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**Making scenarios
more worthwhile:
Orienting to design
story work**

Malcolm Jones

Doctor of Philosophy

2019

Making scenarios more worthwhile: Orienting to design story work

Malcolm Jones

A thesis submitted in partial
fulfilment of the requirements of
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Newcastle for the degree of
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Abstract

Increased complexity in contemporary design work has led designers to place greater dependence on the use of story and narrative. Though many consider story and narrative a fundamental part of design, use continues to present challenges and efficacy is poorly understood. With regards to use, challenges stem from a lack of support in directing strategic conversations towards getting the *right stories* and to *getting stories right*. With regards to efficacy, poor understanding stems from a lack of research and a corresponding lack of unifying theory.

Scenario research represents the largest body of knowledge on the use and efficacy of story and narrative in design. Yet, scenarios are characteristically narrow in scope and their descriptions typically *thin*. Scenario research is in decline, and what theory exists is neither extensive nor extensible. Nevertheless, scenarios serve as a starting point for this research, with questions posed about how designers work with story and narrative, and how, in turn, story and narrative work for designers.

To explore these questions epistemological, philosophical and theoretical positions are taken up and these underpin a Research *into/through/for* Design methodology. A series of self-reflective experiments lead to the creation of novel narrative resources and approaches, which empirical studies expose to a range of increasingly challenging settings. Findings from these studies show that narrative resources coupled with resource-based approaches provide targeted support for cognitively challenging aspects of story work. Furthermore, outcomes from a programme of critical analysis provide insights into how story, narrative and narrative resources work for designers.

Contributions to knowledge are made in three areas: first, in the area of design practice in relation to narrative resources and approaches to story work; second, in the area of design theory in relation to realistic approaches to method innovation; and third, in the area of research practice in relation to aids to visual analysis.

Acknowledgements

In 2007 a question was posed that led to a series of fortunate events and the completion of this thesis. The question was posed at a meeting to review a master of arts dissertation. Manny Ling, my supervisor, asked if I'd ever thought about doing a PhD. At the time there were many things that I wanted to do in my life and a PhD was not one of them. But, as is sometimes the case with ideas, this one grew. I owe a great deal to Manny and the rest of the Design faculty at Sunderland University for helping me get through that one-year masters degree and putting me on the path to further studies..

On completion of the masters degree, another meeting led to another fortunate event. Gilbert Cockton had been one of several reviewers that had generously agreed to give critical feedback on the masters project. When I asked if I could work with him to learn how to do research I was amazed that he said yes. The interest that Gilbert has shown in the work and the support and mentoring that he has given to me over the years has seemingly known no bounds. Now a dear and steadfast friend, it has to be said that the thesis as it now stands would not have been possible without his masterful guidance, keen intelligence, sharp eye for detail, patience, good humour and wit.

This has been matched and serendipitously complemented by the literary prowess of my second supervisor, Mark Blythe. Mark's creative insights have been a constant source of inspiration and his suggestions a source of worthy challenges. Warranting equal praise are the 23 bright and intelligent people who contributed their time, expertise and energies to the studies. Without their generous contribution the research could not have been conducted.

Seemingly on the periphery of this academic arena, but actually at the heart of the day-to-day routines that characterise undertakings of this kind, is my closest friend and partner Christine, without whose understanding and support, it is fair to say, the thesis would in all likelihood never have been finished.

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

I declare that the Word Count of this Thesis is 89,925 words

Name:

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

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Part 1

Part 1 of the thesis concerns itself with establishing broad contextual underpinnings for the research through a body of knowledge and understanding that is guided by aims and objectives, informed by the literature, and founded upon epistemological, theoretical and methodological perspectives.

Chapter 1. Introduction

1.1. Challenge

This research set out to refine solutions to an existing challenge. The use of story and narrative are widespread in design, yet designers continue to encounter difficulties authoring and developing stories that are well suited to their needs. The challenge persists in areas of design work where stories are either conceptually difficult to grasp or storytelling activities are poorly supported by theory, tools or methods. Theory has been developed piecemeal, often in support of tool and method use. But little attention has been paid to theorising or supporting design, as a whole, as an act of storytelling. Until such shortfalls are resolved, it is hard to see how research in design can move forward and designers can be more fully supported in this type of ‘story work’.

Here, story work is taken to mean;

any activities that design teams engage in where the prevailing approach (or methodology) involves formal development and/or use of story and narrative.

The challenge persists in story work for want of the right kinds of competencies, tools, methods, sources of knowledge or theory to be brought to bear in settings that are either novel, unforeseen or beyond the designer’s control. Adaptation of theoretical perspectives and practices in design work and new approaches to resource development and use are proposed as ways of supporting targeted areas of story work where such challenges persist.

1.2. Motivation

Motivation for this research was founded in practice. It can be traced to questions that arose in the co-creation of storyboards. In the early 1990s, the Canadian high-technology sector was just starting to experiment with scenario-based design methods. As a design practitioner working in that sector at the time, some of the work involved

the co-creation of storyboards for front-end product, systems and software design. It was common practice for design workers, such as software systems engineers, user researchers, systems analysts and project managers etc., to author textual scenarios. Naturalistic storyboards, i.e., pictorial depictions of textual scenarios, were found to communicate concepts and design propositions more quickly and effectively. However, the investment required to produce storyboards limited their use to settings such as, for example, customer focus groups and upper management presentations where expedience, clarity of message and trust in the author(s) and the value of their work were critical factors. It was the critical roles played by storyboards in settings such as these that began to raise questions about how they work for design and how designers work with and benefit from scenarios and storyboards.

Later work involved the design of storyboard systems and 'kits' for independent use. This brought a *Design for Design* focus to the work that raised questions about how design expertise, knowledge and techniques regarding storyboard work can be articulated, and how tools for supporting such work can be developed and disseminated.

In 2007, I engaged in a *Research through Design* project that started to answer some of these questions. WorkPlay, a storyboard-based ideation and sketching tool, was designed to help those with little or no artistic training visually express a scenario in a rough-and-ready way. Its value to design resides, first, in the simplicity of just-barely-good-enough visual representations that make scene rendering quick and easy, and second, in the communicative value of words and images over words alone.

For two reviewers of the project this brought some pressing issues to the fore:

Can people easily use WorkPlay to create their own scenarios in the various roles?

The key learning aspect here would not be how to use the software but *how to design effective WorkPlay scenarios*.

The comments inferred that something was missing. A more fundamental and pressing challenge was not being addressed by the tool, and this brought its worth into question. The tool fulfilled some needs, such as rapid scene sketching and ease of use. But these were thought to be of little help if designers have a poor grasp of storytelling or are unsure about which story to tell.

1.3. Questions

With those insights in mind, the following question motivates the research: *How can designers and others engaged in design work, be better supported in telling good stories?*

1.3.1. Framing the research around robust questions

Table 1.1 Research questions

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Two complementary lines of inquiry were taken up to help answer this question; the first guided by the need to understand practice, the second guided by the desire to build theory. Each line of inquiry presents two further questions.

Table 1.1 shows how, when the two lines of inquiry – *understanding practice* and *building theory* – are juxtaposed with the subjects of inquiry – *story, narrative and design* and *narrative resources* – a matrix of four research questions emerges. Questions A and B concern themselves with understanding practice and building theory (respectively) around the subjects of story, narrative and design. While questions C and D concern themselves with understanding practice and building theory (respectively) around the subject of narrative resources.

The table acts as an orienting device throughout the thesis. It is used at the beginning of each chapter and in some cases the beginning of sections to indicate which research questions are being addressed.

1.4. What the research is about

We live in story... we represent life in story... we explain through story [and] we understand and comprehend through story.

(Cochran, 1990:73, in Moller, 2013:28)

Cochran's (1990) four epistemologically distinct 'presences' of story in lived experience provide a starting point for establishing ontological positions. The nature of phenomena, entities or 'social reality' (Mason, 2002:14) associated with each presence are identified in ***bold italics*** (for choices made from Mason's ontological categories, see Appendix D2.1 'Ontological categories'). The 4 presences are described in ascending order of importance to the inquiry.

1.4.1. Presence 1: We live in story

Story and narrative are everywhere. They are ubiquitous and arguably fundamental to an appreciation for *understanding* lived experience. If language and narrative representations of story are what are used to intelligently *interpret* the world, then all that is knowable about the world is constrained to that intelligence. Other things may be experienced, but in the absence of adequate means to relate those experiences to others, such things can neither be fully represented, *communicated* or understood.

Designers' use of scenarios is part of a much broader use made of story and narrative throughout design to *represent*, explain and *understand* things.

1.4.2. Presence 2: We represent life in story

In design, the worth of scenarios, concepts, ideas and propositions etc., are realised by being expressed and represented. According to Lloyd (2000:369), designers build a 'world of meaning' through the *language*, terminology and *objects* they use. Though concept sketches give form and substance to designs from which a range of meanings may arise, scenarios and storyboards give form and substance to the contexts in which designs are formed and encountered; they are instrumental in building the 'world' in which design takes place and by which design worth can be appreciated. The study of *objects* of representation, specifically narrative mediating representations such as textual scenarios and storyboards, informs interrogation of more subtle entities or phenomena.

1.4.3. Presence 3: We explain through story

Stories are also used in design to explain. Design teams use stories to make sense of contextual information gathered during research and to explain concepts to each other as they consolidate and verify their *understandings*. In stories they find explanations of the world in which their designing takes place, and with stories they offer explanations of their work to others. Inquiry into these areas of design story work, therefore, concerns the study of *underlying mechanisms* (human interactions, the function of objects, etc.) and *communications*. *Discourse* plays out in the resolution of questions, concepts and design proposals deliberated in strategic conversations that take place around stories, while *communications* play a role in facilitating those conversations.

1.4.4. Presence 4: We understand and comprehend through story

Understandings shape and are shaped by *interpretations* and *perceptions, motivations* and ideas. In design story work there is a commitment to work things out by adopting

the stance that design is an unfolding narrative with a partially conceived plot-line. It is an approach that suspends judgement, avoids premature fixation and allows *understandings, interpretations, perceptions, motivations* and *ideas*, amongst other things, to emerge through the creation, development and general use of stories and narratives. This inquiry is concerned with how such ‘realisations’ influence, form around, emerge from or manifest themselves in story work.

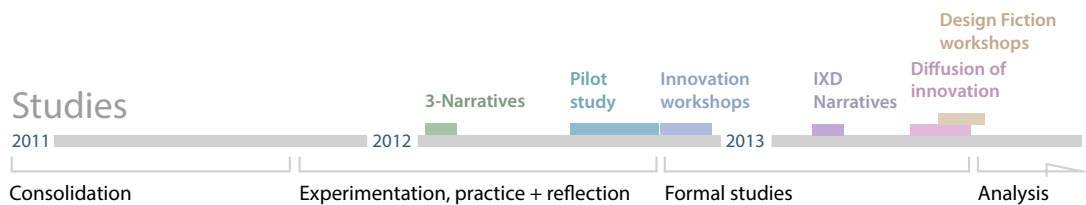
The research, therefore, looks to the co-emergence of scenarios and stories, ideas and design propositions as a way to investigate the emergence of meanings upon which design *understandings* and other *realisations* are based.

1.5. Aim

The research aim stems from challenges that story work presents to design teams. The aim was to investigate scenarios and storyboards, reinvigorate their use and thus make them more worthwhile. To this end, a suite of supportive resources was developed, which, upon completion of the research, had the potential to help designers orient to, deal with, and make the most of conceptually challenging aspects of story work.

1.6. Approach

Figure 1.1. Research studies timeline.



The research consisted of four stages, each with a distinct objective (Figure 1.1).

The objective in Stage 1 was to *consolidate* subject knowledge and research strategies in order that plans for conducting the research could be finalised and put into action. The research began with a critical review of literature intended to identify both advancements and shortfalls in current practice, knowledge and theory with regard to scenarios, storyboards, story work in general and design.

Findings that raised questions and informed choice of research strategy include;

- an unassuaged lack of tool and method support in areas of story work that are conceptually challenging,

- lack of unifying theory for design story work based on pragmatic, humanist principles that view experience in narrative and holistic terms, rather than scientific principles that tend to reduce and objectify experience (see Section 2.2.5.4 ‘Scenarios’),
- the failings of scenarios that do not always work as expected (see Section 2.1.3.2 ‘Problems and limitations of scenarios’), and
- a long-standing misconception that scenarios are no more than material artefacts (see Section 2.2.2 ‘Discourse theory’) often expressed in written text (see Section 2.1.3.3 ‘Bias towards textual scenarios’).

With the objective of learning how to conduct empirical studies in design story work, in Stage 2 a programme of *experimentation, practice and reflection* was initiated. My experience in designing adaptive tools and systems for independent use was taken as a starting point for the design of a suite of ‘supportive resources’ and game-like activities (Jones, Teinaki & Leitner, 2012). Such prototypes of ‘work-oriented design objects’ (Rosson & Carroll, 2003:5) were seen to have the potential to support the study of story work by facilitating scenario authorship and development¹. Created and developed through a series of pilot studies and self-reflective design experiments, once tested and refined, the supportive resources were found to have the potential to fulfil a further long-term goal: that of achieving research impact by supporting story work in areas of design such as software, interaction and experience design.

The objective of Stage 3 was to conduct *formal studies* that would provide data of sufficient quality and quantity to answer research questions and make defensible contributions to practice, theory and knowledge. Informed by ongoing self-reflective design experiments a series of empirical studies were undertaken to support refinement of the suite of narrative resources and development of a unified theory for design story work.

Formal studies exposed novel resources and approaches to interrogation in settings that posed increasing challenges. Two innovation workshops that addressed a novel research question were followed by three Design Fiction workshops that enabled interrogation of independent authorship and the creation of bespoke narrative resources. Concurrent with the latter, proto-dissemination of narrative resources and

1. Use of prototypes as a method of research is widely recognised. In constructive design research, prototypes are viewed as ‘physical hypotheses’ (Koskinen et al., 2011:60); theory manifest in a form suitable for testing. In Action Research, attempts are made to construct something that is ‘calculated to explore, embody or test’ propositions of what might work (Archer, 1995:11).

novel approaches to story work enabled a further study to be conducted in the diffusion of innovation.

Empirical observations made during these studies, as well as field notes, sketches, memos and video recordings, formed the bulk of research materials used in Stage 4, the final stage of *analysis*. The approach taken to analysis sought to forge theoretical links between macro views of story work that tend to present perspectives that are both general and abstract, and micro views of the inner workings of story that lean toward the particular and concrete. This led to a mixed-methods approach to analysis that combines narrative analysis with protocol analysis.

1.6.1. Positions

The research takes up epistemological and theoretical positions that are rooted in constructivist traditions. Constructivism represents an epistemological middle ground between objectivism and subjectivism, and social constructionism provides a lens through which story work can be viewed and analysed. In support of this stance pragmatism's phenomenological view of experience is adopted as the regulative ideal of inquiry, one in which 'representations arise from experience and must return to that experience for their validation' (Clandinin & Rosiek, 2007:39).

Arguments for worth are made through thoroughness and consistency in a strategy that embraces a Research *through* Design methodology where inquiry *into* design seeks to achieve worthwhile outcomes *for* design. By taking such an approach the research seeks to do more than simply interrogate a subject and lay claim to new ways of knowing. With designers as beneficiaries, the focus when inquiring *into* design and achieving outcomes *for* design concerns itself with design purpose, worthiness and impact.

