporation (ABC). The ABC viewed Pool as a way to engage with new, particularly younger, audiences. Pool was a website that encouraged people to join a community to share images, movies, written text and sound files, and was a departure from traditional approaches to engaging listeners online.

To better understand Pool (and Loupe, the next project I will describe) it is important to frame them in the context of social computing (Erickson 2011) a disruptive change in the way people engage with one another using technology. When we were undertaking the Pool project, social computing was enjoying a boom in popularity and commercial success. Business and academia were noticing blogs and services like Facebook, twitter, and YouTube (McAffee 2006). Web2.0 and User Generated Content, were seen as disruptive forces that challenged traditional broadcast models of mainstream media (O'Reilly 2005).

When we took on the Pool project, I was already aware of the pool.org.au website. I had been approached to help specify the technical platform that Pool was built on, but I did not engage with the project at that time. A couple of years later one of my colleagues, Marius Foley, approached me to see if we could engage with Pool as a redesign project under the auspices of the Australasian CRC for Interaction Design (ACID), where I managed a program of research into Multi-User Environments. Marius had been involved with the ABC Pool website since its inception and had worked closely with the Pool team at the ABC to specify the website and see it built.

Themes

user generated content, rich media, social networks, reputation, mental models, walls, approaches to ambiguity, participation

Artifacts

Workshop kit: photographs, mental model, diagrams, scenario cards
Mental Model diagram: combing, clumping, representing

The following diagram visualises the timeline of activities and deliverables that we proposed to the ABC and ACID. It describes our understanding of the different stages of work the project would entail.

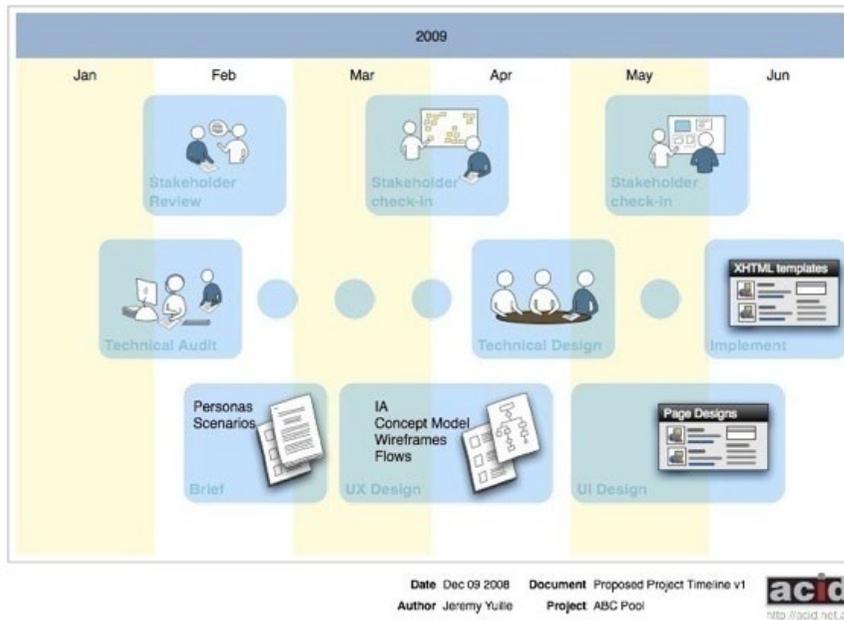


Figure 22 Diagram of the project timeline for Pool

The project plan proposed four phases of work:

1. *Defining the design problem*: examine the website already in place. Evaluate Pool in terms of functionality, usability and user experience. Uncover how current and potential users conceptually view and understand the activities that the website supports.
2. *User Experience (UX) design*: design the way Pool works to align it more successfully to the abilities and experiential desires of the people using it.
3. *User Interface (UI) design*: design how Pool presents itself to support the UX design.
4. *Mock-up and specification*: describe these designs so that they can be understood by the clients and implemented by the developers.

This exegesis primarily concentrates on the first two phases: *Defining the design problem* and *UX Design*. In particular, I concentrate on the artifacts produced to build and communicate a conceptual design for the project.

Roles and Responsibilities

I had three different, but related, roles in this project:

In the role of *interaction designer* I drew on my experience of working with interaction design problems. I brought an understanding of how a person's experience of technology is affected by changes in the design of that technology, and how that person's experience can help identify latent opportunities in existing technologies.

As *studio manager*, I brought to the role my experience of teaching and mentoring designers and managing interaction design research projects, particularly ones that required research and development phases. I recruited two designers to work with me in the studio: Reuben Stanton, who I had taught as an undergraduate communication designer and worked with subsequently on projects after his graduation, and Chris Marmo who had a cognitive psychology and computer science background. I remember thinking that this was a very complimentary set of disciplinary backgrounds to have in a team.

As an ACID *program manager* and project leader on many ACID projects at RMIT, I was experienced in framing these kinds of problems as research projects for the centre, RMIT and industry partners. This also included a lot of experience with the logistics of running ACID research projects at RMIT. In this role I worked closely to complement the skills of my colleague Marius Foley, who represented the project to ACID and the ABC

The first two roles of *designer* and *studio manager* are most relevant to the critical reflection that follows, where I use project artifacts to discuss the kinds of thinking and processes that the team undertook. The final form of these artifacts was often produced by other team members, but the thinking behind these artifacts, and the methods that we used to support that thinking, were very collaborative

Defining the problem:

understanding people's experiences

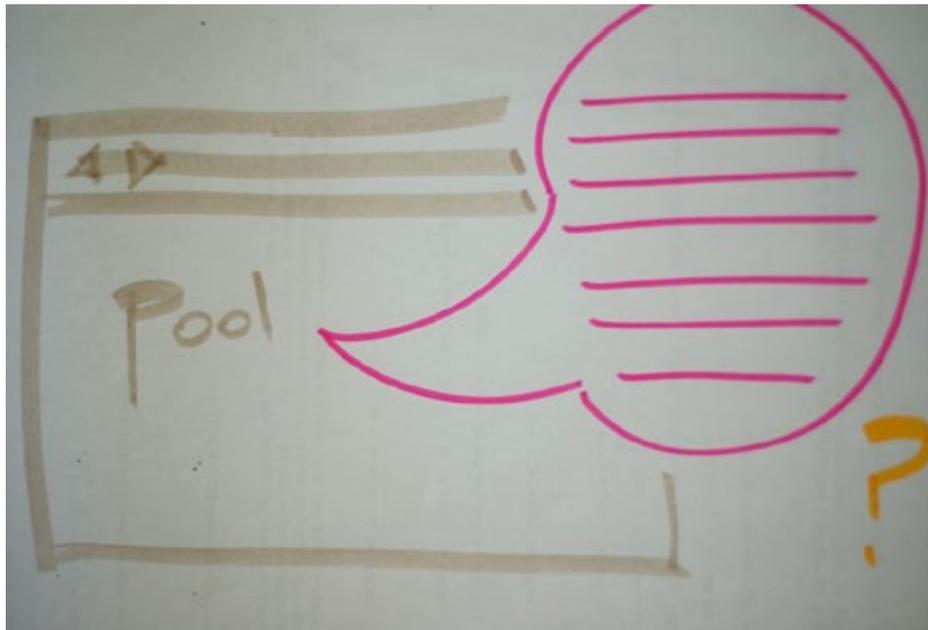


Figure 23 Our first problem was finding the problem

The overarching goal of this stage was to define the problem that our design would need to address. This may sound counter-intuitive: why would you undertake a redesign if you didn't know what the problem was?

In fact, problem definition is a common aspect of many design projects. Schön refers to it as “*the problem of this problem*” (1983:104). To undertake this stage, we reviewed the Pool website, using three approaches: *data analysis*, *heuristic evaluation* and *user research*.

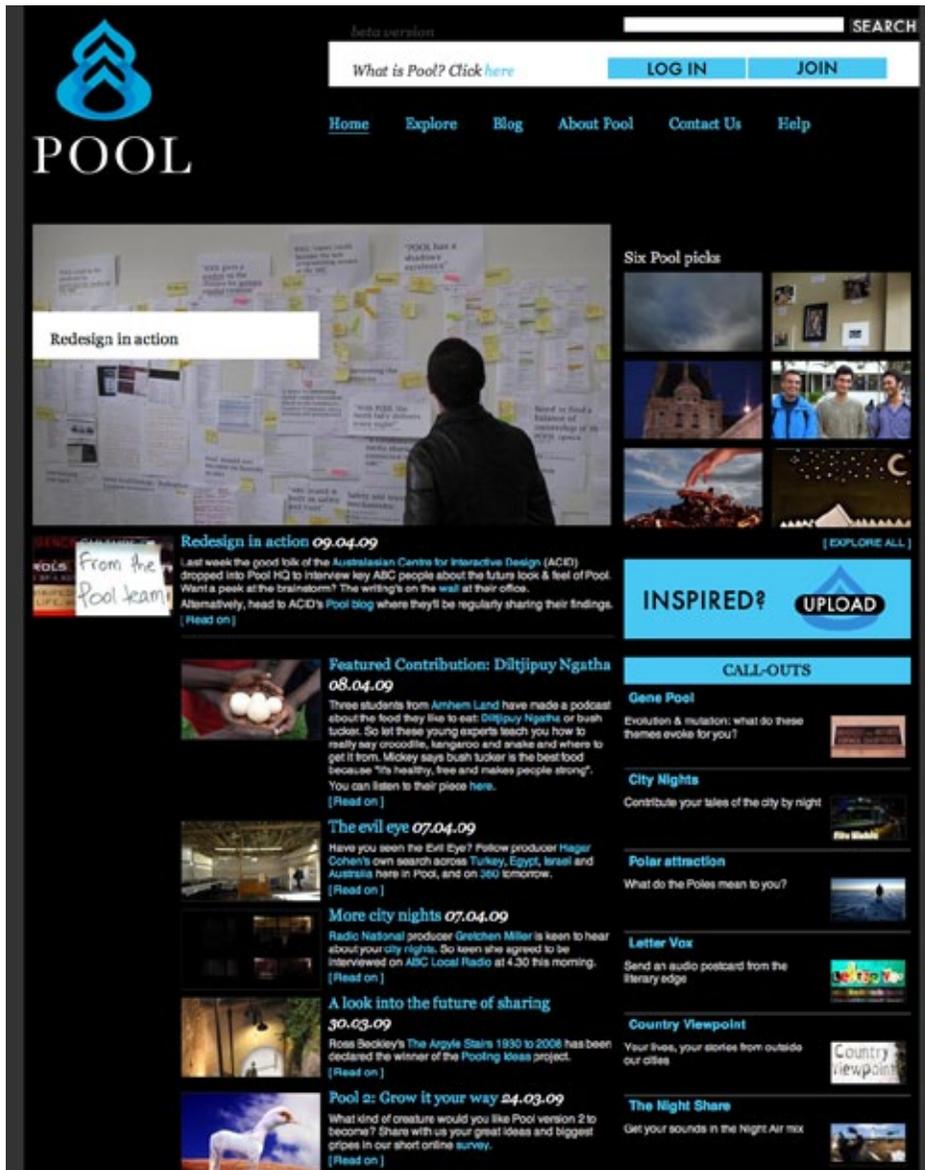


Figure 26 the Pool website before the project (with a story describing the redesign project)

Heuristic Evaluation

As part of a heuristic evaluation (Nielsen & Mack 1994) we created logins and used the site, evaluating each section and element of functionality against standard rules of thumb for websites that are driven by user generated content. Nielsen and Mack describe heuristic evaluation as the most informal and lightweight of a set of methods to use when inspecting the usability of a web site user interface. Usability experts use heuristics or *established usability principles* to construct a rough sense of what issues might arise later in a more user-centred evaluation method. Sites that rely on content that is generated by their users are a special case with respect to usability and conceptual design, because there is very little pre-made content to help the users form an idea of what the site is actually about.

Through this heuristic evaluation I formed the opinion that the Pool website was overly driven by the technical & functional possibilities of its underlying technology (a content management system) rather than a coherent idea of what the users of the site wanted to do.

User Research

No matter how empathetic a designer is, they'll always learn something useful by engaging with people who might eventually use the products of their design. Doing research with users helps designers connect with the kinds of experiences they need to support in their designs.

The design team engaged users in the form of existing Pool members and people who had never used the website, but who the ABC would like to attract as new users. We ran cognitive walkthrough exercises (Nielsen & Mack 1994), and participatory heuristic evaluation sessions (Muller et al 1998) with our users. A cognitive walkthrough exercise involves asking people to perform a specific action on the site—for example: “*please upload a movie*”. During this action, people are asked to speak aloud the thoughts going through their minds, to walk us through their cognitive processes. Participatory heuristic evaluation involves asking current and potential users to discuss the kinds of things they would like to do with a site like Pool, and then see if these were possible. As we examined the outcomes of these research activities, a pattern began to emerge: people were unsure about what the site's purpose was, which left them feeling uncertain about how to use it.

To find out more about why people engage with these kinds of websites we undertook an online survey asking people why they used Pool, and began to see a number of previously unvoiced concepts emerge, most notable among them being the level of attraction to users of the ABC's brand.

We also undertook semi-structured interviews with people we had identified as key stakeholders of the site. These included longtime or influential users of Pool, and people inside the ABC who were involved in the Pool project or were interested in its success. We were fortunate that Pool was seen favourably inside the ABC, and were able to engage with people ranging from interns to producers and managers, all the way up to Mark Scott, the Managing Director of the ABC. This demonstrated that the project had widespread support within the ABC, but also a high degree of expectation regarding the things it could achieve.



Throughout this problem definition stage we produced and collected a lot of artifacts representing the knowledge that was created or uncovered by each activity.

I began to arrange these artifacts on an empty wall in our studio, pinning printouts of interview transcripts, usability reports, survey responses, graphs and other representations of data, to the wall so that the team and I could access all this data simultaneously.

The Wall



My original impetus for constructing The Wall was to build a holistic sense of the different ways people viewed Pool, and explicitly represent this in the studio so that the team would be immersed in the research we were doing at all times.

I imagined this wall being an ambient *actor* on our subconscious thoughts around the design, and a fertile ground from which ideas might spring.

Figure 21 Reuben Stanton looking at The Wall in the studio



This assemblage of research artifacts quickly became overwhelming due to the scale of the material. But it was also strangely attractive as a collage, or composite artifact. It invited interaction from the rest of the team. I returned to the studio one day to find that Marius had layered the wall with large pull quotes taken from the transcripts. This helped to create a typographic hierarchy in *The Wall*—the name the team had given it. *The Wall* was taking on qualities of a designed artifact and the different members of the team picked up on and responded to these qualities.

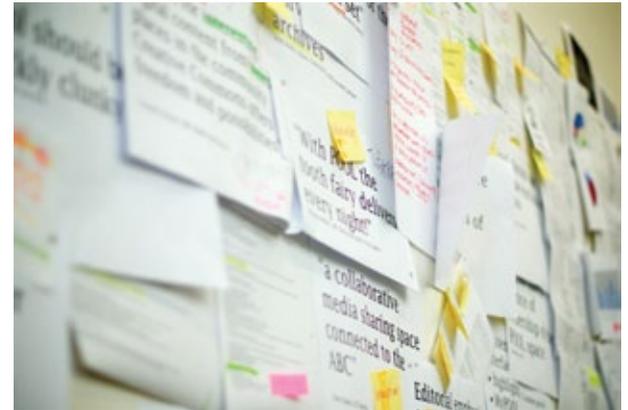
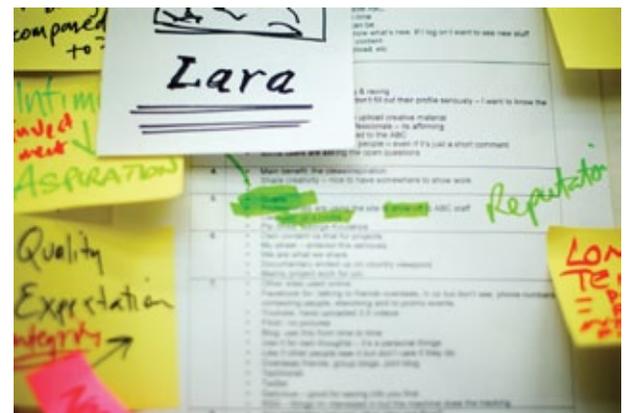


Figure 28 (clockwise from top) different views of the wall in our studio, showing large pull quotes

Figure 29 other annotations using post-it notes, markers, and

Figure 30 scenario sketches.



This wall is the first design artifact from the Pool project that I want to draw attention to for later discussion. With respect to the Pool project, I refer to it as *The Wall* and as I generalise this kind of artifact in subsequent sections I refer to it as a *Forensic Wall*.

Figure 31 Stakeholders from ABC Radio National take part in a design workshop at their Sydney offices in early 2009.

The kit of workshop cards can be seen on each table, along with bigger artifacts: (L-R) Photos of The Wall, whiteboard with post-it notes for brainstorming, and the Mental Model Diagram



A Shared Enterprise

Our *Brief* and *UX* phases of the project overlapped in the form of a design workshop, represented as a stakeholder check-in on the project diagram, where we would literally check-in with our stakeholders at the ABC. In preparation for this, we created a ‘kit’ of artifacts to use in the workshop.

This included images of The Wall, persona cards that represented a set of design personas that we had developed from our research, diagrams that communicated insights we had derived from initial data analysis, and diagrams to convey concepts that we thought were useful for framing the redesign of Pool. This *Pool Workshop Kit* is the second design artifact that I will focus on in discussion, using it to demonstrate different approaches to the use of ambiguity while communicating experiences.



Figure 32 the Pool Workshop Kit, containing persona cards, images of The Wall, diagrams and infographics, used to support participatory storytelling in the early 2009 design workshop.

Figure 33 Mental Model Diagram created for the design workshop



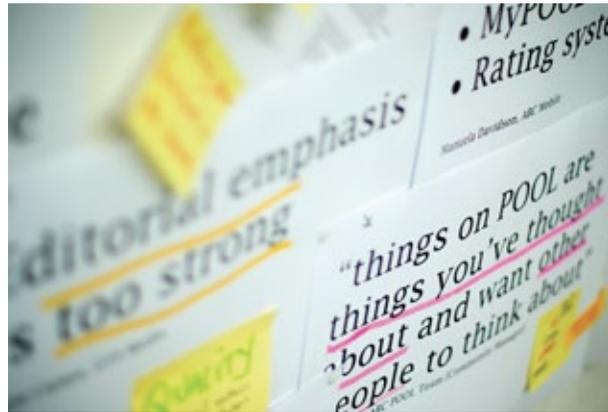
Mental Models

While we were building The Wall and designing the elements of the workshop kit I attended a workshop on researching and building mental models (Young 2003), held by Indi Young. To exercise the learning that I'd had in the workshop, I created a Mental Model diagram to communicate the way people conceptually understood Pool. This Pool mental model is the third design artifact that I will discuss.

Following the workshop, our immediate collaborators inside the ABC kept the poster of the mental model, A3 images of the wall, and the workshop kits. In the next chapter I discuss how these artifacts were subsequently used to build engagement inside the organisation. The end product of the design Brief stage of the project was a report given to the ABC and ACID (Figure 34) containing the listed sections and content reporting on our research and design recommendations.

Pool user research	Executive summary	2
Pool is... <i>what Pool is from the perspective of its users and stakeholders</i>		4
Pool users want to... <i>the motivations and goals of Pool's community</i>		6
Pool should... <i>our recommendations to help the Pool community expand and thrive</i>		8
Next steps <i>what we will deliver in the next stage of the project</i>		10
Pool could... <i>possible future directions for Pool</i>		12
	Appendices	14

Figure 34 The report submitted to our project partners, listing different sections and their relevant content



In the next section I discuss two types of design artifacts used in the Pool project. I distinguish these artifacts in terms of the way they are designed to appeal to perceptions of ambiguity. To frame this distinction, I draw on Dewey's (1939) theories of the expressive object that I described in chapter one.

Dewey's framework of statements and expressions was helpful while I worked towards this workshop because it helped me conceptualise different approaches to producing artifacts that would engage our project stakeholders at the ABC. In the design workshop I framed the first artifact, a set of photographs of our design wall, as *expressions*. These were designed to help the workshop participants experience the highly ambiguous version of the truth that we had constructed in our Melbourne designstudio. I framed the second artifact, a mental model diagram (Young 2003) as a *statement*. It describes an understanding of Pool from the perspective of the groups of stakeholders that we had interviewed in the usability analysis activities. In the following sections I discuss the process of constructing these artifacts and how they were used as part of a design workshop with our ABC stakeholders.

Pool... a mental model

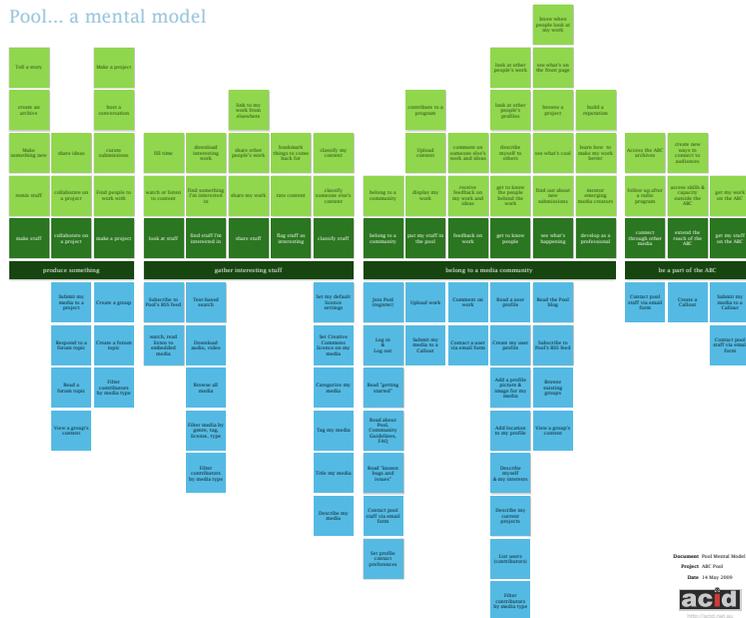


Figure 35 Two types of design artifacts—photographs of our Wall, and a mental model diagram—respectively characterised in the next section as *expressions* and *statements*

Strategic Aims

By the time we started the ACID collaboration, Pool was already two years old, a community had already grown around the website. *Engagement* with this group and our clients at the ABC were key strategic aims of our design project. We were researching with the aim to change an artifact already inhabited by a community, so we had to help our clients understand that community.

The perceived affordances (Norman 1988) of Pool, or those actions that the website content management system would present to Pool members, had emerged alongside this community of users, often in response to issues that arose in the use of the site, or as different technologies became available. For example, while we were researching the existing Pool community, the ABC was implementing changes to the content management system that would allow users to more easily manage conversations and collaboration in groups, to work on specific projects and themes.

This change had been initiated for two reasons: firstly, it was in direct response to requests from Pool members. Secondly, software had recently become available that made the implementation of this kind of functionality less demanding. Over the preceding two years an enormous amount of good will had been built among the Pool community, and many members of this community held a strong personal identification with the visual presentation and tone of the current site. This strong identification created some tension both within the Pool community, and between our team and the Pool community.



Figure 36 an infographic representing responses to the survey question "what is the main reason for you to use Pool?"

This political context created some resistance to change, both at the ABC and in the wider community of Pool users. Many of the conversations I had with academic colleagues who had worked on Pool, or key stakeholders at the ABC, had been fuzzy or vague in their descriptions of what kind of website Pool was, and what its role in the wider organisation was. For some it represented an experiment, a low-risk attempt to *engage* with a different type of audience in a different type of way. For others it represented a disruption to the very concept of the *audience* and, to some extent, the broadcaster. Others saw it as a response to the increasing use of user-generated-content in the traditional media. Mark Scott, the ABC Managing Director, had a large influence on how Pool would be officially viewed and adopted at the ABC. Scott had voiced his interest in using the internet to engage with new audiences, in new ways (Scott 2010). This public support lent momentum to fledgling projects like Pool. According to the Pool team at the ABC, Scott had used Pool as an example of ABC innovation and therefore we were very conscious that the organisation was keeping a watchful eye on Pool, and in turn, our project.

With our studios in Melbourne and the ABC's offices in Sydney, our day-to-day client discussion was conducted electronically, through email or teleconferences. The project plan included a workshop to 'check in' with our immediate stakeholders around the progress of the research and build support internally at the ABC for the next stage of the project. Being a large organisation, with many levels of management, it was important to make sure the strategic views of higher management were included in the evaluation of Pool. We also knew from prior experience at ACID that including senior members of partner organisations in the early stages of a project could help make that project run more smoothly when it came time to propose a design solution.





The *model* of engagement we created in this workshop was important: The ABC is a national broadcaster, placing high value on creativity and production, therefore any attempt to engage stakeholders needed to be *authentic*, and not superficial or overly contrived. We also had a time constraint: the person who controlled whether we would proceed on to the next stage of the project only had 20 minutes free in their diary on the day when most of our key stakeholders were available. With this in mind, and an acknowledgement that this workshop was a key juncture in the project, we prepared to travel to the ABC head offices in Ultimo, Sydney.

One immediate concern for me was that our understanding of the project was deeply connected with the studio environment in Melbourne. Our work had been focused by The Wall of material we had built over a period of intense engagement with the research context. The Wall held an enormous amount of meaning that we relied on every day, and seemed impossible to transport that to a workshop held over 1,000 km away.



Figure 37 The Wall constructed in the studio back in Melbourne

Another concern for me was the possibility of building an authentic engagement over such a short period of time. Marius and I discussed different approaches and decided to structure the workshop in two parts. In part 1, we would report on our research to construct a sense of the problem of the problem (Schön 1983) and, in part 2, we would provide a set of personas to engage the group in building scenarios for using Pool. Cooper (1995) describes how scenarios and personas can help a design team focus on the *experiences* of users, rather than the *product* they use. Critics of tools such as scenarios and personas argue that designers use personas to maintain a safe distance from the people they are designing for, producing lots of interesting design documentation, without leading to any design insight (Portigal 2008).

However, we felt that our group of workshop participants would be highly suited to this method for a number of reasons. Some of the personas were loosely based on roles at the ABC, so we felt that our participants could authentically role-play these personas, projecting themselves into their experience. Additionally, our workshop participants were journalists and producers from Radio National; their experience as feature producers and presenters meant they were highly adept at crafting stories and responding to narrative, particularly in spoken form. Marius and I agreed that by drawing on these strengths as communicators and storytellers we had a good chance of building the authentic engagement we were seeking.

Using these ideas, we framed the scenario building aspect of the workshop as a type of game, and designed a set of cards to represent the different personas we had created.

I had been following the development of the Gamestorming book, (Gray 2010) and was interested in the way that gameplay could scaffold the process of engaging stakeholders in projects. By scaffold, I refer to the way an artifact or process (in the case of game rules) can guide and constrain what is possible in a process, while also reinforcing a certain framing or conceptual understanding of the situation the process is examining. For instance, we did not want the workshop participants to get carried away with the thread of their story, and needed a way to ground their stories somehow in the context that we had been deeply immersed in over the last two months. For us back in Melbourne, The Wall helped keep our thinking connected to the actualities of how people described Pool, and what they really did there. The Wall was our scaffold, and I realised that we *needed a way to bring The Wall into the workshop*.



Figure 38 Persona cards produced for the workshop

Design as (TV) Performance

I started to think about the workshop as a performance, where the first act would be us (the researchers) setting the stage and introducing the elements (personas, contextual cues, mental model) that would then be used to construct multiple versions of the second act. We needed to engage our participants in an authentic fashion, but we also needed to make this engagement fun *and* efficient, two qualities that aren't often easily combined. I wondered how we might *prime* the participants to achieve this unusual mix of engagement qualities. One option that occurred to me was that we might exploit entertainment genres and build a tone or *vibe* to the workshop—after all, we were engaging with people who worked and identified with the media and entertainment industry.

I started to think about framing the scenario building part of the workshop in terms of the police procedural genre, drawing on forensic tropes from TV shows like the CSI franchise (CBS 2000) or *The Wire* (HBO 2002) (which I was watching at the time). In these shows a wall or display is often used to assemble all the evidence available, the characters engage with these assemblages while they describe their understanding of the situation. You could go so far as to say that these walls were major characters in the shows themselves.



Figure 39 Characters from the HBO series *The Wire*: Lester Freamon, Roland Pryzbylewski & The Wall of evidence. Used with permission ©Dennis Culver

Often these walls are the site of the realisation or gestalt in the narrative arc of a show, with characters perceiving an unnoticed relationship or missing element that helps them to solve the mystery. I began to imagine using the genre theme to set the tone and prime the participants for the scenario building aspect of the workshop.

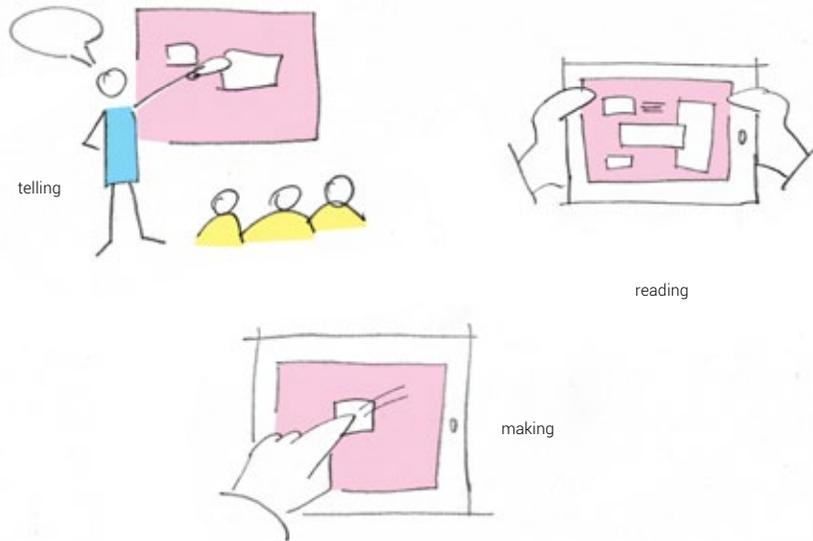


Figure 40 Ways Walls Work: different types of performances that I observed using The Wall, that I examine in detail in chapter five

Framing the Wall

Looking at the workshop as a performance caused me to reflect on the performative aspects of my practice in the studio. I had started the assemblage of The Wall in the studio, and it had changed the way I worked with the wider design team, and in turn, how they worked with each other. On reflection, I became more aware of the kind of performances involved in the way I used The Wall to support design conversations with the team and with myself.

In discussion with others, I would refer to specific areas of The Wall as rhetorical supports or demonstrations. For instance, specific areas of the wall containing different interview transcripts overlaid with images and notes were used to refer to each of the personas. Each of the elements in that area represented different motivations and desires relating to that persona. As another example, while the team was discussing conceptual ideas we would often sketch a quick diagram to represent that idea, or the understanding of the idea that we had come

to during the conversation. We would often refer to these sketches as placeholders of the concept they represented, and move them around on the wall to mash ideas together with other conceptual representations. As we created the personas, quick sketches of their faces went up on the wall as more flexible placeholders of the ideas they represented. Hutchins (2005) describes the use of *material anchors* or artifacts that stand in as placeholders for concepts, allowing people to use these anchors to perform *conceptual blends* to generate new views or insights into a situation. Hutchins' examples are more subtle than the uses I am describing of The Wall, requiring interpretation and analysis to abstract them from their deep embedded practices.

I realised that interaction designers need to *explicitly materialise the intangible*, so that this material can then be conceptualised, blended, and communicated.

Using these reflections on the way I used The Wall with others, and being inspired by the forensic and TV cop-show genres, I started to imagine the kind of *props* that we might use to engage our workshop participants. Images of agents handing over briefing envelopes with TOP SECRET emblazoned on them, full of 8x10 black & white photos and dossiers of information on their subjects. Imagine James Bond, meets The Wire.

At the same time I was anxious to avoid amplifying the fuzziness I had perceived when speaking to people about Pool. The Wall, as a whole, required a lot of interpretation, and it was important that we present a more focused aspect of The Wall to our workshop.



Figure 41 caricatures anchor the persona concepts in place on The Wall

The emergence of personas as conceptual placeholders in The Wall, while having a simplifying effect, still needed to be constructed in order to 'read' the wall. By placing these sketches of the Persona photographs on different sections of the wall, we reminded ourselves that those sections held material that had relevance to that persona. We *anchored* (Hutchins 2005) the concept with these caricatures, but I found that while we still needed to *construct* these concepts from their underlying elements with people who were new to The Wall. Having these material anchors helped that process: both by making it more efficient—we became more practiced with each retelling of the persona development story—and more apparent—the caricature sketches stood out from their surrounding material, announcing that they were somehow a product of that material while also calling attention to the wider group of similar looking caricatures.

interaction designers
materialise and blend
the intangible



Figure 42 Reuben looking at the wall in our studio

Figure 43 which then found its way into a story about the re-design, posted on the front page of the Pool site (captured 13 April 2009). Our visual language started to permeate the discussion around the Pool redesign. In reflection, I can see this as one tactic we used to controll the open and potentially difficult situation of re-designing a website around an existing community

We had started taking photos of The Wall to post on our project blog, framing sections to use for editorial support. Some of these photos were then used on the current Pool site as well (Figure 43)

We experimented with this visual language and arrived at the idea of using photographs to frame different views of The Wall, cropping most of the whole assemblage out, isolating one or two key points in each image.