With the aim of studying story work in its natural setting, the research is predominantly qualitative. Rather than looking for criteria to verify broad generalisations – a goal that does not fit well with constructivist and pragmatist perspectives (Given, 2008:302–03) – quality and credibility are sought through deep understanding of specific cases (*ibid.*). In addition, instead of aspiring to validate arguments and claims, by aspiring to thoroughness and consistency I have sought to build trust in warranted assertions made for what has been achieved and for how those achievements have been attained.

1.7. Contributions

In support of making scenarios more worthwhile as designers orient themselves towards story work, two contributions to knowledge are made in the area of design practice, two contributions to knowledge are made in the area of design theory, and two contributions to knowledge is made in the area of research practice.

1.7.1 Contributions to design practice

Claim 1. A claim is made for specialised tool support by the provision of *a suite of narrative resources*.

In the course of this research a number of narrative resources were developed to support the study of design story work. The value of the resources, however, extend beyond their use as ‘tools’ for conducting research. In the hands of design practitioners, a select suite of empirically tested *storienteering* resources serve as both a toolkit for configuring approaches to a range of different types of story work, and an exemplar to which design practitioners can look when creating their own suite of narrative resources.

Claim 2. A claim is made for method innovation through *guidance to support independent development of narrative resources*.

Value in story work is considered to arise not from the resources themselves (the artefacts), but from the investment that designers make in adapting existing narrative resources or creating their own, and in the way stories arise as a result of making such an investment. Through open-source dissemination of exemplars and practitioner-friendly guidance materials, design practitioners are encouraged to adapt and develop narrative resources independently.

1.7.2. Contributions to design theory

Claim 3. A claim is made for *revision in the way resources are viewed and theorised*.

This claim stems, in part, from proposed amendments to the content of Cockton’s Working to Choose framework (2012a), and, in part, from assertions that functions hold the key to understanding how narrative resources work for designers.

Claim 4. A claim is made for *advancement of theory supporting a view of design as storytelling*.

Such insights have theoretical implications for design. On one hand they challenge the long-standing belief that design is predominantly a problem-solving activity, and on the other they support emerging views of design in which the design team's role is increasingly one of sense-making and mediation through what Goodman (1978) refers to as "worldmaking".

1.7.3. Contributions to research practice

Claim 5. A contribution to knowledge in the area of research practice is made by the provision of two novel, empirically evaluated visualisation techniques that serve as aids to data analysis.

The first, a storyboard transcription technique, presents a static visual overview of entire video episodes that includes utterances, gestures and annotations for actions and events. The second, a graphical notation system that aids mapping, visualisation and analysis of resource-supported story work.

Claim 6. A contribution to knowledge in the area of research practice is made for *furthering methods of analysis*.

The development of tangible, often paper-based, resources is arguably one of the methodological strengths of this research. Other, non-tangible resources developed to support the research are given recognition and claimed as contributions to research practice.

1.8. Thesis structure

The thesis comprises 9 Chapters that are grouped into three equal parts. In light of the subject of study it is useful to view these parts of the thesis as theatrical 'acts' of a narrative, as in the *three-act structure* of storytelling.

Part 1 (Chapters 1–3) is concerned with 'setting-up' the research. Here, the broad contextual underpinnings of the research are described in relation to aims and objectives, the literature and methodological considerations.

Part 2 (Chapters 4–6) is concerned with 'confronting' the challenges presented by the research. A series of self-reflective design experiments and studies confront questions concerned with methods of study, analysis and dissemination.

Part 3 (Chapters 7–9) concerns itself with 'resolving' questions through theory-building, analysis and warranted assertions made for research outcomes.

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Throughout the thesis the above table acts as an orienting device. It is used at the beginning of each chapter and, in some cases, at the beginning of sections to indicate where the focus of research interests lie.

Chapter 2. Literature review

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

In chapter 2 a survey of literature summarises the state of current knowledge in areas of story, narrative and design. The chapter has two main sections, the first focused on practice (A), the second on theory (B).

Practice. Conceptualisation of design story work is grounded in a view of design as a combination of deliberative and creative inquiry supported by specialised tools and methods. However, other forms of support are emerging and these are also explored. Story and narrative are ubiquitous, yet few understand the difference. Taking a range of authoritative interpretations, the meaning of story and the structure of narrative is unpicked to gain a better understanding of the scope and limitations of scenarios, storyboards and, more generally, narrative mediating representations.

Theory. The second half of the chapter describes findings from the literature that support theoretical perspectives on story, narrative and design. Though formalism and structuralism view story and narrative differently, middle ground is found that draws on the former to support narrative resource development and the latter to support narrative analysis. Discourse theory provides theoretical underpinning for story work's focus on the strategic conversation, and an interpretation of the difference between story and narrative helps to explain the perspective taken by this researcher. Scenario theory is found to be wanting, yet use cases are found to stand as a useful precedent for narrative resources. Storyboard theory is summarised, and a case is made for the importance of narrative thinking in story work. The chapter concludes with an

overview of the Working to Choose framework (Cockton, 2012a), which underpins resource theory development throughout the research.

Chapter 3. Research framework

In Chapter 3 a research framework describes the ontological dependence of theories of knowledge, philosophical and theoretical perspectives, research strategies, methods and desired outcomes. An overall leaning towards constructivist epistemology is declared and pragmatism is taken as the research’s dominant theoretical perspective.

These positions underpin and inform choice of research methodologies and methods that begin with methodological debates on questions of what constitutes design research and whether it is appropriate to describe the research as Action Research or merely ‘action relevant’. Some relief from the confounds of the latter are to be found in para-ethnography’s redefinition of the researcher–participant relationship. The approach taken to empirical studies is predominantly qualitative. However, since quantitative methods play a significant role in analysis, mixed-methods approaches come to the fore.

Chapter 4. Narrative resource development

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Chapter 4 describes the suite of narrative resources created to support the study of story work. It concerns itself with how designers may work with narrative resources (C) and how the creation and use of narrative resources might be theorised (D).

The chapter details the properties and theoretical underpinnings of each resource, how the resources were developed and tested through self-reflective design experiments, and how worthwhile resources were recognised and categorised. The term ‘storienteering’ is coined to describe the suite of narrative resources.

Chapter 5. From exploration to formal studies

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Chapter 5 describes three empirical studies designed to observe story work in action.

The focus is on understanding the practice of story work (A and C). The first two studies represent the early exploration phase of research, while the third leads the research firmly into the formal study stage.

The first study was conducted with students. It questioned the usefulness and efficacy of narrative resources in the authorship of multiple narratives. The second study was conducted with a local design agency. It sought to observe the entire life cycle of story and narrative development from the planning and authoring stage to creation of a presentation-quality storyboard. The last study in this series consisted of two Innovation workshops conducted with colleagues at Northumbria University and Delft University of Technology (TU Delft) in the Netherlands. During the studies, the use and efficacy of narrative resources were critically evaluated. Use of an inductive technique to describe the Innovation workshops from two distinct perspectives – design as inquiry and design as storytelling – marks the beginning of a commitment to cast a critical eye on the subject of story work.

Chapter 6. Later studies

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

In Chapter 6 studies continue to focus on understanding questions of practice (A and C). Formal empirical studies begin to draw attention to questions concerning the independent use of narrative resources. The studies include a second student study conducted with interaction design (IXD) students and two studies that ran concurrently: a series of three Design Fiction workshops that provided the opportunity to study the targeted creation of narrative resources, and a study in proto-dissemination aimed at putting narrative resources directly into the hands of design practitioners and demonstrating interest in their practical application.

Chapter 7. Towards theory

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

In Chapter 7 the line of inquiry shifts toward theory building (B and D). Aided by

two novel narrative resources that come to represent claims for methodological innovation in design research, a series of experiments support a programme of critical reflection and analysis. Throughout the chapter, insights are discussed and conceptual propositions build, one upon the other, as conclusions begin to be drawn about how story, narrative and narrative resources work for designers.

To a large extent, the coherence of arguments and claims come to rest on establishing a theoretical basis for how resources function. The prevailing perspectives are questioned, and resource functions become the focus of several experiments. While some self-reflective experiments explore the attribution of functions in interactions that take place at the micro-level of utterances, others explore the roles played by functions in strategic conversations at the macro-level of design activities.

Conceptual propositions begin to take shape around the importance in story work of *keystone ideas*. An extensive study is made of their origins in the research and their emergence in strategic conversations. A definition is proposed, and keystone ideas are considered for inclusion in the suite of narrative resource.

Chapter 8. Analysis

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

In Chapter 8 the focus on theory-building is sustained with a programme of mixed-methods analysis that integrates quantitative techniques used in protocol analysis with qualitative techniques used in narrative analysis. The aim is to build on the growing body of theory about how story, narrative and narrative resources work for designers (B and D) by gaining insights into how designers' ways of knowing evolve through story work. Motivating the analysis is the goal of tracing the co-emergence of questions, concepts, narratives and design propositions.

Story-based design activities are found to have particular 'orientations'. That is, they are motivated and shaped by interests in achieving particular short-term goals. Orientations are categorised, and selected activities are chosen for comparative analysis. Through implementation of a coding scheme and a proprietary data visualisation system, questions and themes referred to in conversation are plotted on data charts; long, vertical visualisations of story-driven strategic conversations.

The features and patterns are examined and narrative analysis techniques are used to interpret the data. The analysis shows, first, how story, narrative and narrative resources function in strategic conversations and, second, how concepts and ideas emerge on account of those functions.

Chapter 9. Claims and Further Work

The chapter begins with a brief summary of the research, whereupon the limitations of the research are discussed.

Table 1.2. Contributions to knowledge.

Design practice	
Claim 1	Specialised tool support in the provision of a <i>suite of narrative resources</i> .
Claim 2	Method innovation in the provision of <i>guiding support for independent development of narrative resources</i> .
Design theory	
Claim 3	<i>Revision in the way resources are viewed and theorised</i> .
Claim 4	<i>Advancement of theory supporting a view of design as storytelling</i> .
Research practice	
Claim 5	Two novel, empirically evaluated visualisation techniques that serve as research aids in narrative data analysis.
Claim 6	Furthering methods of analysis.

The balance of the chapter is devoted to describing claims for contributions to knowledge (Table 1.2). The chapter concludes with a few afterthoughts.

Chapter 2. Literature review

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

The literature review is organised according to the two lines of inquiry; understanding practice, and building theory. First, the literature review takes a humanist, social interaction perspective on story work that concerns itself with understanding current design practices and how, in those practices, *designers work with story and narrative* (A). Second, the review takes up a constructivist, ontological perspective that concerns itself with theory and questions of *how story and narrative work for designers* (B).

2.1. Understanding practice

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Focused on the question of *how designers work with story and narrative* (A), this section reports on findings from the literature that underpin an understanding of practice.

2.1.1. Design practice

This section provides context for the question of *how designers work with story and narrative* by focusing on the kind of work conducted by designers and how designers conduct their work.

Design work increasingly takes place in multidisciplinary settings that are often geographically distributed and sometimes culturally diverse. According to Friedman (2007:8), the world is a more collaboratively enabled place than at any other time in

history. Since there is a temporal dimension to design work, coherence and consistency are constantly challenged by competing priorities and unforeseen circumstances. These factors have made it critical for design teams to establish a diverse and descriptively rich 'common language' (Gruen, 2000:1) both within teams and with others. One of design's responses has been to place ever greater reliance on the formal use of story and narrative to make sense and to structure design thinking, knowledge and argument. Increasingly, design is seen as an organic, self-oriented and personally involved practice where;

Opportunities and insights emerge from anywhere within organisations or systems. The designer steps into this context as a facilitator, one who builds consensus around ideas that continue to evolve under changing conditions. Resolutions to challenges are 'good enough' for the current state of things but 'adaptable' to new, unpredictable circumstances.

(Armstrong, 2009: 231–32).

As a practitioner-researcher who has taken on the role of 'someone who builds the tools and systems through which others will invent experiences' (ibid.:229), it is not surprising to find out that it is increasingly common for designers to 'create tools, templates, and resources for their clients and other users to implement' (ibid.:11).

2.1.1.1. How designers work

Design work is a creative and iterative process concerned with bringing about 'additions to and changes to the artificial world' (Cross, 2001a:54). Work proceeds through the co-evolution of ideas, objects and artefacts. Designers often work in teams in collaborative, multidisciplinary settings where creative work interleaves with research, planning, management, testing and evaluation.

Making is an essential part of design work. Designers have traditionally made and crafted artefacts, from buildings and products to websites, posters and computer graphics. What has not changed in design work is the designer's dependence on the creation of objects that help them generate, remember, reflect, share and evaluate concepts and ideas. Acting as 'mediating representations', i.e., objects that represent and thereby abstract and stand in for a thing, they help designers to better understand what to design and how to design. For an overview of how design thinking has changed over the years, see Bousbaci (2008).

2.1.1.2. Creative Design

The type of work that most defines the field of design and also lies at the heart of story work – creative work – is fraught with ‘uncertainty, instability, uniqueness, and conflict’ (Schön, 1983:49). Designers develop a specialised form of knowledge (Cross, 2001a:54) that, through choice and adaptation of appropriate tools and techniques, supports their cognitive ability to perceive, conceptualise, reason (order, make sense), communicate (use language) and think critically and creatively.

According to Löwgren (1995:88) the difference between engineering design and creative design has to do with the type of problems that are faced and the way in which they are solved:

Engineering design assumes that the ‘problem’ to be solved is comprehensively and precisely described, preferably in the form of a requirement specification. [...] In contrast, creative design is about understanding the problem as much as the resulting artefact. Creative design work is seen as a tight interplay between problem setting and problem solving. In this interplay, the design space is explored through the creation of many parallel ideas and concepts. The given assumptions regarding the problem are questioned on all levels.

Cross (2001b:89) uses the metaphor of a bridge to illustrate how designers move from the problem space to the solution space via a ‘sudden mental insight’ or ‘creative leap’ that has the effect of changing the ‘frame of reference’ by which they view the problem and/or solution.

The “creative leap” is not so much a leap across the chasm between analysis and synthesis, as the throwing of a bridge across the chasm between problem and solution.

(Cross, 2001b:89)

The ‘chasm between analysis and synthesis’ that Cross refers to has been variously described as an act of ‘conversion’ (Cross, 2000:78) or ‘translation’ (Muller, 2004). However, Bonsiepe (1967:16) contends that no designer has yet ‘proposed a conversion from an analytical diagram to a form’, i.e., design artefact, and Carroll and Kellogg (1989:7) contend that ‘bridges from hermeneutic interpretation into design decision-making are essentially mystical. There is no systematic methodology, no conceptual framework, no explicit way to abstract from particular experiences’.

Whether information, minds or designs undergo a conversion or translation in creative design work, it appears that some kind of change takes place when a designer lets go of the brief or set of requirements to propose a design.

The process involves reasoning, an activity later shown to be an integral part of problem resolution (see Section 5.4.5.1.4 'Point of inquiry 4: Reasoning'). In design research there has been resistance to the kind of reasoning favoured by the sciences, such as deductive and inductive reasoning (Archer, 1995). There is also a great deal of debate about other types of reasoning that are thought to be common and useful in design, such as abductive reasoning (Cross, 2000:40) and 'generative' reasoning (Cross, 2004:432). For Peirce (1878), abductive reasoning deals with 'probable inference'; it is 'a conjecture or inference to a plausible explanation' (in Rylander, 2012:7). According to Cross (2004:432), *generative reasoning* is also a conjecture-based activity.

Gladwin's (1964) comparison of Trukese² and European systems of navigation help to illustrate some of the differences that arguably exist between creative design and engineering design.

The European can verbalize his navigational techniques whereas the Trukese cannot. The European's system is based on a few general principles applied to any given case. The Trukese's system is based on a great many cues, interpreted as they arise. Presumably, the European can relatively easily teach his navigational techniques to others, whereas the Trukese cannot - it takes apprenticeship to learn them. This does not mean that the Trukese do not have techniques; it means, rather, that they are subtle and complex. That they work is evidenced by the fact that Trukese get where they are going just as do the Europeans. Conceivably neither method is superior to the other as a method of getting there. They reflect different styles of thought rather than more or less good ones. For some purposes each is doubtless superior. Also, of course, there are good navigators and bad navigators among both Europeans and Trukese.

(1964 cited in Berreman, 1966:347).

It is the contention of this practitioner-researcher that creative designers, particularly those engaged in story work, approach what Cross (2001b:89) refers to as 'the chasm between problem and solution' by 'cues, interpreting as they arise' rather than placing their trust solely in 'a few general principles'.

2. The Trukese (or Chuukese) are a Polynesian people who are indigenous to the Caroline Islands of the Pacific ocean, who's way-finding techniques were handed down through song.

2.1.1.3. Making and doing

Elaborating further on what it means to be creative, and by way of establishing theoretical stances that will be taken up with regards to story work, an exploration is made of the relationship between planning, making and doing.

Planning and making are widely recognised as fundamental activities in contemporary design; both date back to antiquity. For Lawson (2006:20), '[i]n the vernacular process designing is very closely associated with making'. A plan or drawing is the material outcome of a designer's act of making. However, though designers may *make* drawings and designs, they *do* design work. For Aristotle, '[a]ction and making are different kinds of thing, since making aims at an end distinct from the act of making, whereas in doing, the end cannot be other than the act itself' (Nicomachean Ethics, VI.5, 1140b1–5). Aristotle uses the term 'telos', meaning end or purpose, to differentiate reasoning about making from reasoning about acting.

Those who focus on what is to be achieved through making concern themselves with an end or purpose (telos) rather than the act of making. For them, doing is merely a means to an end and the desire to make one thing leads to a desire to make another and another. In contrast, those who focus not on the outcome (telos), but on the act of doing, itself, put achievement of a particular end or goal aside. For them, doing has its own virtues that brings with it satisfaction and reward enough.

By way of an example that also supports philosophical perspectives taken up with regard to story work (see Section 2.1.2.2 'Stories and storytelling in question'), tools developed for design that have making and the achievement of particular ends as their goal simply foster the need for more and more tools. If tools are seen as the primary means by which needs are assuaged (as is the case with Gladwin's European navigator) and needs constantly change, one is always in need of more tools. Gedenryd (1998:202) has critiqued tool and method development and shown how it is at odds with how designers actually work.

Praxis is 'an activity considered in terms of what is enacted or performed *during the action itself*, and of the way in which this is done; its *outcome is extraneous* to the action itself' (Backman, 2010:30; my emphasis). In Aristotle's words, 'good action [eupraxia] itself is its end' (Nicomachean Ethics, VI.5, 1140b6–7). In this view of praxis there is no place for the concept of completion, a concept that is tied to material outcomes, such as products, artefacts, or even resolutions; the doer and the deed are one. Once such

an attitude is taken up it might be said that outcomes, be they products, artefacts or other forms of resolution, take care of themselves. The stance that is being suggested here is that the designer's creative and unfettered engagement in doing is effected by, if not compromised by, exaggerated concerns for the material outcomes of their making. Moments when something genuinely creative happens appear to be accompanied by total detachment from obligations and expectations, for these impose constraints on the impulse to explore what is new and unexpected, an activity which involves risk.

Aristotle poses the concepts of praxis and poiesis as a choice made between two distinct ways of thinking about approaches to activities, and, more broadly, about ways of viewing, interacting with, and being in the world. The fact that poiesis and praxis are presented as an either/or choice suggests that it might be impossible to experience both at the same time.

2.1.1.4. Concepts and ideas

Since concepts and ideas play such a leading role in design work and here come under scrutiny during analysis, it is worth considering how, if at all, they differ.

According to the Oxford English Dictionary, a concept is defined as a 'plan or intention', whereas an idea is defined as a 'possible course of action'. Is the difference to do with how ready or robust they are with regard to being fully realised? Thus, might a plan or intention – a concept – be viewed as a vague course of action that, although plausible, is lacking in ways that cause doubt about how it can be realised? Whereas an idea – a course of action – differs from a concept in that it stands as a realisable proposition?

Can concepts and ideas be distinguished, therefore, on the basis of weak or strong ties to questions that are being asked, problems that are being solved, stories that are being told or, more broadly, things being discussed? Goldschmidt (2014) has shown how the number of links forward and backwards that designers make between propositions that they field in a conversation has an influence on their robustness. In his critique of Actor-Network Theory, Latour (1996) describes social networks as heterogeneous systems held together by the 'careful plaiting of weak ties' (67). If doubts arise about whether an idea can be implemented, whether it can indeed help make the kinds of connections that a given situation demands, then it may well remain a 'weak hunch' (Koskinen et al., 2011:125) – a mere concept. If, on the other hand, a concept can be shown to have sufficient relevance and plausibility with regard to being implemented, then it may well develop into a strong idea.

2.1.1.5. Design methods

To set up how this research engages with others in proposing alternatives to a predominantly methods-based approach to design, a brief introduction is given to the historical origins and development of design methods, as well as some of the main debates and criticisms.

For the design research community, methods have been the subject of long-standing debate and criticism. Tensions go back to the early days of the Design Methods movement and the search for 'relevance', i.e., design's place in the world. In 1967 at a symposium on Design Methods in Architecture, Broadbent, Hanson and others confronted the notion of decomposition in design methods (Broadbent, 1968). In a lecture the following year, Simon (1996) reopened the debate on design as science (Margolin, 2010). The 'method wars' that ensued invigorated debates on design methodology, but failed to reach consensus on a definition for methods (ibid.).

Debates centre around what methods mean to design; their efficacy in design work, on the way in which design knowledge is generated and shared, and on the way in which design as a discipline or profession is viewed. Criticism has been levelled at design methodologists for following agendas that are at odds with those of design practitioners, for many methods do not work as intended (Gedenryd, 1998:66). Referring to information systems development as far back as the late 1990s, a paper entitled 'Are methods really useful?' (Rolland, 1998:1) contends that 'there is an increasing feeling that methods are not well-suited to the needs of their users'.

Persistence of competing theories on the matter motivated the TwinTide initiative to investigate 'domain specific resources and requirements that influence the transferability of methods between different domains' (Woolrych et al., 2011:940). Arguments against methods include the false impression they give as 'recipes' for good design; '[m]ethods create the expectation of a prescribed series of steps or stages, with well-defined decision points, and extensive guidance on what to do at each point' (Ibid.:943). While

[s]ome believe that the correct process or method will produce the ideal object; others believe that the designer must somehow know in advance the ideal properties of this object and then seek the means of achieving that ideal.

(Yates cited in Goldschmidt & Porter, 2004:4).

2.1.1.6. Emerging approaches

Alongside developments taking place in Human Computer Interaction (HCI) a new generation of less prescriptive approaches to design work have emerged, particularly in the areas of participatory design and co-design.

Sanders has developed an approach to generative design that utilises a 'language' (2000:4) called 'MakeTools' (2006). Brandt and Messeter (2004) built on Muller's pioneering work with participatory CARD games (Muller, Wildman & White, 1994), and Ehn's (2003:5) adoption of Wittgenstein's 'language-games' (1953 in Ehn, 2003:5) to create a set of participatory Design Games. Approaches such as these help to 'speculate with future designs rather than aim at reliable and valid explanations of the existing ones' (Vaajakallio, 2012:50).

In design research, Hanington's (2003:15–16) 'innovative methods... allow for creativity in designing methods appropriate to the situation'. Good examples are 'sensitising tools' (Sleeswijk Visser et al., 2005) such as probes (Gaver, Dunne & Pacenti, 1999; Mattelmäki, 2008). Koskinen et al., (2011:173) argue that in 'inventing new methods, there is basically no limit', and '[n]ovelty in constructive design research has often been based on new methods rather than technologies, issues, or theories'. While Lee (2012:6) suggests that two approaches are evident in 'attempts at localization of methods'. First, 'shaping a portable method underpinned by localization guidelines' (i.e., adapting a published method to specific needs), and second, 'designing a context-specific method underpinned by the designer's situated work' (i.e., designing a method on the fly for a particular purpose).

2.1.2. Story and narrative

2.1.2.1. Design story work

Story and narrative have long been used in design (Don, 1990; Laurel, 1991; Carroll, 1995; Erickson, 1996; Muller, 1999; Grimaldi, Fokkinga & Ocnareescu, 2013). They have also played a major role in ethnographic work (Suchman & Trigg, 1991; Crabtree, 1998; Muller, 2007).

Stories have emerged as one of the primary means by which designers structure, share and make sense of their work (adapted from Jenkins, 2006:120–121). In design work, the 'base mode of the conversation is narrative' (Medway & Andrews cited in Lawson, 2004:86). Lawson (ibid.) explains that the conversation may shift into other modes, but 'generally returns to a style similar to that of telling a story'. For Erickson (1996:32),

who has made the case for *design as storytelling* (1996), stories benefit design work in many ways; they are memorable, meaningful, *informative*, persuasive, reusable and extensible. More generally, Quesenbery (ct. in Pruitt & Adlin, 2006:522) contends that ‘we are wired to be receptive to learning from stories’, such that ‘[t]he search for meaning through the invention of stories is hard-wired into our brains’ (Wujec & Muscat, 2002:56). This type of sense-making takes advantage of episodic memory (Tulving, 1972), what Lawson (2004:100) refers to as ‘experiential memory’ and Laurel (1990:114) refers to as user’s ‘prior knowledge’.

Participatory design, with its tradition of designing *with* beneficiaries rather than *for* beneficiaries, and its orientation towards serious play and games (see previous section), has long embraced storytelling. Agile development doesn’t use games to tell stories, but does adopt low-fidelity approaches to craft ‘design stories’ (Cohn, 2004).

Stories also play a significant role in software, interaction and experience design, areas of design that have nurtured the development of user-centred approaches and narrative resources such as personae, scenarios and storyboards. Having grown out of architectural and engineering traditions, these areas of design view story work as being predominantly about making. They tell stories, but typically do so in order to make things (see Section 2.1.1.3. ‘Making and doing’). For them, stories are a means to an end, not an end in themselves. By way of contrast, the purpose of artefacts made in the applied arts tradition – of which graphic design is a part – is to convey a message. In which case, arguments can be made for design as storytelling (Erickson, 1996) or that design *is* storytelling (Lupton, 2017). Verifying Erickson’s contention that storytelling plays a pivotal and essential role in creative design work becomes the focus of questions posed in the first formal study (see Section 5.4.2 ‘Aims of the study’), and claims that arose from subsequent data analysis (see Section 9.3.2.2 ‘Claim 4: Advancement of theory supporting a view of design as storytelling’).

Approaches, such as ‘make-believe’ and ‘play-acting’ are important aspect of storytelling (Pellowski, 1977). Both approaches have been used to support narration through the use of masks, costumes, properties (props) and sets (settings). In the study of design story work it will be shown that, role-play (for example, see Sections 5.4.5.2 ‘Innovation workshop 2’; Figure 6.2 ‘Role-play with ‘20 Questions’), prototypes (Section 5.4.5.2.6 ‘Point of inquiry 6: Warranted assertibility’; Figure 5.18 ‘20 Questions’) and narrative resources, such as scenarios and storyboards, perform the same role.

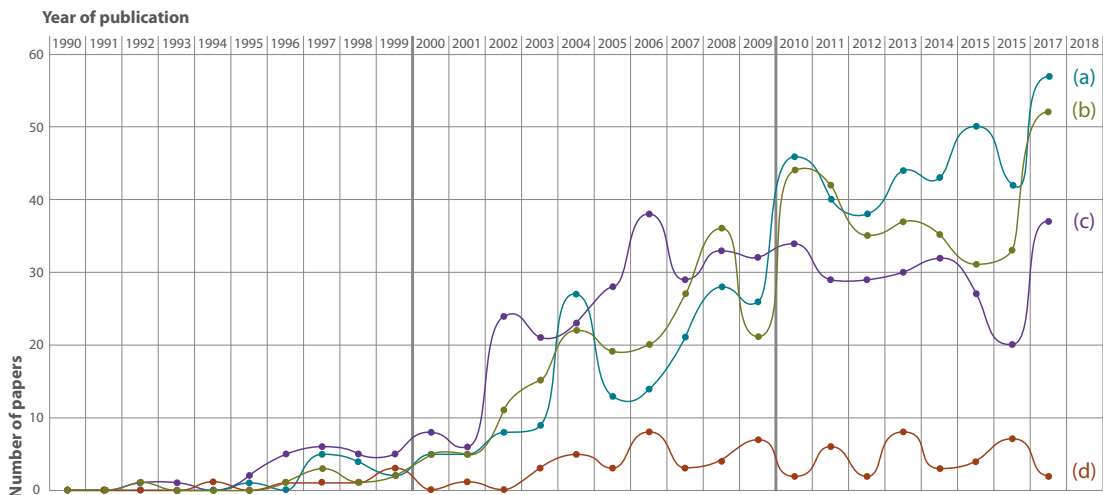
Story work demands a particular skill set. Expertise in storytelling is a recognised asset. A story has 'to suit the purpose for which you created it and fit the context in which you will share it' (Quesenbery & Brooks, 2010). Therefore, 'teams using stories as a design tool should include participants with specific talent, experience or skill in crafting stories' (Gruen, 2000:6), what Van der Heijden (2004:113) refers to as 'remarkable people'. In the studies that follow, the need for participants with experience in design story work becomes evident. For those that approach story work with a 'prepared mind' (part of a quote attributed to Louis Pasteur), in this case, one that is aware of the need for both clarity and vigilance when looking for the right story, are more apt to find one (for example, see Figure 7.16).

2.1.2.2. Stories and storytelling in question

Despite decades of progress in the development of tools and methods intended to support storytelling in a wide range of design disciplines, designers still find storytelling a significant challenge. For example, in the only study to date that claims to use empirical methods to examine design storyboards, researchers report that for the designers taking part storytelling was their 'greatest challenge' (Truong, Hayes & Abowd, 2006:13). For Turner, Turner and McCaul (2001:271), the challenge was to co-construct a narrative to explain how designs proposed for a 'virtual environment to support training in safety critical skills for the offshore and maritime industries' would work. In their approach to this complex, high risk, high cost project, Turner, Turner and McCaul followed what Carroll (2000b:26) refers to as 'empirical and cooperative methods' that are typically 'not unproblematic'. A point was born out when, after a series of 'extended annotated storyboards' were presented to Turner, Turner and McCaul's clients, the project failed. What the storyboards did in this case was provide the clients with the means to make a full and critical assessment of the design proposal (Turner, Turner and McCaul, 2001:274). We might argue that though this event may appear to have questioned the designs, it should not be seen as a failure of either the designers, their methods or their storyboards, which one may assume gave a clear impression of what the probable outcome of the design proposal might be.

As these cases suggest, stories and storytelling are not always embraced in design, and when projects fail, story work can come into question. Progress in accepting storytelling as an essential part of design appears to be hindered by several factors, such as analysts that 'dismiss stories', and consultants that express frustration with storytelling, calling it 'trivial, irrelevant, or meaningless' (Alvarez & Urla 2002:42).

Figure 2.1. Results of a keyword search.