These isolated points then operated in juxtaposition to one another, setting up a number of ways to (literally) frame the understanding of what Pool was, and how it could be understood.

We used a wide aperture setting in these photographs, producing a low depth of field in order to accentuate this idea of focus, and high exposure to normalise the colour palette and render the messiness of The Wall as a more textural background. As we started to do this the nature of The Wall elements changed the way we started framing them. You could say they *talked back* (Schön 1983) to us and affected the way we designed these images.

While the images were composed visually, they included many textual elements. Each image captured the collage in a different fashion, anchoring different concepts that we imagined would be useful in the workshop. In keeping with the TV genre vibe, I printed them at A5 size on a heavy stock with white borders. I also had a set of A3 paper versions made to use as an ambient backdrop and to refer to as we discussed the research in the first half of the workshop. I was very pleased with the outcome for a number of reasons. Firstly, we had found a way to bring The Wall—and all that it entailed—with us to Sydney! I was happy that we had been able to find a way to keep the ambiguity in the wall alive, while at the same time simplifying the enormous assemblage and rendering it more accessible to our participants.

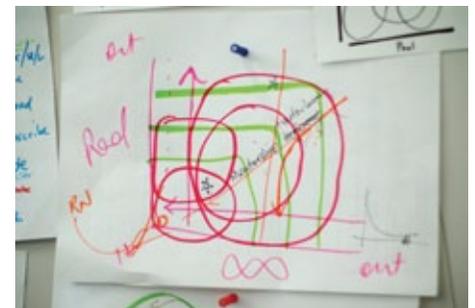
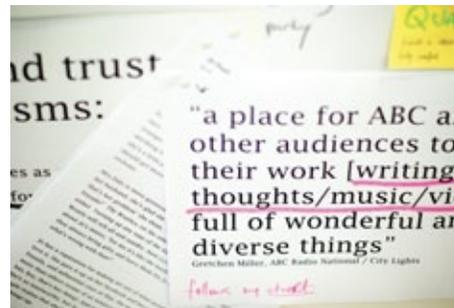
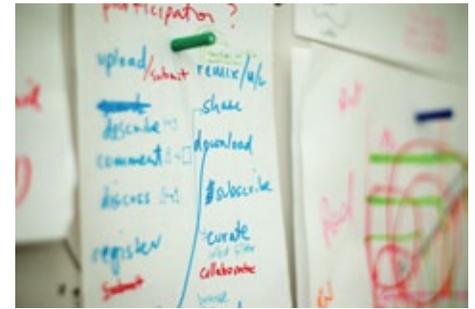
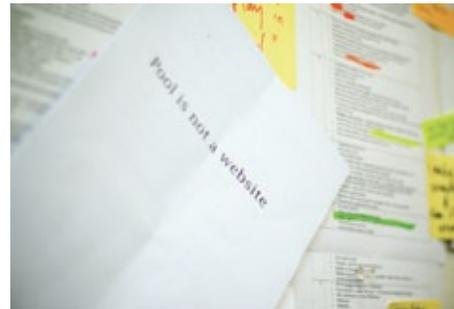


Figure 44 (continues over page) 20 photos of the wall that were used as cards and posters in the design workshop. Images: Reuben Stanton & Author

How can participation improve the quality of works produced?

money would! Sugar join pool?

Share & collaborate with the "professionals" behind the scenes

Critique

collaboration

education

Identity

Pool should stickily clunk

"a space for interesting digital content from weird places in the community Creative Commons offers freedom and possibilities"

"With tooth every"

"POOL has shadowy existence"

Jane Corns, ABC Radio National

integrity

at the ABC existence

"POOL is the unearthed media set"

fan archives

"With LAOT, the tooth fairy deli, every night!"

a collaborative

Younger users are forging the characteristics of effective collaborative

Younger users are forging the characteristics of effective collaborative

collaborative media sharing space

The Pool character is defined by the personality of the people behind it

ABC built on...

the language of

Zara

Quality Expectation

Reputation

Long Term

Current Pool projects in the works

A walking tour of west end

State library of Qld

Focus on strategic partnerships

These partners would struggle to describe what Pool was

See it as a space for experimentation for media outside the ABC

Where the community has much more control

It could be not tied to radio, but generate some radio outcomes

It's seen as building a database of free, contributed works now. It could move away from that

Engage & community - target indigenous people. People who have had several albums, get them to let their stories

Community is self managing - but what happens when the project needs? ABC has a responsibility to allow these people to continue telling stories

SLQ could be the maintainer (what is SLQ??)

Targeted at users who:

- Are burned into it
- Choose media natives
- Also a broad range - generally people who want to contribute to projects
- Media is more important than browsing
- It's "lean forward", but there could be more "lean back"
- Who could definitely be "lean back" is a project, something similar who come to participate, or to get staff to engage with later office responsibility - lean back. If secure audio products;
- ABC has a great product
- Content video may be good to engage online. Auto generated

I make something of it

RECORDING

History

ARCHIVES ARE SAFE

Systemic Challenge to ART

PROFESSION/WORK

THE MEDIA

"POOL is the unearthed media set"

fan archives

"With LAOT, the tooth fairy deli, every night!"

a collaborative

pool character

by the

editorial emphasis

too strong

"things on POOL are about and want other people to think about"

editorial emphasis

too strong

"things on POOL are about and want other people to think about"

MyPool

Rating system

As props in a design *performance*, I felt that the 20 images we chose to produce would be very useful for the improvised performative style that a workshop requires. The team and I were very familiar with using The Wall to provoke conversation and support our ideas, and I felt these images were a more than adequate substitute. To some extent, they were better than the actual wall they were taken from, because their cropped focus on one or two elements was a more explicit material anchor, meaning we did not need to spend time (that we didn't have) constructing these understandings up front.

Figure 45 (clockwise from Right)
Marius presenting at the workshop, with posters of the Wall photographs behind him

Figure 46 Cards made from the Wall photographs

Figure 47 Workshop participants with the Wall photograph posters (left)
Mental Model diagram (middle) and workshop kits on their tables





Communicating Mental Models

This section describes the second of the project artifacts, the mental model diagram.

As I stated previously in the overview of the Pool project, in a lucky piece of happenstance I attended a workshop given by Indi Young that described and demonstrated the creation of what she calls Mental Models. Young's (2008) book, *Mental Models: aligning design strategy with human behaviour*, describes a process for engaging with project stakeholders that leads from semi-structured interviews; analysis of interview transcripts for tasks, philosophies and feelings; looking for patterns in these elements; and visualization of the data for different purposes. Mental models communicate three levels of hierarchy; atomic tasks, more general towers or groupings of tasks, and mental spaces. These three layers bear architectural resemblance to the actions, operations and activities of Leont'ev's Activity Theory (1947).

Young states that “Mental models give you a deep understanding of people’s motivations and thought-processes, along with the emotional and philosophical landscape in which they are operating.” (Young 2008:3)

In the course of Young’s workshop we worked in groups to enact the stages of the method as described in her book. I was inspired by this workshop for a number of reasons:

Firstly, the method was repeatable and rigorous, as it is built on a foundation of anthropological practices of open-ended interviewing and observation. This lent the method a sense of *objectivity* that our current workshop kit artifacts did not have.

Secondly, the method was aimed at producing a very ordered visual representation of anthropological data, called an affinity diagram (Young 2008:3). Casting forward and thinking about the workshop we were preparing for, I thought that the orderliness and implied rationality of these diagrams would *complement* the messiness and subjectivity of the Wall photographs illustrated in the preceding pages.

Löwgren and Stolterman (2004) point out that design demands the ability to communicate in a rational manner, including an ability to “appreciate the client’s understanding of rationality” (p50). This is a useful way of describing why I wanted to complement the messiness of the Wall photographs. My colleagues and I had an implicit understanding that these *expressions* (Dewey 1934) would be good for drawing the workshop participants *into* the types of experiences we wanted to examine, but that they needed to be rounded out or balanced with artifacts that required less interpretation. We needed to bring *statements* (Dewey 1934) into the mix in order to make the workshop experience more congruent with our client’s ideas of rationality.

During her workshop, Young mentioned that she had once left a large printout of a mental model diagram at the company she had prepared it for. It was fixed to the wall in a prominent place (from memory, it was near the bathrooms) with a pen attached to the diagram with a piece of string. This had prompted people to engage with and comment on the diagram in their own time. The diagram had sparked several discussions because it was in a high traffic location. I was intrigued by this use of design artifacts in situ and decided that I would learn more about this kind of design artifact by attempting to build a mental model diagram of the Pool research for us to use in the coming workshop. I had about a week.

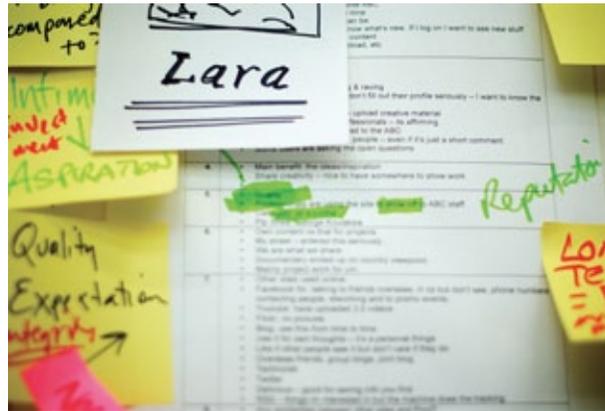


Figure 49 photograph of interview transcript with highlighted action



Figure 48 notebook with list of collected phrases

Making the Model

Young's method is described in a step-by-step fashion in her book, and we had stepped through the method with her in the workshop. I decided to follow the steps as well as I could, with the time available and the materials I had to hand. Whereas Young's method involves open-ended interviews that are planned around the production of the mental model diagram, I had interview notes that had been made from semi-structured interviews that Chris Marmo and Marius Foley had conducted earlier in the project. These weren't perfect for the task, because the aims during the interview were different, however I thought they might be useful, and decided to use these notes, along with the quotes that Marius had highlighted, as the input data for the modelling process.

One afternoon I *combed* The Wall for statements that would help me "*adopt the customer's verbs*" (Young 2008:35) or identify key phrases where people described real or imagined tasks, using their own terms to describe these tasks.

I then began to look for patterns among these task descriptions, grouping them according to their affinity with one another, rather than an external set of categories. As the groups grew, they would split, or combine with other groups, a hierarchy emerged where two or more groups could themselves be grouped together and described in a more abstract fashion.

I iterated this process for a weekend, resulting in a four level hierarchy corresponding to tasks extracted directly from the transcripts at the lowest level, abstractions of those tasks, activities that these tasks were a part of, and mental spaces—at the highest level. This hierarchy is illustrated in the image above. I then began to construct the visual representation of this hierarchy, or build the mental model diagram.

The first stage of this involved generating a diagram that included a box with a corresponding label for each element in the top three levels. After doing



Figure 50 organising, sorting and grouping collected phrases

this I quickly became aware that the elements needed to be re-arranged, and a period of shuffling boxes around ensued. Because I was building this mental model diagram alone, and with limited time, I kept this shuffling to a minimum, but I did notice a distinct difference in the way visual and textual representations afforded analysis and re-arrangement. The mental model diagram built collaboratively in the Loupe project (a month or so later and discussed in chapter 4) included far more discussion and moving of elements after we had translated it into a visual diagram form, and I will comment on these affordances in more detail in the next section, where I describe the Loupe project.

Once I was satisfied that the diagram represented the research—in a way that was useful for us to work with in the workshop—I began to audit Pool for the functionality or features of the current website that supported the groups of activities the modelling process had identified. In Young's method, these elements are grouped and aligned

Pool... a mental model

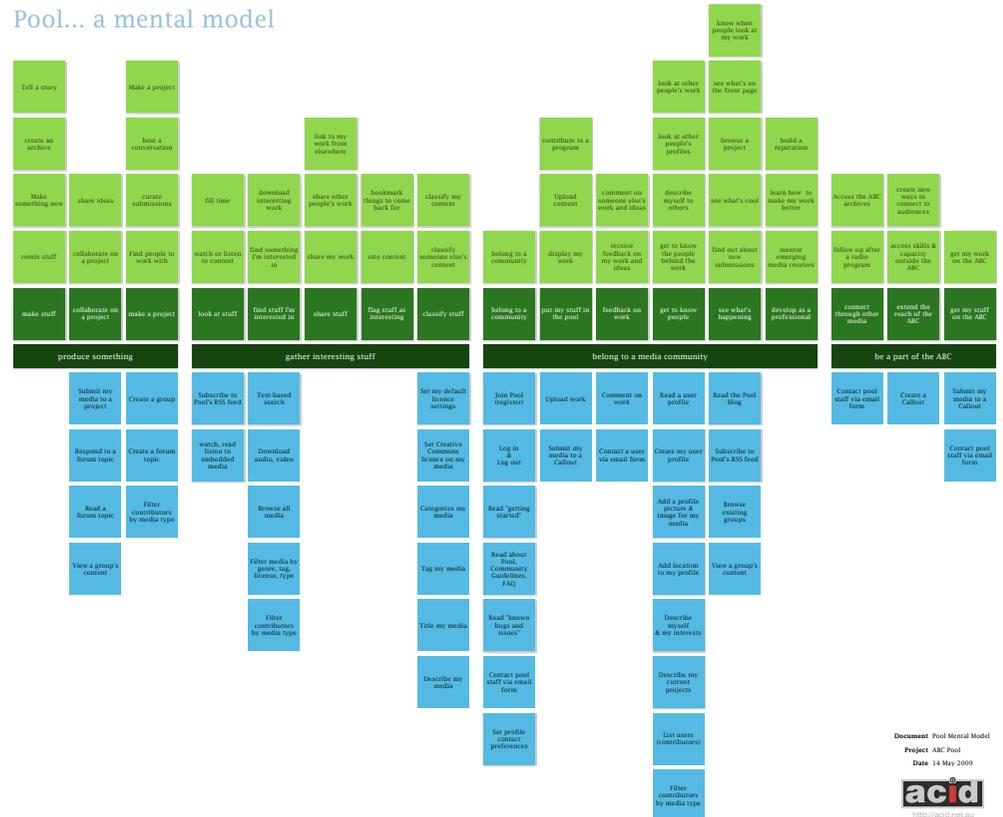


Figure 51 the final mental model diagram used in the design workshop

underneath the activities, to identify 'gaps', or where the design is not supporting the users mental model. I also began to craft the way the diagram would be visually presented: adapting the visual schema that Young used in her book to produce a poster that complimented the other workshop materials we had already produced.

I now move on to describe the workshop: what we did, and what I learned in critical reflection on these design actions.



The Design Workshop

In May 2009 Marius Foley, Chris Marmo and I travelled to Sydney to conduct a design workshop with key stakeholders from within Radio National at the ABC. We had three primary goals for the workshop:

- To convey a sense of what we had discovered through our research to date
- To engage key stakeholders in the project
- To gain some insight into the practices that Radio National producers might use Pool to produce work.

To achieve these goals we decided to begin by presenting what we'd discovered, using the kit of artifacts to represent the ideas as we introduced them. We would then move from this information delivery mode into more of an interactive role, facilitating activities that used these artifacts.

Thinking back to this I can see that we used the artifacts in the kit to anchor concepts in the sense that Hutchins describes material anchors for conceptual blends.

As I mentioned previously, it was important to be able to bring The Wall with us in some sense. I had the photographs turned into cards, like 8x5 prints. Marius also suggested blowing them up to A3 scale, and this proved very useful because we were able to assemble them into a composite Wall in the workshop space, and use this as a backdrop for our presentation. I found that this stood in well for The Wall back in Melbourne, and we had a high degree of fluency and confidence with using this composite wall to anchor concepts as we spoke, and subsequently began to blend concepts and refer to them during the more interactive phase of the workshop. We also had a large printout of the mental model, and the kit of cards with personas, word clouds, diagrams and wall photos. One benefit of having multiple copies of everything was that workshop participants could hold a copy of a wall photo in their hands and begin to build conceptual relationships with it while we were referring to a copy of that image in the course of introducing and discussing the concepts behind it.

Marius began the workshop, outlining our research process to date and giving an overview of the big discoveries we had uncovered through this research. While he did this he used different artifacts to explicate these discoveries. I then described the mental model.

This conversation set up the next activity by anchoring the concepts with different artifacts. We would refer to one of the A3 photographs and describe how it represented one of the discoveries we had made through the research. Alternatively we would discuss our research, lead in to an idea of what a research outcome might mean, and then use a photo or diagram to explain and anchor that concept for later use.

It's useful to see two or more levels of anchoring working here. If I frame the workshop as a performance, then it might be seen as a semi-structured improvisation. The first section was more scripted and 'led' by us than the second section, but in each section, we had The Wall to fall back on for structure. It could remind us of what was important to discuss, and to scaffold a discussion that could easily get very complex, or anchor concepts that could easily get very abstract.

Reflecting on the Workshop

Interaction designers work by “*shaping a material with no qualities*” (Lowgren & Stolterman 2003) and it's easy to see this work getting very abstract and ‘fluffy’ when discussing systems that are only represented in terms of electronic interaction.

A website is more than the pixels that appear on screen at one time, it is also the logic behind individual interactions that unfold over time, and the social interactions that take place as a result of these individual experiences. Ideas can easily spiral into abstract theory and appear fluffy or ungrounded, particularly when discussing them with people who haven't had the opportunity to construct a holistic understanding of the web of interactions that the pixels of an interface represent.

Artifacts, like the Wall, persona cards, and infographics that we used the Pool workshop, help to ground the complex ideas that they refer to. They scaffold the discussion, and are useful for keeping a concept *open* rather than closing it down (or solving the problem). A workshop situation like the one I have just described requires discursive, generative thinking, we wanted to use the time with our ABC stakeholders to construct understandings and ideas that we did not already have. We needed to keep ideas open or *alive*.

Artifacts like the Wall helped us do that. They represent a concept, without *being* that concept. They let people make complex comparisons, blends and conceptual leaps without having to *describe* what those leaps are. For example: *this photo alongside these two personas, in this particular situation, equals an idea that sheds light on the design situation*, AND constructs a bridge between our research and the understandings of our stakeholders, helping us construct authentic engagement experiences.

In the next section, I describe how these workshop artifacts were installed in our clients offices afterwards, and took on a life of their own as a way to engage wider support in the organisation.

The Afterlife of Workshop Artifacts

As I discussed earlier, I had been intrigued by the idea that we might leave a set of design artifacts with our clients and that they might make use of the artifacts we had designed for the workshop to engage with other stakeholders inside their organisation. I dropped a few hints throughout the workshop, relating the story Indi Young had told me in our workshop, when I introduced the mental model diagram.

The format of the cards was also a factor: deciding to print the images on cardboard rather than just on paper, giving them borders so that the images would keep their quality even if they were handled a lot, and the way that all the elements fit together as a set, their colour palette, their size and uniform format all worked together to help build a strong rhetorical foundation for the message they were trying to communicate, and the insights we were trying to provoke.



Figure 52 the new Forensic Wall and Mental Model diagram located near the Radio National office printer

Even with all these prompts, I was still pleasantly surprised to hear that the Pool team at the ABC had fixed the workshop elements to the outside of the walls and doors of their offices, directly beside a shared office printer. These elements stayed up for a few months while the project was building support internally for funding and strategic acceptance. About three months after our workshop I was in Sydney and spoke with our key stakeholder Sherre DeLys, the executive producer of Pool, about the way she and others in the team used these artifacts to engage their colleagues.



Figure 53 Sherre pointing out new elements added to the assembled forensic wall

One thing I noticed when reflecting on this conversation was the way Sherre and her colleagues had built their own *Forensic Wall*, adding new elements to the collection of workshop materials we had produced. Sherre explained that they had added to the existing material partly because they “wanted to cover all the wall space”, but also because they had become aware of the way an element became part of (and affected) the “ecology” of the wall.

I related to Sherre the way different people interacted with the photos of our wall back in Melbourne—which by this time had been packed away. Sherre discussed how she and her colleagues had used these photos and diagrams to help other stakeholders understand both the Pool website, and also the redesign project. It was interesting to hear the kinds of things that these



Figure 54 discussing elements on the Pool teams new Forensic Wall

images communicated, and why Sherre and her team had chosen to construct their own wall.

One reason that Sherre referred to was that the images of the wall were a “demonstration of the participatory nature” of the design project, a “visual representation of the process that went on”. She repeatedly stressed this aspect of the photographs, and why a communication of the process was important to her and her team. By communicating the complexity of the research process and the participatory nature of that process, a sense of rigour was developed.

“You get a sense that this is bigger than one person and nobody could *cook this up*. It’s a matter of collecting a lot of stuff from a lot of people and a few people trying to refine what they see (and) pull some patterns out of it”



Figure 56 Sherre pointing out additions made to their Mental Model diagram

Sherre also commented on the effect that the visual design of the artifacts had on subsequent documents and presentations that she and her team developed. She said that the design of the artifacts we had produced directly informed the visual design of the presentation she used inside the ABC to build support for Pool. When describing the photos, she commented on the way they changed the office space that they were exhibited in:

“...they really speak to people... on a very simple level it gives a *vibe* to our space, it sets it apart from other things that are going on here, gives it a kind of identity...”

Sherre noted that the photos pulled people’s interest in, and “pose a lot of questions” around which a discussion or “Q&A session” could grow.

As she used the photos and other materials (infographics, word clouds, persona cards & diagrams) to engage colleagues she noticed how useful they were as “tools” to describe their project, and also the value of undertaking such a project in a participatory fashion. On this last point, I was very interested to hear that through her experience with us and the Pool redesign, and subsequent telling of this experience with colleagues, Sherre’s views around the process of designing technology had changed:

“I realised that web design should be approached as collaboratively as we think editorially about every other aspect of the project.”



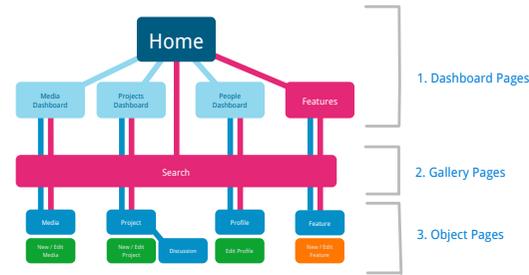
Figure 55 Our workshop artifacts were used to assemble a new forensic wall in the Radio National offices of the Pool staff

Realising Pool

In this section I briefly describe the rest of the Pool project. It covers the period of about a year, from delivery of the report following the workshop until the handover of completed design specification documents to the ABC development partners. While this research is not concerned with these aspects of this project, I do not believe these latter phases any less important. I simply believe that the conceptual phases I have described to this point best describes the way I want to frame interaction design, and design in general.

After this conceptually driven activity, the project started to work towards solving the problem it had defined, which involved me working closely with Reuben and Chris on translating our research findings into design *acts*. For example: the structure of mental spaces (Young 2003) in our mental model was mapped directly onto the navigational and content structure, or information architecture, of the Pool website. I found that the work we had done early on in the project had created a strong set of constraints around these more solution oriented aspects of the project. The phases of the project associated with UX and UI design seemed to run without having to return to the problem setting phase because our goals and activities were well defined, and many of the key ambiguities had been addressed in the Brief building stage.

In order to address our initial findings about Pool—that it lacked a coherent conceptual model, that people were confused about what Pool was and who it was for—we simplified the site's information architecture. This defined what kinds of content there would be on Pool, how the content was conceptually related, and how the different areas of the site were arranged in a navigational structure.



Layout Framework

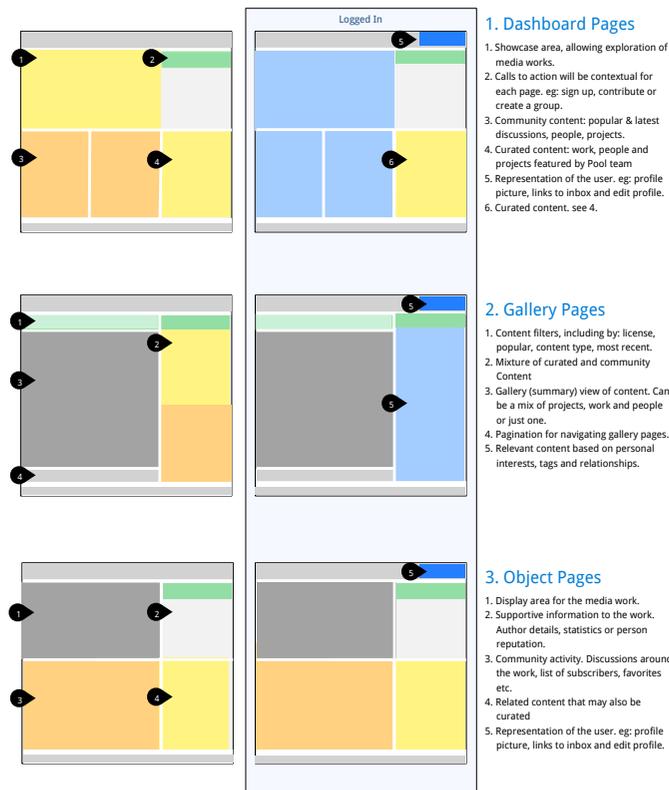
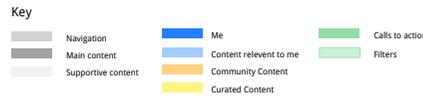
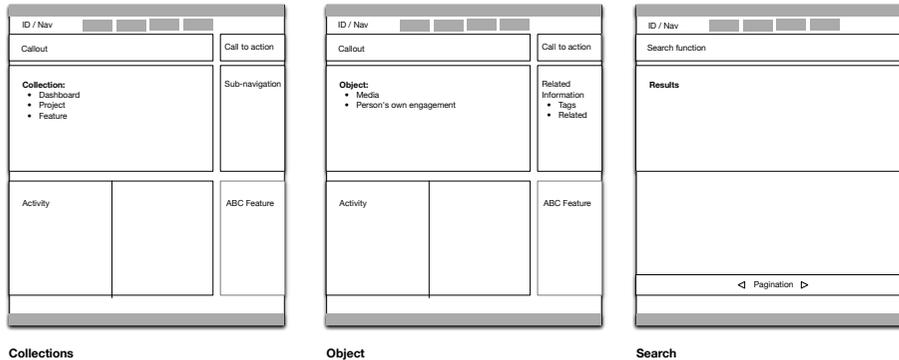


Figure 57 The Pool Information Architecture and Layout framework, illustrating different types of pages. Image: Chris Marmo, Reuben Stanton



From this plan, we analysed the different kinds of pages that a person might encounter while using Pool, and organised them into a framework of page types, designing a set of visual templates for presenting the content on these different page types.

Building on these frameworks, we defined the full set of pages that would need to be designed, and started the process of designing “wireframe” diagrams for each of them. A wireframe diagram communicates where different elements will go on a screen design, but does not attempt to communicate what those elements will eventually look like.

We then designed the visual, or presentation, layer of the Website. This includes layout, typography, colours and art-direction.

Home Page

pool.org.au Design Specification

The Home Page is where people first experience Pool
The Home Page (Lugged Out) is designed to give Pool visitors a browsing, or sit-back experience. People can explore a set of Feature articles by navigation tabs on the right of the Showcase box. Clear and concise descriptions of what Pool is are supported with easily identified call-to-action to encourage participation.

- 1. ABC global header**
Take viewer to ABC site.
NB: viewer will leave Pool with no return route
- 2. POOL Identity**
Links to Lugged out home page.
NB: Pool visual identity is currently being designed
- 3. Top Level Navigation**
Based on the four spaces created to highlight core features of Pool: Media, Projects, People
- 4. Call to action**
Encourages visitor to explore Pool through the 3 key areas: Media, Projects, People
- 5. Showcase box**
Houses the feature pieces selected for display on the Home page. Editorial is added to a feature work by the Social Media Producer #1.
Showcase will feature Media, Projects and People (see Roles) for a description on how these are selected).
New whole article takes visitor to Feature page (below).
- 6. Call to action #2**
Alternative way to explore Pool and understand what Pool is and how the community works
- 7. Call to action #2 Status report**
Data collected from the logs to convey current status and progression. Note geo-location functionality (located)



- 8. Pool Search**
Takes user to top level Pool search results.
Search page provides extra levels of search functionality (Advanced Search via Media, Projects, People, etc. see Search Facets page.)
- 9. Get started: Sign In / Sign Up**
Low entry point; takes user directly to Sign In / Sign Up Page
- 10. Feature navigation tabs**
Takes visitor to each of the Showcase box features; Links to create, media and/or project
- 11. Call-outs**
Call-outs are a feature of Pool. This box contains 3 of the current call-outs to encourage visitor to sample call-out outcomes.
View all call-outs takes visitor to a list page of all current call-outs
- 12. Pool footer**
Links to About Pool/Conditions/Privacy/Licensing/Credits
Add links to Pool's other social media presences such as Twitter and Facebook.
- 13. ABC global footer**
Takes viewer to ABC site.
NB: set common location of footer to approx 300px below the Pool footer.

After these documents had been iterated a few times with the ABC, to define the direction of the ‘look and feel’ for Pool, we began pulling the wireframes and visual design together to communicate a holistic specification. We demonstrated some interaction design (how individual elements in the page would react) by using HTML mockups, and eventually delivered a Design Specification that documented the visual and functional designs for every page on Pool.

Reflecting on Pool

I see the Pool project as an example of the way that reification and participation work to facilitate a *mutual engagement*, that in turn enables a shared sense of *enterprise* (Wenger 1998).

As an interaction designer, it seemed obvious to me that any successful re-design of a website like Pool required engagement and participation from the wide range of people who held a stake in its success. As an executive producer of Pool and longtime ABC radio producer, it was obvious to Sherre that a project like Pool required a strong culture of collaboration and participation in order to thrive in the institutional and cultural landscape it inhabited. For some reason, Sherre's belief in collaborative approaches to decision making had not extended to include decisions regarding technological artifacts, like the software used to run websites.

I had seen this kind of disconnect before: in many guises. Experienced professionals framing their practice in a sophisticated and deep way, revealing the role of interaction and experience on not just the product but also the strategy of that practice, yet still holding instrumental notions of other fields of practice. I myself have been guilty of this.

I found it interesting that Sherre had been able to see a reflection of her own practice in ours. I wondered how the artifacts we had used to engage our ABC stakeholders had supported this.

When I reflect on what I mean when I think about design *work*, I realise that my research is more concerned in the up-front activity of framing a design problem and engaging stakeholders in a conceptual direction than the subsequent design work of producing the outcomes of that design direction.

Interaction design literature has this latter aspect of practice well covered; many books, posts and papers describe methods and techniques for applying a conceptual design direction to a design medium. What I identified as missing from the discourse was any discussion of the ways that designers come up with the conceptual direction in the first place.

This oversight in the discourse led to the incoherence that initially prompted my research; namely that while a lot of design work might look the same, using the same types of methods and artifacts, the way that designers approach these respective artifacts, and the meaning they ascribe to them, can profoundly differ. I have sought to understand this difference by reflecting on the methods I use design to frame a problem, or arrive at Schön's "problem of this problem" (1983:104)

In the next chapter I build on my theories about performative ambiguity by examining the ways that designers modulate their perceptions of affinity.

Perceiving Affinity

Loupe: the social life of visualisation

af•fin•i•ty

|ə'fɪnɪtē|

noun (*pl.* affinities)

...a similarity of characteristics suggesting a relationship, especially a resemblance in structure...

– Oxford Dictionary of English, 2010

Splicing in the Affinity Gene[†]

What we *do* as designers relies a lot on how well we can harness our skills at identifying affinity between objects and the systems those objects create. Many design methods explicitly involve some sort of affinity parsing, or search for isomorphic relationships between disparate and unfamiliar objects.

Card sorting, affinity diagrams, mental models... these are but a few of the many methods and tools designers use to work out what's going on in a situation, and what to do about it.

These process stages are often described in language closely tied to the context of the process being undertaken. For example: in the Mental Modeling process, Indi Young describes the affinity parsing process in terms of the “one of these things is not like the other thing” game from Sesame Street (Young 2004:255).

This fuzziness is necessary for a number of crucial reasons: the main one being that identifying affinity is a constructive process of negotiation between the ‘things’ being grouped and the people doing that grouping. Anyone who’s tried to find clusters in a set of post-it notes can remember the moment when one note reframes the whole set, requiring existing clumps to be broken down differently. In this way, *affinity* is also a process lens we use to get a holistic view of a situation. Conversely, one way of looking at the many frameworks and methods designers use could be in terms of how they help us focus our ability to perceive affinity—our *affinity ability*—between different aspects of a situation.

For simplicity, I have broken this down into three ways that the *affinity ability* is used in design projects; *affinity seeking*, *spotting* and *making*. On the next page, I describe these three manifestations of affinity ability using a cyclical model, with one leading into the other. I use it to frame a complex practice and highlight the role that our perception of affinity plays in design processes.

[†] This title and subsequent ideas owe much to Peter F. Hamilton, creator of the science fiction universe that features a future **biotek** culture, able to share an *affinity* link with animals and synthetic beings.