Pointing to either an aversion or lack of interest in storytelling as a subject of inquiry, until very recently there has been a notable absence of the term *storytelling* in design research literature. Figure 2.1 shows the number of papers published in the ACM digital library (“Y” axis) over the past 30-years (“X” axis) that have in their title either the term; *storytelling* (a), *narrative* (b), *scenario* (c), or *storyboard* (d). To put these very low numbers into perspective, in the year 2000, where only nine papers used the term *storytelling* in their titles, the number of papers that had the term *interaction* in their titles totals 2,469. The recent spike in interest in *storytelling* and *narrative* can be attributed to one area of design only, that of digital game design. There is almost no interested in exploring the broad cross-disciplinary use and application of story, narrative and *storytelling* in design.

2.1.3. Scenario practice

In design, scenarios can broadly be described as ‘stories about people and the activities they carry out’ (Potts, 1995; Carroll 2000a) or a ‘concise description of a persona using a product to achieve a goal’ (Cooper, 1999:179). Design scenarios are often short texts that describe one of several possible ways in which a story, event or interaction, etc., might occur. They are often speculative, i.e., ‘what if—?’ questions about or propositions of significance to design. Scenarios differ from stories in that

stories... are very specific. They include fleshed-out characters and settings, dramatic elements, well-formed plot-lines, and enough detail to understand the people who will use a system and the value it will bring to their lives.

(Burroway, 1999; McKee, 1997 cited in Gruen et al., 2002:504).

Whereas scenarios 'often do not include detailed descriptions of the people involved in a task, or their motivations, values and goals' (Gruen, 2000:1).

At about the height of their diffusion across areas of design such as HCI, requirements engineering, software engineering and information systems design, Jarke et al.'s (1997) 'state of the practice' report shows how widely scenario-based design approaches were adopted and yet how ill-defined and poorly exploited scenarios were. With companies developing their own definitions from at least three different industry standards, the report found that there was no agreed understanding of what constitutes a scenario.

At that time, one of the benefits associated with scenario use included the role played by scenarios as 'evocative' (Rosson & Carroll, 2003:3) representations that effect and mediate communication (ibid.; Amyot & Eberlein, 2003:3; Carroll 2000a:1). Another was their provision of a concrete yet flexible way to deal with ambiguity (Carroll, 2000a:4). Scenarios 'are concrete in the sense that they... fix an interpretation of the design situation' (ibid.:5), providing a 'common view' for discussion (Pohl & Haumer, 1997:10) and reflection (Carroll, 2000a:1). Scenarios also have a role to play in evaluation where they are used to check 'completeness' (ibid.:5).

The following observations about the scope of scenario use in design focusses attention on the two main areas of interest. Mack (1995:362) describes the difference between 'two larger roles' of scenarios:

The first is the use of scenarios to represent the broader cognitive, social, and contextual aspects of work. This analysis contrasts to the task analysis focus on narrower ergonomic considerations and behavioural analysis.

While Mack (1995) differentiates scenarios on the basis of narrative content alone, Sutcliffe (2003) differentiates them on the basis of both content and expression (for clarity on these terms see Section 2.2.1.2 'Characteristics of narrative'):

[T]he best way to understand scenarios is as a continuum from the real world descriptions and stories to models and specifications. At one end of this dimension, scenarios are examples of real world experience, expressed in natural language, pictures, or other media. At the specification end are scenarios which are arguably models such as use cases, threads through use cases and other event sequence descriptions³.

(Sutcliffe, 2003:2)

3. He concludes his review of scenarios by proposing that 'scenarios may vary according to their content, how closely they relate to the real world, and their role in the design process'.]

2.1.3.1. How designers work with scenarios

To understand how designers work with story and narrative examples of scenario use that focus on Mack's (1995) *broader cognitive, social, and contextual aspects of work*, or Sutcliffe's (2003) *real-world descriptions and stories* are considered. The origins of this type of scenario can be found in scenario planning, an approach to strategic planning pioneered by Royal Dutch Shell during the 1950s. Scenarios such as these use narrative techniques, such as rich description, to build views of as yet unrealised events and happenings.

Since the late 1990s scenario content has become increasingly nuanced and rich, and with the development of new technologies scenario forms have diversified. For example, with the introduction of personas, Cooper (1999) challenged both the orientation of scenarios towards action and the lack of attention paid to the characteristics of actors. In turn, Djajadiningrat, Gaver and Frens (2000:1) call for 'extreme characters... with exaggerated emotional attitudes', and Nielsen (2002:102) has made a case for even more 'rounded characters'. Drawing on readers' shared knowledge of already familiar characters, pastiche scenarios purport to afford deeper insights into 'felt life' (Blythe, 2006:1141). With regard to scenario *form* (see Figure 2.7 'Scenario Classification Framework'), Carroll and Tobin (2003) have explored the idea of scenario performance, and the origins of simulation and role-play used in *experience prototyping* (Buchenau & Suri, 2000) can be seen in Burns' (1994) 'Informance' or 'bodystorming'.

2.1.3.2. Problems and limitations of scenarios

Scenarios do not always work as expected (Rosson & Carroll, 2001:105). 'We are not much farther than Kahn⁴ was in understanding how scenarios work as tools for planning and design, or in understanding how to fully exploit their unique strengths as aides to thought' (Rosson & Carroll, 2003:30; Kahn, 1962). Rolland et al., (1998:2) contend that 'we have little understanding about how scenarios should be constructed, little hard evidence about their effectiveness and even less idea about why they work'. According to Carroll (2002:3), some designs fail because designers just write scenarios, instead of making proper use of them. For Carroll,

the practical problem is less one of finding scenarios at all and more one of generating and identifying good scenarios or good sets of scenarios, where

4. Herman Kahn was a futurist and military strategist who, during the 1950s, worked for the RAND Corporation. His predictions about the consequences of nuclear war were instrumental in drawing attention to the value of scenario planning.

“good” means scenarios that raise and illuminate key issues of usability and usefulness, or that suggest and provoke new design idea.

A set of scenarios has good coverage if it includes examples of the significant uses of a system and the major types of agents, goals, actions, events, obstacles, contingencies, and outcomes that constitute these uses. Of course, this just pushes back the question to one of how to identify significant uses and major components in situations of use.

(2000b:256).

Carroll touches on one of the difficulties with story work, that of coming to know what is good by having a clear understanding of what is important. No answers are offered. The question, however, touches on the way stories, narratives and all their component parts function for designers and how, when working with story and narrative, designers find what they are looking for.

Sutcliffe (2003:8) cites sampling and coverage as the two most critical problems with scenarios. With regard to sampling, i.e., knowing ‘when you have collected an appropriate and representative set of scenarios’ (ibid.), Konrad (2008:4) agrees that ‘[i]f scenarios of use guiding technology design are often inadequate, the question arises, how scenarios of use are generated and “shaped”, that is, why specific scenarios are envisaged by innovation actors rather than others’. *Coverage* is related to *sampling* in that it concerns how well scenarios cover the subject. As Sutcliffe suggests (2003:8) ‘[t]here are no easy answers to these problems’.

Though not fully resolved, issues of coverage posed by Carroll (2000b:256), and Sutcliffe (2003:8), begin to be addressed by experiments and studies conducted later in the research, the aim of which was to investigate the role of keystone ideas in story work (see Section 7.5.5 ‘Definition of keystone ideas’).

2.1.3.3. Bias towards textual scenarios

Although Carroll (1995:3) admits that scenarios can be described in different forms, such as ‘storyboards of annotated cartoon panels, video mock-ups, scripted prototypes, or physical situations contrived to support certain user activities’, he also holds to the perspective that ‘[s]cenario narratives are not defined to be text, but they often are codified in text. Text is easy to create and manipulate’ (2000b:326). This perspective has led to comparatively little consideration being given to forms of expression other than written text.

Trifonas (2003:3) laments '[t]he demise of logocentricity, the deflation of the spoken word and the inflation of the written [that] places undue emphasis upon written text at the expense of visual images', and Maiden, Zachos and Tosar (2005:89-90) concur that '[t]he last 10 years have seen sporadic use of rich-media representations in requirements processes'.

This constraint on how scenarios are viewed, particularly in Scenario-Based Design, has, I argue, caused theory-building to stall and interest in scenario research and development to fall into decline (see Figure 2.1 'Results of a keyword search'). The root of this bias can be traced to a significant body of research conducted by members of the Cooperative Requirements Engineering With Scenarios (CREWS) project and a single study on which their entire research aims and objectives were based.

Figure 2.2. Responses to the CREWS questionnaire.

Scenario Facet		Project														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Form	Narrative text	F	M	F	M	M	M	M	F	M	—	—	—	F	—	M
	Structured text	F	F	M	F	F	F	F	F	M	—	F	F	—	F	
	Diagrammatic notations	—	—	M	F	—	M	F	F	—	F	F	F	—	—	
	Images	F	F	M	M	M	M	—	M	M	—	—	—	M	—	—
	Animations or simulations	—	—	—	—	—	—	—	—	F	—	F	—	—	F	—
	Typical size (pages)	1-3	1-2	2-8	3-8	10-20	3-20	5-20	/	/	1-2	3-10	1	10-200	*	10-50
	System context	M	M	M	M	—	—	—	F	F	—	—	—	F	—	F

On the basis of a questionnaire completed by fifteen companies (Figure 2.2), Jarke, Bui and Carroll (1998a:13) argue for the need 'to provide authoring guidance for the structured text scenarios'. Details of the study and data analysis are described in (Weidenhaupt et al., 1998).

The claim for supporting authorship of textual scenarios is based on quantitative analysis of data, where frequency of use rather than qualities of context and use is taken as an indicator. Allowing for the disturbing fact that the author's summary does not match data depicted in the table (for full table, see Appendix D1.1 'CREWS table'), the claim, which is based on the number of respondents that 'used natural language heavily' (Weidenhaupt et al., 1998:36), can be refuted on two counts: First, by the fact that all creative, deliberative or problem-based endeavours use some form of natural language. Second, by the fact that all but one of the respondents (Number 15) also use either diagrammatic notations, images or both. Of those, only numbers 5, 6 and 9 use them less frequently than structured text. The same data could, therefore, have motivated

research in support of authoring guidance for natural language visual scenarios. Or better yet, all forms of scenarios.

However, in the drive to deconstruct and operationalise scenario work, the ambiguity of 'natural language' was deemed to be problematic (Achour, 1998:1). Efforts to systemise scenario authorship and management continue (Haesen, Luyten & Coninx, 2009). But more valuable contributions to the body of knowledge and theory on story work have been made by those who have looked beyond textual scenarios to visually rich media, such as storyboards, that focus attention on the way narrative resources support the designers' strategic conversations. For example, in a study of early stage requirements design, Branham, Wahid and McCrickard (2007) explore the role of digital storyboards as a 'design mechanism' for making 'good design choices'.

Freeing up constraints imposed by dominant forms of language (written text) and what appear to be narrowly defined roles may be one way to make scenarios more worthwhile. 'On the one hand, organizations see the value of scenarios; on the other, they use them only in limited ways, such as to gather information that can help shape requirements for a particular system' (Desouza, 2005:42). The objective in critiquing the current state of the art in scenario literature is to reinvigorate the debate on scenarios by showing that they have far more worth than is currently acknowledged and proposing different and more diverse ways of looking at them and working with them. This inevitably brings into question debates on much broader issues related to the value of stories, narratives and, of particular interest to this research, strategic conversations that take place around them.

2.1.4. Storyboard practice

The following review of the state of storyboard research underpins work undertaken in the design of resources, provides context for their evaluation and a basis for claims made for them in areas of design practice and research. After providing a definition of storyboards, a summary of findings from the literature will address how designers work with storyboards.

2.1.4.1. Storyboards defined

Storyboards depict movement, change and the passage of time as a sequence of static images. They tell stories through a spatial arrangement of words, pictures and graphical devices, such as frames (image borders), numbers and symbols.

Figure 2.3. Example of a naturalistic storyboard.



For Greenberg et al., (2012:64) storyboards describe ‘a sequence of images [that] tell a more complete story about people’s interaction over time, where each image in the storyboard represents a particular event’. Storyboards ‘provide a shared visual language for people from different backgrounds’ (Kantola & Jokela, 2007:49). Working with them ‘supports visual thinking, which is vital to the creative process’ (van der Lelie, 2006:159).

The term ‘naturalistic’, a term quipped by Kress and Van Leeuwen (2006:50) to describe situations with human ‘participants’, that are ‘akin to story-writing’ (ibid.:62). The term is used here to differentiate storyboards that visually depict human experience – of which Figure 2.3 is a good example (source; Greenberg, 2011) – from those used in systems design that tend to describe object or interaction sequences.

Figure 2.4. Example of an object interaction sequence.

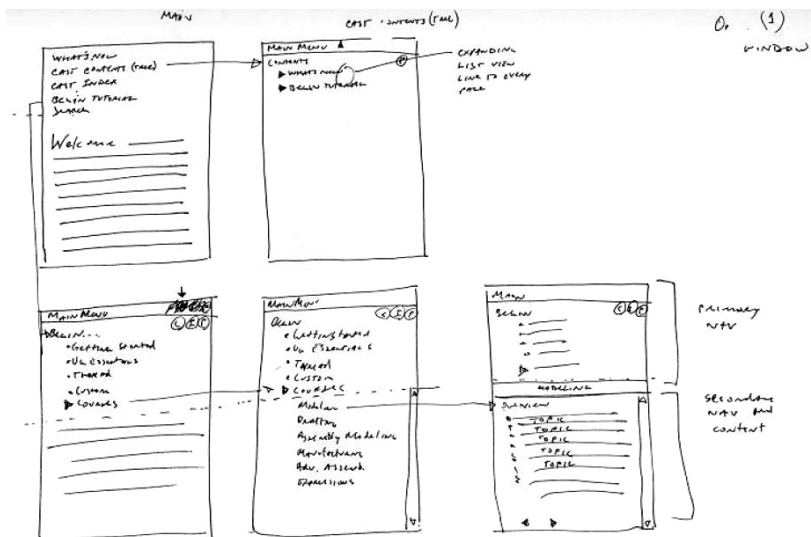
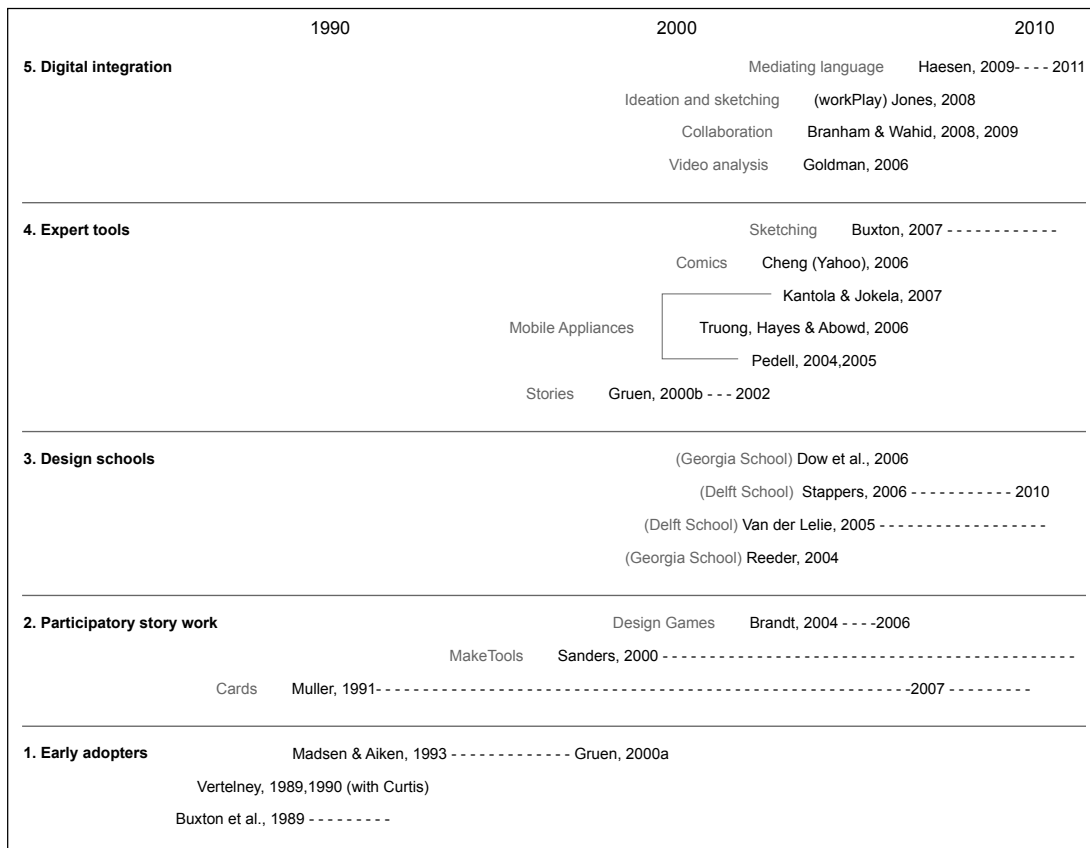


Figure 2.4 is an example of the kind of storyboard used in systems design (in Newman & Landay, 2000:268).