I can remember, while addressing my IxDA colleagues at our 2009 Director's retreat in San Francisco, realising that **sensitivity to affinity was a fundamental but largely unexplored capacity for interaction designers.**

I had recently finished Hamilton's (2009) collection of short stories, *Second Chance at Eden*. The book contains stories that explore the possibility of humans and synthetic beings sharing perceptions, an ability that Hamilton attributes to gene therapies available in these future cultures.

Spotting Affinity

I'll start with spotting affinity, because this is the most widely understood manifestation of this ability. Sense-making tasks such as card-sorting, mental modelling or analysing coded recordings are good examples of affinity spotting. This analytic ability works with a set of collected data, identifying groups of elements that share properties or structure. In many cases, like mental modelling or card sorting, the process of spotting affinity between elements also helps to make sense of the larger set of data by implying categories or taxonomies that help us to understand how to further cluster the elements. It's a process that feeds back on itself, and it's important here to remember that design invokes Herbert Simon's (1963) *satisficing* to set a breakpoint in this potentially infinite loop. (p 64)

Affinity *spotting* sits in the analysis stage of many design projects, as a bridge between researching the situation and changing the situation. To borrow from Simon again, affinity spotting sits between designers using *afferent*, or sensory channels to gather information about a current situation, and using *efferent* or motor channels to move toward a preferred situation. (pp 55, 66)

Because spotting is traditionally and most easily understood in terms of affinity, I'll use it as an anchor to help describe these adjacent processes.

Seeking Affinity

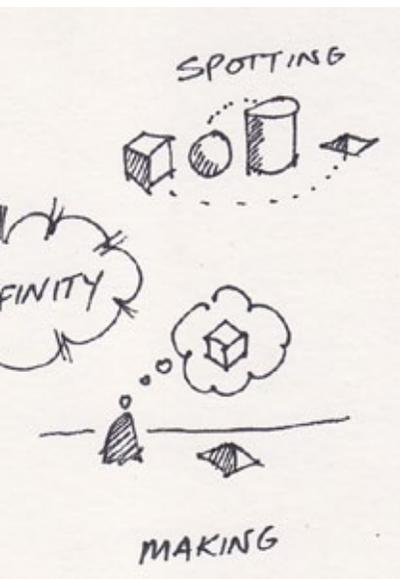
Affinity seeking encompasses activities that help to build that set of elements used for *spotting*. Methods and methodologies including contextual inquiry, ethnography, cultural probes, focus groups, surveys, and even eye-tracking are all examples of affinity seeking.

The link between these kinds of research methods and affinity becomes clearer if we look at these activities as the means to gather a better set of data in order to *spot* affinity rather than goals in themselves. In this way, I'm framing evaluation and observation in terms of how they help us ask and answer questions like "how can I identify and solve this problem?" or, more specifically, "what *should* people do here, and *how* can we bring that about?" It is interesting to look at how affinity ability can help us be better at researching a design situation.

Many methods that I clump under affinity seeking talk about the need for the designer to distance themselves from the situation, to "*leave your assumptions at the door*" (Young 2004) in order to objectively perceive elements in the situation (behaviours, objects, beliefs, actors) without subjective biases.



Figure 58 three approaches to affinity



Achieving objectivity is arguably a futile task, but that's what we try to do when we're affinity seeking. Many methods have been designed to help us fake objectivity and build a data set that satisfies (Simon 1953) requirements for variety, so we can then apply our natural pattern-recognition ability in the spotting phase.

We might look at this faking of objectivity as a suspension of the affinity spotting activity. Turning that part of our brain off, so we don't bias the outcomes with our previous experiences. Of course this is impossible and it might make more sense to think of this process as a suspension of affinity, somewhat akin to the suspension of disbelief we encounter at the movies. It is also worth remembering that not applying something doesn't necessarily imply its absence. Affinity ability is required to suspend affinity *spotting*, and therefore I suggest that a designer can become better at *seeking* affinity by developing a more sophisticated understanding and control over how they use their affinity ability.

Some great examples of this are the many permutations that research methods undergo when they are applied in practice: the *guerilla* or *quick and dirty* versions of methods reflecting the pragmatic views of professionals for whom affinity seeking is a core component of everyday practice.

Making Affinity

The activities previously described help designers to understand the world, but at some stage they need to put something back into the world, to *make* changes. This process of creating things that solve problems can be framed as making affinity.

Many people think that *all* that design does is the creation of artifacts, processes, and things that affect a situation in order to move it towards a preferred situation (Simon 1963). In many ways this is the part of design that many students sign up for, because it is the only part of design that most people experience.

Making affinity is demonstrated by descriptions of intuitive interfaces (affinity with what we know already) or innovative services (affinity with perceived opportunities and latent mental models). This is where Arthur C. Clarke's "magic" happens, and it's here that we can see the challenge for teaching and developing this ability most clearly. Just look at the diversity of schools, approaches, theories, philosophies that aim to enable and augment this ability.

In this section I critically reflect on my second project, titled Loupe. This project incorporated research undertaken with Deloitte Digital for the design and development of an online platform for social visualisation of financial data. I use the Loupe project to illustrate how interaction design can be framed in terms of affinity perception.



Please refer to the Loupe report included in the accompanying artifacts for more detail on each of the artifacts described in this chapter

Loupe

In 2008 I started the Loupe project with the Australasian CRC for Interaction Design (ACID). The project was designed to sit at the intersection of social media and data visualization, drawing on themes including knowledge management, collaboration, engagement, and awareness.

Loupe built on the past 4 years of research undertaken in the MultiUser Environments program at ACID, particularly around remote collaborative work. As fast network infrastructure became more ubiquitous - cloud computing was beginning to be mentioned in business literature - more and more data became readily available in useful formats, which in turn drove an interest in visual representation of data. At the same time, the software ecosystem of the browser was rapidly developing as a serious competitor to the desktop operating system, javascript libraries were being developed that made visualisation more of a design problem than a computer science or programming problem. Hardware manufacturers began to concentrate on graphics performance in domestic



machines, and suddenly there were opportunities for designers to create visualisations without investing a large amount of time in development. Visualisation was an idea whose time had come.

Originally, I imagined that the project would be looking at ways to interface data visualisation with existing social media platforms. This strategy drew on experience I'd had previously with two prototypes created for ACID research projects.

Scribble, was an online platform for annotation of still images, derived from research into Architectural practice (Weakley et al. 2009, Burry et al. 2007).

Protospace was an online platform for annotation of video, derived from research into media production and use of video as a rich recording medium in ethnographic fieldwork (Vaughan et al. 2009).

Both of these prototypes were developed as *skins* or *themes* for widely used open source content management systems. This was the quickest path to demonstrating the ideas behind the design because we did not need to develop the underlying software for file management, user authentication, and integration with email notification and social networks.

Themes

visualization, data, social objects, collaboration, professional services, three perceptions of affinity

Artifacts

workshop sketches, mental model, design patterns, infographics

The Loupe project proposal suggested that social media platforms like blogs and wikis were increasingly being used in business, but the graphical user interfaces (GUI) for these platforms had real problems when it came to understanding what knowledge was contained in a platform, or how someone might begin engaging with that platform. I saw the growing field of data visualisation as a fantastic opportunity to represent the content of these platforms, and to also create new kinds of interfaces for them. All we lacked in the project was a clear industry context, or partner.

In 2009 the team started working with Deloitte Digital on the design of a new online accounting product. We were engaged to examine the opportunities for data visualisation to enhance the user experience of Deloitte's new product. This shifted the area and focus of the research considerably, as I now assumed that we were dealing with a business context that was far less interpreted or negotiated than the contexts I'd built the project around. Spreadsheets, general ledgers, and taxation seemed a long way away from blogs, wikis and twitter. My assumptions proved to be unfounded – as we engaged more closely with our new partners we found that their practices required large amounts of negotiation with both clients and colleagues. This shift in understanding impacted directly on what we concentrated on and produced in the project.

The project plan with Deloitte had originally been drafted to design data visualisation interfaces for their new product, but as the project got underway my understanding of the requirements shifted. As I spoke with our partners, I realised that they were driven by a good understanding of what technology was capable of, but they did not have a foundational understanding of what the people using that technology were capable of, or even desired. Our partners at Deloitte knew what the technology could do, and I saw our role in working with them as helping decide what it *should* do.

Seeing my role in a more strategic light helped me to re-frame the project in a way that gave the team more scope for design, and less risk around development. Our first step was to engage with the people who would be using this product, to see how they talk about what it was they do in their everyday work.

Forces at Play

The Loupe project researched the impact that a convergence of digital platforms for managing data and social connections would have on professional services. The project came into being as a result of the following different technological platforms maturing at the same time: data visualisation, the social web, and financial reporting formats.

Data visualisation was increasingly being used to explore and communicate complex relationships between sets of data, and the technology for implementing data visualisation over the web had become more accessible to developers and designers. Google¹ had just acquired GapMinder² as a flagship in its suite of visualisation widgets, and sites such as the New York Times (Yau 2008) and the Guardian³ were using data visualisation to build the field of data driven journalism (McGhee 2010). Up until now, it had been a technically challenging undertaking to implement data visualisation on a website, but sites including manyeyes⁴, mint⁵, and xero⁶ were demonstrating how data visualisation could not only be used as an interface to data, but could also add value as a point of difference for online products and services.

Social media and networking technologies on the web had been slowly maturing with the growth of online services including Facebook⁷, LinkedIn⁸, and flickr⁹. Freely available content management platforms like WordPress¹⁰, Joomla¹¹, and Drupal¹² made it possible for organisations to easily install and run their own site with built-in social networking and media publishing functionality. Many organisations including Deloitte, had experimented with using social networking and media to enhance knowledge management, innovation, and collaboration (Mcafee 2006) inside their organisation and to engage with their customers (O'Reilly 2005). In this context, the emergence of the *social web* was seen as an important opportunity to explore for customer engagement, particularly where the engagement involved services rather than tangible goods.

A government standardisation initiative completed the contextual framing of the research and helped focus the scope of the project. The Standard Business Reporting (SBR) initiative, run by the Commonwealth Government, had recently announced development of an online portal¹³ designed to simplify the way that businesses report to all government agencies (Bowen 2009). SBR specified a format named XBRL, or eXtensible Business Reporting Language, for the way all reporting would need to be undertaken through the portal. XBRL had also been recommended as a format in the recent International Financial Reporting

1 <http://google.com>

2 <http://gapminder.org>

3 <http://www.guardian.co.uk/data>

4 <http://www-958.ibm.com/software/data/cognos/manyeyes/>

5 <http://mint.com>

6 <http://xero.com>

7 <http://facebook.com>

8 <http://linkedin.com>

9 <http://flickr.com>

10 <http://wordpress.org>

11 <http://joomla.org>

12 <http://drupal.org>

13 <http://sbr.gov.au>

Specification (IFRS Foundation 2008). This created the situation where reports in different global jurisdictions and industry sectors could be compared easily; the comparison process could be automated; and the data from these reports could be represented in different forms, including data visualisation. XBRL already had the attention of the Deloitte Board. In the year prior to the Loupe project, the Deloitte Digital team had demonstrated that by adopting the XBRL standard as the basis for their internal workflow, it had enabled them to produce financial reports for their clients in 20% of the time it took using their current workflows.

These three technological forces set up the initial collaboration between ACID and Deloitte Digital, and strongly framed the project in terms of a technological push. The conceptual space of the product or service being designed—the idea of what it was—emerged as a combination of its constituent technologies. One of the challenges that arises from a product or service framed in such a technical way is that it can easily remain disconnected from the conceptual models and experiential desires of the people who will eventually use it. The technology pushes itself into the product, rather than the product responding to the pull of user needs and desires.

One outcome of the project being technologically framed was that team members often held vastly different ideas of what the aims and objectives of the project were. I found that over and over again we were trying to make sense of what the project was trying to achieve, or

what the project actually meant. One description of the Loupe project could be the story of the evolution towards a shared understanding of the reasons for undertaking the project.

Loupe was a project framed by different traditions of research. The RMIT team was made up of multiple disciplines, colleagues from three schools spread across the University, including Business, Architecture and Design, Media and Communications. The RMIT team had been researching together for over two years in one form or another, and our research concentration was in online collaboration, multiuser environments, knowledge management, visualisation, and interaction design.

The Deloitte team were from Deloitte Digital, a new arm of the professional services firm, specifically aimed at exploring professional services online. Their research agenda was driven by ideas of innovation in services, scalability and a wish to automate some of the more tedious aspects of accounting practice. They also wanted to position their analysts as advisors, and move from tactical to strategic practices which they thought would help retain the best staff and take their existing services “up the value chain”

With all these agendas in play, the two teams came together around the opportunities implied by rapidly developing visualization technology, online social networking, and underneath it all, a newly minted financial data standard called eXtensible Business Reporting Language (XBRL). We both

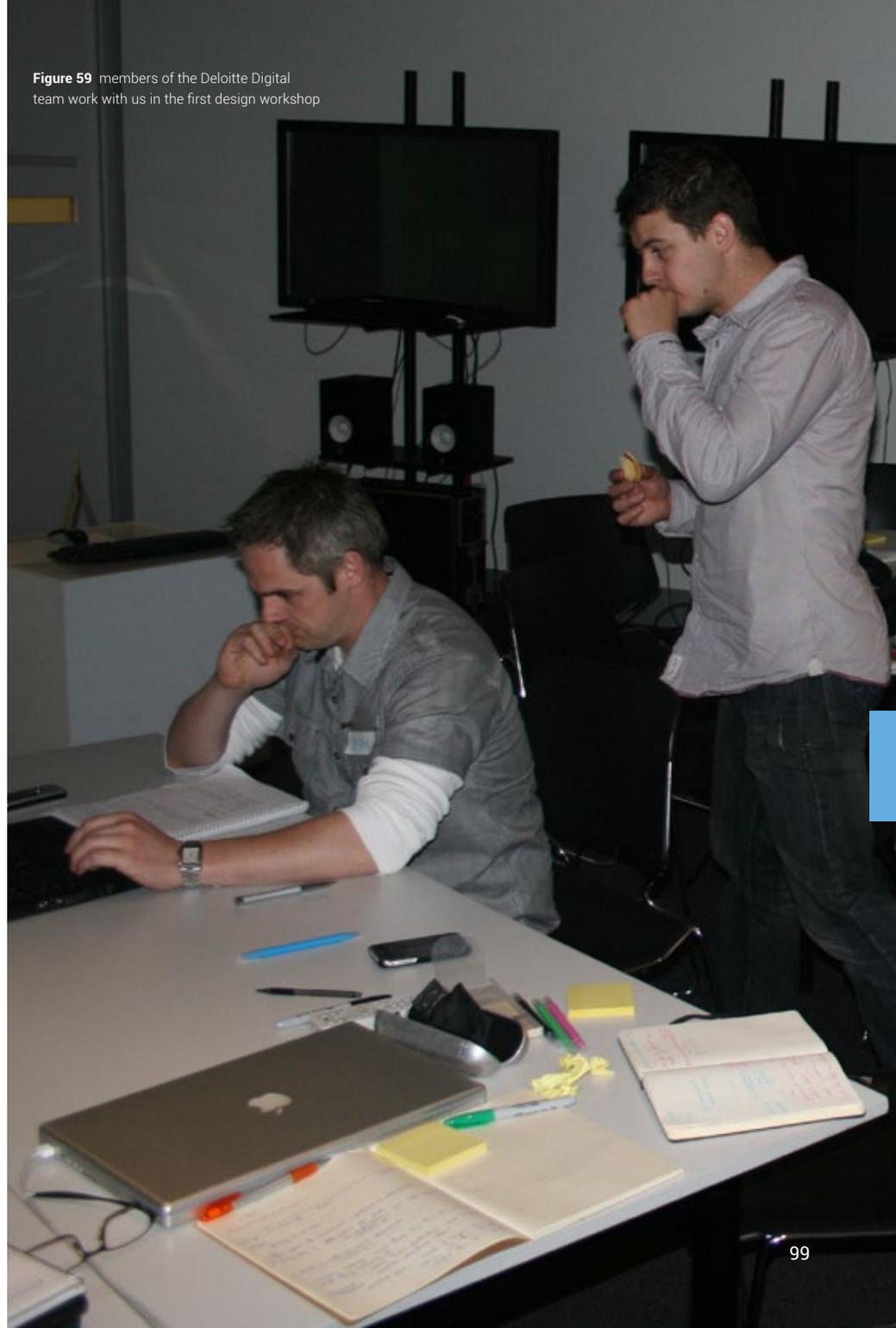
thought that the intersection of these three technologies, and the related changes in practice around social and ubiquitous computing would provide the opportunity to develop innovative services and products for Deloitte's Growth Solutions clients.

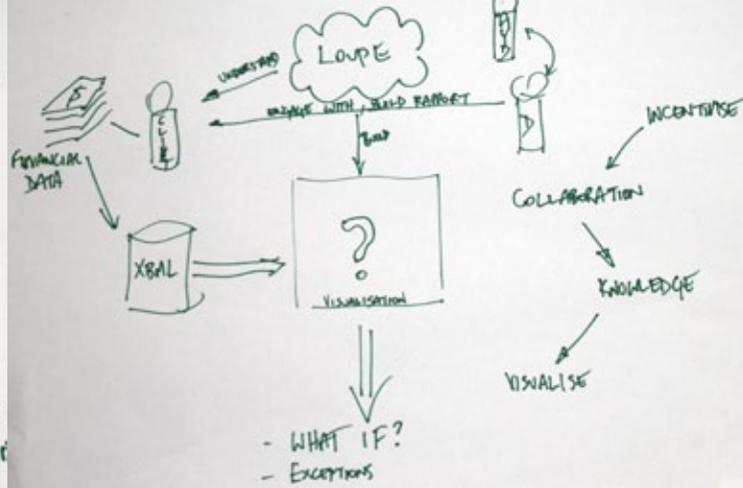
It is important to understand that while the technological forces that brought the project together were identified at the outset of the project, despite having a shared project plan and deliverables in place, the *organisational* forces that played such a big part in shaping the culture of the research took some time to understand one another. As project leader for most of the project, I found that building a shared vision of the research aims took a lot of my time, and it wasn't until the very closing stages of the project that I felt as though ACID, Deloitte and my academic colleagues were beginning to be "on the same page".

A high degree of conceptual ambiguity was quite apparent at the outset of the project, and I planned a team workshop to highlight and examine the range of different ways that the team envisaged what it was we were about to undertake.

In the following section I introduce some key artifacts produced in this project, and frame them in terms of how they demonstrate three different approaches to the designers' perception of affinity.

Figure 59 members of the Deloitte Digital team work with us in the first design workshop





Loupe — WE MAKE DATA INTERACTIVE AND INSIGHTFUL FOR OUR BUSINESS CLIENTS

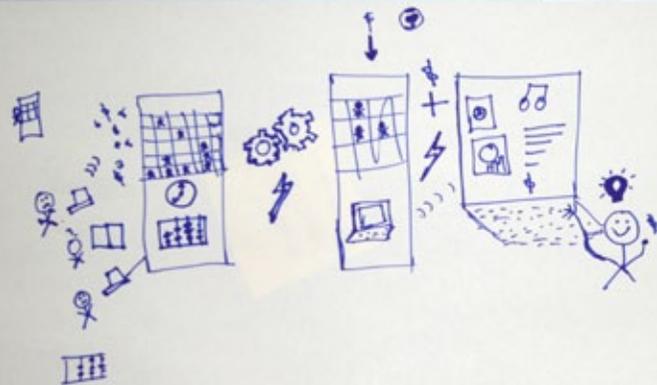
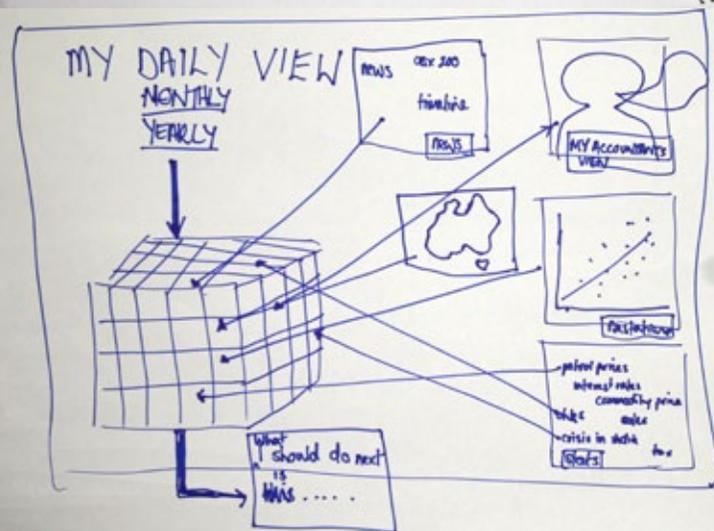


Figure 60 workshop sketches illustrating people's understandings of the Loupe project.

Workshop Sketches

This workshop was useful for identifying the range of opinions held by individuals, and, while it may not have resulted in a converging of the various conceptual models that team members had about the project, it at least expanded each person's idea of the field within which their model of the project currently was placed.

Towards the end of this workshop I asked everyone to sketch a picture of how they envisaged the project. We collected these sketches, and posted them on a private project blog a few days later, inviting the team to add text comments to describe what they were trying to represent in the images. These are the first set of design artifacts that I discuss. I use these sketches and the subsequent online comments that were produced as part of this process to represent the range of ideas that the team held. These artifacts were also used as a way of engaging people to help them make sense of the project. In subsequent sections of this exegesis I refer to these artifacts and the process as the Workshop Sketches.



Figure 61 some of the workshop sketches revealed deeply held perceptions about the project

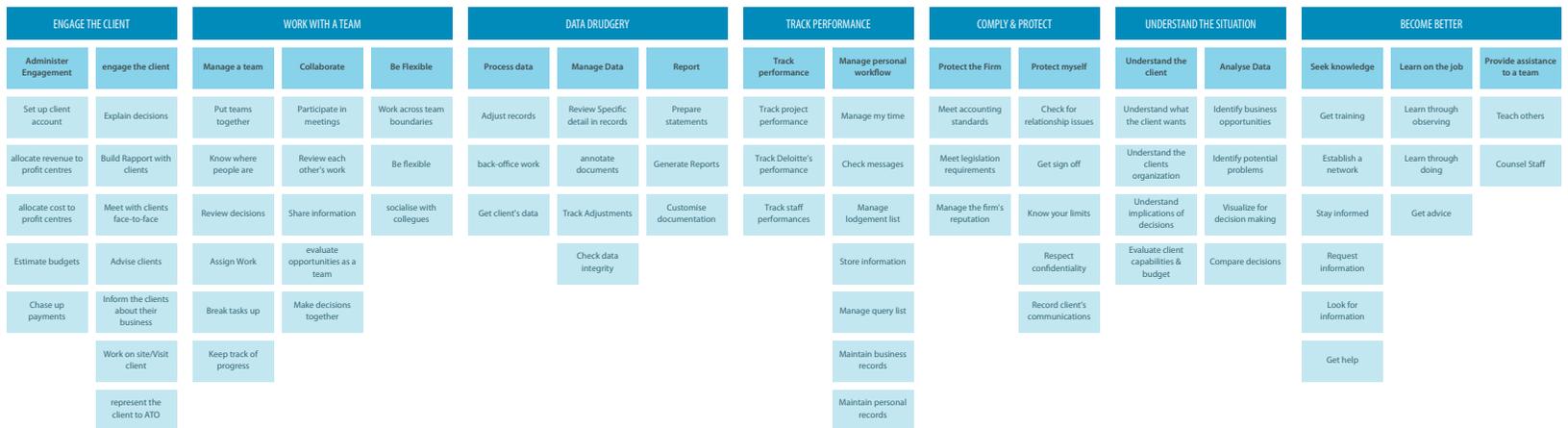


Figure 62 Loupe Mental Model Diagram.

Loupe Mental Model

After this workshop, the research seemed to move in two parallel threads: broadly speaking, one thread involved building an understanding of the people for whom we were designing, the other investigated the fields of data visualisation and the social web.

The first thread sought a more detailed understanding of the everyday practices of people working for Deloitte, and produced another of the design artifacts that I critically reflect on. In December 2008, I undertook initial semi-structured interviews with two members of Deloitte's Growth Solutions team.

Following up in early March 2009, Nifeli Stewart, a PhD student on the project, “shadowed” the wider team for two weeks, observing them and engaging in conversations around their work. Nifeli presented a diagram of her analysis at a project workshop later that month, highlighting the disparity between what the research participants said they did, and what she had observed them doing. From this diagram, transcripts of my interviews, and Nifeli's observational notes, we worked with Hugh Macdonald, a research assistant on the project, to construct a mental model diagram (Young 2008) that we presented as part of a final report to Deloitte Digital. I discuss this mental model diagram later in this chapter, referring to it as the Loupe Mental Model Diagram.

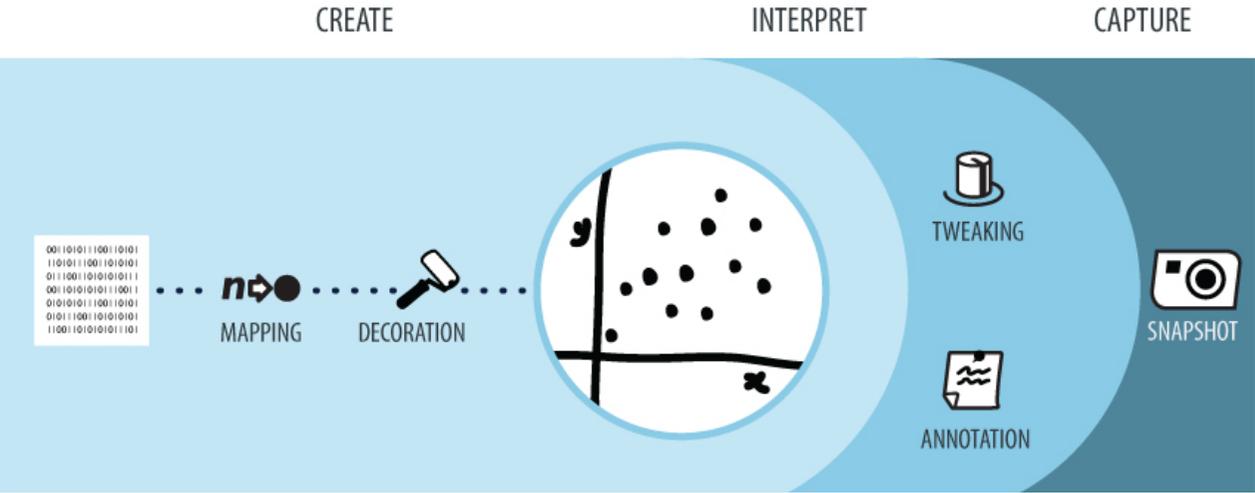


Figure 63 a diagram illustrating the Social-Data-Visualisation-framework, that we developed. Image: Reuben Stanton

Interaction Design Patterns

In a parallel thread of research, we uncovered a wide range of perspectives and information relating to the intersection of data visualisation and the social web. Both visualisation and social technologies had matured to the extent that they were readily available and easily implemented. You no longer required a skilled programmer to offer social networking or data visualisation functionality in web products.

While this commodification meant that people could easily implement these technologies, putting data visualisation on a social web platform was relatively new, with few examples of how to approach it. IBM had worked with the SenseUS project to produce the social data visualisation service ManyEyes (Viegas et al. 2007). Other

socially enabled data visualisation services had emerged that I have listed on page 99—each with its own unique take on how to mix perceived social and visualisation affordances.

I saw our challenge as being one of making sense of the technological complexity to help the people who would be championing the project inside Deloitte, while at the same time working with the developers, to increase their understanding of how these technologies would be experienced. As a response to this challenge the project developed an approach that framed a social web platform using data visualisation as an object centred sociality (Knorr Cetina and Bruegger 2000). We designed and produced a framework of interaction design patterns for social data visualisation, reframing data visualisation as a social object. This framework and its constituent patterns are the next set of design artifacts that I examine. They are described in more detail throughout this chapter, and in two publications (Macdonald 2009, Yuille 2010). I refer to these artifacts as *Interaction Design Patterns*.

Scenarios and Infographic

Up to this point in the project our research had resulted in a divergent set of outputs: the design patterns I have just described, a mental model, and a set of reports on the current state of data visualisation and social web services. As a way of integrating these divergent research directions, I focused the team on designing a set of scenarios to explore potential experiences for using this kind of social data visualisation platform.

These scenarios brought together the understanding of people that we had constructed during the mental modelling process. It also drew on the research into social and technical affordances of data visualisation that we had carried out when designing the interaction design patterns. We attempted to integrate the two parallel tracks of inquiry into two scenarios of use, describing the experiences of an

external client of Deloitte and an internal Deloitte team respectively. I eventually decided that these two scenarios should be combined in a visual way, to better communicate the power that visualisation has on sense-making in a complex situation.

The more we started to look into this, the more logical it seemed to use techniques of visualisation to communicate the complex relationships between actors and forces in the network of people, technology, data and interfaces. During the process of a meeting with members of the Deloitte Digital team I started sketching as they described how they envisaged the eventual platform. Reuben and I worked up this sketch through a process of analysis, sketching, and discussion to represent a scenario that integrated the two inquiries and satisfied our communication requirements. Not surprisingly, producing a visual representation of the narrative caused us to re-evaluate and change some of the details in the original text-only scenario. This text scenario and its visual representation are the final project artifacts that I discuss. I will refer to them as the *Scenario* and *Infographic*.

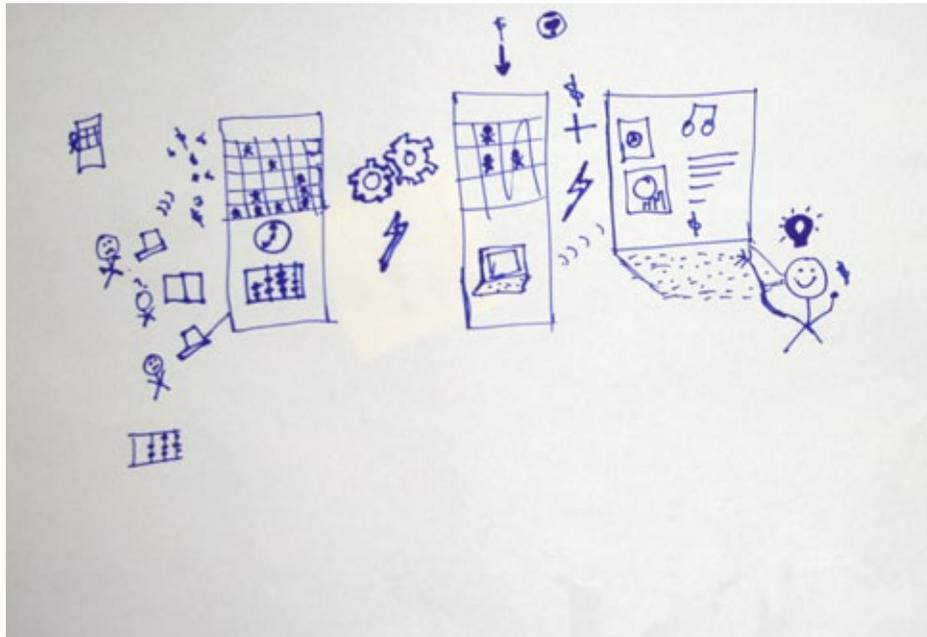
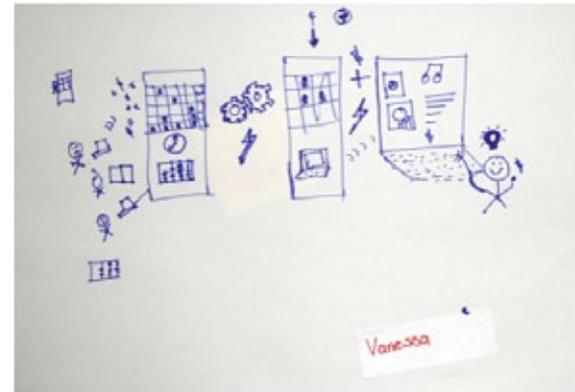


Figure 66 One sketch from the workshop, which was then placed in the team blog. The team member who created the diagram responds to the post by writing a caption for their sketch

img_60351

By hugh | September 9, 2008



Posted in Uncategorized | 1 Comment | Edit

ONE COMMENT



Vanessa

Posted September 15, 2008 at 12:36 pm | Permalink |

Edit

- The traditional way accounting firms have operated involved many junior accountants crunching data (depicted by the abacus and stick figures in the accounting firm building) using data provided from "shoeboxes" full of receipts and basic accounting software packages.
- This method is time consuming and mechanistic, depicted by the funny looking cogs between the
- The XBRL project will require fewer junior accountants working on this type of number crunching, represented by fewer stick figures in the building.

One Cycle of Affinity: *Framing the Project*

We began our client engagement in the Loupe project by holding a workshop with our partners. We wanted to expand the idea of what data visualization is, by demonstrating different contexts for a range of visualizations types.

This took the form of a presentation with a following discussion where we discussed the tone, or qualities of interaction that people wanted to see in this new product. This exercise resulted in people writing down how the product should feel or act on post-it notes, and then arranging these post-its together in groups on a whiteboard at the front of the room. We then photographed these for use, which I'll describe later.

Many methods in this kind of design research use a version of this exercise, and over the years the post-it note has been taken up as not only a good medium/tool for undertaking this process, but also a symbol for this kind of process itself.

After a discussion on the kinds of approaches or character that people envisaged for the product, we asked everyone to draw a picture of what the project looked like to them. This was an open request, and everyone was given blank sheets of A3 paper with different coloured marker pens to use.

Later, back at our studio, we photographed the drawings and posted each one as an individual page on our project blog. We also transcribed the words on the post-it notes and ran them through a visualization tool called Wordle¹. This creates 'word clouds' out of a body of text, to give a quick sense of the frequency and range of a set of words.

One thing I realised very quickly from this exercise of textual analysis was that the project was about people, and the qualities of interactions made possible by a technological platform, not about the technology. This took us back to the interpretive, negotiated space again.

¹⁴ <http://wordle.net>

Commenting, on the other hand is an explicit form of participation, particularly when a person is able to see the other comments made by colleagues. This participation is supported by the ability to ‘name a thing’, with people engaging in conversations around things. It is a normative process, where similarities are recognised and pointed out.

“...when we engage in conversation, we somehow recognize in each other something of ourselves, which we address. What we recognize has to do with our mutual ability to negotiate meaning.” (Wenger p56)

Both these processes are open to negotiation of ambiguity, offering sites for the creation of meaning, but they can be cast as working with ambiguity in different ways: sketching constructs and expands the ambiguity of a situation whereas commenting—either online as we did it, or in person, as also happened in the workshop—reduces the ambiguity of a situation.

Viewed through this lens of ambiguity, a relationship can be drawn between this pair of processes—and therefore Wenger’s duality—and Dewey’s model of *statements* and *expressions* that I discussed in the previous chapter. This conceptual connection prompted me to notice resemblances between my projects. I sensed that their different approaches and outcomes were related, and that these projects were part of a larger more methodological inquiry.

I also frame this set of artifacts as an example of one small cycle of affinity *seeking*, *spotting* and *making* that I described at the beginning of this chapter. The activities of the workshop contribute to *seeking* the set of material within which we then *spotted* affinities. The word cloud exemplifies *making* something that demonstrated our interpretation of the situation, and consequently affected the perceptions and actions of the team and our stakeholders.

Noticing the way affinity was used in Loupe helped me to frame my projects in terms of their approaches to ambiguity, the role that artifacts played in these approaches, and how my colleagues and I drew on our perceptions of affinity in different stages of the projects.



Seeking Affinity: *Interviewing*

Alan Cooper describes the main task of interaction design as being the decision of how to represent the *implementation* of a product so that it aligns with the *mental model* that people have of that product (Cooper 2007). In order to bridge the gap between *implementation*, or how to construct a product, and *experience*, or how a product presents itself, it is helpful to have an understanding of how the people using the product conceptualise that product.

Interaction design practice draws on many methods to help designers get a clearer idea of how the people they are designing for conceptualize a product, including contextual inquiry (Beyer and Holzblatt 1997), anthropological methods (Geertz 1977), goal based inquiry (Cooper 2007) and more.

While the many different methodologies and their methods have different procedures and slightly different driving principles, they all have one thing in common: they aim to help the designer and the design team get a better idea of the design situation by learning more about how the people inhabiting the

design situation (often referred to as *users*) think, perceive, and ultimately *feel* about the design situation. Norman (1988) describes the impact that tacit understanding of a product, or its situation, has on the perception and eventual success of that product.

Many methods use the process of open ended or semi-structured interviews to engage with people in the design situation. Design methodologies may do different things with the resulting recordings of such interviews, ranging from developing scenarios from the stories that interviewees tell (Cooper 1999), through to searching for correlations in the interview transcripts (Young 2008).

With the aim of learning more about the design situation, I planned and undertook semi-structured interviews with a manager and a director of the Growth Solutions team at Deloitte.

I met the participants at their office and we conducted the interviews at and around their workspaces, trying to get an idea of where their daily work practice occurred, and what it entailed. Interviews were recorded using a livescribe smartpen, which allowed me to draw and write while also recording what the participant said. I began the interviews with very broad questions about the participant's role in the organization, asking simple questions like: "*What is it you do here? Tell me about a typical day...*"

While the participant was answering I made a note of any interesting comments, gestures or keywords that I would like to explore in more depth. I came back to these later, using questions like: “*What is this printout that is taped to your desk?*” while referring to a data visualisation that they had pointed to earlier. This led to questions like: “*Can you please describe your workspace to me?*”, where I would draw the layout of the workspace while the participant described their workspace; what it was called, and how it was used.

As the interviews continued, our conversations would ebb and flow. Sometimes I found myself asking a question that seemed to be awkward because we had covered aspects of it previously. I felt a lot of pressure to appear intelligent, to be able to draw conclusions “on the fly”, to reflect-in-action (Schön 1984) on the situation, while we were discussing things. One part of me was always saying to myself: “*try not to talk.. don’t nod your head... don’t agree... hold the silence until they start talking again...*”, all of which was rather uncomfortable. I found myself wanting to be *designerly*, and *clever* at least in a pragmatic sense, and having to deliberately turn that part of my personality down, so that I could actually hear what the person was saying. I was listening in order to understand, which could lead me to pushing further into an area, rather than listening in order to offer a solution. I asked a lot of what must have seemed like silly questions. I think the people I spoke with thought I had no idea about what they did and that they felt somewhat misunderstood. This is interesting to

note, and leads me to think that while I was withholding my judgment and trying to not form a set notion of what was going on in the situation, I was also trying to see the situation through the eyes of the person I was interviewing. I was trying to build empathy with the design situation.

This approach can face issues when the people you’re talking with think you’re looking for *something* in particular, and they think that they know what that *something* is.

I realised that I was *performing* a different kind of design. As the performance went on, I reflected on what it was that needed to change in order for this performance to be effective, and help me to uncover tacit understandings that my interviewees seemed unable to explicitly discuss.

I noticed while I was interviewing the director of the group that her answers seemed to be framed by the project we were working on. These interview participants had not taken part in any of the research before I interviewed them, but their junior team colleagues (analysts) had undertaken a pilot trial of an automated accountancy system, and had discussed aspects of the current research project. I started to see that her answers seemed to be trying to fit with the themes of the project. For example, when I asked what a normal day at the office was like, she made reference to the fact that she didn’t really know about, or have much to do with data visualization or technology.

This statement—that I’m not good with technology—is something that I’ve heard a lot when working as an interaction designer. One of the ways I have learnt to interpret this kind of response is to look beyond the person’s comments on their perceived technical capabilities and understand that they may be going through a tough process something like:

“this project is about technology. I have trouble with some things that fall under the broad definition of technology. This person I’m talking with wants me to help fix the technology. I don’t know much about technology. I’m not sure how I can help.”

When I reflect on this experience as an example of *seeking* affinity, I can see an awareness of performativity starting to emerge. I was forming an understanding that I was performing a role—not as *problem solver*, or even as a *problem finder*, but as a *data gatherer*—and that I had choices in how I played that performance.

I had to, as Kees Dorst says of designers who teach: “*not say everything that comes into my designer’s mind*” (Dorst 2004:82). I had to actively listen, questioning things that seemed obvious, staying quiet when the designer in me wanted to show off. In order to build empathy with the situation, and the people in that situation, I had to *play dumb*.

Director	Talk to clients either over the phone or face to face meetings	Monitoring of team production, work in progress & cash collection via Teamstat and email	On chair team meeting	Business Development Attend monthly professional services match meeting	Attend Directors Function for Directors Throughout Decade in Melbourne	Recruitment of interns, vacationers and graduates	Performance Review for recruiting team and myself	Write on client engagement
	Endeavor to perform over 4.5 hours of chargeable work	WORK on at least one business development opportunity	Attend Partner/ Director meeting	Attend monthly tax training	Adv & counseling team function	Attend the 'State of the Nation' address by Giam Swagers	Set key targets and plan for my client on the strategic client program #CODDICE	Put together new client proposals?
	Lodge time sheet	Holding internet meeting with staff from another division	Business Development Attend G2 middle market meeting with Daria	Facilitating of training for vacationers and graduates	Attend Decade Growth Solutions Summit	Monitoring tax lodgement list	Review of Financial statements and Tax returns	Input Business Development Ideas into SMARTNET
Manager	Talk to clients (generally by phone or email)	Monitor performance metrics of team via web reports	On Chair team meeting	Attend monthly team leaders meeting	Attend quarterly team function	Facilitating of training for vacationers and graduates		
	Endeavor to perform over 6 hours of chargeable work (generally reviewing work)	Follow up overdue debtors by phone or email	Performance Review for counselling team and myself	Attend monthly tax training	Input Business Development Ideas into SMARTNET			
	Attend Recruitment events, such as group interviews for interns, vacationers and graduates	Attend PLAD meetings	Lodge time sheet	Attend Decade Growth solutions summit	Client Site visit to collect documentation for engagement			
S. Analyst	Talk to clients either over the phone or face to face meetings	Attend monthly tax training	Attend team meeting	Development to client site	Facilitating of training for vacationers and graduates	Respond to Client Queries		
	Attend time-sheet check	Lodge time sheet	Sector follow up	Review of Financial Statements and Tax Returns	Financial Modelling	Preparation of Financial Reports such as Balance sheet & p/l & loans (usually analyst does this)		
	Endeavor to perform over 6 hours of chargeable work	Analyse WTHs and propose bills to partners	Manage Queries list	Client Site visit to collect documentation for engagement	Input Business Development Ideas into SMARTNET			
Analyst	Lodge time sheet	Preparation of weekly team meeting (Teamstat)	Attend team Meeting	Attend monthly tax training	Client training	Prepare filing analysis for review with Senior and Partner	Respond to client queries	Prepare yearly performance review
	Endeavor to perform between 3.5-6.2 hours of chargeable work (depending on the monthly target)	Talk to my clients either over the phone or via email	Meeting colleagues to discuss specific issues (e.g. DOD tax, NAA3)	Analyse WTHs and propose bills to partners	Prepare business activity statements for senior review	Career planning	Prepare income tax returns including manufacturing working file for senior review	Prepare performance reviews for engagements
	Prepare sets of accounts including manual/electronic working file for senior review	Meetings with manager and senior analyst to discuss issues with engagement	Meetings with Directors and partners to discuss issues with engagement	Attendance at client meetings	Attend Decade Growth Solutions Summit	Work at the request of Partners, Directors and Seniors (particularly for prior members of the team)	Administration tasks - invoicing, filing, collating, lodgements etc.	Attend the 'State of the Nation' address by Giam Swagers

Figure 68 Nifeli's diagram showing the differences between perceived and actual tasks, according to role. Image: Nifeli Stewart

Spotting Affinity: *Mental Models*

Our reflection on the workshop with Deloitte indicated that we needed to engage with the people who would eventually be *using* this product. At the end of 2008, I conducted open-ended interviews with three people working at different levels inside Deloitte's teams. These interviews went for approximately one hour, and were held in the person's workspace. We discussed the goals of their role, including how they accomplished these goals, and what kind of things (artifacts) they employed or produced in the course of their everyday work.

Nothing much happened for a few weeks, but in early 2008 we were able to embed a PhD student, Nifeli Stewart, within a Deloitte team to collect information. A month later, we had a great deal of rich data to make sense of.

As I previously described, I had built a mental model diagram for the Pool project, adopting the *quick and dirty* approach to the method described by Indi Young (2008). I felt that this diagram had been helpful in engaging the stakeholders of that project, and wanted to revisit this method with the data Nifeli and I had collected in our engagement with the internal Deloitte teams. I also wanted to expose this method to the Loupe team members and see how it worked when more than one person built the model. Nifeli and Hugh transcribed recordings of the open ended interviews I'd done earlier, adding this to the data that Nifeli had already collected. They then did the first run through of 'combing' for what Young (2008) describes as atomic tasks. From this analysis of the interview and observational data we constructed the first iteration of the mental model diagram, translating from the text based spreadsheets to the visual format of towers and mental spaces that characterise these kinds of diagrams.

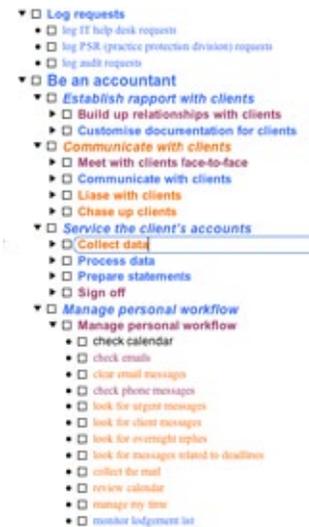
- 
- ❑ Log requests
 - ❑ log IT help desk requests
 - ❑ log PSR (practice protection division) requests
 - ❑ log audit requests
 - ❑ Be an accountant
 - ❑ Establish rapport with clients
 - ❑ Build up relationships with clients
 - ❑ Customise documentation for clients
 - ❑ Communicate with clients
 - ❑ Meet with clients face-to-face
 - ❑ Communicate with clients
 - ❑ Liaise with clients
 - ❑ Chase up clients
 - ❑ Service the client's accounts
 - ❑ Collect data
 - ❑ Process data
 - ❑ Prepare statements
 - ❑ Sign off
 - ❑ Manage personal workflow
 - ❑ Manage personal workflow
 - ❑ check calendar
 - ❑ check emails
 - ❑ clear email messages
 - ❑ check phone messages
 - ❑ look for urgent messages
 - ❑ look for client messages
 - ❑ look for overnight replies
 - ❑ look for messages related to deadlines
 - ❑ collect the mail
 - ❑ review calendar
 - ❑ manage my time
 - ❑ monitor lodgement list

Figure 69 we collaborated on sorting and clumping the atomic tasks

As the diagram began to take shape, we rendered it into a physical form: cutting out the atomic tasks we had identified and shuffling them around collaboratively. The interactions between the team members then changed, as we started to move pieces of the model around, and engage with the meanings and implications of each move. I noticed that we started to develop a language for explaining moves (when we'd move a task from one tower to another) and clustering (when we'd try to name the towers, or collections of atomic tasks and mental spaces, or collections of towers).

As the personas and photographs of The Wall had scaffolded the workshop participants experience of creating scenarios, the mental model diagram scaffolded our interactions with one another inside the team, and with the understanding of the situation we were examining. Building a mental model diagram helped me understand how both Nifeli and Hugh perceived the problem that we were exploring in the project.

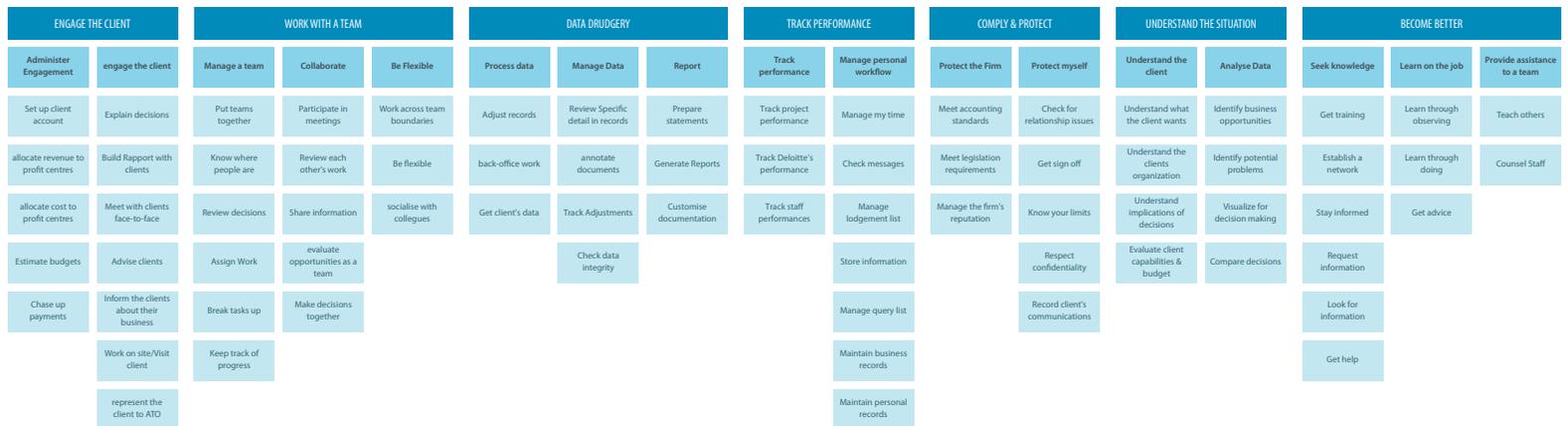


Figure 70 Loupe Mental Model Diagram

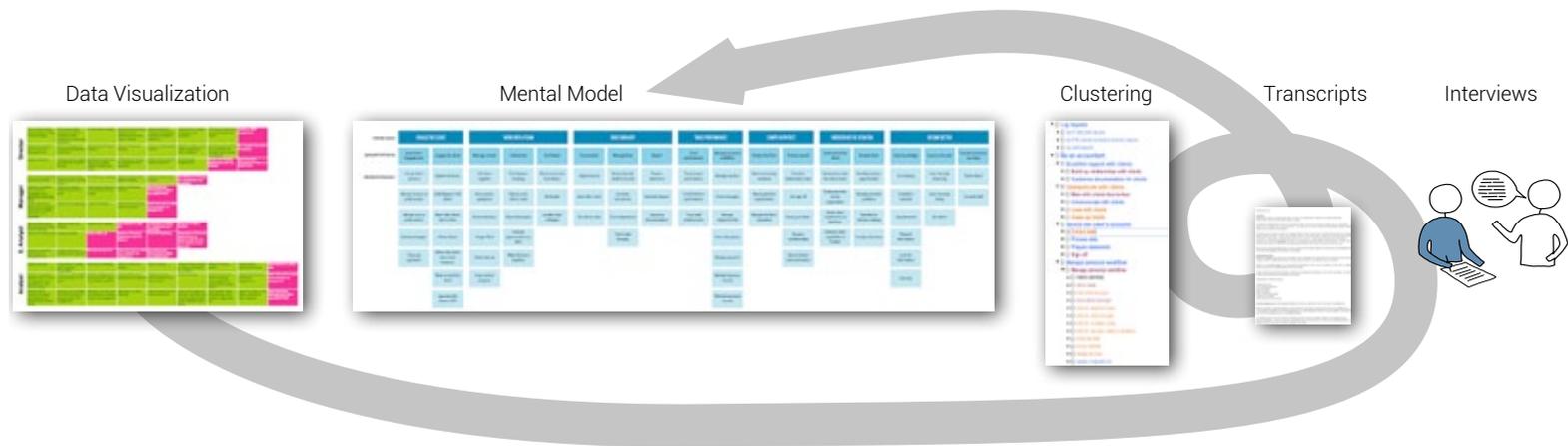


Figure 71 diagram of the process of moving from original diagram through interviews and analysis, to constructing the mental model diagram

The mental model diagram for Loupe went through more iterations than the model for the Pool project. It reflected more than one perspective of the situation, and for this reason was a more general and abstract than the mental model diagram I had designed for the Pool project. Stakeholders from Loupe engaged very differently with their mental model diagram than did the stakeholders from Pool. The Loupe mental model diagram lacked a singular viewpoint and was, I believe, less provocative than the mental model diagram used in the Pool project.

In reflection, I think the Loupe diagram suffered a little from trying to be “all things to all people & situations”. Perhaps more time spent on the Loupe mental model diagram would have focused its rhetorical intention, but the general nature of the diagram can also be seen as a product of the exploratory nature of the project.

Unlike Pool, Loupe did not have a clear brief to deliver a solution, the project was still working to better define the problem, or avenue of inquiry for the research. The mental model diagram constructed for Loupe reflected this strategic difference in the two projects, and how collaborative the process of constructing the mental model diagram had been in either project.

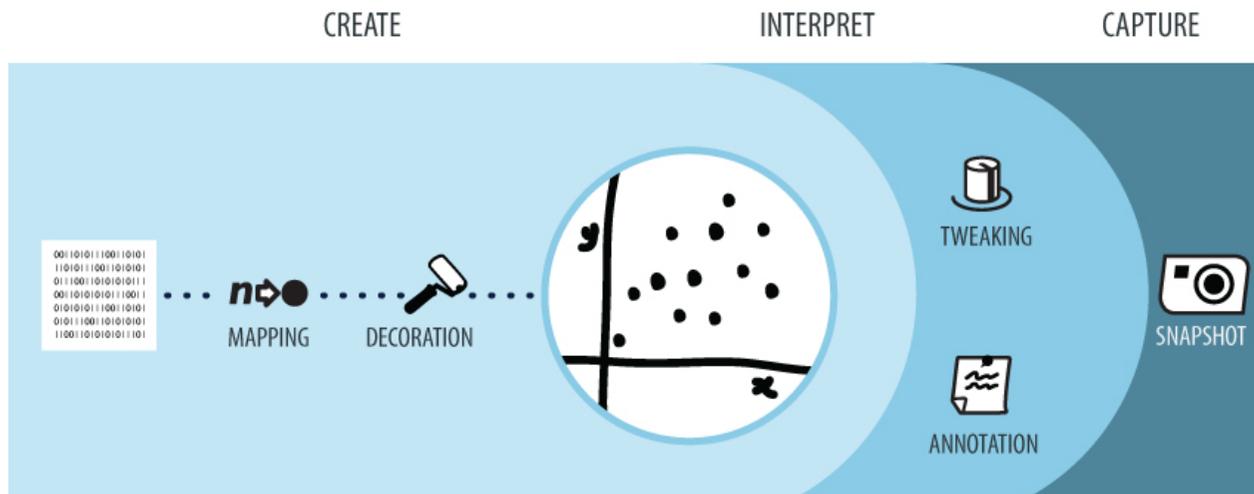


Figure 72 a diagram illustrating the Social-Data-Visualisation-framework.that we developed. Image: Reuben Stanton

Making Affinity: *Interaction Design Patterns*

In conjunction with our Deloitte stakeholders we continued to research current trends and developments in the social web and visualization. My focus was on areas where these two ways of looking at things intersected. In particular, sites that used social networking technology platforms to share data sets or visualizations of shared data. As our understanding of the field grew I noticed that the field seemed to be missing a unifying approach that integrated what was known about data visualisation and what we knew about ways to engage people around artifacts on the web.

On this basis, I decided to take our research back into the individual areas of visualization and social interaction design, keeping an eye out for approaches that reflected an intersection between these two fields. To help frame this process, we asked of ourselves questions such as: “How does social media gather people around artifacts? How are knowledge and reputation communicated

through and around artifacts? How does data visualization help you to design for multiple users? What approaches are used to encourage negotiation of meaning in data visualization?”.

During this time a number of texts were being published by the professional presses that used design patterns (Alexander et al 1977) as a framework for discussing interaction design (Tidwell 2005, Crumlish and Malone 2009). The scaffolding framework of design patterns was gaining currency in the interaction design community as organisations such as Yahoo! began to use design patterns to communicate their user interface guidelines and products.

Common approaches to design patterns share a primary set of components: (Yahoo! 2010)

- a title
- a problem
- a context
- a solution

These components may be augmented with additional elements such as: a visual representation of the pattern, a rationale for why the pattern works, comment on any issues to be aware of in the application of the pattern, and a list of related patterns or where that pattern fits into a wider pattern language (Alexander et al 1977).



Figure 73 The social visualisation patterns web site

In keeping with this industry development, I decided to explore design patterns as a frame for the research, putting the idea of what a pattern was up as a scaffold to support the analysis of our desktop research. The subsequent synthesis of this research was then turned into design propositions for visualization on the social web.

The use of patterns gave the team a way to focus our desktop research. We had a lot of data to filter because the popularity of visualization had exploded in the preceding year, mirroring the ease of access to technologies for easily implementing social media platforms (O'Reilly 2005). The social web was growing exponentially, and with that growth came a renewed interest in the role of design in making successful platforms for social web engagement. At the same time, more and more people were engaging with data visualization, and developers were releasing code libraries to make integrating visualization of data to web applications a commonplace affair. Social data visualization had become a viable strategy from a technological perspective and many platforms had begun to put these two ideas together, including Tableau software, IBM's Many Eyes, and Swivel. [Refs]

At the same time, there was renewed discussion in the design community about the concept of social objects. As a corollary to object centered sociality (Knorr Cetina et al 2000) where social behaviour is driven by non-human entities, theories of social objects are concerned with the qualities of the objects or artifacts that people cluster around. Hugh McLeod (2007) states that: "social networks grow around

social objects, not the other way around” and Jyrge Egenstrom (2007) discusses the social gravity of a social object, or how many ‘handles’ it has that afford discussion and social interaction. The renewed interest in these ideas led me to think that no one had taken a step back to look at how data visualization operated as a social object, and the impact this view might have on the design of data visualization interfaces and social platforms. To address this gap, and keep things at a medium level of abstraction, I decided to use design patterns as our framework for communicating our designs in the project.

A design pattern operates like a bridge, moving ideation between abstract and concrete domains of a problem. The creation of a design pattern forces the designer to consider these two domains, and to choose ways of communicating a problem-solution pair that is specific enough for other designers to be able to use it effectively and general enough for other designers to be able to recognize when to use it.

Formats can be artifacts too. By choosing to use design patterns I was acutely aware that the development and design communities had adopted design patterns as a lingua franca (Erickson

2000), or as a way of communicating between the frames of user experience and implementation. Erickson describes the disciplinary diversity of interaction design teams, and the lack of shared concepts, experiences and perspectives that this diversity entails. He proposes that design patterns, and pattern languages, can be adapted from their use to date in architecture (Alexander 1979), software engineering (Gamma et al 1994) and interface design (Tidwell 1999) to the situation of interaction design, working as a lingua franca between diverse disciplinary collaborators.

This form of a design pattern communicates something more than just the information contained in the pattern, it communicates a way of framing the information, and the context that information relates to. It says to the developer and the designer: “I understand how you see the world, and I think that a generalised system will be more useful for you than specific examples that you then have to ultimately generalise from in order to implement them” Communicating with design patterns also assumes that the context for the patterns is able to be described in terms of a pattern language, or meta-framework. Whether the pattern and its related pattern language is a correct or true representation of the contextual situation is not the point.

The point is that a set of design patterns communicates that its authors viewed the contextual situation in this abstract modular fashion. The format carries meaning that implies a perspective.



a pattern language
is one kind of design
performance



a format can also
be an artifact

Our pattern research resulted in the development of a set of five design patterns related to the use of data visualization in social web services (Macdonald et al 2009)

Detail of these patterns can be found in the included Loupe Report document. It describes the following set of interaction design patterns:

Mapping - support for the process of taking data into a visualization

Decoration - presenting that visualization as a social object

Tweakability - an interface to the visualization, to explore different configurations of the data

Annotation - ability to mark and annotate different elements of a visualization

Snapshot - ability to recall associated configurations and annotations, to ‘see what I saw’

These design patterns are described and illustrated in the Loupe report, contained in the supplementary material.

There is a relationship between the individual design patterns and the framework that they sit within. While not extensive enough to be called a pattern language, there is a hierarchical relationship between the design patterns described and their respective framework (figure 74). This framework situates the individual patterns in a context of application, and in relationship to one another.

The process of creating a coherent set of design patterns had a number of effects on the way the design team worked together. Proposing a pattern required us to synthesize the wide range of literature, observational and comparative research that had already been conducted. It also required the team to communicate design concepts as “user stories”, in the form of “People will be able to...”, rather than “The software will provide the function to...”. The language and schema of design patterns helped to make the ideas uncovered by the research team much more specific to the design of user interfaces for data visualization. This specificity helped keep conversations between the design team members grounded in the user experience, and anchor this dialogue to concrete interactions and their corresponding interface elements.

At the same time, engaging with multiple patterns helped scaffold a discourse of synthesis and abstraction for the design team. Once we started working with multiple patterns, a complex process of ‘trade-offs’ began. The number of patterns present in the entire set began to affect the level of detail used to describe each pattern. Fewer total



design patterns meant that each pattern had more ‘ground to cover’ and was therefore described at a more abstract level. The combination of these two discourses helped the team to identify new ways to interpret the research and new contexts where it might be applied. This process helped to identify points of innovation in the area of social data visualization that the project had uncovered. For instance, the inclusion of a snapshot pattern created a feedback loop in the pattern framework, that we later applied in the scenario infographic describing how the creation (and sharing) of particular views on information (snapshots) introduce the opportunity to recognise novel correlations in data and develop innovative products & services.

Alongside the creation of these design patterns, a diagram was designed to describe these patterns as part of a coherent framework (figure 73 on page 120).

The process of designing this diagram impacted on elements of the individual patterns. For example; the names given to each pattern were discussed at length by the design team, to ensure that they helped support a coherent understanding of the framework as a whole. At the same time, the framework changed many times seeking an effective visual and conceptual schema. The process of drawing and tweaking this artifact prompted dialogue driven by the tension between individual patterns and their parent framework. This enabled the team to position the contribution of the project within the meta-discourse of behaviour and the social web. The patterns and their corresponding framework helped to frame discussion around the kinds of actions people undertake when sharing online, and how this might affect the design of interfaces to support this behaviour with financial data.

The design patterns that we designed for Loupe are good examples of Dewey’s (1934) statements: they describe the elements required for an experience, and set out the conditions under which that experience may be had. The use of design patterns supports a pragmatic view of ambiguity, seeking to remove or reduce it to acceptable levels for either side of the experience—implementation divide. One outcome of this research and design activity is a re-framing of data visualisation as a dialogic interface element, rather than a purely descriptive one. A framing that returns us to the forensic nature of design artifacts, and their role in designerly discourse. I will now describe how we used another type of visualization to integrate these mental model and design patterns with scenarios of use.

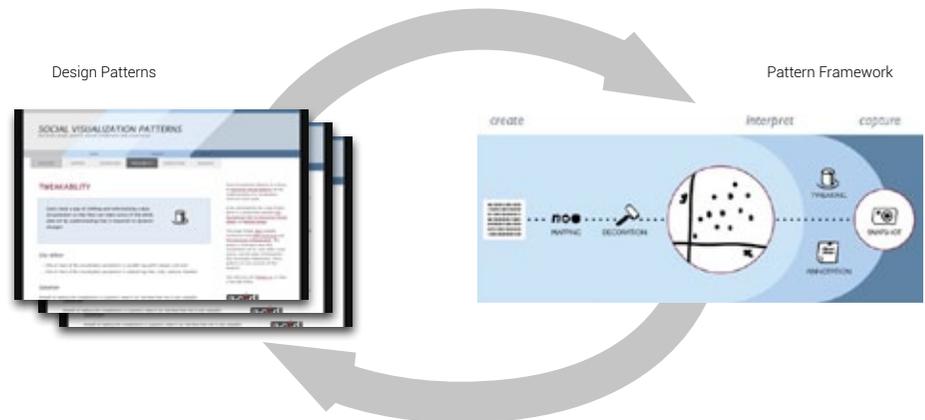


Figure 74 Working on the patterns affected the framework or language, and vice versa

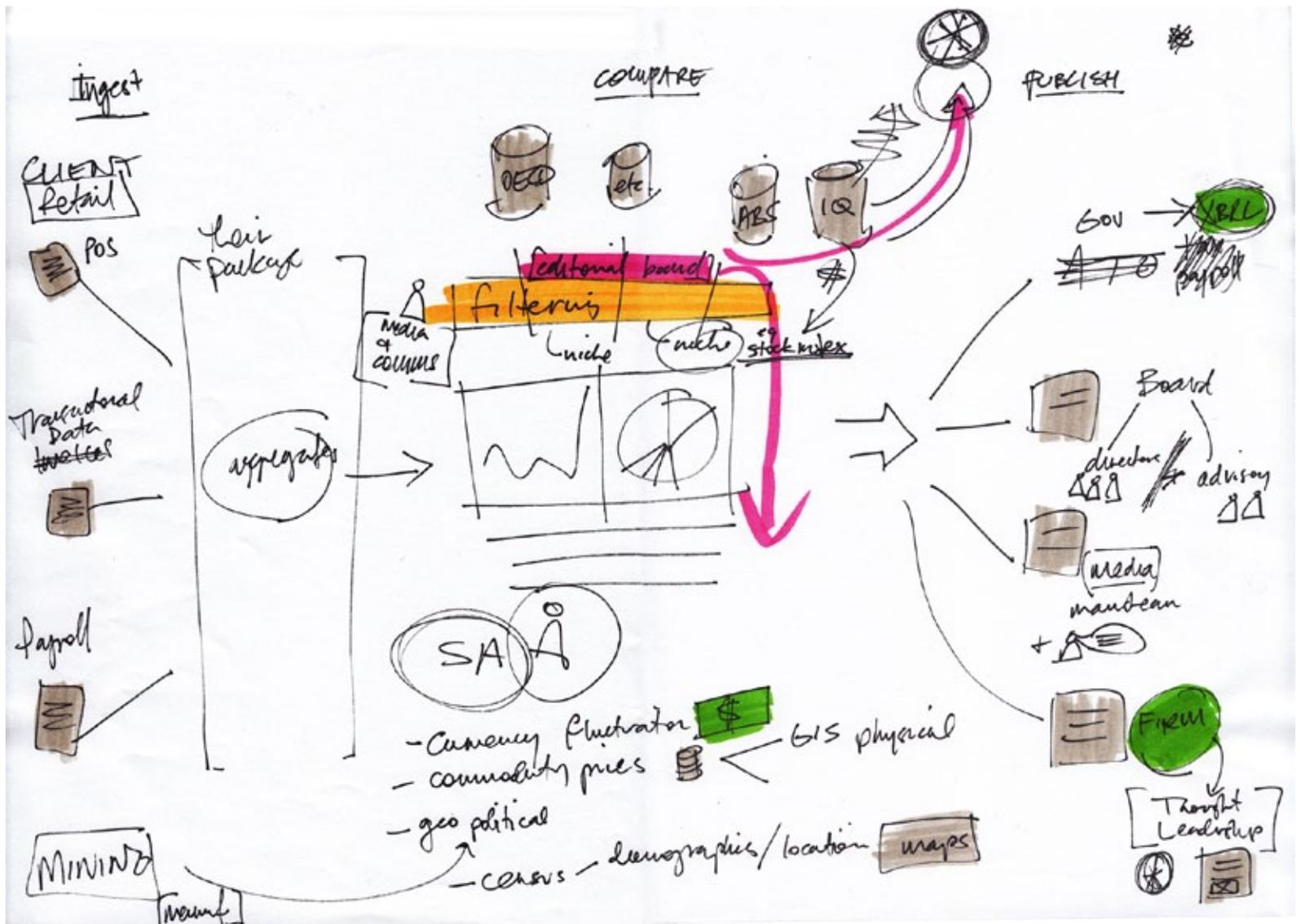


Figure 75 Diagram sketch of the project in terms of the flow of knowledge through a platform

Making Affinity: *Infographic Scenarios*

After using design patterns to explore how interfaces might aggregate social affordances, and qualitative methods to identify and discuss current practices in the accountancy workplace, I decided that these previous outputs should be integrated into something that helped our project stakeholders understand how their future practices might be affected by these findings.