2.1.4.2. How designers work with storyboards

Figure 2.5. Storyboard research 1989 – 2011.



To aid discussion of storyboard practice both in this section and Section 2.2.7 ('Storyboard theory'), significant contributions made to the field of study not exclusive to those listed in the ACM digital library have been arranged on a timeline (Figure 2.5). The timeline divides the field of storyboard research into five phases: 1. Early adopters, 2. Participatory story work, 3. Design schools, 4. Expert tools, and 5. Digital integration.

2.1.4.2.1. Early adopters

Storyboard research conducted in the period between the late 1980s and early 2000s tended to take a humanist perspective on the practice and craft of storyboarding, setting out to explain how storyboards can be authored, as well as why and where they are useful. Naturalistic storyboards were adopted as a pre-production video editing, and sketch prototyping tool in the high-technology sector (Buxton et al., 1989; Vertelney, 1989; Curtis & Vertelney, 1990; Madsen & Aiken, 1993). They were routinely used in areas of design such as participatory design, scenario-based design and user-centred design to support strategic conversations concerned with human-computer interactions, user experiences and product development (Gruen, 2000; Reeder, 2004).

2.1.4.2.2. Participatory story work

Entries in this category are included to show where, historically, selected key developments were made in participatory design ‘tools’ that, like storyboards, had the aim of supporting designers’ ways of narrative knowing through stories (these and others are described in Section 2.1.1.6 ‘Emerging approaches’).

2.1.4.2.3. Design schools

TU Delft’s strong pedagogical focus on early-stage design techniques and Research *through* Design has led to a number of fruitful collaborations on storyboards at the ID-Studio Lab, well summarised in (Stappers & van der Lelie, 2010). Here, Reeder’s (2004) argument for the value of ‘visual storyboarding’ in industrial design education at Georgia Institute of Technology is also worthy of mention because of its ties to scenario research conducted by Potts (1995), and storyboard research conducted by Dow (2006), and Hayes and Abowd (Truong, Hayes & Abowd, 2006).

2.1.4.2.4. Expert tools

As design work diversified throughout the 1990s, some storyboard research continued to build on this body of practice-based knowledge. For example, Pedell and Vetere (2005) introduced the idea of ‘Picture Scenarios’ – storyboards created with the help of digital cameras that provide designers with a consistent and common focus for dealing with ‘dynamic use context’ (ibid.:271). Van der Lelie (2006) conducted an investigation into styles of representation used in a number of different storyboarding situations. Seeking to overcome perennial difficulties associated with storyboard authorship, Kantola and Jokela (2007) proposed ‘Simple and Visual Storyboards’. And, with the aim of providing novice designers with creative guidelines and best practices, Truong, Hayes and Abowd (2006) conducted the first empirical study to uncover some of the important elements of storyboards.

5. Digital integration: Since my research takes a low-fidelity approach to ‘tool’ development, storyboard research conducted since the early 2000s that has sought to integrate the language of storyboards into the designer’s digital workflow has greater value for building theory than for understanding practice, and will, therefore, be discussed in greater detail (see Section 2.2.7 ‘Storyboard theory’).

2.1.5. New directions

Since 2000, driven by developments in communications systems and new technologies, storytelling has undergone a major transformation that has repercussions for design story work. Cross-media or transmedia storytelling and augmented reality have changed the way people create and interact with story and narrative. As the stories that designers tell get bigger, more complex and distributed in time, space and across different media, the way story and narrative are approached has begun to change. '[T]he multiplicity of narrative forms' available to designers has made approaches that 'begin from the principle that writing is the vehicle of storytelling... obsolete' (Groensteen, 2007:8).

2.1.5.1 Transmedia storytelling

In 'Transmedia missionaries', Jenkins (<<https://www.youtube.com/watch?v=bhGBfuyN5gg&feature=youtu.be>>) heralds the rise of a 'participatory culture', one that participates in the creation and ongoing evolution of stories as they are presented and (re)presented through a range of ubiquitous media, from apps on cell phones to movies in cinemas and immersive games.

2.1.5.2 Design fiction

In an early essay on Design Fiction, Sterling (2009:23–24) suggests that one of the enduring characteristics of design is that it 'seeks out ways to jump over its own conceptual wall'. For Bleeker (2009:6), 'Design Fiction... is a conflation of design, science fact, and science fiction'. By drawing on science fiction's rich tradition of narrative, world-building and inventing as yet unrealisable science and technologies, design is able to do more than simply speculate about the future. With roots in speculative design (Dunne & Raby, 2013), critical design (Bardzell et al., 2012), future studies (Mankoff, Rode & Faste, 2013:1631) and, more broadly, the critical traditions of art (for overview, see Dolejšová, 2018:64–66), Design Fictions allow design to field propositions and create 'diegetic prototypes [that] demonstrate... a technology's need, benevolence and viability' (Kirby, 2009:43).

For example, by tapping into 'an author's richly imagined world', Wong, Van Wyk and Pierce (2017) use science fiction as a starting point for speculative design proposals. Some combine Design Fiction with other techniques. Dolejšová (2018:9), for example, combines Design Fiction with participatory techniques to explore possible food futures as prophecies, an approach underpinned by the creation of a bespoke deck

of Food Tarot cards. Meanwhile, Candy and Dunagan (2017) combine Design Fiction with transmedia practices to create a live intervention in the city of Phoenix where participants immerse themselves in ‘experiential scenarios’. Used increasingly in HCI as either a method of inquiry or a speculative technique, Design Fiction lends itself equally to ‘material speculation’ (Wackarry et al., 2015) and ‘fictional abstracts’ (Blythe, 2014).

2.2. Building theory

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

In support of the interest that this research takes in *how story and narrative work for designers* (B), this section provides a theoretical complement to subjects addressed in the last section that dealt with *how designers work with story and narrative* (A).

2.2.1. Story and narrative theory

Though, in common parlance the terms *story* and *narrative* may be used interchangeably, in fields such as literary studies and disciplines such as narrative inquiry it is necessary to distinguish one from the other.

For example, in formalist theory the basis of story, the ‘fable’, is ‘the set of events tied together which are communicated to us in the course of the work’ or ‘what has in effect happened’ (Tomashevsky, 1965 in Chatman, 1980:20). Structuralist theory argues that story is the chain of events, characters and settings that form the content of narrative. Carpenter and Emerald (2009 cited in Dwyer & Emerald, 2016:4) add that ‘stories, in the main, provide meanings for past events, that is, they are a context for knowledge production’. While Bremond (in Chatman, 1980:19–20) adds that story has a ‘layer of autonomous significance, endowed with a structure that can be isolated from the whole of the message’.

2.2.1.1. Narrative theory

Etherington (2008:4) contends that ‘etymologically... “narrative” combines recounting of events with a particular kind of knowledge or understanding of them’, adding that in Martin’s view (2008, in *ibid.*) ‘[t]his indicates the characteristics of narrative which go beyond sequencing of events and towards meaning-making’.

Narratology, the study of the form and function of narrative, is a vast subject (Prince, 1982), a full description of which is beyond the scope of this thesis. Here, a brief introduction is offered with an assurance that further relevant theoretical discussion will take place on the subject throughout the thesis.

It is widely accepted that narrative consists of at least two essential parts, though descriptions of the parts differ from one school of thought to another. Formalist interpretations of narrative take neither the author of a work nor the work's *expressive* form into account. A sequence of events, characters and settings unfolds as a 'fable' or *fabula*, which addresses 'what has in effect happened', and a 'plot' or *sjuzet*, which addresses 'how the reader becomes aware of what happened' (Chatman, 1980:20). Referring to Russian Formalism, Bruner (2004:696) gives a rough interpretation of *fabula* as 'theme', the timeless aspect of story, *sjuzet* as 'discourse', the sequenced aspect of story, and *forma*, the third aspect of Formalist narrative theory, as 'genre'.

Structuralist theory, on the other hand, argues that both the author of the work and the form that the work takes are essential elements of narrative. In any given narrative the story is necessarily allied to a discourse which, by reason of it being expressed by someone in a particular way, takes on a particular form (Chatman, 1980:20). Things that have come to characterise contemporary narrative as literary forms have evolved include a steady move 'toward an empowerment and subjective enrichment of the Agent protagonist' (Bruner, 2004:698), and, citing (Grimas & Courtes, 1976), 'a landscape of consciousness, the inner worlds of the protagonists involved in the action' that complement a landscape 'of action on which events unfold' (Bruner, 2004:698).

Through plot selection, narratives bring absent or distant actants, events and settings related in stories into the present where they are imbued with new meaning. Thus, '[e]very narrative... is constructed on the basis of a set of events which might have been included but were left out' (White, 1980:17)⁵. The term 'actant' is used to refer to 'something that acts or to which activity is granted by others' (Latour, 1996:7). Throughout the thesis the term is used to refer to actor categories or archetypes (ibid.), and the term 'actor' is reserved to refer to individuals. According to White (1980:15), narrative representation acknowledges and partakes in the co-construction of culturally determined 'social systems' through which judgements are made about ethical and moral significance in lived experience.

5. A point that comes to the fore in reflections of 'The usefulness of narrative resources' (see Section 5.5.2 'Reflections on the Pilot study')

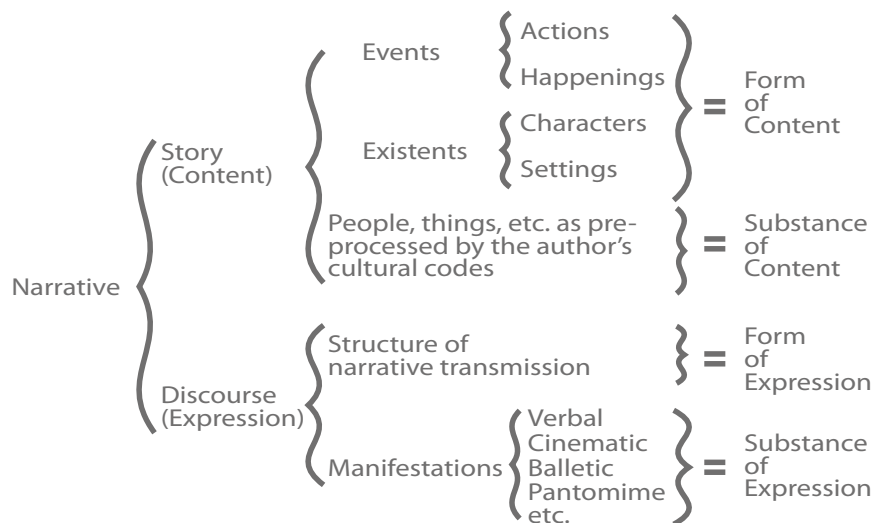
2.2.1.2. Characteristics of narrative

Hermeneutics; the analysis of historical texts, offers theory on the characteristics of narrative. Gergen (2005:100) provides an overview of attempts made in a number of domains to characterise well-formed narrative. The following criteria are deemed to be central: demarcation signs (ibid.:65, 82), establishing a valued endpoint, selecting events relevant to the endpoint, the ordering of events, stability of identity, and causal linkages (ibid.:100–104).

White (1980:9) separates narratives from annals and chronicles on the basis of the contestability of events and whether the author has written with an authoritative voice. Since annals purport to relate incontestable events that are eminently rational there is little need for the text to take up an authoritative voice. However, chronicles are written from the point of view of individuals whose authority may be contested. Thus, an authoritative voice is used to persuade readers of the plausibility of events.

Annals are characterised as having no plot, identified author, date associated with authorship, stated rationale, opinion, beginning or ending and no claim to be either factual or fictional. Chronicles, on the other hand, are characterised as having greater comprehensiveness, greater narrative coherence, thematic organisation of materials, a central subject, evidence of the author’s hand/view and an authoritative force motivating their making. However, because they act as a record rather than a rationale they simply terminate and draw no conclusions. In contrast, narratives have a kind of moral closure⁶ that neither annals nor chronicles have (White, 1980:26).

Figure 2.6. Chatman’s model of narrative.



6. The concept of moral closure bears some similarities to Gergen’s ‘valued endpoint’

For further insights, Chatman (1980:26) provides a model of narrative structure that draws on Saussure and Hjelmslev. Described here as a branching tree diagram, the model describes how narrative stems from a combination of story, which deals with elements of content such as events and existents, and discourse, which deals with elements of expression such as the structure of transmission and manifestation. This subdivision of elements can be grouped into four categories (Table 2.1 below).

Table 2.1. Narrative elements.

Matrix of narrative elements		
	(Story) Content	(Discourse) Expression
Form	(FC)	(FE)
Substance	(SC)	(SE)

Figure 2.6, Table 2.1 and terminology used by Chatman (1980) in relation to these elements of narrative structure (below) are used throughout the thesis to discuss, analyse and support claims for resource-supported story work.

Form of Content (FC)⁷: is ‘the abstract structure of relationships which a particular language imposes [...] on the same underlying substance’ (Chatman, 1980:23). Form is a characteristic of narrative that, in the case of content, structures components such as events that include actions and happenings and existents that include characters and settings, in a particular way.

Example: the story structure and form of *Easy Rider* stems from the friendship between Wyatt and Billy, their affiliation with hippies and drugs and their search for spiritual truth.

Substance of Content (SC)⁸: The substantive elements of story, consisting of selected ‘thoughts and emotions common to mankind’ (ibid.:23). Elements such as ‘people, things, etc., processed by the author’s cultural codes’ (ibid.:26) that are particularised by Form of Content.

Example: the substantive content of the movie *Easy Rider* is that of motorcyclists, tour trips, rebellion and freedom.

Form of Expression (FE): refers to ‘[t]he structure of narrative transmission’ (ibid.:26),

7. Form of Content may be understood as an ‘illocutionary act’ in speech act theory, which refers to the purpose of what is uttered. Functions associated with form of content, therefore, describe the content’s purpose(s). In Chatman’s (1980) interpretation of Austin, illocutionary acts are set firmly in opposition to locutionary acts (what is said) and perlocutionary acts (what is interpreted).

8. Functions associated with substance describe a general, culturally accepted, effect or action that is moderated and made particular by functions attributed to form.

that is, how the substance is put together or presented. It is the form given to a particular manifestation of narrative discourse that imparts special meaning.

Example: sound techniques, editing and cinematography give particular qualities of form to the substance of a cinematic narrative.