Scenarios have been used extensively to help generate deeper understandings of situations that don't exist yet. Scenarios can help uncover implications and relationships between elements in a design system, particularly unintended impacts of a system, leading to a greater awareness of the impact of proposed designs and potential opportunities for evaluating progress (Cooper 1999).

Reflecting on our work looking at Deloitte practices, and our previous experience with technology uptake and acceptance in previous ACID projects, I believed that any scenarios we used would have to bear enough similarity to Deloitte's current practices for them to be able to imagine a progression over time between where they are currently and what the scenario described. The scenario would also need to be different enough from Deloitte's current situation to imply the changes required to make this scenario possible.

I brainstormed Online Accounting 2012 with the Loupe team. This resulted in a set of two scenarios, looking at how data visualization would be used in an online accounting product. The scenarios told the story of people using a fictional online accounting system that integrated social data visualization technologies to deliver advice and support financial decisions to external clients. The scenarios also uncovered the opportunity to develop what we labeled an innovation and knowledge platform for use internally at Deloitte. These topics were used to help make the narrative of the user experience less abstract, as they corresponded to areas of practice change that we identified in our research for the mental model.

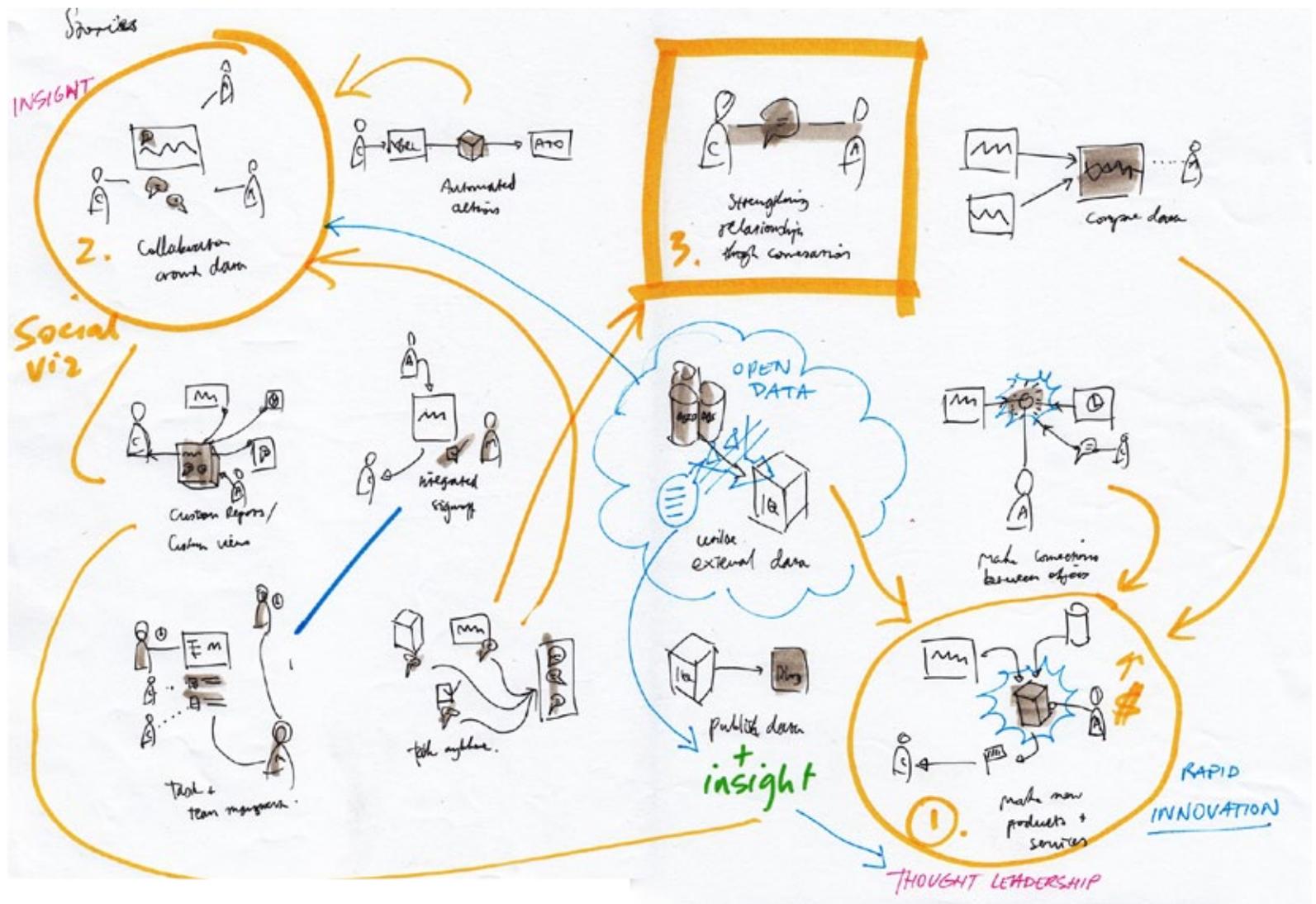


Figure 76 Transactions between people and objects in the system. Annotations used to group activities and decide what transactions were more important to show. Image: Reuben Stanton & Author

At one discussion with Deloitte stakeholders, I began to diagram what was happening in these stories, and quickly realised that the text-based scenarios were highlighting the transactions between people. I found that the form of the textual scenario privileged a linear understanding of time and space, where actions between people are perceived to occur one after the other. This way of communicating requires a reasonable level of narrative skill to build a holistic, non-linear understanding of a set of complex transactions. In the realm of fiction, the oulipou and associated authors (Perec, Borges, Calvino to name my favourites) have experimented with this kind of craft, but designers don't have the luxury of time to devote to crafting a scenario in this way. Moreover, designers are not novelists, and the text is not an outcome in itself, it is just a tool or process for getting to a better design outcome.

The linear experience of the scenario narratives contrasted with my initial objective of constructing a holistic picture of the ecosystem of interactions that were occurring in the organisation, and what these changes might mean for the firm as a whole. Consequently, we decided to further explore this tension, between the linear scenarios and diagrams that communicated a more systemic perspective. Our sketches initially reflected a 'flow' of information and knowledge through the technology platform our stakeholders were proposing to produce (figure 75).

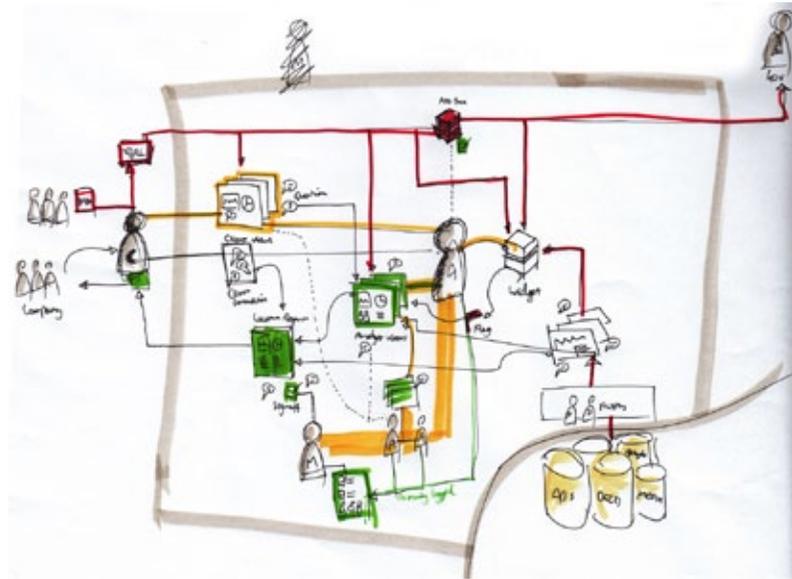


Figure 77 An early attempt at integrating both perspectives into a single visual schema. Image: Reuben Stanton

We then decided to analyse this situation by describing the range of transactions that currently occurred between people in their work activities. This design move involved analysing the written text for transactional interactions between individuals, and had similarities with the way we would abstract atomic tasks (Young 2008) from their context in the mental modelling process (fig 76).

Discussion of the two diagrams, shifted our understanding of the written scenarios that we had developed. As we analysed the interactions in the system from platform and transaction perspectives, we decided that a trade off between communicating among a wide group of stakeholders and communicating the designs and their effects with a high level of detail would have to be made. We attempted to integrate the two previous sketches into one view, drawing on a subset of the transactions and a simplified idea of the platform, resulting in figure 77.

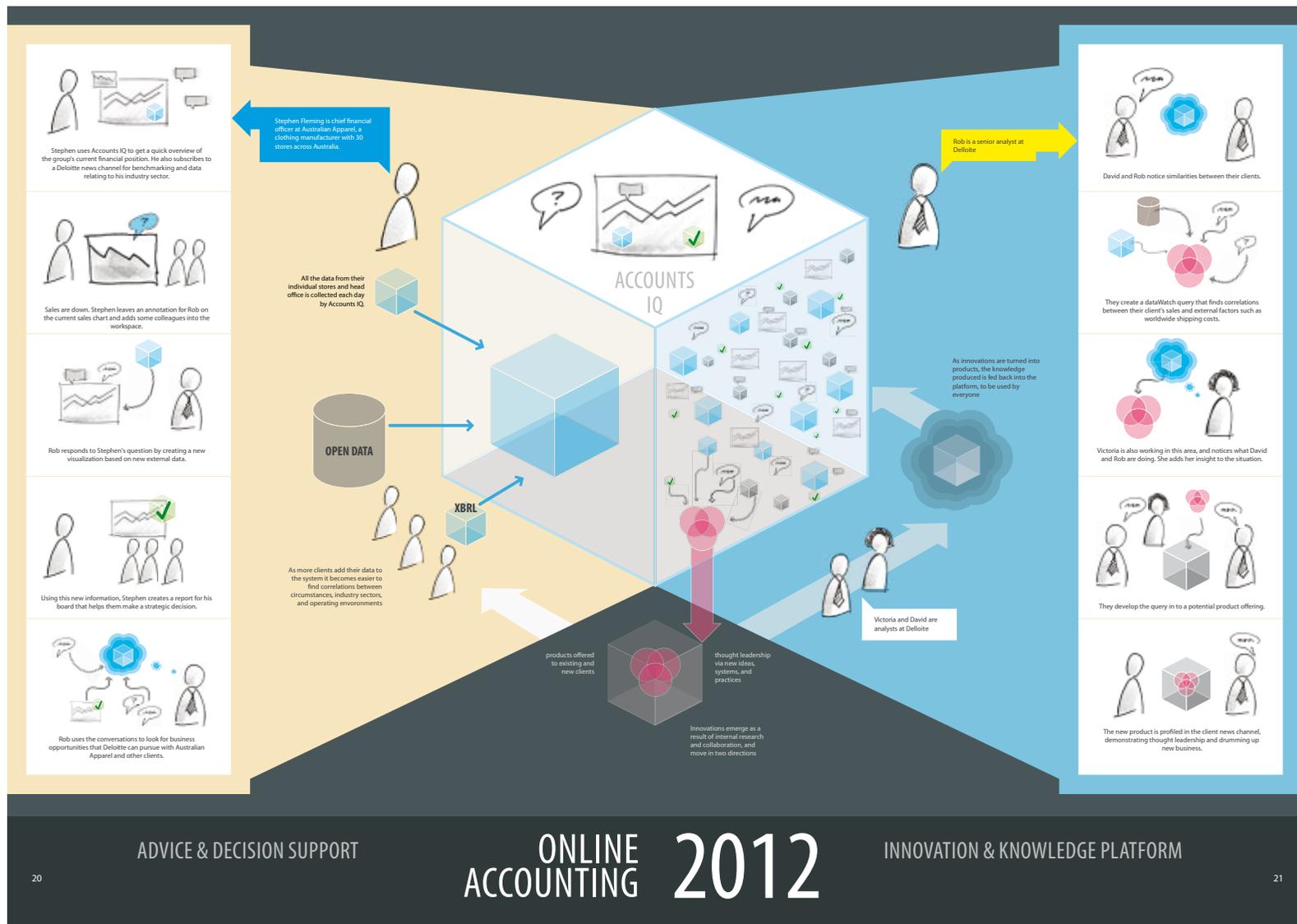


Figure 78 Online-Accounting-2012: design scenarios illustrated as an infographic. Image: Reuben Stanton

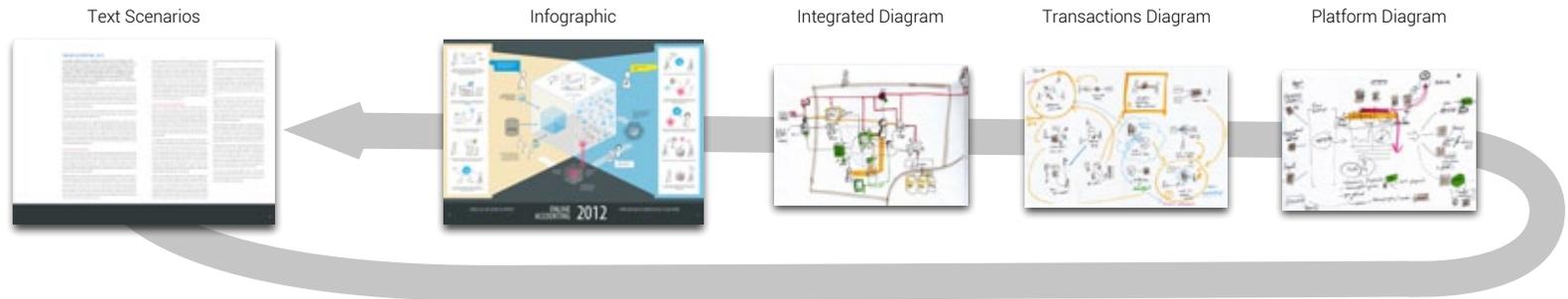


Figure 79 A diagram showing the design process beginning with scenarios, moving through sketches to an integrated infographic that, in turn, informed changes in the original text scenarios

The sketches were combined and consolidated whilst the project team discussed a number of different methods to present the scenarios visually. It was decided that an information graphic, or *infographic* would be used. Tufte (1997:9) describes infographics as: “the arrangement in space and time of images, words and numbers – for presenting information about motion, process, mechanism, cause and effect”. The scenarios were reduced to their most salient points, and then illustrated to enable a dense representation of their connection to the wider systems of “cause and effect” within the proposed ecosystem of social data visualization. Figure 78 was an articulation of all the research conducted in the project, consolidating discoveries relating to knowledge management, social visualization patterns and the behaviours uncovered through the mental models.

Feedback from Deloitte demonstrated that this artifact (Figure 78) communicated their vision of the future “perfectly” (McLeod, personal communication June 11, 2010). In the past, the Deloitte team had difficulty in explaining how the new platform would impact on people, roles and clients. This infographic was useful for discussing the processes a move to this online platform would require, and the issues that it might raise. Consequently the infographic was used extensively inside the organisation to raise awareness and gather support for the project.

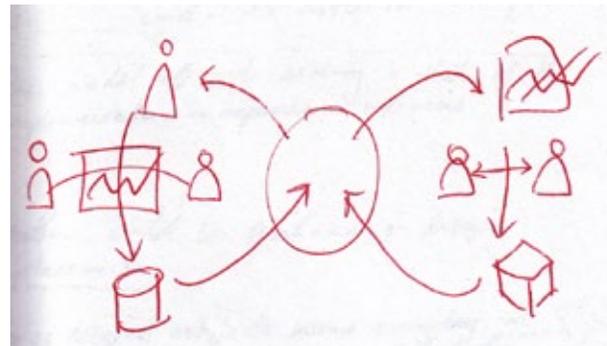


Figure 80 The infographic entered our day-to-day lexicon in the form of shorthand sketches, used when we wanted to describe what the idea was, without having the finished infographic to refer to

Learning from Loupe

The loupe project demonstrates a team attempting to align their ideas of *rationality*; to understand how each member of the team sees the world, and what artifacts will help communicate that understanding.

I have used the activities undertaken in the Loupe project to demonstrate the ways that designers *use* their perceptions of affinity to engage in *designing*.

At one timescale, I have described a fast cycle of *seeking*, *spotting* and *making* affinity demonstrated by the process of analysing post-it note exercises to engage team members in conversations around their workshop sketches.

At another time scale I have described each of these activations of affinity through critical reflection on interviewing (seeking affinity), mental modeling (spotting affinity), and the creation of design patterns and infographics (making affinity).

Loupe is the last of my projects framed as design *practice* (Fallman 2008). In the next chapter I introduce my final project, Affinité, and shift to a different mode of inquiry on Fallman's model: *exploration* of my research questions, *through* design.

The Forensic Wall

Affinité: designing a digital wall



The Forensic Wall

This chapter is concerned with one site of interaction design practice: a method and artifact that I have called the *Forensic Wall*. I use my final project to analyse this way of working, distinguishing between different uses of Forensic Walls, and the different kinds of performativity they afford or require. Before I start in on the detail of the next project, it is important to set out my definition of a Forensic Wall.

Throughout my research with Loupe and Pool, I became aware of the way my teams would engage with assemblages of design artifacts on walls. I deliberately pushed this method in early stages of the Pool project, in what I now see as an attempt to emulate the style regimes (Tonkinwise 2011) of interaction design. I have described many of the ways we used walls in our projects, but I also began to see a pattern emerging in the wider discourse around interaction design practice, particularly when I looked at the Cooper website after its re-design in mid 2010 (Cronin 2010).

The pattern I perceived wasn't just that many designers use some version of the Forensic Wall to develop assemblages of their design research, thinking and production, although this is true. I also realised that design (and interaction design in particular) overlooks many of these practices at its core.

Interaction design literature often makes reference to using perceptions of affinity, but rarely discusses what this actually means. The impetus for me writing the section on affinity was a realisation that affinity was treated like a primary colour of interaction design practice—in the sense that it was indivisible. Affinity is anecdotally referred to as a foundation of the practice, always present, but never discussed. Take for instance Young's description of the "one of these things is not like the other thing" game when explaining the task of spotting affinity (Young 2008). Similarly, images and descriptions of designers standing in front of walls festooned with artifacts relevant to their design projects are many, but analysis, descriptions or evaluations of this process are few and far between.

Researchers in the field of HCI, particularly computer support for cooperative work (CSCW), have explored how extreme collaboration (Mark 2002) has led to the increasing use of walls for holding persistent project material, often in dedicated project war rooms. Moran et al. (1999) describe this use of walls as a common workplace practice, identifying the public & persistent nature of this way of presenting information as two advantages of physical walls over virtual or digital systems. Many CSCW research projects that look at these kinds of walls do so in order to understand the productivity impacts that this kind of radical collocation (Teasley et al 2000) brings to work, with a particular emphasis on knowledge work. Another body of research draws on this productivity discourse and looks at walls and war rooms to inform the design of technology to recreate, augment and more easily scale this kind of collaborative environment. This research draws together interests in public and ambient display research (O'Hara et al 2003) tangible computing (Ishii & Ullmer 1997), group awareness (Moran et al 1999), distributed (Hutchins 1995) and situated (Suchman 1987) cognition, mobile devices (Fallman et al 2005) and electronic representations of tangible knowledge artifacts (Everitt et al 2003).

All these accounts of walls and war rooms stress the importance of these kinds of spaces for helping teams to collaborate on complex problems, but there is little examination of the ways that teams use these spaces to question and share understanding of the design situation, or how they come to an agreed framing of the design problem that is to be solved. Walls are well known for their ability to help teams solve problems, but my use of walls in the Pool project have demonstrated how they are powerful tools and methods for both finding the right problems to solve, or framing design problems, and ensuring that this framing of the design problem (and its related model of rationality) is shared across a wide group of project stakeholders. Walls help to build and sustain a project culture, evidenced in Nafus and Anderson's (2009) study of war rooms and how teams work through walls:

“Walls have become materials to think with, think through, and perform what it is that researchers are thinking about. ... these materials make a certain social configuration possible. Social relations happen in the process of moving between text, visual material, and orality.” (p137)

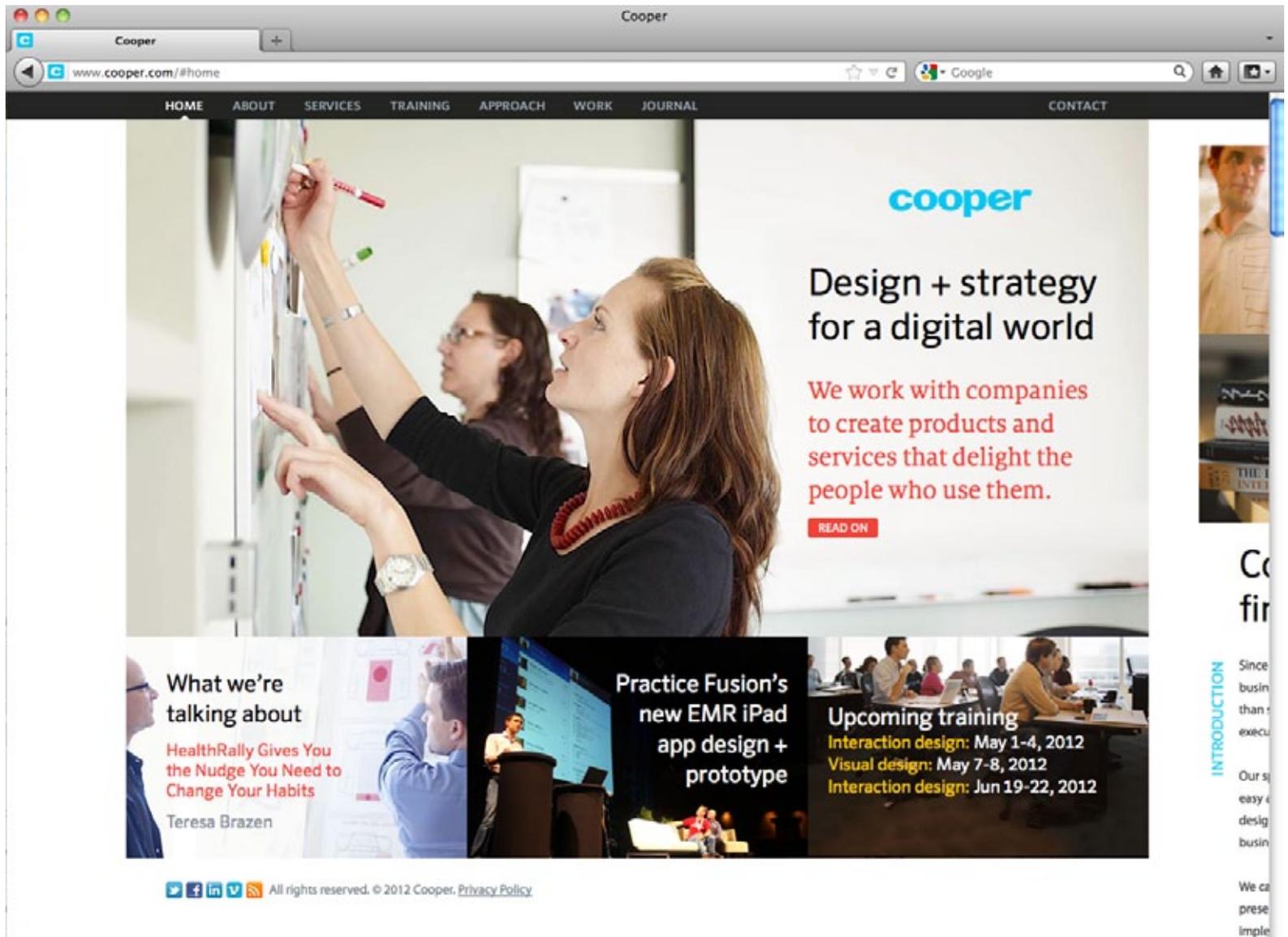


Figure 79 Cooper used the Forensic Wall to communicate what their kind of design looks like. This image is a great example of performing design: it says so many things about how Cooper want their design process to be perceived. What I found most interesting with this art directions is the way it foregrounds the Forensic Wall as a site of design performance.

By calling a wall forensic...

I am not referring to the genre of TV show that uses scientific research as a backdrop for crime drama, although this is one source of the word in my research lexicon (see page 69 for more on *The Wire*, *CSI* etc). I decided to use forensic, but to draw on its Latin root *forensis* (of or related to the forum). In this sense, forensic denotes that which is *of, related to, or used in public debate or argument* (Wordweb 2011). The wall is the forum, or public place, for reification and negotiated sense-making required by the kind of design that I am describing in this research.

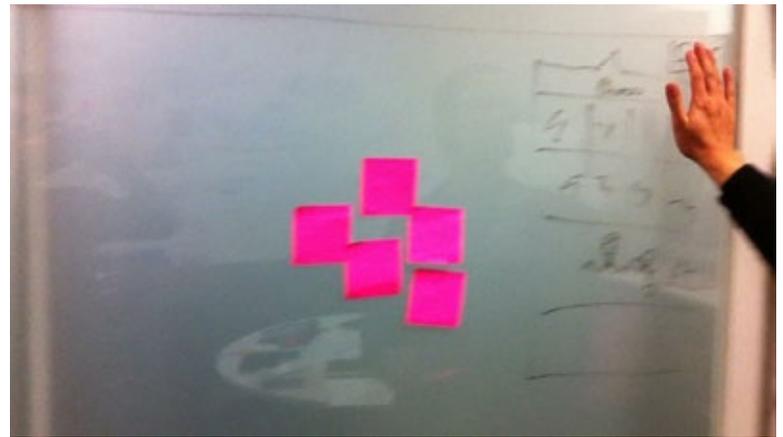
There is no *essential* Forensic Wall; although there might be a prototypical *wall-ness* or *forensic-ness*, two loci that describe a field of approaches to this kind of activity.

A Forensic Wall can be large or small, vertical or horizontal, but it is always a stage for designerly conversation—even if only with “one-self acting as another” (Glanville 1999:88).

Over the next chapter, I use *Affinité*, my final project to demonstrate how Forensic Walls are: *a spatial element* that define areas of social interaction; *surfaces* that support back-talk (Schön 1983) from the intangible design materials of interaction design; used to construct a shared enterprise (Wenger 1998) though collaborative sense-making; allow designers to manage ambiguity while designing; and are one key place where the practice of interaction design is *performed*.



Figure 80 IDEO's open source Human Centered Design toolkit (IDEO 2009) uses another hero shot of the Forensic Wall, to illustrate their points about multi-disciplinary teams and dedicated spaces for design reflection as key components in what they label as "The Infrastructure of Innovation". Image: IDEO HCD Handbook.



“Notice that what is seen is not simply what is visible. What is seen is something that is only there by virtue of the activity of seeing being conducted in a particular way. That is, what is seen is what is enacted.”

— Edwin Hutchins (2011:433)

Affinité

Bringing it all together: *designing a digital wall*

Up until this point in the text, I have concentrated on specific qualities of the design artifacts produced in the Pool and Loupe projects. Now I turn my attention to a project that explores what I learned by reflecting on those projects.

In the previous two projects, material elements were assembled to create the Forensic Wall. Representations of these walls were used in workshops. Diagrams were used to represent mental models, that in turn represented our understanding of the way people understood the object of our project. Infographics proposed scenarios that represented how we thought people might use our designs. All these artifacts were brought together in reports that advocated particular actions, or what we thought *should* happen.

The material qualities of these artifacts are important, and I have discussed them in depth throughout the preceding sections, particularly with reference to the duality of *ambiguity* and *affinity*. In this next section I examine the way that these material elements are brought together in designerly (Cross 2006) conversation, and how this kind of conversation can be conceptualised as performance.

To do this, I draw together my understandings from previous projects discussed in chapters three and four and reflect on my final project: the design and implementation of Affinité, an application for the iPad that uses the Forensic Wall concept as a way to organise the presentation of ideas.

Deconstructing the wall

I identified the *Forensic Wall* through critical reflection on my practice, and an understanding that these methods and artifacts were also present, although largely unexamined, in wider interaction design.

Forensic Walls are sites used for multimodal sense-making and designerly conversation. My research then explored this particular design method, reflecting on the perceived affordances (Norman 2005) and practices that emerged in the design, implementation and use of a digital Forensic Wall.

By reflecting on my projects, particularly on the relationship between the use of ambiguity in design artifacts and the perception of affinity in design processes, I realised how important it was for designers to orchestrate situations for these two aspects of design practice to meet in a productive manner. Over the course of the Pool project I had been amazed at the engagement that our wall of design artifacts had generated, not only in the team but also in our project stakeholders and visitors to the studio.

This realisation, coupled with the successful use of the Forensic Wall in subsequent projects led me to wonder how this way of working might translate to a digital medium. Working with a Forensic Wall in our studio had become an important part of my design practice, but in late 2009 our school moved out of the large drawing studios in building 4 at RMIT and into purpose-built spaces in building 9. Suddenly I was in an office, with no surfaces that

would support this kind of activity. There were no whiteboards and no pin-boards, but there were an awful lot of screens. I started to imagine ways that a digital version of a Forensic Wall would be useful, and how to go about producing one. At the same time, the Apple iPad was launching, and I wanted to see what I could learn about the interactions with a Forensic Wall from emerging tablet platforms.

I examined the way Forensic Walls had been used in the Pool and Loupe projects, and identified three different modes of engaging with a wall. I describe these modes in terms of the design actions they build on: *reading*, *making*, and *telling*.

These modes don't exist separately from one another, but are useful ways of framing the different kinds of design performance that a Forensic Wall affords.

Reading

Reading describes something I noticed people do when they first encountered our studio, particularly during the Pool project (discussed in chapter 3 on pages 70-75). If people had not encountered The Wall before, their engagement with the enormous assemblage of design artifacts often began with a sense of confusion. I could see people attempt to read what this assemblage was, what it meant, why it existed, and begin to make their own sense of it.

In *reading*, the Forensic Wall becomes a text, and people make their own sense of that text.

Making

Making describes a process that brings reading and telling together in a cycle of interaction, either with others, or “oneself as another” (Glanville 1999). Making on a Forensic Wall involves the construction of both the physical wall itself, and the meanings attributed to the arrangements of elements on the wall, and is a good example of the mutual engagement that Wenger (1983) describes as a duality of participation and reification, a situation where we “... *project ourselves onto the world, and not having to recognize ourselves in those projections, we attribute to our meanings an independent existence.*” (ibid p58).

As I have noted earlier when describing Hutchins (2005) concept of *material anchors*, and Löwgren & Stolterman’s (2004) concepts of *rational communication*, giving material form to an idea (reifying it in the Wengerian sense) is a primary concern for practices that work with intangible materials, such as interaction design.

Making Forensic Walls helps designers to communicate experiences.

Telling

Telling describes a mode I noticed through reflection on the way I had used the Forensic Wall to engage with team members and stakeholders in the Pool and Loupe projects. I would build a narrative that traversed the wall, using it to both prompt and support my argument. This mode of engagement has similarities with improvised performance, something I had a lot of experience with through 15 years of improvisational musical and sound practice. On reflection, it also has a lot

in common with my undergraduate Architecture studio presentations, where we would talk to our drawings that were pinned to a wall. While using more popular platforms for presentation—like powerpoint—I often wished for a tool with the improvisational affordances of a Forensic Wall.