Elements of expression (the discourse) impart particular meanings to elements of content (the story).

Substance of Expression (SE): refers to the media or mode of conveyance by which narrative expression is achieved. 'In languages, the substance of expression is the material nature of the linguistic elements, for example, the actual sounds made by voices, or marks on paper' (ibid.:22). Manifestation of the substance of expression may be verbal, cinematic, balletic, etc., (ibid.:26).

Example: The story of Wyatt and Billy's friendship is told through the media of cinema. The Substance of Expression is therefore cinematic.

2.2.2. Discourse theory

For Cohan and Shires (2005:19), '[d]iscourse is where meanings actually get produced' . The value of stories and scenarios, therefore, does not lie in the objects used to describe them or in the stories and scenarios themselves, rather 'the power is in the dialogue and potential for creating shared understanding'(Blandford et al., 2007:18). 'One common problem is that people often focus on the scenarios themselves, while the benefit needs to derive from the process gain. All emphasis must be on the quality of the 'strategic conversation' (Van der Heijden et al., 2002:3). For Schwartz (1991:xv), an authority on strategic planning, strategic conversations are those 'that, in themselves, lead to continuous organizational learning about key decisions and priorities'. The focus of strategic conversations in design story work, therefore, revolve around questions that the design team seeks answers to that will lead to greater understanding of what and how to design for.

2.2.3. On the difference between story and narrative

Narrative is desirable in contemporary design work because it embodies features of story and discourse that are capable of conveying the complexities and subtleties of lived experience (McCarthy & Wright, 2007). For designers, narrative affords privileged views of human desires, motivations and beliefs that mere chronicles and annals do not.

To be clear on where this researcher stands with regard to the relationship between story and narrative the following interpretation is offered.

If story is likened to what an annotated map, such as a street map or even a map of the human body, describes, narrative can be thought of as the kinds of descriptions that might arise from someone walking those streets or being instructed on the inner workings of the human cardiovascular system. In this respect story couches content, such as settings, happenings and actions, in abstract terms. In story both the content and the structure of that content become defining characteristics. Changes made to key aspects of a story become defining characteristics of another story. For example, if the river Thames was taken out of a map of London and the streets were rearranged as if it had never been there, it would no longer stand as a map of London as it is currently known, but rather as a map of a very different London. Narrative, on the other hand, arises from a combination of story *and discourse* (Chatman, 1980). It concerns itself with one or many renderings (focalisations or ‘point of view’) of a story. These might be thought of as paths through or interpretations of story. For example, Robert Wise’s 1961 film adaptation of *Westside Story* and issue 21 of Marvel’s comic, *Deadpool*, are distinctly different narratives. Yet they are both based on William Shakespeare’s *Romeo and Juliet*. In this respect narratives are concrete and particular. They offer a particular interpretation of a story through a particular form of expression. It is the discursive aspect of narrative that couches story in human terms that imbue it with meaning.

2.2.4. Storytelling

‘The telling of a story requires skill’ (Eisner, 1996:7).

Storytelling consists of a story, a teller and at least one listener. Using a political statement made to the press as an example of storytelling: the story may be of a recent policy; the teller a politician and the listeners a reporter. The act of telling a story creates narrative. The politician’s narrative refers to the particular way in which the policy is described, whether persuasive, defensive, contrite or inspired.

Though the story and its meaning may be clear to the teller, listeners’ interpretations may differ. The most successful storytelling, therefore, is when stories are co-created. Such arrangements are contractual. The teller offers narrative prompts. If the listener accepts the offer, their response may be to fill in or complete parts of the narrative. In effect the listener is retelling the story to themselves or to the teller. Thus, the skill of

the storyteller is linked to the contract they establish with listeners, and the resonance of their story depends on the quality of the narrative prompts they offer.

2.2.4.1. Well-formed narratives

Citing Lippman's (1986) study of recall in courtroom testimonials, Gergen (2001:253) describes how well-formed narratives, which 'demonstrated the selection of events relevant to an endpoint, the causal linkages between one event and another, and the diachronic ordering of events' were believed to be genuine, whereas ill-formed narratives were considered to be false. Narratives are coherent and persuasive when their value and purpose are recognisable, and these are more easily recognised when their structure is somewhat familiar. '[W]hen events within a narrative are related in an interdependent fashion, the outcome approximates more closely the well-formed story' (Gergen in Straub, 2005:99). With so many challenges facing designers, guidance in authoring a well-formed story may be one area where the research can make a difference. 'Narratives are conversational resources, constructions open to continuous alteration as interaction progresses' (Gergen, 2001:249).

2.2.5. Scenario Theory

Theoretically, scenarios are closely related to schemas, frames and scripts, the origins of which pre-date the emergence of scenario-based design. As such, schemas, frames and scripts provide a good starting point for understanding how scenarios have been theorised and how new perspectives might be brought to that body of theory.

2.2.5.1. Schemas

The notion that individuals develop and use mental *schemas* to make sense of the world has been attributed to the work of Bartlett (1932), whose work is concerned with understanding human relations and interactions. Schema is a 'term used in psychology literature which refers to memory patterns that humans use to interpret current experiences' (Bartlett 1932:254 ct. in Herman, 2002:89). To study memory patterns, Bartlett composed short fables that are almost impossible to remember⁹.

The term *schema* was popularised by Piaget, whose work in developmental psychology underpins current understandings about how intellect – the ability to know and understand – grows throughout childhood. According to Piaget (1952:6), in the early stages of cognitive development, children create simple cognitive *schemata* to store and retrieve information about things they encounter in the world.

9. The best known of these is 'The War of the Ghosts' (<http://penta.ufrgs.br/edu/telelab/2/war-of-t.htm>).

Bartlett's (1932) schemata was later subdivided into 'static' and 'dynamic' knowledge representations; the former 'stereotypic states of affairs or situations' called 'frames', and the latter 'stereotyped sequences of events' called 'scripts' (Herman, 2000).

2.2.5.2. Frames

Cognitive thinking and the computational theory of mind, which views the human brain as an information processing system that performs computer-like operations, can be traced back to Descartes. Exemplified in the work of Broadbent (1958), this view underpinned emergence of the fields of cognitive psychology, cognitive science, and Human Computer Interaction (HCI).

In an early paper that begins to tackle the problem of imparting to machines the human capacity for common sense reasoning, Minsky responds to propositions posed by Piaget (1952), Bartlett (1932) and others on how *frame theory* might address them:

When one encounters a new situation (or makes a substantial change in one's view of a problem), one selects from memory a structure called a frame. This is a remembered framework to be adapted to fit reality by changing details as necessary.

(Minsky, 1975:1)

Building directly on Bartlett's (1932) *schemas*, Rumelhardt (1980) emphasises the importance of the way *frames* form interlinking conceptual networks that help constitute 'the individual's view of the world, enabling the individual to meaningfully interpret events, objects and situations' (in Hoyle, 2001:10).

2.2.5.3. Scripts

A script differs from a frame in that it [a script] represents a set of expectations... a sequence of events that take place in a time sequence.

(Bartlett 1932:255 in Herman, 2002:89).

Throughout the 1970s, the Computer Science Research Group at Yale was instrumental in laying the groundwork for story-understanding and story-generation systems that made significant contributions to the field of artificial intelligence. The work was underpinned by script theory. According to Schank and Abelson (1977:248), a *script* is a 'frequently recurring social situation involving strongly stereotyped conduct, such as a visit to a restaurant'. Scripts are used in computer programs where their function is

to act on a pre-set number of inferences or assumptions about stereotypical situations that may be encountered in the course of processing narrative texts. Like Minsky (1975), Schank's (1981) conceptualisation of how memory works includes the notion that memory is stored in container-like spaces that can be accessed according to a hierarchical arrangement, and his description of Memory Organization Packets (MOPs) speaks of higher levels that accommodate access to 'generalized scenarios', and lower levels that store 'specific details of particular events'. (ct. in Hoyle, 2001:12).

2.2.5.4. Scenarios

Throughout the research, theories about the structure, function and evolution of scenarios serve to inform scenario authorship and analysis, and provide a starting point for theorising narrative resource development and use.

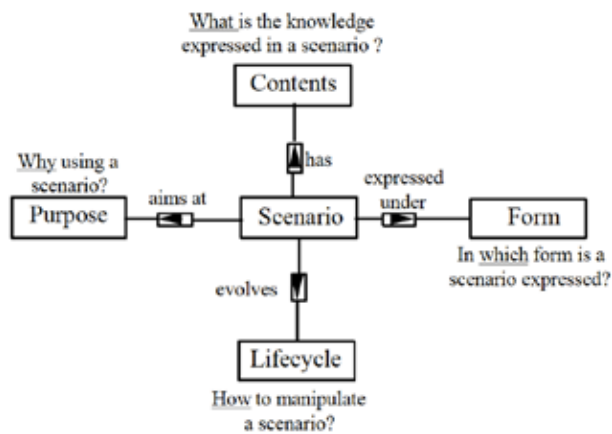
Minsky (1975:35) devotes two sections to scenarios, referring to them as 'thematic or scenario structures' that contain *frames* that may be syntactic, semantic, thematic or narrative in nature. Drawing on theoretical perspectives in psychology, anthropology and cognitive psychology, scenario-based design took up this view of scenarios as 'privileged cognitive structures' (Jarke, Bui & Carroll, 1998a:9). Carroll cites four ways that cognitive psychology might support such a view:

First, concrete/real material is processed more by the mind (depth of processing theory). Second, incomplete material is ineluctably elaborated and better remembered (elaborative memory, generation effect). Third, speaker and listener tacitly agree to background what can be presumed and to emphasise what is novel (given-new contract). Fourth -- and this is a risk of relying on stories -- people overestimate the relevance of things that are familiar (representational bias).

(In Jarke, Bui & Carroll, 1998b:7)

Despite such theoretical speculation, the authors admit to the fact that at the time 'theories that allow us to evaluate scenario-based approaches in a systematically robust manner are still missing' (Jarke, Bui & Carroll, 1998a:6; Weidenhaupt et al., 1998:35).

Figure 2.7. Scenario classification framework.



Lack of a unified system of classification was seen to be one of the stumbling blocks in gaining a deeper understanding of the structure of scenarios and the ways in which they function. The CREWS¹⁰ scenario classification framework (Figure 2.7; in Rolland et al., 1998:3) describes scenarios according to the type of knowledge they express (content), the form of expression they take (form), how they are manipulated (lifecycle), and what their intended use is (purpose). For an illustrated version of the framework, see Appendix x). Such frameworks may have some value in scenario authorship and post-hoc analysis, but they will not help a design team find the right story.

In the development of ‘novel designs [for a digital library] that created new interaction possibilities’ Blandford et al., (2007:80) found ‘neither relevant theory nor empirical data on which to base the design of scenarios’. And, to circumvent the lack of progress made in theorising the temporal evolution of scenarios across multiple design phases, Konrad’s (2008) study of technology designers’ representations (scenarios of use) returns to the origins of script theory (Akrich, 1994; Latour, 1992) and typification theory (Schutz, 1964). With such sparse findings to underpin the theorisation of scenario structure, function and evolution, this research took an approach to theory development not unlike that taken by Konrad (2008). Early conceptualisations of scenarios as elaborated schemas, frames or scripts are preferred over scenario-based design’s apparent objectification of scenarios as material assets to be managed, stored and reused. And this view is complemented by sources of theory from other sources, such as story, narrative and literary theory.

10. Cooperative Requirements Engineering With Scenarios.

2.2.6. Use cases: Exemplar for a resource-based approach?

Despite the reservations that this researcher might have about the virtues of scenario-based design methods, use cases, an approach that has been used primarily in software engineering, may stand as exemplars of how design workers move from requirements to design propositions through a series of steps that include different forms of expression.

Use cases 'describe a system from an external usage viewpoint' (Wirfs-Brock & Schwartz, 2002:3). They are relatively easy to author and 'stakeholders do not need to learn formal syntax to describe and understand them' (Maiden, 1998:5).

As such, use cases afford one of several starting points for theorising about how narrative resources might support story work. Arguably, the set of distinct forms in which use cases are expressed constitutes a suite of narrative resources that tells a story, and activities that summarise use case work constitute approaches to design through story and narrative. When designers author use cases they work with a case story and develop a number of different views or ways of looking at that story. The following four Figures¹¹ describe forms of expression used to synthesise requirements and restate them in terms that resonate for design.

Figure 2.8. Example of the 'narrative' form.

The user can make online payments to vendors and companies known to the bank. Users can apply payments to specific vendor accounts they have. There are two typical ways to make payments: the user can specify a one-time payment for a specific amount, or establish regular payments to made on a specific interval such as monthly, bi-weekly, or semi-annually.

In their narrative form, use cases consist of prose written in third person present tense (Figure 2.8). Since each sentence conveys a single fact, action or event the 'narrative' is action-oriented rather than actor-oriented.

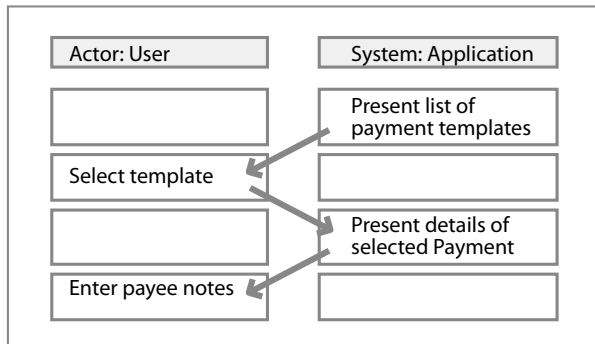
11. Adapted from Wirfs-Brock & Schwartz, 2002.

Figure 2.9. Example of the ‘scenario’ form.

1. User enters registration information.
2. System checks that password matches confirmation password.
3. System validates required fields and verifies uniqueness of login ID.
4. System verifies customer activation information.
5. System creates and activates customer online account.
6. System displays registration notification.

In their scenario form, use cases consist of structured text (Figure 2.9). The form is that of a chronicle rather than a narrative. Sentences are abbreviated and numbered for ease of scanning.

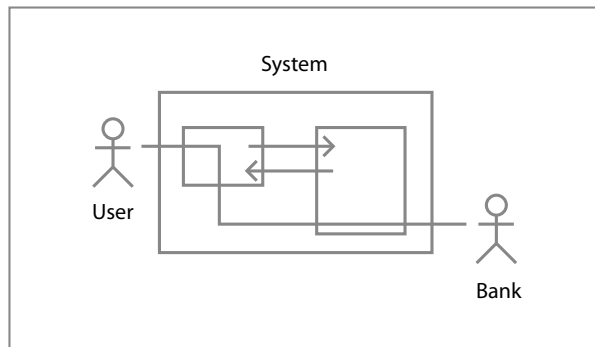
Figure 2.10. Example of the ‘conversation’ form.



By visually differentiating actants and assigning ‘call and response’ actions to them, the *conversation* form adds an important temporal dimension to what can now be seen as a series of interconnected events (Figure 2.10). As such the *conversation* form, first and foremost, appears to demonstrate the need in design work for ‘tools’ that perform particular kinds of functions. In this case, that of supporting a move away from a focus on the minutia of individual actions and events (expressed in structured texts) towards the visualisation of actants, their relationships and interdependencies (expressed in diagrams).

During later studies, refinements made by this practitioner-researcher to one of the most useful narrative resources, Event Maps, show how influential this early insight was (see Figure 5.8).

Figure 2.11. Example of the 'diagram' form.



Finally, the contextual setting in which use case conversations take place can be described as a simple diagram that depicts inter-actant relationships (Figure 2.11). The form is now visual and spatial.