I wasn’t alone; in 2005 I worked as a Research Associate on the *Eureka* project with Professor Mark Burry and Gregory More. *Eureka* was a presentation application that allowed the presenter to improvise a presentation experience as a path through a 3D arrangement of images (More et al. 2003).

As I reflect on this work, improvisation emerges as an organising concept for design performance. When framing the Forensic Wall as a space for telling a story, the improvisatory skill of the people telling that story has a rhetorical value. More convincing tellings of the Wall influence not just what steps a project team might take next, but the underlying direction or strategy of the project itself.

I quickly learnt that the Wall could sustain great complexity of understanding in a team who regularly *read* the wall, and people encountering the Wall for the first time often required a *telling* of the wall in order to be able to break it down into a set of elements that they could reasonably understand and manipulate. Above all, I realised that when people were invited to *make* and subsequently *tell* the wall, they developed a deeper and more nuanced *reading* of what the wall meant, and how it related to strategic goals of the project.

Telling with Forensic Walls helps designers to integrate *making* and *reading* the wall, and to reframe a design situation.



Figure 81 Reading, telling and making: three ways of using a Forensic Wall

Using a Forensic Wall to tell a story brought *reading, making* and *telling* together in a way that I wanted to explore further.

To date I had not seen any presentation software for the iPad that supported the kind of improvised telling that I was used to when using a Forensic Wall. Using this impetus, I designed a scenario of use with myself as the user; giving a presentation using an iPad, but with a performance that that would normally require a Forensic Wall.

I then went on to analyse this scenario from three different perspectives: what the *presenter* does, what the *audience* sees, and what *functionality or conceptual guidelines* these experiences implied. I had no experience developing for the iPad, but Reuben Stanton, with whom I'd worked on Loupe and Pool, had begun moving from flash development to iOS development. I discussed my ideas for the application with Reuben, and we decided to collaborate on the design and development of the app. I shared the initial scenario with Reuben, and we started to brainstorm how the app might work.

From these documents, and our conversations, Reuben built a number of working prototypes, or a spike solution—a very simple (but functional) program that explores potential solutions to the identified problem (Beck 1999). The idea of a spike is taken from Agile Development methodology, particularly *Extreme Programming* (ibid) and *Scrum* (Takeuchi and Nonaka 1986) methodologies. In 2006 I had trained in the Scrum method, and had seen the benefits of using the approach in the intervening years. The scenario

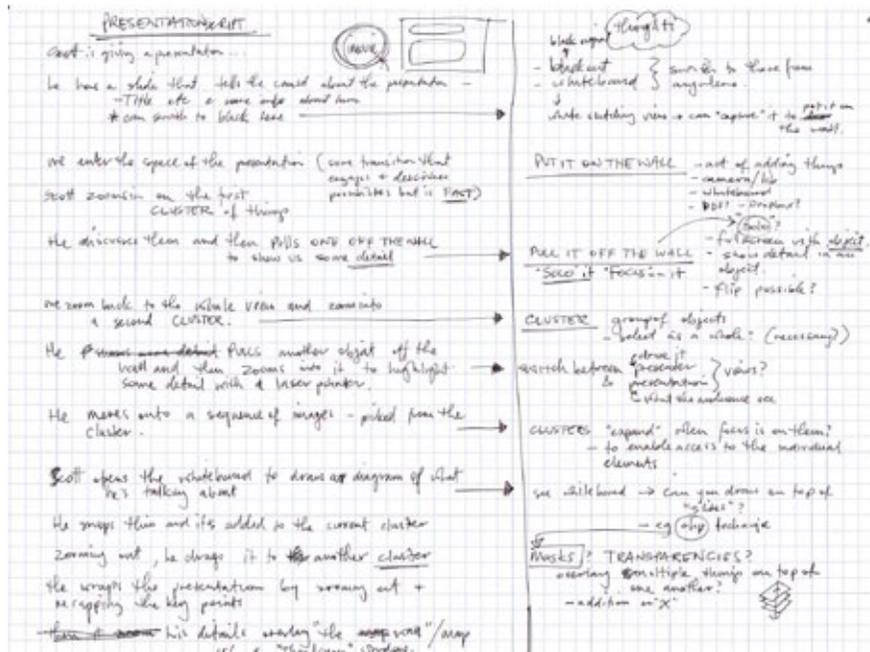


Figure 82 A scenario describing a presentation using a digital Forensic Wall

action	what scott does	what the audience sees	implied functionality	thoughts
scott is giving a presentation	he opens up the app on his iPad, plugs the VGA cable in, and chooses this presentation from a number that he has on the device	scott standing on stage, touching an iPad	multiple presentations or maps can be saved and recalled	scenes? think about iMovie on the iPhone here wrt playback and editing modes
he has a slide that shows the title and some details about him	hits Play on the chosen presentation	title slide	potentially generated form presentation title and owner details (ie twitter handle etc)	
he switches to black as there's a delay and he doesn't want to bore people with these details while they wait as he begins, he switches to the title screen and intros himself	hits a button disengages black screen	screen goes black title slide again		
he enters the presentation, the view transitions into a map view of many objects or images	taps through the title slide? swipes to enter?	some kind of transition that denotes entering a space of ideas - spatial transition, transform.?	zoomable and animation between key points	prec. start of tekken bouts. maps, backgrounds? corporate branding etc..
he zooms into a cluster of images	reverse pinch? select? double tap?	zoom in to show that cluster of objects. objects might be spread out during the zoom (eg from a pile to an arrangement)	zui. clusters. levels of hierarchy. cluster object behaviour (arrangement)	iPad photo events and albums
he discusses the idea this cluster represents, using individual images as examples	taps on each object	object is displayed full screen	presenter view (ie what Scott sees and interacts with) and presentation view (ie what the audience sees) are different	vj apps
each time he points on an individual image it fills the presentation screen	pinch? return button?	zoom back from cluster view to whole map view (or -1 up the hierarchy)	hierarchy of objects. animated transitions between discrete states	more iPhoto than Google Maps
he's finished with this section, so we zoom back to the map view	reverse pinch			can you move 'sideways' to the second cluster? instead of going up and back down. ? suburban buses vs centralised trams.
and zoom into a second cluster	tap object	object is fullscreen		
scott shows another item and zooms into a part of it to	double tap? switch mode to presenter view?	zoom in on part of the object		
highlight something	touch and hold on area of image	attention is drawn to one part of the screen	laser pointer? drawing tool?	iPad keynote laser pointer or potentially whiteboard mode as an overlay
he then moves through a sequence of images that describe how a process works, each image builds on the last one	could just tap each image in a sequence	drawing is built - illusion of layers being turned on	transparency, masking or multiply layers?	overhead transparency
he switches to black again to discuss a topic in detail without any distraction from the projection	blackout button	black screen		doesn't pause, just turns the screen black

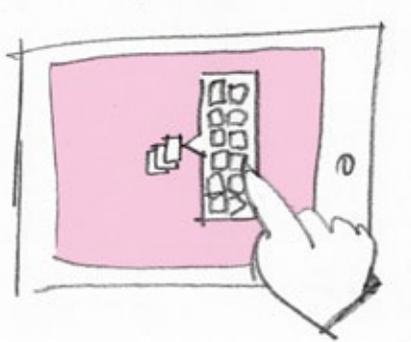
Figure 83 Analysis of the scenario: what the presenter does, what the audience sees, and implied functionality

and spreadsheet that I had already constructed directly drew on these methodologies, where the experiences that users will have with a product are often called “user stories” (Beck 1999).

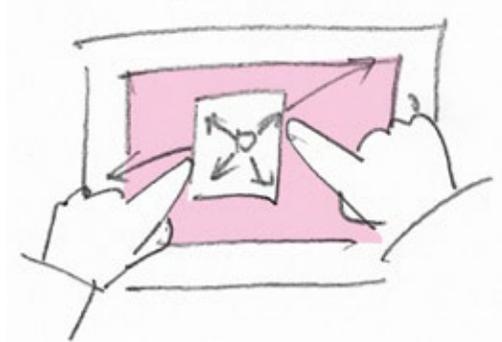
Reuben’s prototypes included iPad apps that demonstrated adding and deleting digital images to a virtual working surface (ie a wall), moving and scaling individual elements into arrangements, zooming in and out of the virtual wall, and showing these elements on an external screen.

Affinité positions the idea of a Forensic Wall alongside presentation software such as keynote or powerpoint, exploring the impact that a spatial interface affording non-linear access to content has on both the presentation of ideas, and the process of constructing those ideas.

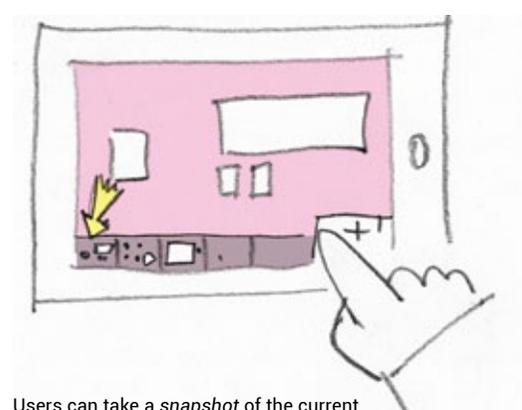
How Affinité works



The application lets people place elements (for example: images from the iPad photo library) on a virtual workspace, called a canvas. These elements can be arranged, scaled, and assembled as a virtual Forensic Wall.



The user can zoom in to focus on a one small area or zoom out to show the entire canvas. Users can also quickly focus on a full-screen view of individual elements without zooming the canvas view.

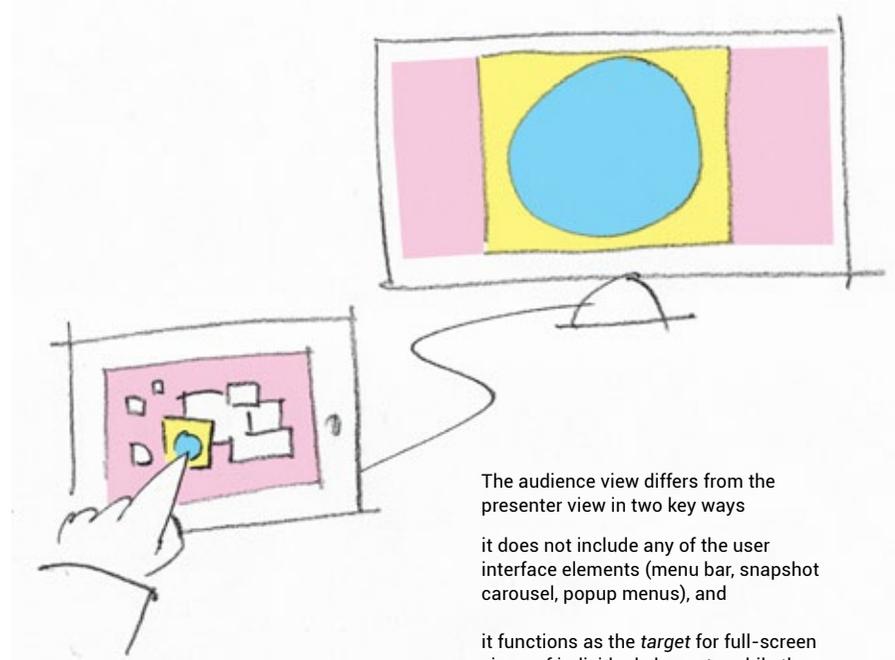
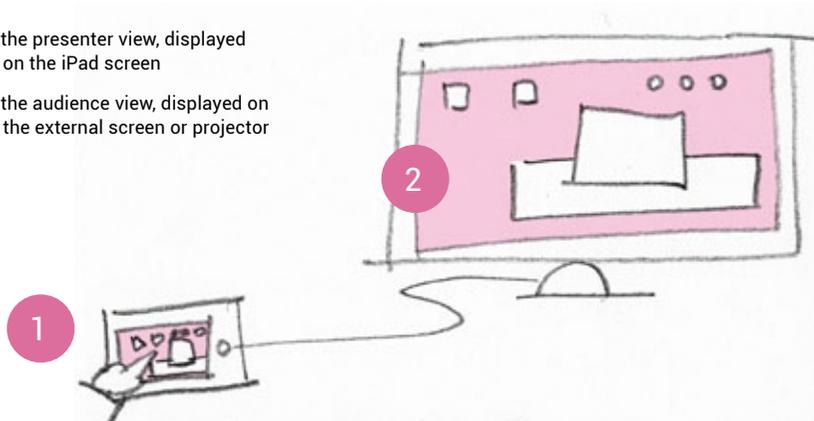


Users can take a *snapshot* of the current view, storing all the information used to build that view: what elements are on the canvas; the scale, location and layer of each element; and the area of the canvas that is currently in view.

A visual representation of each snapshot is presented using a carousel interface at the bottom of the iPad screen. Users can recall any snapshot by tapping on its corresponding representation in the carousel interface.

While Affinite can be used to construct an assemblage of images on a virtual canvas, it has been designed to use these collections of assemblages to support a presentation using an external screen. When the iPad is connected to an external screen or projector, the application runs in presentation mode. In this mode Affinite creates two distinct views:

- 1 the presenter view, displayed on the iPad screen
- 2 the audience view, displayed on the external screen or projector



The audience view differs from the presenter view in two key ways

it does not include any of the user interface elements (menu bar, snapshot carousel, popup menus), and

it functions as the *target* for full-screen views of individual elements, while the presenter view keeps the canvas in view.

In this case the app can be used like a conventional slide based presentation software, with each element on the canvas corresponding to a slide.



Figure 84 photo of Affinité being used

Ways of seeing walls

Over time our different prototypes evolved into a sophisticated environment for arranging and displaying digital content on the iPad, and our attention moved onto the nuances of interaction with this content. Our prototypes proved that the iPad hardware could support our design intentions, we now started to examine ways that the interface could be made more efficient and intuitive.

To do this we drew on previous experience in projects of using walls to assemble design artifacts for making sense of complexity. In the process we used Forensic Walls to understand these interactions, and to enact our understanding in designerly conversation. The next three sections discuss critical incidents in this design process. They exemplify three ways of framing the Forensic Wall, and the contributions it makes to the performance of design.

Wall as Surface: *working at the speed of thought*

Somewhere in the process of designing an aspect of the interface for Affinité, we had decided that a contextual menu of commands would make it easier for people to perform operations on objects that were placed on the virtual wall. For instance: an image can be moved or copied to a new location on the wall, grouped with other elements on the wall, and moved in front of or behind other images on the wall. In this example, a contextual menu is an interface element that appears nearby an object when that object is selected. These menus usually list actions that can be carried out on the selected object. The right-mouse-click menu in most current operating systems is a good example of a contextual menu.

We wondered whether a gestural interaction might work well to trigger the contextual menu, and decided to quickly prototype an interface that would allow you to choose an action for an object by swiping in one of four directions on that object.

This was a highly abstract set of interactions, that weren't easily supported in the development environment for iOS applications. We decided to test our assumptions around the effectiveness of this design, and to share our understandings of how it worked by building a low fidelity prototype of the interaction.

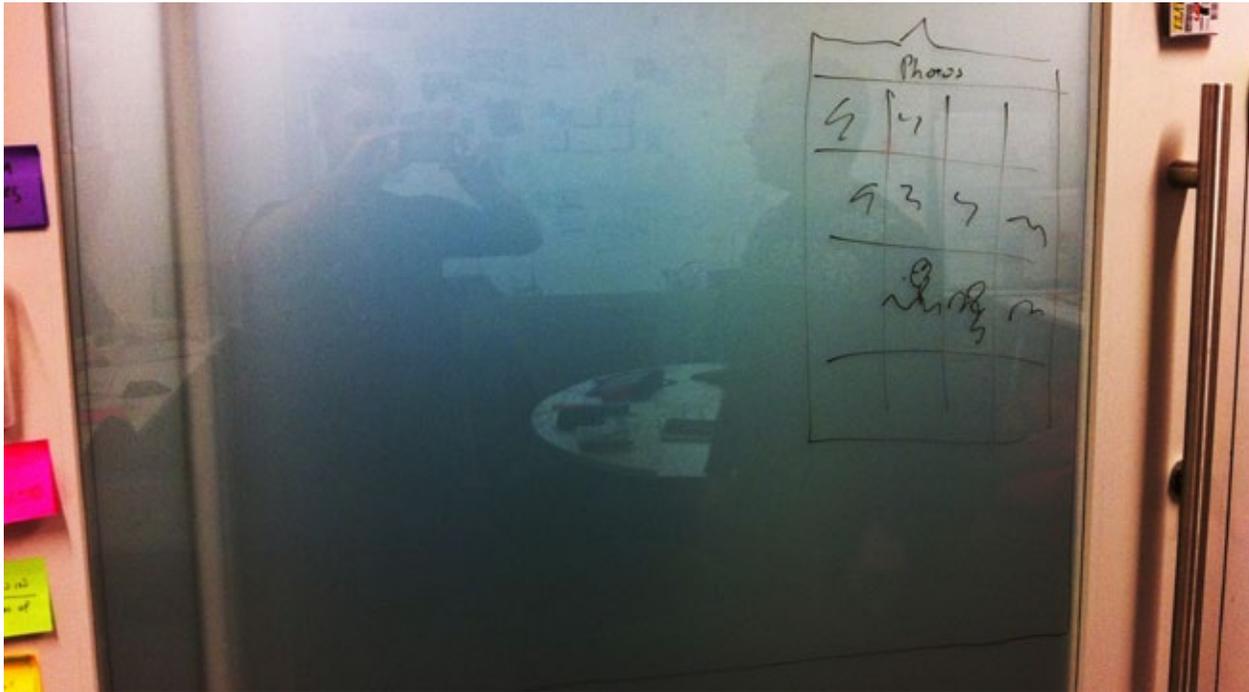


Figure 85 Reuben and me, reflected in the sliding glass doors to our office, that I had modified so they would be more like whiteboards

To begin with we used paper cutouts and a 1:1 model of the iPad, but the interface elements were too small and fiddly to work with quickly. We moved to a new ‘whiteboard’ surface that I had added to my office, a translucent film applied to the outside of the sliding glass doors to our shared office, which allowed us to easily see dry-erase marker drawings on the glass.

As soon as we started working on these large vertical surfaces our interactions changed, and I realised that we were back in the familiar territory of the *Forensic Wall*.

There are two specific moments that I want to examine, because they give a sense of the different kinds of performance that these walls afford. The first example involves Reuben demonstrating what someone would do when they select and place a set of images on the virtual wall in the application. I use a short video of this interaction to demonstrate the concepts that it brings to light. The second kind of performance only exists as a digital video file, a stop-motion account of me performing the interactions around the contextual menu described earlier.

The first video documents Reuben showing me how he thinks a set of interactions with the application might progress: what the application would do after the user did something. In this case we were playing with the idea of how images would be placed on the canvas, which was the term we used to describe the virtual Forensic Wall in the application.

- Reuben has tapped on the ‘add photo’ button, and a menu of available photos has appeared
- He selects 5 photos. The number of selected photos (5) appears in the top right box
- He taps on the canvas in the application, and the 5 selected photos are placed around the point he tapped
- The number in the top right hand box is erased

Important things to note when watching the video of this interaction: Reuben is demonstrating an idea for making the placement of more than one image at a time on the canvas more efficient. I had described how I initially laid out elements on a physical Forensic Wall: by collecting a range of elements and then assembling them in a way that seemed to make sense to me at the time. The ability to put many elements on the page at once seemed to be important, and I was particularly anxious that the ‘flow’ of thought would be interrupted if I could only add one image to the canvas every time I opened the interface to the photo library. Many iPad apps have this form around their interactions with images in the photo library, and I had been frustrated at how clunky it was.

The key insight I get from this 19 second snippet of video is that the Forensic Wall supports designerly conversation *at the speed of thought*.

The combination of a translucent glass surface of the wall and the material elements we applied to the wall (post-it notes and dry-erase markers) supported a fast and loose kind of interaction, allowing for improvisation and exploration of ideas. Reuben is thinking about the form of the interaction he is representing, as he is representing it: what Schön (1983) refers to as reflection-in-action. The materials of the wall are talking back (Schön 1983) to Reuben as he demonstrates the interaction, and Reuben is talking through the wall to me (who you can hear cheering his enacted thoughts on from behind the camera)

The key moment for me is right at the 18 second point, when Reuben wipes off the number ‘5’ from the upper-right box, implying many potential avenues for design to explore, but also bringing a logical close to the interaction. In the video, this action appears to be a casual afterthought, possibly as a reaction to perceived affordances of a whiteboard surface: for instance, the pen can easily be erased with a soft material, like skin.

What I learn from this moment is that the wall has a type of *friction*, the surface impacts on the things we can do on this wall, but our thinking on the wall—what I frame as enaction in the next section—has an *inertia* that can overcome this friction and respond to what is represented on the surface while we are building it.

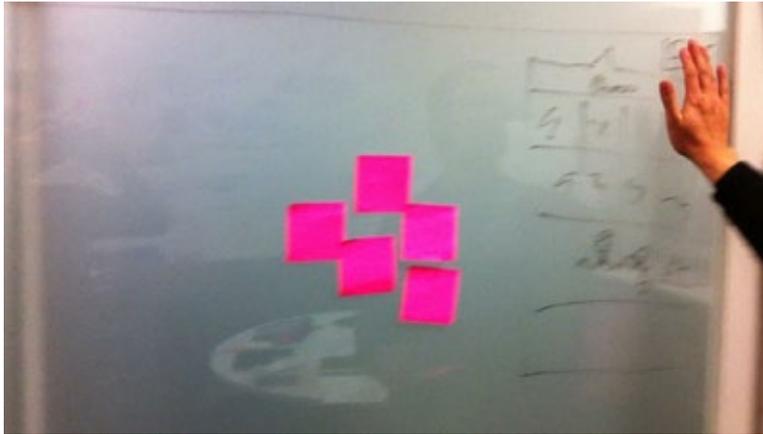


Figure 86 Example 1—Reuben demonstrating an idea for the Forensic Wall app

These videos are available on the USB memory stick included in the supplementary material



Figure 87 Example 2—Me demonstrating a complex set of interactions with the interface

In the second example, a video of me working on the wall has been edited to simulate the way an interface would respond to user input.

- I swipe up on an image, and the contextual menu appears, I have chosen the move/copy action
- I double-tap on the canvas and a copy of the image is placed there.
- I swipe up on the image to select the move/copy action, and tap elsewhere on the canvas.
- The selected image is moved to this position.

This example demonstrates how Forensic Walls are themselves just another element in the designer's set of tools for communicating experiences. Reuben and I have used the video editing capability of the iMovie app on our iPhones to assemble a representation of the experience of using the contextual menu interface we had been thinking about. Because the idea was very abstract, and complex to implement in the iOS development environment, we tried to make a quick and dirty experience sketch (Buxton 2007) to explain the potential of the idea.

In this example, the video is the design artifact, and the Forensic Wall is a material that makes that artifact more easily produced. Building on the practices documented in the previous video, our fluency with the wall enabled us to experiment with how we used that wall in our everyday practice.

Wall as Interface: *enacting an interactional approach*

Enaction

Throughout my research, I have encountered theories and concepts that help me to understand and explain what interaction designers do. One set of theories, or field, that has influenced my thinking heavily in the latter half of this research is *enaction*, particularly the understanding of enaction that has emerged from the discourse around distributed cognition (Hutchins 2005, 2011, Clark and Chalmers 1998, Goodwin 1994). It is important to include here a brief overview of how I am engaging with the emerging field of enaction, and in turn, how that applies to my research.

According to Hutchins, "Enaction is the idea that organisms create their own experience through their actions. Organisms are not passive receivers of input from the environment, but are actors in the environment such that what they experience is shaped by how they act." (Hutchins 2011:428). An view of the world framed by enaction acknowledges that perception is an act—something that people *do*—not a passive event that *happens* to them. Put this way, these contemporary cognitive theories resonate with my understandings of Dewey's theories of "double barrelled" perception, and experience as the perception of a relationship between "doing and undergoing" (Dewey 1934).

Another consequence of this view of experience is that it gives agency to the *things and people* that are involved in the experience. For instance: to recognise or see something as a representation of something else—to apprehend metonymy—is to take part in a world that "does not consist of isolated objects, but of a system of enacted understandings" created by "specific culturally shaped perceptual processes" (Hutchins 2011:429-430). The actors in this world create what is perceived through their actions. Artifacts in the world perform something, because the people engaging with those artifacts "enact their meanings" (ibid p434).

This framing of enaction; that people create meaning through actions, and that these actions can ascribe performativity to artifacts, is a useful way to think about the activities that make up a design process, and the places where these processes are performed.

My third example is not documented in video, it describes our attempts to solve an interface problem that had us stumped. This example demonstrates how Forensic Walls support *enaction* and how this support helped us solve an interface issue that was compromising the conceptual design of the Affinté application.

To better understand the nature of this interface issue, I'll describe the ideas we were trying to manifest in the application and how these ideas had such a strong impact on the way the application was structured.

One of the aims of making a digital Forensic Wall was to support the storytelling mode of working with walls. In the previous section I have referred to this previously as telling, a practice of using walls as a rhetorical device that I observed in the Loupe and Pool projects. This involved constructing an understanding of how individual elements on the wall were related to one another, and how these groups of related elements related to the other groups, and the whole.

Through critical reflection on this practice, I noticed that I would often use narrative to build a hierarchy of elements on the wall in order to then use those elements to tell a more complex story. I have referred to this in an earlier section, particularly with reference to Hutchins' (2005) theory of material anchors for conceptual blends. Where an element stands in for, or represents a larger group of elements, that themselves represent an idea or narrative.

I wanted to be able to support this kind of activity in a digital Forensic Wall, and had always conceptually framed the problem as one of *grouping*, where elements belong to one or more groups of other elements. This added a functional requirement to the software we were designing: that people using it would have the capacity to arrange and represent groups of elements automatically according to these group properties. For instance: all members of a certain group might be automatically clustered, or elements not in a certain group might be made less visible to accentuate that group. These requirements were derived from the idea that being able to draw attention to one group of elements while they were still arranged with all the other elements would be useful for constructing and managing complex narratives around the wall. This approach

changed the way we thought about designing and implementing the software—the conceptual architecture of the code would need to accommodate this new type of abstract object, a *group* of objects. This would impact the way the interface and the individual elements were technically related in the code. It made the application more complex by introducing a layer of hierarchy between the interface and the individual elements on the canvas.

It also challenged our assumptions around interactions with the people using the application. For instance: how would you create a group? How would you add or remove an element to a group? How would you select a group? We found ourselves discussing ever more elaborate versions of these questions: as we would propose a solution, a technical or experiential implication of this solution would appear and we would adapt the solution to address this new issue. We were running around in circles reacting to a technologically driven agenda, and the application design seemed more and more clunky as a result.

Our breakthrough on this challenge came when we stopped trying to work on *groups*, and started working on what we thought at the time was an unrelated interaction: the *snapshot*.

Snapshots

Snapshots let you store the current configuration of a wall (what you can see, the state of every element - wall zoom and pan, object scale and position). Snapshots are derived from working with physical walls, and the idea of taking a photo of the wall in a certain configuration so that you can show it to people, or using the wall to deliver a linear presentation. Reuben and I had discussed the idea of snapshots before in our work around design patterns for the Loupe project, particularly how a capture of the current state of an object can help support a narrative around your interpretation of that state.

Physical walls can flip back and forth very easily between views of a field of content and presentations of a path through that field, but they are not very good at recalling a historical state or configuration of the assembled elements. Computational systems are far better at recalling a previous state because every state of every element on the wall must be explicitly described, making it a trivial task to save that state for later recall. This ability to easily recall previous states was one aspect of the digital Forensic Wall that I wanted to explore, because beyond taking a photograph, it was virtually impossible in a physical wall.

As we started prototyping these interactions, exploring how a snapshot might work, what it might look like on screen, how you might make it happen and so on, It dawned upon me that this was how we could incorporate the grouping functionality that we had been so frustrated by earlier. We should forget about making groups in the data model, since that doesn't happen on a physical wall, *why should it happen in a digital one..?* (because computers are good at that sort of thing is not an appropriate answer in this case) Groups are *enacted*, or made in the actions of the people looking at the wall.. The snapshots *are* the groups.

Each *snapshot* helps to define a group of objects by framing them in a particular configuration. The relationships between these visible objects is built in the mind of the people regarding the wall and listening to the person presenting.

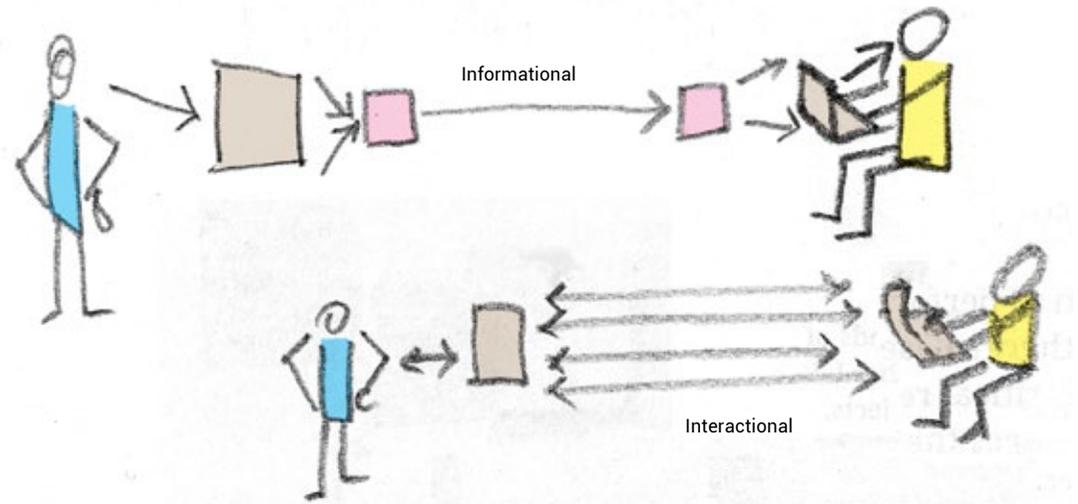


Figure 88 Boehner et al.(2005) discuss interactional vs informational approaches to designing for affective computing. This is relevant to my research because it distinguishes between informational approaches toward interaction design that rely on a computational model to interpret, encode and decode the meaning of an interaction, and interactional approaches that leave this interpretation up to the people at either end of the interaction.

On reflection, this was a classic example of an *interactional* approach (Boehner et al 2005) trumping an *informational* one. Our conceptual model of ‘groups’ created an assumption that we had to define those groups in the technical model and architecture of the software. This realisation was significant not because it demonstrates these theories, nor because it is a good example of the way technology pushes an informational approach to interaction (which it is). It is significant to my research because it demonstrates the way a medium that facilitates and encourages *enaction*—such as a Forensic Wall—not only helped me to realise the folly of an informational approach to solving our problem, it also suggested the possibility—and legitimacy—of adopting an interactional model. The Forensic Wall privileged embodiment and enaction, and this in turn privileged the perception of interactional models for the design of our application.

At one level you can say that when designing for physically engaging touch based computing (eg tablets, touch screens, phones) it can be useful to use a physically engaging medium to do that design. The Forensic Wall works well to simulate the experience of using tangible and touch-based interfaces.



Figure 89 Design artifacts from the Loupe project, annotated with ideas for discussion

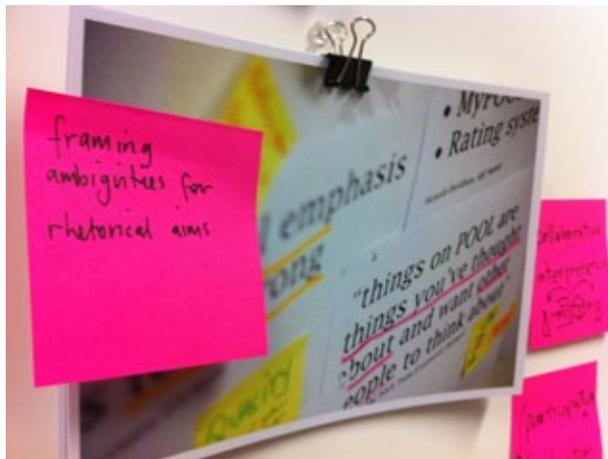


Figure 90 Design artifacts from the Pool project, annotated with ideas about how to discuss them

Wall as Stage: *performing design*

What does it mean to perform design? What kinds of performance are there? Based on the approaches I have described in critical reflection on my projects, there are performances that *exercise* ambiguity of design outcomes and there are performances that attempt to *excise* ambiguity from a design situation. Framed by perception, there are performances that *seek*, *spot* and *make* affinity between elements in a design situation. These performances are brought together at the *Forensic Wall*, a stage for constructing shared meaning, and sense of mutual enterprise.

In the next section I describe three ways I used a Forensic Wall as a tool to examine a complex design problem *and* as a rhetorical device to support a complex narrative. Each instance is increasingly digital in its form, revealing different aspects of what I am referring to as *design performance*.

In the Studio...

I wanted to put evidence of all my project work together in one place so that I could begin to get a sense of how Loupe and Pool related to one another, and what artifacts would be useful to tell this story in this exegesis. To build this holistic perspective, I constructed a *Forensic Wall* using reports and artifacts from the projects, alongside notes and sketches that I had made while engaging with literature in the field.