2.2.7. Storyboard theory

From the critical examination that I have made of the field of storyboard research (Figure 2.5 'Storyboard research 1989 – 2011') there appears to be a strong indication that while interest in exploring the craft of storyboarding did not increase over the 20-year period between 1990 and 2010, interest in exploring novel techniques and applications of storyboards as a form of language did. Seeking to improve the designer's workflow and expand their repertoire of sense-making tools, several studies in that period sought to establish storyboards as a mediating language between forms of expression that had hitherto been incomparable. Some of these studies also sought to systemise or automate storyboard production. Though neither systematisation nor automation support the aims of this research, expansion of the role of storyboards with the aim of improving story work does. Methodologies and theories developed in those studies have thus served to either inspire or give credence to new ways of thinking about storyboards.

For instance, to improve video editing efficiency, Goldman et al., (2006) turned conventional filmmaking procedures 'on their head' by creating algorithms that automatically generate storyboards from video clips. The study claims to provide the 'first concise rule book' for the use of storyboard annotations (ibid.). This reversal of roles (storyboards traditionally preceded video production) is evident in a novel approach to transcription developed later in these studies (see Section 7.2.2 'Research aid 2: Storyboard transcription').

Other examples of inspirational storyboard innovation include a series of studies conducted by (Branham, Wahid & McCrickard, 2007; Branham et al., 2008; Wahid et al., 2009) that sought to understand how storyboards could enhance collaboration in design by focussing on the reuse of design artefacts, work that resulted in the development of a digital tool called PIC-UP. Finally, a team of computer science researchers brought a combination of User-Centred Software Engineering procedures and storyboards to bear on getting requirements straight (Haesen, Luyten & Coninx, 2009), and modelling interface development (Luyten, et al., 2010).

2.2.8. Narrative thinking

The following section provides a segue between subjects that provide a springboard for developing resource theory, for it helps to make a case for design teams adopting a particular way of thinking when they engage in story work.

Design thinking has been the subject of research for some time (Cross, Dorst & Roozenburg, 1992; Goldschmidt & Porter, 2004) and the notion of complementary ways of thinking is a common theme. Of those cited in Goldschmidt (2014:45), Bruner’s two intelligences or ‘modes of thought’ (1985) are widely accepted.

Table 2.2. Modes of thought.

	Logico-scientific mode	Narrative mode
Objective	Truth	Verisimilitude
Central problem	To know truth	To endow experience with meaning
Strategy	Empirical discovery guided by reasoned hypothesis	Universal understanding grounded in personal experience
Method	Sound argument Tight analysis Reason Aristotelian logic Proof	Good story Inspiring account Association Aesthetics Intuition
Key Characteristics	Theory driven Categorical General Abstract Decontextualised Ahistorical Non-contradictory Consistent	Meaning-centred Experiential Particular Concrete Context-sensitive Historical Contradictory Paradoxical, Ironic
	Limits	‘Correctives’
	Imperfect generalisations Tacit justification Requires consistency and non-contradiction	Contextuality and reflexivity Expression of purposes and motives Temporal sensitivity

For Bruner (1985), distinct yet complementary dependencies exist between the paradigmatic (or logico-scientific) mode of thought and the narrative mode of thought (Table 2.2). ‘To compare the two modes’, Bruner claims, is to ‘understand the difference

between a sound argument and a good story' (1985, in Tsoukas & Hatch, 2001:11–12).

The paradigmatic mode;

fulfils the ideal of a formal, mathematical system of description and explanation. It is based upon categorization or conceptualization and the operations by which categories are established, instantiated, idealized, and related one to the other to form a system.

(Bruner, 1985:98).

Whereas the narrative mode 'deals in human or human-like intention and action and the vicissitudes and consequences that mark their course' (ibid.). Described thus, it requires no great leap of imagination to consider which mode of thinking dominates in approaches taken by Gladwin's (1964) Western and Trukese navigators, or which mode of thought might come to the fore in story work.

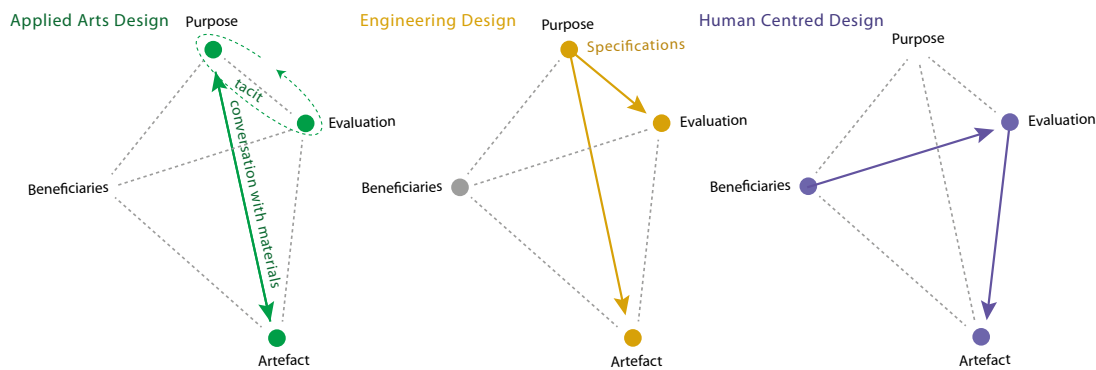
The objective in design story work is not to discover, uncover or know a particular truth (Table 2.2 'Modes of thought' > Logico-scientific mode), but to create a sufficiently persuasive appearance of truth (verisimilitude) to endow experience with meaning (Narrative mode). Taking as an approach not the making of a sound and reasoned argument but the inspired telling of a good story, and drawing on intuition rather than proof, design story work seeks understanding by association rather than reason and reveres aesthetics over Aristotlian logic.

As such, it does not seem unreasonable to suggest that *story work may be understood as a leaning towards or dependence on the narrative mode of thinking.*

2.2.9. Design theory: The working to choose framework

With origins in HCI and usability, the Working to Choose (W2C) framework is a lattice of theory and knowledge that connects epistemologically distinct aspects of design work. Connections are made between design paradigms, designers' values, and ways of working.

Figure 2.12. Design paradigms.



2.2.9.1. Design paradigms: Co-ordination of choice types

Design Arenas view design practices as ‘co-ordination of different types of design choice’ (Cockton, 2013a), or ‘coherent conceptual spaces where distinct forms of knowledge or making practices support distinct aspects of design work’ (Cockton, 2017: 751–755). Choices are categorised by type. They include: purpose, beneficiaries, artefact and evaluation. Design paradigms can be expressed as sets of relations between Design Arenas. For example, design choices in the Applied Arts (Figure 2.12, left) combine tacit choices of purpose and evaluation with artefacts that evolve explicitly through a conversation with materials. In Engineering Design (Figure 2.12, middle) purpose is dealt with explicitly as specifications that describe the artefact and its verifiable properties. Specifications are subject to rigorous change, hence the one-way arrow. Human-centred Design (Figure 2.12, right) considers beneficiaries in its evaluations of artefacts, but provides little in the way of systematic effective inputs to support choices about features and qualities.

2.2.9.2. Design values: Meta-principles for designing

Meta-Principles for designing express values for design work as virtues (e.g., *acquisitiveness*, *inclusiveness*) or potentials (e.g., *expressivity*, *viability*) (Cockton, 2009; 2012a:2). Meta-principles accept that in ‘analysis of the work performed by different methods’ there is an element of human judgement and therefore subjectivity (Cockton, 2011:6). For Cockton, in design work this is an acceptable and appropriate basis for evaluation.

Issues of subjectivity become evident during analysis when descriptive versions of meta-principles thought to be better suited¹² to research into design are attributed to

12. Meta-principles need project-specific targets (Cockton, 2013a).

inter-actant *functions* (see Sections 7.3.1 ‘The primacy of functions’ and 8.3.2 ‘Detailed analysis of U540’).

2.2.9.3. Ways of working: Resources and Approaches

The W2C framework takes a novel view of design work. Woolrych et al., (2011:953) have called for a move away from ‘monolithic methods to component resources’. To position design resources in relation to methods, Woolrych et al., offer the analogy of cooking a meal; in this view, resources are to methods what ingredients are to recipes (ibid). Resources can be combined or configured to work with or as methods, but because of their ‘raw’ utility and latent potentials when brought together for a particular purpose an assemblage of resources is more appropriately referred to as an *approach*. For, approaches are open-ended: they offer a way to begin and move forward, allowing designers to *do* design and find their way but, unlike methods, do not give the false impression of a prescribed outcome.

2.2.9.4. Design resources

The use of resources in design work is not a novel idea. Designers often turn to things close at hand that are neither methods nor tools, but rather objects, ideas or bits of information that serve particular purposes in moments of need. Design’s acknowledgement of the importance of resources and its study and theorisation of resources is, however, recent. Not very much is known about what constitutes a resource, what makes them distinct from methods or tools, how they work for design, or how they may be either created or conscripted into use.

2.2.9.5. Resource functions

This research makes claims for contributions to knowledge in the area of design theory that propose changes to the way design resources, and resources in general, are viewed, classified and named (see Section 7.3.1.1 “Types” questioned’;). Warranted assertions that underpin the claim hinge on having a clear understanding of ‘resource functions’
For Cockton,

Resource functions are...a vocabulary that supports understanding, assessment and improvement of existing design and evaluation approaches, as well as targeted creation of new ones.

(Cockton, 2013b:2145).

In order to build arguments to underpin these claims, resource functions are used selectively throughout the thesis wherever it is helpful to shed light on the purpose

or role of actants, such as resources, participants and objects, etc., or to understand what they or their actions afford in the way of benefits or values. Where used, they are *italicised*. With the exception of function 3, which represents a personal preference, functions are drawn from Cockton's (2013b) list of extended resource functions;

1. Adumbrative (rough outline of an approach's scope)
2. Ameliorative (an approach's guiding values)
3. Acquisitive (takes things in) – Cockton's Inquisitive (finds stuff out)
4. Directive (systematically guides design work)
5. Expressive (gets stuff out)
6. Informative (puts stuff in)
7. Performative (spreads stuff out)
8. Invigorative (spurs things on)
9. Protective (keeps things right)
10. Integrative (pulls stuff together)

2.3. Summary

The following summarises selected findings from the literature.

2.3.1. Understanding practice: How designers work with story and narrative

The challenges of design work and the designers' roles have changed. In response, designers have turned increasingly to story and narrative as a primary means of making sense and of structured design thinking, knowledge and argument.

Making is an essential part of creative design. Designers do not just make designs, they make the tools and representations they need to think about designs, and they continually remake the approaches they use to deal with unforeseen contingencies. Nowhere is design work more challenging than in the translation or synthesis of contextual knowledge to design propositions.

The worth of methods 'as published' has long been questioned. Since they can only ever stand as instantiations of generalised theory, methods often fail to support designers' needs in situated work. Lighter, more agile and adaptable approaches and resources are emerging to extend the designer's repertoire beyond traditional tools and methods.

Story and narrative are ubiquitous in many areas of design. However, some situations demand that formal critical, deliberative and often collaborative story work is brought

to bear on them. A definition for this type of story work helps to establish the stance that is taken on the subject of inquiry. Scenario use is widespread in design, making them an ideal starting point for understanding how designers work with story and narrative. This research focusses on what Mack (1995) refers to as the *broader, cognitive, social and contextual scenarios* or what Sutcliffe (2003) refers to as *real-world descriptions and stories*. Though less widely used, storyboards are a useful complement to textual scenarios. As a form of story-sketching, storyboards hold out some promise as a way to rebalance a long-standing bias in scenario-based design towards textual scenarios. Focusing on transmedia storytelling and Design Fictions, the section concludes with a brief overview of the way storytelling has changed in recent years.

2.3.2. Building theory: how story and narrative work for design

The section opened with a discussion of philosophical stances taken by formalists and structuralists on the question of what constitutes story and narrative. While story merely concerns itself with explaining a general course of events, in its recounting of such events narrative takes-up a stance that makes the general particular and imbues it with meaning. Helping to define narrative, White's (1980) insights on the difference between annals, chronicles and narratives are useful. As is Chatman's (1980) model of narrative, which becomes a significant mnemonic device throughout the study and an integral part of the theoretical framework used in analysis. Turning to the subject of discourse, attention has been drawn to the importance in story work of the strategic conversation and the power of a well-formed narrative. This leads to a stance being taken on the difference between story and narrative that informs and guides resource development and theory building.

The review draws on schema theory, frame theory and script theory to reinvigorate debates on scenario theory. In scenario literature, research in the area of scenario-based design accounts for the largest body of theory. Yet, with leanings toward engineering, scenarios are viewed as textual objects to be operationalised. As such, scenario-based design offers little in the way of a theoretical springboard for making scenarios more worthwhile. Despite this narrow focus, use cases may be viewed as a theoretical precedent for complementary resources that shed light on a case from multiple perspectives, a goal that gains significance during the studies.

In design, much has been said about storyboard practice, but little has been said about storyboard theory. Extensive reading into comics theory has been necessary, and the

discovery of few exceptions to the above rule appear to demonstrate that storyboards have as many, if not more, unrealised potentials for supporting design story work as scenarios. Acting as a segue into design theory, a case is made for story work's affiliation with and possible dependence on narrative thinking, a mode of thought quite distinct from that involved in problem setting, framing and resolution.

Because of its influence on the way design and design research were viewed, analysed and theorised over the course of the studies, the Chapter ends with an overview of the W2C framework.

Chapter 3. Research Framework

In this chapter a research framework is developed. Its aim is to establish positions on epistemology, philosophy, theory, methodology and working methods. The framework supports post-hoc critical reflection on practice-based activities and informs choices with regard to methods of analysis. The aim in developing a research framework is to reinforce the feasibility of outcomes and show their potential for making a rigorous contribution to knowledge.

The research is contextualised within epistemological and theoretical perspectives that help to consolidate emergent methodologies and guide method choice for analysis of data. Establishing such epistemological positions promotes critical reflection on how outcomes of particular research practices can make a general contribution to knowledge. With no established research framework for design (Yee, 2010:16) and few 'off-the-shelf' design research frameworks available, many designers turn to the social sciences for guidance.

The framework proposed by Crotty (1998:1) is taken, as offered, in the spirit of 'scaffolded learning [...] an approach to teaching and learning that, while careful to provide an initial framework, leaves it to the learner to establish longer term structures'. The framework supports the conceptualisation of methods and methodologies and their relationship to theoretical perspectives and epistemological paradigms that underpin them. Typically a framework of this kind includes positions on ontology. Ontology deals with the nature of reality (Denzin & Lincoln, 2011:183), or the nature and relations of being (Merriem-Webster). Crotty (1998:11) contends that ontological issues and epistemological issues tend to emerge together and are therefore frequently conflated – where ontology is concerned with *what is*, epistemology is concerned with *what it means to know what is* (ibid.:10). Positions have been taken up

with regards to ontological categories (see Section 1.4 'What the research is about') that act as guiding influence in questions of what to study and analyse.

The four elements of Crotty's framework are epistemology, theoretical perspective, methodology and methods (ibid.:2-9).

3.1. Epistemology

In this section, an epistemological middle ground between the extremes of objectivism and subjectivism are found in constructivism's view of continuous creation and renewal of perceived social realities and how these perceptions shape and are shaped by language. Social constructionism, with its co-construction of meaning through mindful engagement with the world is taken as a lens through which the story work that designers engage in can be viewed and analysed. Such views cannot be limited to single perspectives, however, for dualisms abound in a 'root and branch' view of story work that takes equal interest in the co-evolution of concepts, stories and designs as it does in the function of resources and strategic conversations. Perspectivism is, therefore, not a chosen epistemology but rather a fundamental requirement in the study of a subject that both affords multiple perspectives and demands interpretations drawn from multiple perspectives (for example, see Sections 3.5.1 'A balanced approach' and Section 3.5.6 'Multiple, complementary views').