This wall took me approximately two weeks to construct, slowly adding and moving elements until I felt ready to use it to tell a story about my research. I used this wall to present to my supervisors, and during this presentation I described my thoughts behind the photographs of the wall that we had used in the Pool project workshop. I expanded on the theme of television drama, and the Forensic Police Procedural genre. At the end of this presentation my supervisors suggested that the work was overwhelmingly about this way of working with what we would come to call a Forensic Wall, and I decided to refocus my research around this practice and artifact.



Figure 91 The wall of material in my studio, assembled to help me to reflect on my projects, and inform the design of Affinité

As an Experience Sketch

In September 2012 I was already discussing the Affinité app with Reuben, and had produced the scenario and spreadsheet analysis that I described on page 145. I was thinking about Affinité as a way to present my research, and I decided to use the wall I had constructed to present my research to my supervisors as the basis of an interactive digital mock-up or sketch (Buxton 2008) for my next presentation at the school Graduate Research Conference in October 2010.



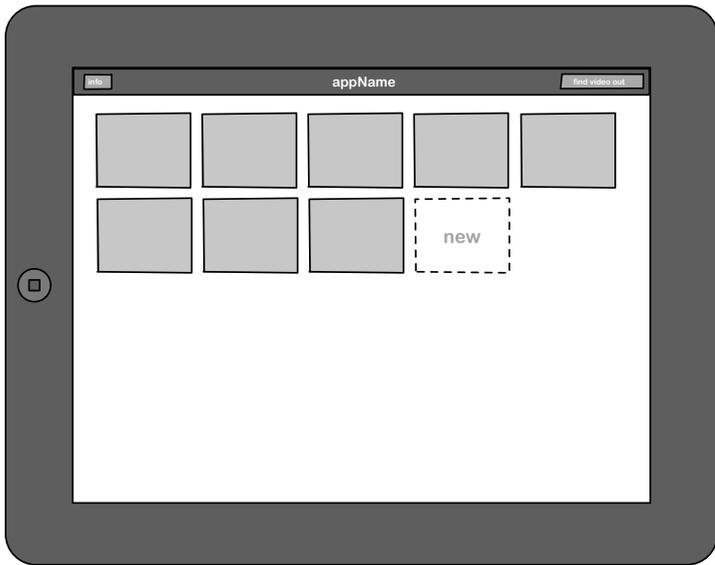
Figure 92 High resolution photo of project artifacts on my office wall, showing interactive buttons used in the PDF prototype

To prototype the way Affinité might work, I took a high resolution image of the Forensic Wall I had produced in my office, and used Adobe Acrobat to create clickable sections of the image that corresponded to different artifacts on the wall. When I clicked on these sections of the image, Acrobat would display the page of this multi-page PDF that had the corresponding image on it. Invisible buttons on these pages would take me back to the original image of the wall. I built this in PDF because many iPad applications could display PDF documents. Some of these applications also supported the interactive aspects of the PDF specification, meaning that I could tap on the interactive buttons and it would register as a click, performing the corresponding action. I could also zoom and pan the images in the PDF, so it functioned as a reasonably useful mock-up of a digital wall.

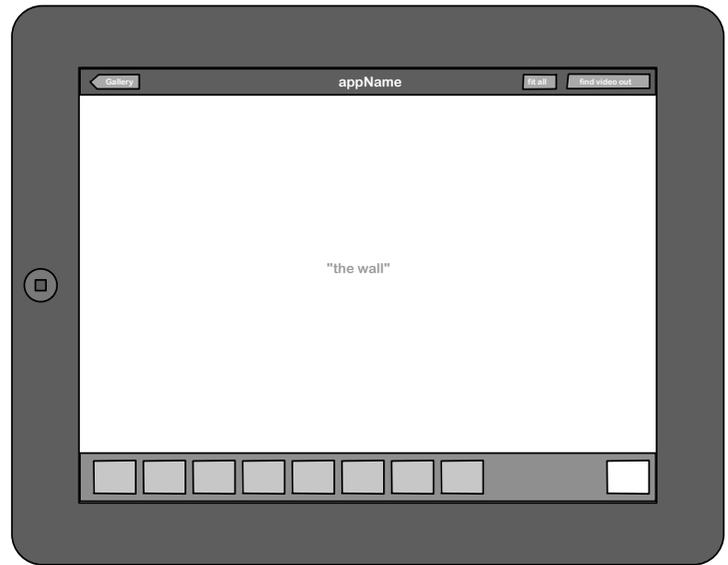
Because I was making this for my PhD review, I became very conscious of the narrative I wanted to use to present my research. I was continually refining the PDF mock-up in response to this narrative, and my work on the mock-up also had an impact on the rhetorical path I was designing. While I was designing this mock-up I was reminded of my musical practice, particularly the aspects of it where I had constructed bespoke software environments for performance. This PDF document was beginning to take on the characteristics of an instrument, and as I changed the configuration of its elements, it changed the way I thought about playing it.



Figure 93 a multipage view of the PDF prototype that I used on my iPad to present at the 2010 RMIT Media and Communication Graduate Research Conference



Gallery



Wall

As an iPad app

In February of 2011 I traveled to Boulder, Colorado for the IxDA annual conference to deliver a workshop or primer on Interaction Design. I also presented to two classes for a colleague Professor Mark Amerika at the University of Colorado. I used these as an opportunity to test Affinité in a real performance situation.

The two situations were quite different: Mark's class on remix culture was held in an underground classroom, with about a dozen students while my workshop had about 40 participants, and was held in a room that was setup for conference presentations to groups of around 200 people. There were a lot of empty seats and space in my workshop, while the classes were very cozy and intimate.

On reflection, the Forensic Wall format of Affinité helped me to describe my work and practice as a sound designer and performer to Mark's classes, but was not as effective in supporting the performance that my workshop required.

In Mark's classes, I had a smaller palette of images to use, and they were organised in a very specific way. Clustered around different projects that I could easily improvise a description around. Constructing that presentation was fun, because I had not reflected on these projects in a long time.

The act of putting a series of images together to represent these projects, and support an argument around them, was exactly the kind of thing a Forensic Wall is good for. I began to notice a link between the way I was building the presentation, and the way I was thinking about discussing it in the class. As I arranged a node or cluster of images to represent a project, I found myself responding to that arrangement with a narrative that described the project, which led me to identifying the key points with respect to the class I was presenting to (remix culture). This narrative and key points then fed back into the way I arranged groups of images.

A reflexive cycle ensued that resonated with the way I'd seen the Forensic Wall used in the Pool project, to help build a shared understanding of the project strategy in our Melbourne studio (described on pp70-75), and later with the Forensic Wall that the Pool team had constructed around their offices at the ABC (pp83-85).

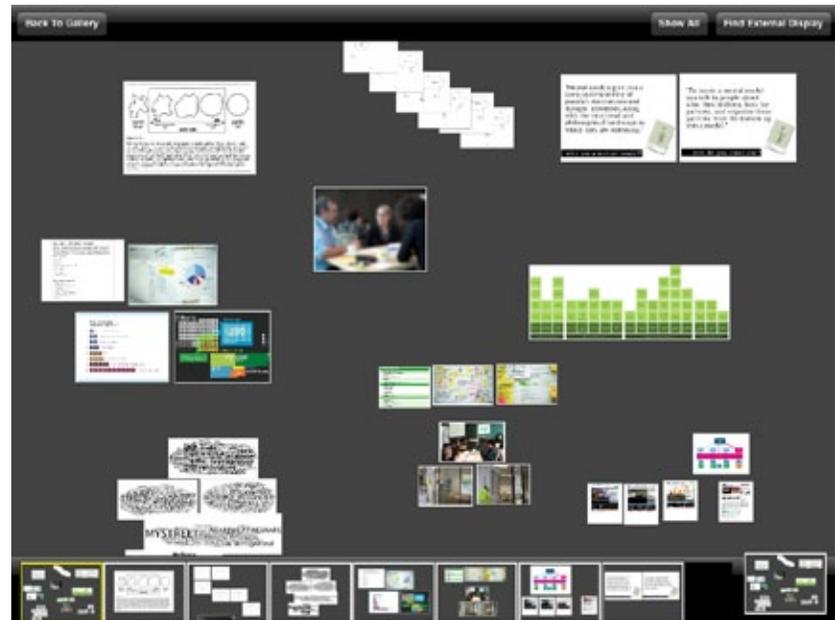
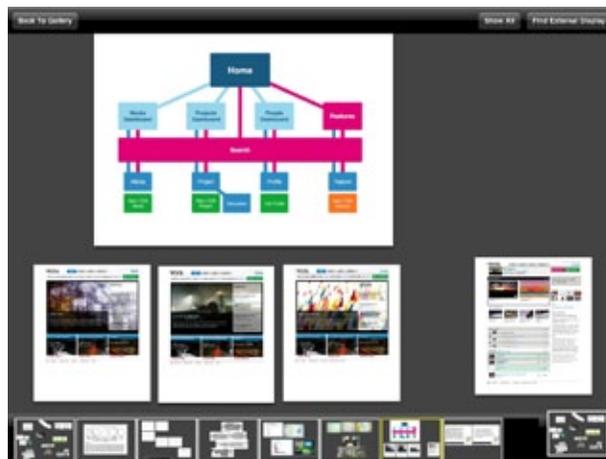
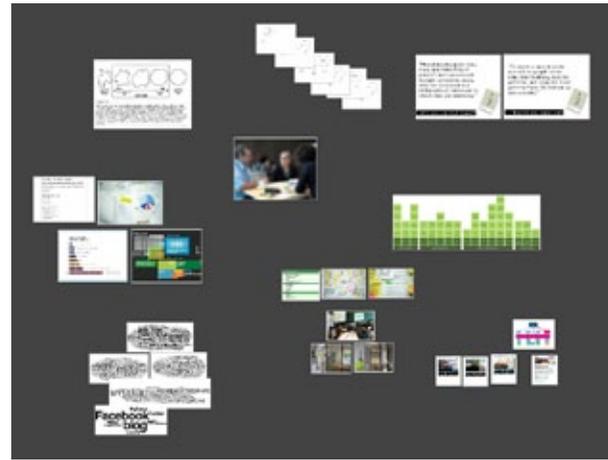


Figure 94 Screenshots of Affinité in use (Clockwise from top left)

- 1 The gallery screen, where people can choose to open a saved wall or create a new one.
- 2 The Forensic Wall. A view of different elements assembled on the canvas.
- 3 The interface of the wall is revealed, showing different snapshots in the carousel at the bottom of the screen.
- 4 Choosing a snapshot causes the screen to reflect that view, and highlights the current snapshot

When I put a linear slideshow presentation using Powerpoint or another platform that simulates a linear deck of slides, I also go through this cycle of reflection and refinement. But I noticed that using a Forensic Wall let me break the cycle of refinement and move on to the next aspect in the presentation sooner than other traditional platforms. Because each cluster and associated narrative supported one other in a loose and interpretive fashion I did not have to tweak the order of individual images in a deck. I did not have to go to that level of detail with the associated narrative either.

The Forensic Wall supported a more ambiguous resolution of the presentation materials. I was free to improvise the performance of these materials, and had more time to practice that improvisation. This let me concentrate on the meaning I was trying to construct with the students in the class. I felt more comfortable with the material I was using to perform the class, partly because it was representing my own projects, and partly because I had time to practice the performance.

In contrast, Affinité was less effective in the workshop situation. For many of the reasons I have just described, Affinite was a lot better than a linear slideshow for the workshop format, but the spatial configuration of the workshop room, and the format of the workshop, introduced subtle shifts in the relationship between me and the workshop participants. The improvisatory approach that had worked the night before in a small room with 12 students was not working in a big empty room with three times that many people. One contributing factor was that my workshop presented work done by other people. I did not have a deep familiarity with the material to support a lot of improvisation around the way I presented it.

The workshop setting was less intimate than the classroom, this made negotiation more difficult. Reflecting on this, I can see that the physical configuration of people and furniture in a room can have a large impact on the way those people engage with one another. One thing that I noticed, both then and more recently in classroom experiments, is that sitting at the same level, with desks between you and an audience, sitting down at table together, creates more opportunities for collaborative negotiation of meaning than standing up in front of a seated crowd.

Designing Affinité helped me deconstruct and analyse the design practices that are performed at Forensic Walls. I have distinguished different ways that Forensic Walls work in designerly conversation: as surfaces that support improvisation, interfaces that privilege embodied cognition, and stages that prompt the performance of design.

Practices of *reading, telling* and *making* the Forensic Wall can be seen as analogous to the actions of seeking, spotting and making affinity that I described in chapter four. In the next chapter I incorporate my arguments from this and previous chapters and propose a coherent perspective on design in general, and interaction design in particular.

Performing design

Conclusions: a design fiction

Over the preceding five chapters I have described my reasons for beginning this inquiry, how I undertook the research studies, projects and exploration involved, and the roles played by ambiguity and affinity in design performance.

In chapter one I located interaction design within a larger turn toward experience as a way to frame design situations. This turn toward experience changes the kind of things that designers pay attention to in a design situation and, by extension, the way they communicate what it is they perceive in those situations. An example of the impact of this turn to experience may be seen in the different styles of interactions design, which I have characterised as three broad approaches towards ambiguity in the design process.

My research is a reaction to a multiplicity of perspectives that I perceived in the discourse around interaction design. In chapter two I introduced the projects and activities that I have undertaken and critically reflected on in order to be able to reframe the practice of interaction design in a more coherent fashion. I presented my research in terms of Fallman's (2008) triangle of design studies, practice and exploration, introducing a framework of ambiguity, affinity and performativity that I have used to examine and discuss each of the three projects I report on in this exegesis.

Throughout chapters three, four and five I have used my projects to expand on each of these topics.

I used the Pool project to illustrate what I call *performative ambiguity*, or different ways of using ambiguity. With descriptions of artifacts and activities from the Pool project I distinguish between *pragmatic*, *critical* and *enterprising* approaches to, or performances of, ambiguity.

I used the Loupe project to present perception as a performative act, illustrating the ways that designers activate their perceptions of *affinity* in the course of experience-led design projects. Using descriptions of artifacts and work undertaken in the Loupe project, I differentiate between *seeking*, *spotting* and *making* affinity as distinct attitudes to the perception of similarity that designers use when undertaking their work.

I used the Affinité project to introduce and examine the *Forensic Wall*, a place where *performative ambiguity* and *affinity ability* are enacted. Through relating the interactions and artifacts produced in the course of designing a digital wall for the iPad, I illustrate how forensic walls work as surfaces to support improvised collaboration, interfaces that privilege embodied interaction, and stages that scaffold the performance of design.

The time has now come to combine these insights into a more coherent model of what it is that interaction designers *do* when they design. In order to do this I critically reflect on my three projects, using a fictional reflection tool.

A Design Fiction

For the sake of this discussion, let us assume that I have a piece of technology—called an *Ambiguitometer*[†]—that enables me to discern the range of ambiguity felt in a project at any time. My Ambiguitometer gives me a measurement on an ambiguity scale, between two extremes:

0: there is no ambiguity at all. Everyone in the project knows exactly what is going on, they all share the same understanding of what the project is trying to achieve, and how it is going to get there.

10: maximum ambiguity. No one in the project shares an understanding of what's going on, everyone has many ideas of what the project is about, and many different theories about how to achieve their respective project goals.

Let us also assume that this ambiguitometer can sense and measure a **range** of ambiguity in a project. For instance: different project activities may be going on at one time, and different artifacts may be involved in those activities; our ambiguitometer is able to tell us, for specific points of time throughout the project, just how high the most ambiguous aspect of the project is, and how low the least ambiguous aspect is at the same point in time.

Given these parameters: I will present a time sequence graph that analyses each of my three projects by illustrating the individual design artifacts along a timeline and overlaying them with the range of ambiguity that my ambiguitometer has recorded at that corresponding time. The horizontal axis of these diagrams denotes time, moving left to right from the beginning of the project, to the end of the project. The vertical axis of the graph represents the ambiguity scale ranging from 0 - 100, that I have just described. The numbered markers indicate critical incidents in the design process.

Reflecting on my projects with the aid of this overlay of ambiguity exposes relationships between the range of ambiguity in the project, and my understanding of how well we had engaged our clients and participants at the same point in time. To demonstrate, I will discuss the ambiguity arc of each project particularly focusing on the critical incidents that I have numbered in the diagram.

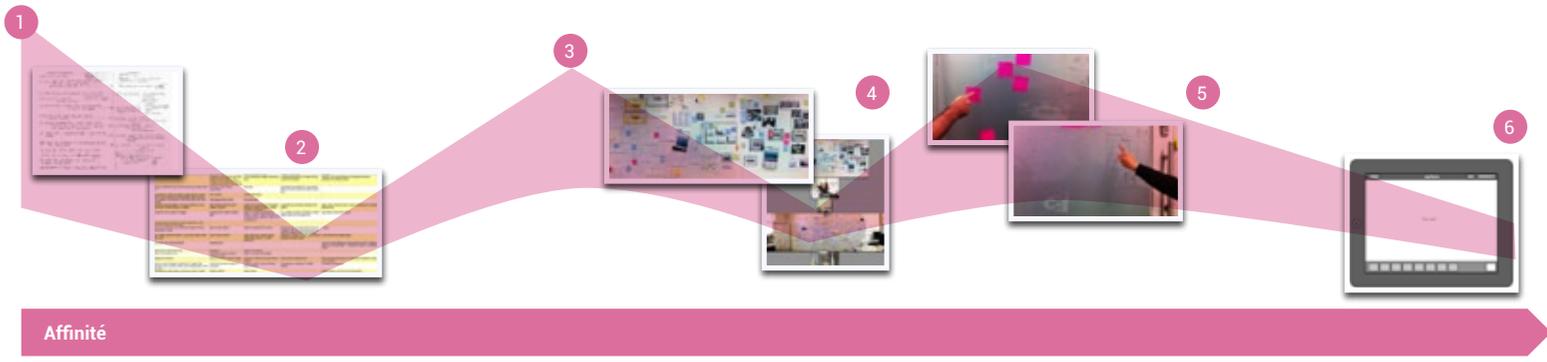
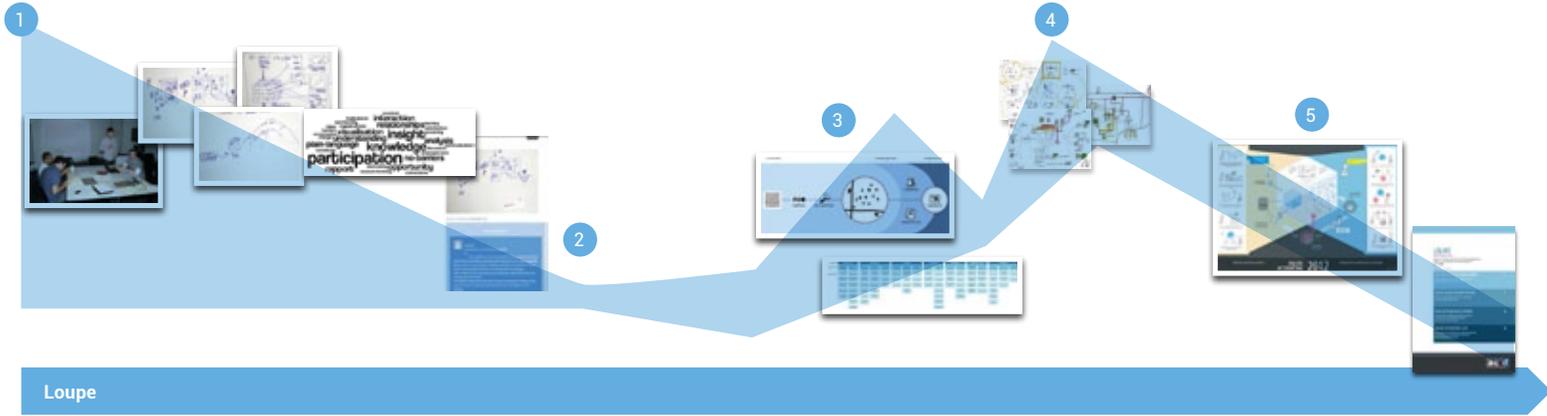


[†] not a real device: a hypothetical proxy for my own perceptions of how ambiguous the design project is for everyone involved. Conceived as a technology in order to set up and play out a **design fiction** (Bleecker 2009, Sterling 2009)

Pool moved from a shared sense of a slightly ambiguous design problem at the beginning of the project **1** through an expansion toward a wide range of ambiguity in our workshop **2**. We achieved a high level of engagement by using a wide range of artifacts, and the project moved in a steady state towards specification for development, or as little ambiguity as possible **3**.

Loupe started with a wide range of different understandings of what the project was about **1** and we quickly tried to simplify and explain our research by removing ambiguity around the topic **2**. As our engagement with the project partners grew, we began to expand the range of ambiguity present in the project artifacts **3**. The ambiguity peaked in a project meeting when I sketched the first of a set of diagrams **4** that would eventually be the most successful artifacts of the project, the infographic scenarios for Online Accounting 2012 **5**.

Affinité began with a high shared sense of ambiguity, about what the project was, and how Reuben and I might go about working on it **1**. My scenarios and subsequent analysis of inferred functionality worked to remove some of this ambiguity **2**, but we then discovered more and more uncertainty and room for misunderstanding as we designed the details of interactions and interfaces for the iPad app **3**. Our initial wireframes and prototypes cycled up and down **4** in terms of ambiguity, but the range of ambiguity in the project began to narrow **5**. Over time we reached a shared understanding of what it was we had designed and made, acknowledging that there was still room for us to learn more by using the app **6**.



Conclusion: *the designer's choice*

Through this analysis I have discovered three key things about what it is that interaction designers *do*.

Firstly, the practice of interaction design can be usefully framed as a *performance*. The artifacts of interaction design practice can similarly be framed as *performative*. Design performance isn't solely the domain of the *designer*; artifacts produced in the course of a design do not just describe a situation, they also *do* something.

Just as J.L. Austin (1962) names the speech act "I do" a performative, and Verbeek (2005) discusses *what things do* in his book of the same title, elements on a forensic wall perform roles in the course of a design process.

More importantly, I propose that a performative framing of design artifacts is useful for thinking about what it is that makes a designer, and their designs, engaging.

This framing of how designers use artifacts to *perform* design impacts on many fields including

Education: how should we teach designers to perform? how could we use design performance to teach other domains?

Workplace design: how should we design the places where we undertake this kind of work? How can the Forensic Wall help nurture a performative design culture?

Secondly, there is a relationship between the *performative ambiguity* of chapter three and *perceptual affinity* that I discuss in chapter four.

Looking at my analysis of the ambiguity arcs in projects on the previous page, and reflecting on my experiences of those projects, I can characterise *seeking* affinity as a process of expanding understandings and *engaging* with the ambiguity of a situation. I see *spotting* affinity as a process of reducing complexity and analysing a design situation to *manage* ambiguity.

This duality of *ambiguity* and *affinity*—of difference and similarity—reveals a new way to understand and appreciate what it is that designers *do* when they introduce new things, or *act* in the design process.

In a world where design is increasingly strategic (Hill 2012) and is referenced from many fields, this framing of how a designer *performs* is a useful way to manifest the often intangible methods and practices that design uses. Performing design is more than just *thinking*. This way of framing design creates a productive conceptual space for designers and users of design services to negotiate the fuzzy and ambiguous aspects of undertaking design projects. This *productive conceptual space* often manifest as some permutation of a Forensic Wall.

Which brings me to my third and final point: *making* affinity involves a *choice*.

When acting into the design situation, the designer can *excise* or *exercise* ambiguity. Which way will the designer take things? More ambiguous? Less ambiguous? Why? What does the situation call for? What *should* happen?

Interaction designers use different styles of artifacts to communicate experiences. When they do this, they can *choose* to increase or decrease the ambiguity of a situation. They can do this by *choosing* how to modulate and act on their perceptions of affinity in that situation. The *Forensic Wall* is one place where this interaction design practice is routinely performed.

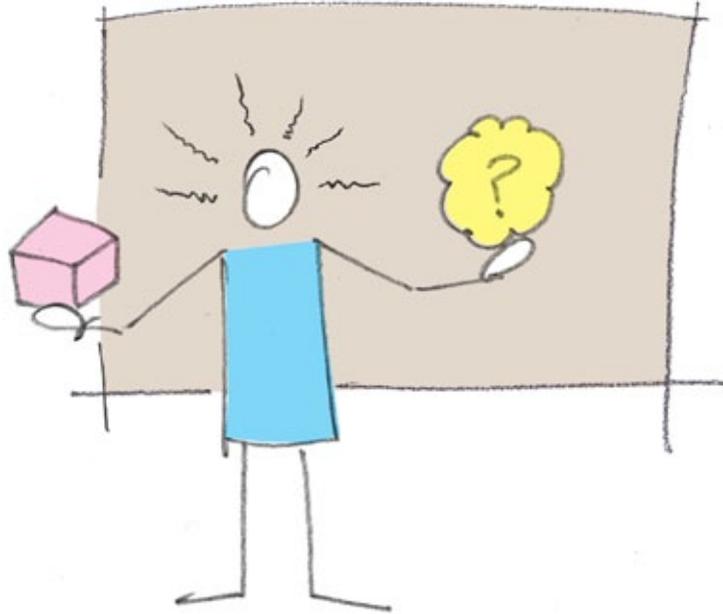
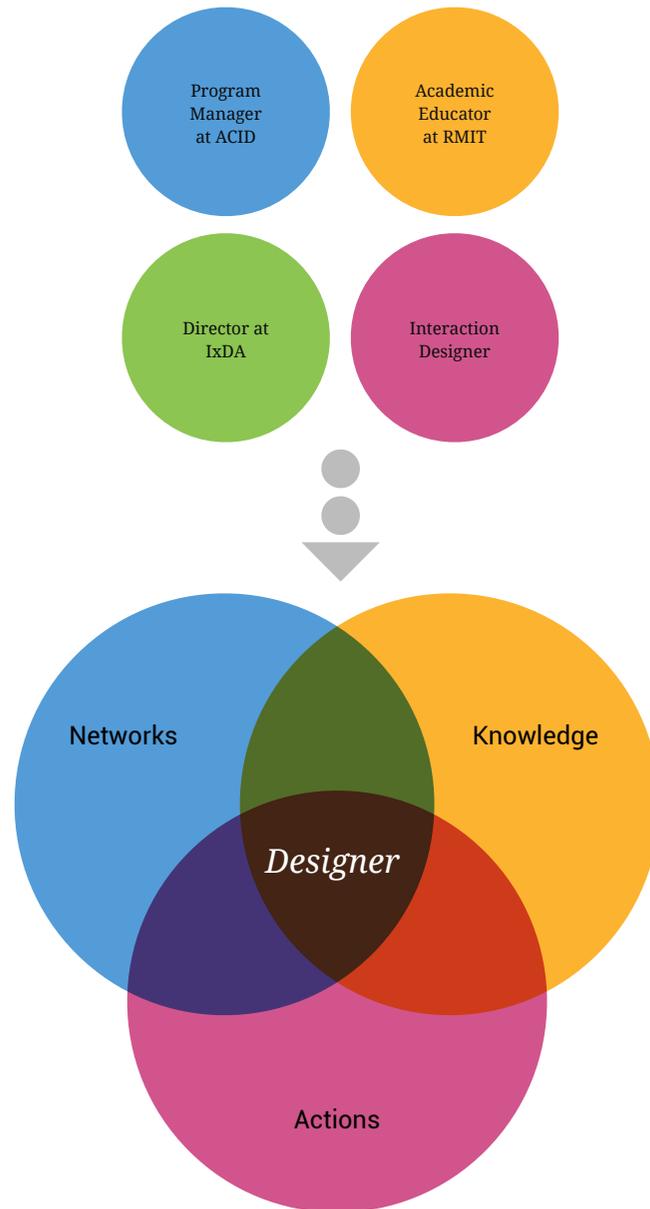


Figure 92 The designer's choice, and their tools



What did I learn by doing this?

This inquiry has been undertaken as an embedded practitioner, framed by four interrelated but distinct roles:

Academic educator at RMIT University, *Director* at the Interaction Design Association (IxDA), *Program manager* at The Australasian CRC for Interaction Design (ACID), *Interaction designer* in a range of design research projects.

I began the research with the goal to discover what made a good interaction designer. My discoveries are applicable to the wider practices of design. My roles, that seemed separate when I began this research, are now connected in a coherent model of my practice, or *how I do what I do*.

The shift I have gone through is one that moves the title designer from one role on its own to the core of them all. I now understand these previously separate approaches as extensions of design into different areas of concern, and I now understand design as a performative foundation for these different areas of my practice.

Reflecting on the way I have identified *performative ambiguity* and *affinity ability* as a foundational duality of design practice, I now see a more useful way of labelling the different aspects of *my* practice. Forgetting roles and organisations, and concentrating on the *materials of concern* in each aspect of what I do, a coherent model emerges: I am a *designer* who works with *knowledge*, *networks* and *actions*.

References

- Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language*. Oxford University Press US.
- Ashby, W. R. (1956). *An introduction to cybernetics*. Chapman & Hall.
- Austin, J. L. (1962). *How to do things with words*. Oxford University Press.
- Bagnara, S., & Smith, G. C. (2006). *Theories and Practice in Interaction Design* (1st ed.). Lawrence Erlbaum Associates.
- Beck, K. (1999). *Extreme Programming Explained: Embrace Change* (US ed.). Addison-Wesley Professional.
- Beer, S. (1979). *The heart of enterprise*. Wiley.
- Beyer, H., & Holtzblatt, K. (1997). *Contextual Design: Defining Customer-Centered Systems* (1st ed.). Morgan Kaufmann.
- Blackwell, A. F. (2006). The reification of metaphor as a design tool. *ACM Trans. Comput.-Hum. Interact.*, 13(4), 490–530. doi:10.1145/1188816.1188820
- Blair-Early, A., & Zender, M. (2008). User Interface Design Principles for Interaction Design. *Design Issues*, 24(3), 85–107. doi:10.1162/desi.2008.24.3.85
- Bleeker, J. (2009, March 3). *Design Fiction: A Short Essay on Design, Science, Fact and Fiction*. Retrieved October 18, 2009, from <http://www.nearfuturelaboratory.com/2009/03/17/design-fiction-a-short-essay-on-design-science-fact-and-fiction/>
- Blevis, E., Lim, Y., Stolterman, E., Wolf, T. V., & Sato, K. (2007). Supporting design studio culture in HCI. CHI '07 extended abstracts on Human factors in computing systems, CHI EA '07 (pp. 2821–2824). New York, NY, USA: ACM. doi:10.1145/1240866.1241086
- Bødker, S. (2006). When second wave HCI meets third wave challenges. *Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles, NordiCHI '06* (pp. 1–8). New York, NY, USA: ACM. doi:10.1145/1182475.1182476
- Boehner, K., Depaula, R., Dourish, P., & Sengers, P. (2005). Affect: From Information to Interaction. *Critical Computing Fourth Decennial Aarhus Conference* (pp. 59–68). ACM Press.
- Boehner, K., DePaula, R., Dourish, P., & Sengers, P. (2007). How emotion is made and measured. *Int. J. Hum.-Comput. Stud.*, 65(4), 275–291.
- Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007). How HCI interprets the probes. *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 1077–1086). San Jose, California, USA: ACM. doi:10.1145/1240624.1240789
- Borchers, J. O. (2000). A pattern approach to interaction design. *Proceedings of the conference on Designing interactive systems processes, practices, methods, and techniques - DIS '00* (pp. 369–378). Presented at the the conference, New York City, New York, United States. doi:10.1145/347642.347795
- Bourdieu, P. (2008). The Forms of Capital. In N. W. Biggart (Ed.), *Readings in Economic Sociology* (pp. 280–291). Blackwell Publishers Ltd. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/9780470755679.ch15/summary>
- Bowen, C. (2009). Press Release - Simpler Reporting for Business [25/08/2009]. Retrieved from <http://ministers.treasury.gov.au/DisplayDocs.aspx?doc=pressreleases/2009/015.htm&pageID=003&min=ceba&Year=&DocType=>
- Brown, D. (2006). *Communicating Design: Developing Web Site Documentation for Design and Planning* (1st ed.). New Riders Press.
- Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), 5–21. doi:10.2307/1511637
- Buchanan, R. (2001). Design Research and the New Learning. *Design Issues*, 17(4), 3–23. doi:10.1162/07479360152681056

- Buchanan, R. (2011, February). Interaction Design: what are we? where are we? where are we going? Keynote conference presentation presented at the Interaction 11, Boulder. Retrieved from <http://www.ixda.org/resources/richard-buchanan-keynote>
- Buchenau, M., & Suri, J. F. (2000). Experience prototyping (pp. 424–433). ACM Press. doi:10.1145/347642.347802
- Burry, J., Weakley, A., Deverell, K., Vaughan, L., & Yuille, J. (2007). Scribblr: Back to the Future of Visual Document Mark-up.
- Buxton, B. (2007). Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufmann.
- Carroll, J. M., & Kellogg, W. A. (1989). Artifact as theory-nexus: hermeneutics meets theory-based design. *SIGCHI Bull.*, 20(SI), 7–14. doi:10.1145/67450.67452
- CBS Corporation. (2000). *CSI: Crime Scene Investigation*. CBS.
- Christine A. Halverson, Luc E. Julia, & Cheyer, A. J. (2008). Working through Walls: Mediating Cooperation in Dynamic Spaces. *CiteSeerX*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.92.7057>
- Clark, A., & Chalmers, D. (1998). The Extended Mind. *Analysis*, 58(1), 7–19. doi:10.1093/analys/58.1.7
- Clarke's three laws - Wikipedia, the free encyclopedia. (n.d.). Retrieved November 7, 2011, from http://en.wikipedia.org/wiki/Clarke%27s_three_laws
- Cooper, A. (1995). *About Face: The Essentials of User Interface Design*. John Wiley & Sons.
- Cooper, A. (1999). *The Inmates Are Running the Asylum* (1st ed.). Sams.
- Cooper, A., Reimann, R., & Cronin, D. (2007). *About Face 3: The Essentials of Interaction Design* (3rd ed.). Wiley.
- Course Kw, Caroline Hummels, Tom Djajadiningrat, & Kees Overbeeke. (2008, December 4). Knowing, doing and feeling: communicating with your digital products. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=?doi=10.1.1.124.7718>
- Crampton-Smith, G. (2007, March 1). *The Craft of Interaction Design*. Retrieved June 5, 2010, from <http://tdd.elisava.net/coleccion/25/gordillo-en>
- Cronin, D. (2010, July 13). *Cooper Journal: Introducing our new web site !!!* Retrieved April 22, 2012, from http://www.cooper.com/journal/2010/07/introducing_our_new_web_site.html
- Cross, N. (2006). *Designerly Ways of Knowing* (1st ed.). Springer.
- Crumlish, C., & Malone, E. (2009). *Designing Social Interfaces: Principles, Patterns, and Practices for Improving the User Experience*. O'Reilly Media, Inc.
- Davis, M. (2008). Toto, I've got a feeling we're not in Kansas anymore… *interactions*, 15(5), 28–34. doi:10.1145/1390085.1390091
- Denzin, N. K. (2001). *Interpretive Interactionism*. SAGE.
- Dewey, J. (1934). *Art as Experience*. New York: Minton, Balch & Co.
- Dieng, R. (2000). *Designing Cooperative Systems: The Use of Theories and Models : Proceedings of the 5th International Conference on the Design of Cooperative Systems (COOP'2000)*. IOS Press.
- Dong, A. (2007). The enactment of design through language. *Design Studies*, 28(1), 5–21. doi:10.1016/j.destud.2006.07.001
- Dorst, K. (2004). *Understanding Design*. Gingko Press.
- Dourish, P. (2001). *Where the Action Is: The Foundations of Embodied Interaction* (New ed.). The MIT Press.
- Dourish, P. (2004). What we talk about when we talk about context. *Personal Ubiquitous Comput.*, 8(1), 19–30. doi:10.1007/s00779-003-0253-8

- Dourish, P., Finlay, J., Sengers, P., & Wright, P. (2004). Reflective HCI: towards a critical technical practice. CHI '04 extended abstracts on Human factors in computing systems (pp. 1727–1728). Vienna, Austria: ACM. doi:10.1145/985921.986203
- download.pdf. (n.d.). Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.86.6303&rep=rep1&type=pdf>
- Dreyfus, H. L., Dreyfus, S. E., & Athanasiou, T. (1986). *Mind over machine*. Basil Blackwell.
- dubberly, hugh. (n.d.). *Designing for Service: Creating an Experience Advantage*. Retrieved March 17, 2010, from http://www.dubberly.com/articles/designing_for_service.html
- Dunne, A., & Raby, F. (2001). *Design noir: the secret life of electronic objects*. Birkhäuser.
- Ehn, P. (1990a). *Work-Oriented Design of Computer Artifacts*. Lawrence Erlbaum Associates, Inc. Retrieved from <http://portal.acm.org/citation.cfm?id=1102017&dl=ACM&coll=Portal&CFID=81554788&CFTOKEN=54923344>
- Ehn, P. (1990b). *Work-Oriented Design of Computer Artifacts*. Hillsdale, NJ, USA: L. Erlbaum Associates Inc.
- Ehn, P. (2008). DOC and the power of things and representatives. Proceedings of the 26th annual ACM international conference on Design of communication, SIGDOC '08 (pp. 31–32). New York, NY, USA: ACM. doi:10.1145/1456536.1456543
- Ehn, P., & Kyng, M. (1992). Cardboard computers: mocking-it-up or hands-on the future. Design at work: cooperative design of computer systems (pp. 169–196). Lawrence Erlbaum Associates, Inc. Retrieved from <http://portal.acm.org/citation.cfm?id=125488&dl=ACM&coll=Portal&CFID=81554788&CFTOKEN=54923344>
- Ehn, Pelle, & Löwgren, Jonas. (2004). *Design [x] research: Essays on interaction design as knowledge*. Retrieved from <http://hdl.handle.net/2043/1189>
- Ekanayake, H., Backlund, P., Ziemke, T., Ramberg, R., & Hewagamage, K. (2011). Assessing Performance Competence in Training Games. In S. D'Mello, A. Graesser, B. Schuller, & J.-C. Martin (Eds.), *Affective Computing and Intelligent Interaction, Lecture Notes in Computer Science* (Vol. 6975, pp. 518–527). Springer Berlin / Heidelberg. Retrieved from <http://www.springerlink.com/content/q8133j5u82725m53/abstract/>
- Erickson, T. (2000). *Lingua Francas for design*. Proceedings of the conference on Designing interactive systems processes, practices, methods, and techniques - DIS '00 (pp. 357–368). Presented at the the conference, New York City, New York, United States. doi:10.1145/347642.347794
- Erickson, T. (2011). *Social Computing*. In M. Soegaard & R. F. Dam (Eds.), *Encyclopedia of Human-Computer Interaction*. Aarhus, Denmark: The Interaction-Design.org Foundation. Retrieved from http://www.interaction-design.org/encyclopedia/social_computing.html
- Erickson, T., Halverson, C., Kellogg, W. A., Laff, M., & Wolf, T. (2002). Social translucence: designing social infrastructures that make collective activity visible. *Commun. ACM*, 45(4), 40–44. doi:10.1145/505248.505270
- Evenson, S., Forlizzi, J., & Zimmerman, J. (2008). An Introduction to This Special Issue on Interaction Design Research in Human-Computer Interaction. *Design Issues*, 24(3), 1–3. doi:10.1162/desi.2008.24.3.1
- Everitt, K. M., Klemmer, S. R., Lee, R., & Landay, J. A. (2003). Two worlds apart: bridging the gap between physical and virtual media for distributed design collaboration. Proceedings of the SIGCHI conference on Human factors in computing systems, CHI '03 (pp. 553–560). New York, NY, USA: ACM. doi:10.1145/642611.642707
- Facebook. (n.d.). Facebook. Retrieved April 15, 2012, from <http://www.facebook.com/>
- Fallman, D. (183AD). *The Interaction Design Research Triangle of Design Practice, Design Studies, and Design Exploration*. *Design Issues*, 24(3), 4–18. doi:10.1162/desi.2008.24.3.4

- Fallman, D. (2003). Design-oriented human-computer interaction. Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 225–232). Ft. Lauderdale, Florida, USA: ACM. doi:10.1145/642611.642652
- Fallman, D., Kruzeniski, M., & Andersson, M. (2005). Designing for a collaborative industrial environment: the case of the ABB Powerwall. Proceedings of the 2005 conference on Designing for User eXperience, DUX '05. New York, NY, USA: AIGA: American Institute of Graphic Arts. Retrieved from <http://dl.acm.org.ezproxy.lib.rmit.edu.au/citation.cfm?id=1138235.1138283>
- Findeli, A. (1990). Moholy-Nagy's Design Pedagogy in Chicago (1937-46). *Design Issues*, 7(1), 4–19. doi:10.2307/1511466
- Flores, F., Graves, M., Hartfield, B., & Winograd, T. (1988). Computer systems and the design of organizational interaction. *ACM Trans. Inf. Syst.*, 6(2), 153–172. doi:10.1145/45941.45943
- Forlizzi, J., & Battarbee, K. (2004). Understanding experience in interactive systems. Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques (pp. 261–268).
- Forlizzi, Jodi, Zimmerman, J., & Evenson, S. (2008). Crafting a Place for Interaction Design Research in HCI. *Design Issues*, 24(3), 19–29. doi:Article
- Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1994). *Design Patterns: Elements of Reusable Object-Oriented Software* (1st ed.). Addison-Wesley Professional.
- Garrett, J. J. (2002). *The Elements of User Experience: User-Centered Design for the Web*. New Riders Press.
- Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: Cultural probes. *interactions*, 6(1), 21–29. doi:10.1145/291224.291235
- Gaver, W. W., Beaver, J., & Benford, S. (2003). Ambiguity as a resource for design. Proceedings of the SIGCHI conference on human factors in computing systems, CHI '03, 233–240. doi:10.1145/642611.642653
- Geertz, C. (1977). *The Interpretation Of Cultures*. Basic Books.
- Glanville, R. (2009). A (Cybernetic) Musing: Design and Cybernetics. *Cybernetics and Human Knowing*, 16(3), 175.
- Glanville, Ranulph. (1999). Researching Design and Designing Research. *Design Issues*, 15(2), 80–91. doi:10.2307/1511844
- Goodwin, C. (1994). Professional Vision. *American Anthropologist*, 96(3), 606–633. doi:10.1525/aa.1994.96.3.02a00100
- Goodwin, K. (2009). *Designing for the Digital Age: How to Create Human-Centered Products and Services* (annotated ed.). Wiley.
- Gray, D., Brown, S., & Macanufo, J. (2010). *Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers* (1st ed.). O'Reilly Media.
- Hamilton, P. F. (1999). *Second Chance at Eden* (First edition & printing in this form.). Pan Macmillan.
- Harper, D. (n.d.). Definition of Forensic. Online Etymology Dictionary. <http://www.etymonline.com>. Retrieved from http://www.etymonline.com/index.php?allowed_in_frame=0&search=forensic&searchmode=none
- Haseman, B. C. (2006). A manifesto for performative research. *Media International Australia Incorporating Culture and Policy: quarterly journal of media research and resources, Practice Led Research*, (118), 98–106.
- Hill, D. (2012). *Dark Matter and Trojan Horses: A Strategic Design Vocabulary* (1st ed.). Strelka Press.
- Hoekman, R. (2006). *Designing the Obvious: A Common Sense Approach to Web Application Design* (1st ed.). New Riders Press.
- Home Box Office inc. (2002). *The Wire*. HBO.
- Hutchins, E. (2005). Material anchors for conceptual blends. *Journal of Pragmatics*, 37(10), 1555–1577. doi:10.1016/j.pragma.2004.06.008

- Hutchins, E. (2011). *Enaction, Imagination and Insight. Enaction: Toward a New Paradigm for Cognitive Science* (pp. 425–450). MIT Press.
- IFRS Foundation. (2008, March 31). The IASC Foundation publishes IFRS Taxonomy 2008. Retrieved April 15, 2012, from <http://www.ifrs.org/News/XBRL/The+IASC+Foundation+publishes+IFRS+Taxonomy+2008.htm>
- Ishii, H., & Ullmer, B. (1997). Tangible bits: towards seamless interfaces between people, bits and atoms. *Proceedings of the SIGCHI conference on Human factors in computing systems, CHI '97* (pp. 234–241). New York, NY, USA: ACM. doi:10.1145/258549.258715
- Jones, J. C. (1992). *Design Methods*. John Wiley and Sons.
- Jonsson, M., Tholander, J., & Fernaeus, Y. (2009). Setting the stage - Embodied and spatial dimensions in emerging programming practices. *Interact. Comput.*, 21(1-2), 117–124. doi:10.1016/j.intcom.2008.10.004
- Ju, W., & Leifer, L. (2008). The Design of Implicit Interactions: Making Interactive Systems Less Obnoxious. *Design Issues*, 24(3), 72–84. doi:10.1162/desi.2008.24.3.72
- Kelley, T., & Littman, J. (2005). *The Ten Faces of Innovation: Ideo's Strategies For Beating The Devil's Advocate & Driving Creativity Throughout Your Organization*. Currency/Doubleday.
- Kimbell, L. (2009). *Beyond design thinking: Design-as-practice and designs-in-practice*. Presented at the CRESC Conference, Manchester.
- Kimbell, L. (2011). Rethinking Design Thinking: Part I. *Design and Culture*, 3(3), 285–306. doi:10.2752/175470811X13071166525216
- Knorr Cetina, & Bruegger, U. (2000). The Market as an Object of Attachment: Exploring Postsocial Relations in Financial Markets. *Canadian Journal of Sociology*, 25(2), 141–168. doi:10.2307/3341821
- Kolko, J. (2009). *Thoughts on Interaction Design*. Morgan Kaufmann.
- Kolko, J. (2011). *Exposing the Magic of Design: A Practitioner's Guide to the Methods and Theory of Synthesis* (1st ed.). Oxford University Press, USA.
- Koschmann, T., Kuutti, K., & Hickman, L. (1998). *The Concept of Breakdown in Heidegger, Leont'ev, and Dewey and Its Implications for Education*. *Mind, Culture, and Activity*, 5, 25–41. doi:10.1207/s15327884mca0501_3
- Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J., & Wensveen, S. (2011). *Design Research Through Practice: From the Lab, Field, and Showroom*. Elsevier.
- Kosrara, R. (n.d.). *The Rise and Fall of Swivel.com | eagereyes*. Retrieved April 15, 2012, from <http://eagereyes.org/criticism/the-rise-and-fall-of-swivel>
- Krippendorff, K. (1989). On the Essential Contexts of Artifacts or on the Proposition That “Design Is Making Sense (Of Things).” *Design Issues*, 5(2), 9–39. doi:10.2307/1511512
- Krippendorff, K. (2006). *The semantic turn*. CRC Press.
- Krug, S. (2005). *Don't Make Me Think: A Common Sense Approach to Web Usability, 2nd Edition* (2nd ed.). New Riders Press.
- Kurvinen, E., Koskinen, I., & Battarbee, K. (183AD). *Prototyping Social Interaction*. *Design Issues*, 24(3), 46–57. doi:10.1162/desi.2008.24.3.46
- Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press.
- LinkedIn Corp. (n.d.). *LinkedIn*. Retrieved April 15, 2012, from <http://www.linkedin.com/>
- Lowgren, J. (2001). From HCI to interaction design. *Human computer interaction: issues and challenges* (pp. 29–43). IGI Publishing. Retrieved from <http://portal.acm.org/citation.cfm?id=375170.375357&coll=Portal&dl=ACM&CFID=81554788&CFTOKEN=54923344>

- Lowgren, J. (2008). Interaction Design. (M. Soegaard & R. F. Dam, Eds.) Encyclopedia of Human-Computer Interaction. Aarhus, Denmark: The Interaction-Design.org Foundation. Retrieved from http://interaction-design.org/encyclopedia/interaction_design.html
- Lowgren, J. (n.d.). Interaction design bookshelf. Retrieved August 12, 2008, from <http://webzone.k3.mah.se/k3jolo/idBookshelf/>
- Lowgren, J., & Stolterman, E. (2004). Thoughtful Interaction Design: A Design Perspective on Information Technology. The MIT Press. Retrieved from <http://portal.acm.org/citation.cfm?id=1050958&l=ACM&coll=Portal&CFID=81554788&CFTOKEN=54923344>
- Macdonald, H., Yuille, J., Stanton, R., & Viller, S. (2009). The social life of visualization. Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group: Design: Open 24/7 (pp. 193–200). Melbourne, Australia: ACM. doi:10.1145/1738826.1738858
- Margolin, V., & Buchanan, R. (1996). The Idea of Design. The MIT Press.
- Mark, G. (2002). Extreme collaboration. *Commun. ACM*, 45(6), 89–93. doi:10.1145/508448.508453
- Matthews, B., Stienstra, M., & Djajadiningrat, T. (183AD). Emergent Interaction: Creating Spaces for Play. *Design Issues*, 24(3), 58–71. doi:10.1162/desi.2008.24.3.58
- Matthews, E. (2002). The philosophy of Merleau-Ponty. McGill-Queen's University Press.
- Mcafee, A. P. (2006). Enterprise 2.0: the dawn of emergent collaboration. *Engineering Management Review, IEEE*, 34(3), 38. doi:10.1109/EMR.2006.261380
- McCarthy, J., & Wright, P. (2004). Technology as Experience. The MIT Press.
- McGhee, G. (2010). Journalism in the Age of Data: A Video Report on Data Visualization by Geoff McGhee. Retrieved April 15, 2012, from <http://datajournalism.stanford.edu/>
- Meadows, D. H. (2008). Thinking in systems: a primer. Chelsea Green Publishing.
- Meng, J. C. S. (2009). Donald Schön, Herbert Simon and The Sciences of the Artificial. *Design Studies*, 30(1), 60–68. doi:10.1016/j.destud.2008.09.001
- Merholz, P., Wilkens, T., Schauer, B., & Verba, D. (2008). Subject To Change: Creating Great Products & Services for an Uncertain World: Adaptive Path on Design. O'Reilly Media, Inc.
- Merleau-Ponty, M. (1945). Phenomenology of perception. Routledge.
- Moggridge, B. (2007). Designing Interactions (1st ed.). The MIT Press.
- Moran, T. P., Saund, E., van Melle, W., Bryll, R., Gujar, A. U., Fishkin, K. P., & Harrison, B. L. (1999a). The ins and outs of collaborative walls: demonstrating the collaboration concept. CHI '99 extended abstracts on Human factors in computing systems, CHI '99, 192–193. doi:10.1145/632716.632837
- Moran, T. P., Saund, E., van Melle, W., Bryll, R., Gujar, A. U., Fishkin, K. P., & Harrison, B. L. (1999b). The ins and outs of collaborative walls: demonstrating the collaboration concept. CHI '99 extended abstracts on Human factors in computing systems, CHI EA '99 (pp. 192–193). New York, NY, USA: ACM. doi:10.1145/632716.632837
- More, G., Padgham, L., Mathieson, I., & Burry, M. (2003). Multidimensional presentation environments with integrated intelligent agents. Presented at the ACADIA: Connecting Crossroads of Digital Discourse, Bookmaster, Mansfield. Retrieved from <http://researchbank.rmit.edu.au/view/rmit:2486>
- More, G., Yuille, J., Padgham, L., Sahani, A., & Burry, M. (2005). The space and sound of intelligent information environments. Proceedings of the 17th Australia conference on Computer-Human Interaction: Citizens Online: Considerations for Today and the Future, OZCHI '05 (pp. 1–9). Narrabundah, Australia, Australia: Computer-Human Interaction Special Interest Group (CHISIG) of Australia. Retrieved from <http://dl.acm.org/citation.cfm?id=1108368.1108407>

- Muller, M. J., Matheson, L., Page, C., & Gallup, R. (1998). Methods & tools: participatory heuristic evaluation. *interactions*, 5(5), 13–18. doi:10.1145/285213.285219
- Nafus, D., & Anderson, K. (2009). Writing on Walls: The Materiality of Social Memory in Corporate Research. In M. Cefkin (Ed.), *Ethnography and the Corporate Encounter: Reflections on Research in and of Corporations* (pp. 137–157). Berghahn Books.
- Nielsen, J. (1999). *Designing Web Usability* (1st ed.). Peachpit Press.
- Nielsen, J., & Mack, R. L. (Eds.). (1994). *Usability Inspection Methods* (1st ed.). Wiley.
- Norman, D. A. (1988). *The Design of Everyday Things*. Basic Books.
- Norman, D. A. (2005). *Emotional Design: Why We Love (or Hate) Everyday Things* (1st ed.). Basic Books.
- Norman, D. A. (n.d.). *Technology First, Needs Last*. jnd.org. Retrieved December 10, 2009, from http://jnd.org/dn.mss/technology_first_needs_last.html
- O'Day, B. A. N. & V. L. (2000). *Information Ecologies: Using Technology with Heart*. MIT Press.
- O'Hara, K., Perry, M., Churchill, E., & Russell, D. (2003). *Public and Situated Displays: Social and Interactional Aspects of Shared Display Technologies*. Springer.
- O'Reilly, T. (2005, September 30). *What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software*. Retrieved August 29, 2011, from <http://oreilly.com/web2/archive/what-is-web-20.html>
- Ozenc, F. K., Kim, M., Zimmerman, J., Oney, S., & Myers, B. (2010). How to support designers in getting hold of the immaterial material of software. *Proceedings of the 28th international conference on Human factors in computing systems, CHI '10* (pp. 2513–2522). New York, NY, USA: ACM. doi:10.1145/1753326.1753707
- Penin, L., & Tonkinwise, C. (2009). *The Politics and Theatre of Service Design*. IASDR 2009, Seoul.
- Portugal, S. (2008). TRUE TALES: Persona non grata. *interactions*, 15(1), 72–73. doi:10.1145/1330526.1330550
- Princeton University. (n.d.). Definition of forensic. Definition of forensic. Retrieved April 22, 2012, from <http://wordnetweb.princeton.edu/perl/webwn?s=forensic>
- Reckwitz, A. (2002). Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European Journal of Social Theory*, 5(2), 243–263. doi:10.1177/1368431022225432
- Reinman, R. (n.d.). *Cooper Journal: So You Want To Be An Interaction Designer*. Cooper Journal. Retrieved from http://www.cooper.com/journal/2001/06/so_you_want_to_be_an_interacti.html
- Resnick, L. B., Säljö, R., Pontecorvo, C., & Burge, B. (1997). *Discourse, Tools and Reasoning: Essays on Situated Cognition*. Springer.
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155–169. doi:10.1007/BF01405730
- Rogers, Y., Rutherford, A., & Bibby, P. A. (1992). *Models in the mind: theory, perspective and application*. Academic Press.
- Rosenfeld, L., & Morville, P. (2006). *Information Architecture for the World Wide Web: Designing Large-Scale Web Sites* (3rd ed.). O'Reilly Media, Inc.
- Ross, P. R., Overbeeke, C. J., Wensveen, S. A., & Hummels, C. M. (2008). A designerly critique on enchantment. *Personal Ubiquitous Comput.*, 12(5), 359–371.
- Saffer, D. (2006). *Designing for Interaction: Creating Smart Applications and Clever Devices* (1st ed.). Peachpit Press.
- Schnetler, N. (2005). *The Idea Machine: How Ideas Can Be Produced Industrially*. Wiley-VCH.

- Schön, D. A. (1984). *The Reflective Practitioner: How Professionals Think In Action* (1st ed.). Basic Books.
- Schön, D. A. (1990). Educating the reflective practitioner: toward a new design for teaching and learning in the professions. *Jossey-Bass*.
- Schön, D. A. (1992). The Theory of Inquiry: Dewey's Legacy to Education. *Curriculum Inquiry*, 22(2), 119–139. doi:10.2307/1180029
- Scott, M. (2010). A global ABC. *The Journal of International Communication*, 16(1), 75–85.
- Sengers, P., & Gaver, B. (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. *Proceedings of the 6th conference on Designing Interactive systems, DIS '06*, 99–108. doi:10.1145/1142405.1142422
- Sharp, H., Rogers, Y., & Preece, J. (2007). *Interaction Design: Beyond Human-Computer Interaction* (2nd ed.). Wiley.
- Shaw, R., & Shockley, K. (2003). An Ecological Science of the Artificial? *Journal of the Learning Sciences*, 12(3), 427–435. doi:10.1207/S15327809JLS1203_5
- Shove, E., Watson, M., Ingram, J., & Hand, M. (2008). *The Design of Everyday Life*. Berg Publishers.
- Simon, H. A. (1963). *The Sciences of the Artificial* (3rd ed.). The MIT Press.
- Sterling, B. (2009). Design fiction. *interactions*, 16(3), 20–24. doi:10.1145/1516016.1516021
- Stevenson, A. (2010). affinity noun. *Oxford Dictionary of English*. Oxford University Press. Retrieved from <http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t140.e0011720>
- Stewart, J. R., Gapenne, O., & Paolo, E. A. D. (2011). *Enaction: Toward a New Paradigm for Cognitive Science*. MIT Press.
- Suchman, L. A. (1987). *Plans and Situated Actions: The Problem of Human-Machine Communication*. Cambridge University Press.
- Takeuchi, H., & Nonaka, I. (1986). The new new product development game. *Harvard Business Review*.
- Teasley, S., Covi, L., Krishnan, M. S., & Olson, J. S. (2000). How does radical collocation help a team succeed? *Proceedings of the 2000 ACM conference on Computer supported cooperative work, CSCW '00* (pp. 339–346). New York, NY, USA: ACM. doi:10.1145/358916.359005
- Thackara, J. (2006). *In the Bubble: Designing in a Complex World*. The MIT Press.
- Tholander, J., Karlgren, K., Ramberg, R., & Sökjer, P. (2008). Where all the interaction is: sketching in interaction design as an embodied practice. *Proceedings of the 7th ACM conference on Designing interactive systems, DIS '08* (pp. 445–454). New York, NY, USA: ACM. doi:10.1145/1394445.1394493
- Tidwell, J. (2005). *Designing Interfaces*. O'Reilly Media, Inc.
- Tonkinwise, C. (2011). A taste for practices: Unrepressing style in design thinking. *Design Studies*, 32(6), 533–545. doi:10.1016/j.destud.2011.07.001
- Vaughan, L., Stewart, N., Dunbar, M., & Yuille, J. (2009). Propositions and applications: Collaborating through the use of design methods. *Aesthesis: International journal of art and aesthetics in management and organizational life*, 2(3), 106–114.
- Verbeek, P.-P. (2005). *What things do: philosophical reflections on technology, agency, and design*. Penn State Press.
- Viegas, F. B., Wattenberg, M., van Ham, F., Kriss, J., & McKeon, M. (2007). ManyEyes: a Site for Visualization at Internet Scale. *Visualization and Computer Graphics, IEEE Transactions on*, 13(6), 1121–1128. doi:10.1109/TVCG.2007.70577

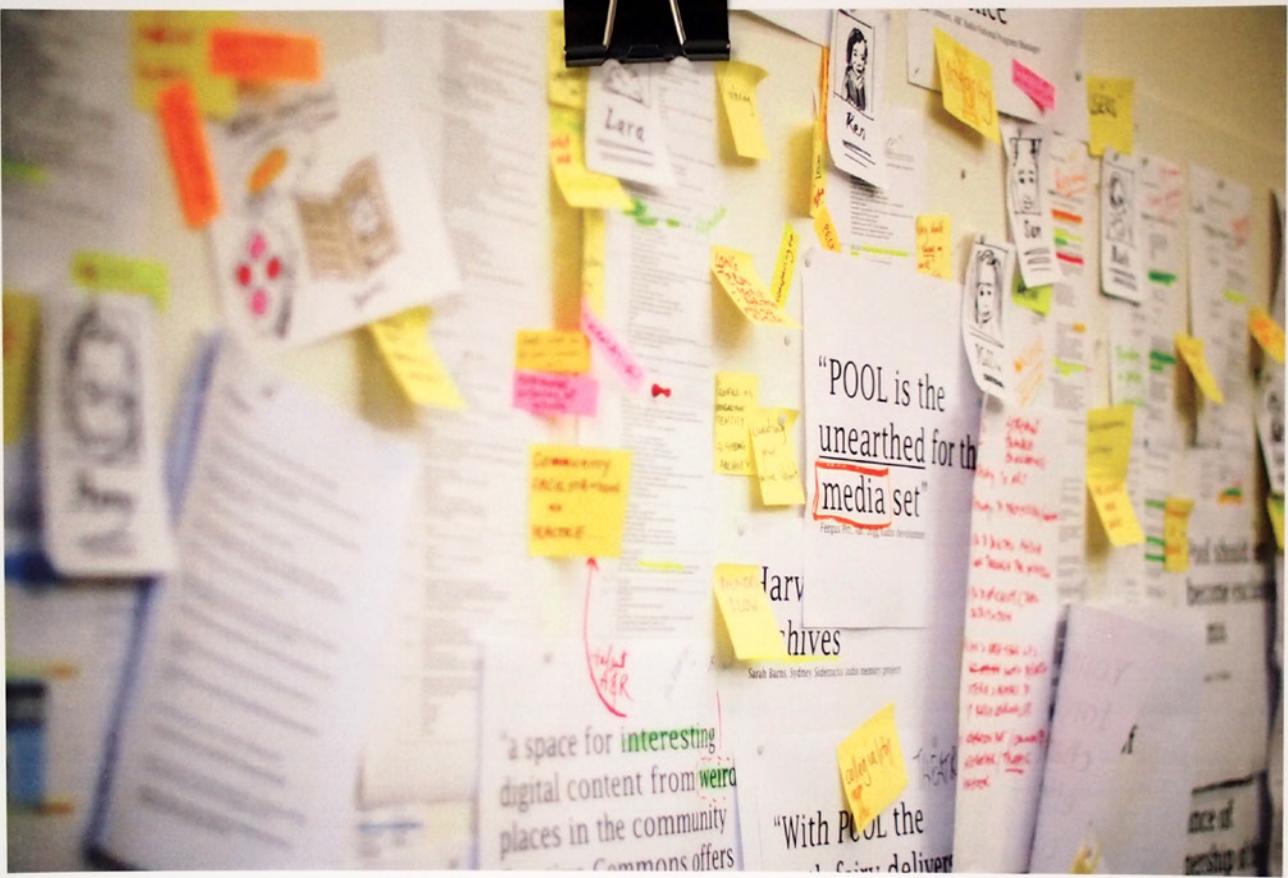
- Wardrip-Fruin, N., & Montfort, N. (2003). *The New Media Reader*. The MIT Press.
- Weakley, A., Deverell, K., & Yuille, J. (2009). WEB 2.0 in Support of Sketching in Architectural Practice. CiteSeerX. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.143.1595>
- Wenger, E. (1998). *Communities of practice: learning, meaning, and identity*. Cambridge University Press.
- Winograd, T. (1997). From computing machinery to interaction design. *Beyond calculation: The next fifty years of computing* (pp. 149–162).
- Winograd, Terry. (1995). From programming environments to environments for designing. *Commun. ACM*, 38(6), 65–74. doi:10.1145/203241.203259
- Winograd, Terry (Ed.). (1996). *Bringing design to software*. ACM. Retrieved from <http://portal.acm.org/citation.cfm?id=229868&dl=ACM&coll=Portal&CFID=81554788&CFTOKEN=54923344>
- Wood, J. (2009). *How Fiction Works* (Reprint.). Picador.
- WordPress › Blog Tool, Publishing Platform, and CMS. (n.d.). Retrieved April 15, 2012, from <http://wordpress.org/>
- Wright, P., & McCarthy, J. (2008). Empathy and experience in HCI. *Proceedings of the twenty-sixth annual SIGCHI conference on Human factors in computing systems, CHI '08* (pp. 637–646). New York, NY, USA: ACM. doi:10.1145/1357054.1357156
- Wright, P., Wallace, J., & McCarthy, J. (2008). Aesthetics and experience-centered design. *ACM Trans. Comput.-Hum. Interact.*, 15(4), 18:1–18:21. doi:10.1145/1460355.1460360
- Yahoo! Inc. (n.d). flickr.com. Retrieved April 15, 2012, from <http://www.flickr.com/>
- Yahoo! Inc. (2010). *Design Pattern Library*. About the Pattern Library - Design Pattern Library - YDN. Reference Library. Retrieved February 23, 2010, from <http://developer.yahoo.com/ypatterns/about/index.html>
- Yau, N. (2008, October 28). *New York Times Visualization Lab – Collaboration with Many Eyes*. Retrieved April 15, 2012, from <http://flowingdata.com/2008/10/28/new-york-times-visualization-lab-collaboration-with-many-eyes/>
- Young, I. (2008). *Mental Models: Aligning Design Strategy with Human Behavior* (1st ed.). Rosenfeld Media.
- Yuille, J., & Macdonald, H. (2010, January). FEATURE: The social life of visualization. *interactions*, 17, 28–31.
- Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). Research through design as a method for interaction design research in HCI. *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 493–502). San Jose, California, USA: ACM. doi:10.1145/1240624.1240704



TWEAKABILITY

Users need a way of shifting and reformulating a data visualization so that they can make sense of the whole data set by understanding how it responds to dynamic changes.

- Use a series of the visualization (location) to create my own maps, with color
 - Use a series of the visualization (location) to track my time, amount
- Insights:**
- Method of making the visualization complex, make it an interface that is a user-friendly interface.
 - Create new for users to change how a dataset is represented in a visualization allowing the impact of any changes they make to be immediately reflected.



POOL

HOME

Pool is an open platform where people...

Out in the open
By Kurisu
About the project City Nights

Lorem Ipsum
Image by Kurisu

Dolor sit amet
Image by Overlobe

Consectetur adipiscing
Image by Kurisu

Suspendisse magna
Image by Kurisu

Out in the Open

By Rachael Kohn

Radio National's artist in residence Linda Neil is living and singing like a minstrel for a whole year as part of our newest callout, Our Year of Singing Love Songs. Every week from today, Linda will upload a new love song for us to use, starting with...