An epistemology is a theory of knowledge, 'a way of understanding and explaining how we know what we know' (Crotty, 1998:3). Epistemologies concern themselves with questions of truth and meaning. For Bunge (1966 ct. in Friedman 2000:12) epistemologies present a challenge, because they are 'actually an entire system of problems'. The problems can be posed as a series of questions:

- What is knowledge?
- What can know: minds, brains, computers or social groups?
- Can we know everything, something or nothing?
- How does one get to know: from experience, reason, action, a combination of two, or all three or none of them?
- What kind of knowledge is best – that is, truest, most comprehensive, deepest and most reliable and fertile?

(Bunge, 1966:104)

Crotty's social research admits three epistemologies: objectivism, subjectivism and social constructionism. These are compared and debated in order to evaluate their appropriateness for describing this research and building theory.

3.1.1. Objectivism

The objectivist epistemology is closely related to realism and the philosophy of science commonly known as positivism. Positivism holds to the belief that knowledge is considered authoritative only when verified by logical argument. Logic is greatly strengthened by realism, the belief that some aspects of reality exist independent of thought. It is upon principles such as these that the scientific method is founded. Objectivism holds to the view that there are certain unquestionable constancies in the world that permit theories of truth and knowledge. The epistemology is based on three core interdependent beliefs: reductionism, linear causality and value-neutrality¹.

3.1.2. Subjectivism

The subjectivist epistemology presents an 'interpretive' view of the world that questions the notion of constancy and takes objectivist beliefs to be unfounded assumptions. In this theory of knowledge, the existence of an external physical reality is accepted, but the extent to which it is considered real, true, reliable and worthwhile is determined by the individual. One's own consciousness is the only unquestionable fact of experience.

In subjectivism, meaning does not come out of an interplay between subject and object but is imposed on the object by the subject. Here the object as such makes no contribution to the generation of meaning

(Crotty, 1998:9).

3.1.2.1. Issues of bias in research

The scientific method strives for objectivity through the elimination of researchers' subjectivity and bias. However, in practice, 'researchers may be both objective and subjective in epistemological orientation over the course of studying a research question' (Tashakkori & Teddlie, 1998:25). In their studies of science, Polanyi (1966),

1. Reductionism 'is a viewpoint that regards one phenomenon as entirely explainable by the properties of another phenomenon. The first can be said to be reducible to the second' (Rainer cited in Given, 2008:746). Dualism, which 'postulates separate orders of phenomena', and dialectical emergence with its view of more complex, multifaceted and heterogeneous phenomenon offers two alternatives (ibid.). Linear causality holds to the notion that events bind a complex phenomenon together in such a way that one event is held responsible for causing another. Weber's view of value-neutrality (in Hammersley, 2017:2.1-3.2) is the production of 'sound factual knowledge' free of value judgement. Whereas for Douglas (2004:11) neutral objectivity or 'value-neutral, should not be taken to mean free from all value influence... one instead focuses on taking a position that is balanced or neutral with respect to a spectrum of values'.

and Kuhn (1977) have drawn attention to the unavoidable bias that researchers bring to their work (Ogden, in Given, 2008:60). In particular, Kuhn (1977:358) contends that an individual's subjectivity cannot be suppressed at times of theory choices, for 'no scientist works with a blank mind' (Denzin, 2008:51). Approaches taken by contemporary researchers working in a postmodern era that acknowledges phenomenological pluralism must also acknowledge the bias/contribution dichotomy that their 'background, training, prior experiences, desires, and standpoints' bring to the work (Denzin & Lincoln, 2011:671).

3.1.3. Constructivism

Constructivism represents an epistemological middle ground between the extremes of objectivism and subjectivism. A constructivist epistemology holds to the belief that knowledge of the world is constructed by parsing what is perceived as an external, objective world with that of an individual's internal, subjective experience of the world.

One of the defining characteristics of constructivism is that language plays a dual role in both shaping people's perceptions of social reality and in turn being shaped by them. Continual construction and redefinition of the world through language and experiential interaction has the effect of changing subject/object roles and relationships. The relationship between observer (subject) and observed (object) on which objectivism and subjectivism depend, breaks down, and instead a relativist stance is taken up that reconciles the objectivist–subjectivist dualism. Relativism holds that 'no ideas or beliefs are universally true but are, instead, "relative" — that is, their validity depends on the circumstances in which they are applied' (American Heritage Dictionary). A relativistic, constructivist stance can be described as 'understanding the complex world of lived experience from the point of view of those who live in it' (Schwandt, 1998 ct. in Micklethwaite, 2002:62).

Since construction, and therefore the act of building, is an integral part of constructivist theory, it finds advocates in research concerned with the development of computer-based software programmes (Winterbottom & Blake, 2008; Muise & Wakkery, 2010) artificial intelligence, and high-technology sector such as robotics and virtual reality. Elsewhere, in practice-led design research, constructionist epistemology underpins social constructionism where it is common for researchers to take up hermeneutic, interpretive and phenomenological perspectives to help explain human action.

3.1.3.1. Social constructionism

In the social construction of reality 'personal ascriptions of meaning to a phenomenon are contingent on both the perceptual constraints of a culture, and also of an individual's position within that culture' (Micklethwaite, 2002:61). The social constructionist theory of knowledge posits that '[t]ruth, or meaning, comes into existence in and out of our engagement with the realities in our world. There is no meaning without a mind. Meaning is not discovered, but constructed' (Crotty, 1998:8-9). According to Charmaz (2006:139), social constructionism is 'a theoretical perspective that assumes that people create social reality(ies) through individual and collective actions. Rather than seeing the world as given, constructionists ask, how is it accomplished?'

3.1.4. Perspectivism

Holding to some of the principal tenets of pragmatism (Baert, 2009:24; following section) and constructivism, perspectivism – a philosophical stance introduced by Friedrich Nietzsche – 'rejects the idea of objective or absolute truth and argues that there are multiple ways to view the same phenomenon or object' (Given, 2008:481). The limitations and folly of belief in a singular truth are well illustrated by the following two allegories.

Six blind men encounter an elephant

Each man touches a different part of the elephant and expresses what they believe the elephant to be. Although they are touching the same elephant, each man touches a different part of the elephant, and thus perceives it differently from the other men (Go & Carroll, 2004a:45).

Plato's cave

For Plato, truth and reality are mere perceptions contingent upon one's experience of the world. In Plato's allegory, prisoners from birth are chained in such a way that they are unable to see anything other than what is on the wall in front of them. Behind them is a fire, and between them and the fire people are talking and casting shadows of puppets and objects on the wall in front of the prisoners. With their perception thus impaired, the prisoners believe that the shadows are actually talking and therefore are a true representation of reality.

3.2. Theoretical perspective

In this section, pragmatism is found to provide a strong philosophical base for a constructivist epistemology. While its stances on such things as the primacy of lived experience, the situatedness of knowing and the value of creativity, novelty and experimentation provide valuable theoretical perspectives for design research, Dewey's method of inquiry (1938:107–117) and new pragmatism's critical leanings offer underpinning for a combination of methodological rigour and good sense.

There are few epistemologies, but many theoretical perspectives (Crotty, 1998:3–4). Theoretical perspectives consist of philosophical stances that underpin and inform the methodology (ibid.). With its offer of 'a robust methodological terrain for design research' (Stompff, 2012:48), pragmatism is an attractive if not compelling option for this research.

3.2.1. Pragmatism

Pragmatism seeks to establish a practical yet robust middle-ground between realist Cartesian philosophies and those of often mystical idealism². As a theoretical stance, pragmatism is predisposed to constant revision and adaptation (Baert, 2009:25). Despite diverse interpretations there are three common characteristics of significance to this research.

First, pragmatism shuns grand theories of knowledge and truth. Instead, it offers a practical, common sense way of knowing and experiencing the world. Pragmatism adheres to a 'principle of continuity', which holds to the belief that things in the world are neither experienced nor understood in either physical or temporal isolation, but rather through 'continuity of consciousness' (Peirce, 1878). Supporting this view is the role played by emotion in aesthetic or artistic experience, which, according to Rylander (2012), emphasises the importance of integration and interaction between the individual and the environment.

Second, pragmatism supports a theory of knowing rather than a theory of knowledge, i.e., an epistemology (Martin, 2003:404). In pragmatism, knowing is not possessed but rather emerges through action (Dewey, 1938 cited in Stompff, 2012:87). For practitioners, such knowing-in-action (Schön, 1983:49) gives practical advantages that are valued over knowledge as 'a thing stored in the mind' (Gedenryd, 1998:79).

2. Cartesian philosophy holds to the belief that body, mind and God are separate phenomenon; it is the mathematical foundation of the natural sciences. Some idealist philosophies, such as Hinduism, hold to a Platonic belief in an all-pervading consciousness, while others, such as Buddhism, lean towards phenomenological explanations of experience.

Third, pragmatism establishes a 'middle ground' between long-standing distinctions, competing arguments, and dualisms. For example, between appearance and reality, theory and practice, knowledge and action, fact and value (Dewey ct. in McDermid, 2006:4).

Though pragmatism is considered to be 'design's natural epistemological base' (Melles, 2008:5), 'the rich heritage and relevance of pragmatism is poorly understood' (ibid.:3). Citing (Cherryholmes, 1988), Melles complains that compared to Rorty's intellectually robust and ideologically critical neo-pragmatism, design conducts a 'vulgar' discourse in pragmatism (2008:5).

Like Rorty, Kadlec (2007:519) has discovered critical potentials in Dewey's work that are 'worthy of greater attention and appreciation'. These 'potentials' have relevance for design research, and, in particular, this research. For example, Dewey's method of inquiry (1938:107–117) provides the necessary logic, order and rigour to support explanations of how research questions may be posed and interrogated, how problems and solutions may be seen to co-emerge, how theory may be built and applied and how outcomes may be evaluated. The six points of inquiry defined by Dewey – doubtful situation, institution of problem, determination of problem, reasoning, experimentation, and warranted assertibility – influence the research and inform methods used to analyse the first formal study, Innovation workshops (see Section 5.4.5 'First reading: Design as inquiry'), where they are explained in detail.

3.3. Methodology

A methodology is a 'strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes' (Crotty, 1998:3); choices which should complement epistemological stances and theoretical perspectives (ibid.:2–9).

The 'plan of action' taken up in this research was founded on coming to a clear understanding of, a) what aspects of story work could be studied, b) how and with whom such studies could be conducted, and c) how outcomes could be analysed and interpreted for beneficiaries.

A good fit was sought between, i) participant groups, ii) the focus given to studies conducted with participant groups, iii) limitations imposed by my own experience and situation, and iv) the relevance to beneficiaries of findings that might arise from

such study configurations. A good fit proved to be difficult to find. Many possible configurations were tried and finally a way was found to overcome the impasse (for how this was done, see Appendix D3.1 ‘Challenges in planning the field studies’). The outcome was a plan of action that set a series of empirical studies designed to enable observation of targeted aspects of story work, alongside a programme of self-reflective design experiments designed to support resource development.

The methodology adopted to achieve these objectives may be broadly stated as Research *into* design, *for* software, interaction and experience design, *through* graphic design. To help explain my position on this methodology, stances are taken up with regard to two aspects of design research; first, what constitutes *research*, and second, how *design research* can be categorised.

3.3.1. What constitutes research

Frayling’s discussion of the difference between ‘research with a little r’ and ‘Research with a big R’ goes some way to answer questions of what constitutes research. Citing the Oxford English Dictionary, Frayling contends that research with a little r is not about ‘professionalism, or rules and guidelines, or laboratories’, but about searching (Frayling, 1993:1). Whereas Research with a big R is about professional practice in areas such as ‘chemistry, architecture, physics, heavy industry, and the social sciences’ (ibid). Admitting the possibility that in art and design both types of research may be in play at the same time, Frayling goes on to suggest that one way to alleviate ambiguities about where the value of research outcomes lie is to appoint one as ‘master’ (Ibid:2). This strategy proves to be useful in establishing research categories.

3.3.2. How design research can be categorised

Founded in art education and the work of Read (1943), Frayling’s (1993) ‘Research *into* Art and Design’ (RiD), ‘Research *through* Art and Design’ (RtD) and ‘Research *for* Art and Design’ (RfD) anchor a discussion on research categories. Archer (1995) develops a similar set of terms that avoid the terms ‘art’ and ‘design’. These occasionally prove useful, as does his near-scientific definitions. In addition, other classification schemes are brought into the discussion where needed.

3.3.2.1. Research into Design

Research into design (RiD) concerns itself with the development of theoretical perspectives on subjects such as design history, aesthetics and perception (Frayling,

1993:5). These types of subjects, whether related to design or otherwise, lend themselves to basic Research, an approach 'directed towards fundamental problems in understanding the principles... which govern and explain phenomena' (Buchanan, 2001:17). Though typically of least interest to design researchers (Frayling, 1993:5), an argument will be made for involvement of some form of *RiD* whenever research is conducted *for* design (see Section 3.3.2.3 'Research for design').

3.3.2.2. Research through design

Research through Design (*RtD*) adopts the theoretical perspective that design practice acts as a mode of inquiry. The term may apply to Research where design is not the subject of study, yet 'design thinking' (Brown, 2009) or design practices are used as methodologies. *RtD* has been defined as 'a Research approach that employs methods and processes from design practice' (Saikaly, 2005:5; Zimmerman & Forlizzi, 2008:2).

Different interpretations of the term have led to claims that design artefacts are a valid form of knowledge. This raises questions about whether 'thinking is... embodied in the artifact' (Frayling, 1993:5), whether such *thinking* is communicable, and, indeed, whether an artefact can 'speak for itself'? (ibid.). Such questions can only be settled by declaring intended purposes, values and beneficiaries.

3.3.2.3. Research for design

For Frayling, *RfD* is the most 'thorny' (1993:5). It raises difficult questions about design research and more general doubts about whether classification systems of this kind are still useful.

On one hand the term has been interpreted to mean Research conducted by academic researchers for the benefit of design as a discipline or for designers in general. On the other hand, it has been interpreted to mean *research* conducted by design practitioners for the creation of designs.

Archer (1995) defines 'research for the purpose of practice' as 'research activity conducted for the purposes of contributing to other practitioner activities'. This does not distinguish between Research and *research*. The following does, but at a cost: 'the fact that research 'for the purposes of' has underpinned practitioner activity does not permit the practitioner activity itself to be described as research' (ibid.:11). The 'cost' in Archer's definition is that research activities are deemed to be separate from 'other practitioner activities'. Many would argue that in a continuously creative, iterative and

reflective practice where the designer may never really stop searching for a better solution, separation of such activities is impossible.

Rather than offer a definition of RfD, Frayling (1993:2) offers insights based on usage. Artists, such as Constable and Stubbs, engage in a form of *research* for art. Though they have the spirit of *research* in them, their aim is art not Research. Further help comes in the guise of Humpty Dumpty, who, in *Alice Through the Looking Glass*, enlightens Alice on how words can be imbued with particular meanings. When Alice complains that words can have so many different meanings, Humpty Dumpty insists that the question is not one of 'whether you can make words mean so many different things [but] which is to be master'? (ibid.:2). When conducting design Research the same question must be asked: with regard to design and research, which is to be the master?

When research is the primary objective or 'master', and design the facilitator or 'servant' of research, then the research may be categorised as Research with a big R. However, when design is the primary objective or 'master', and research the facilitator or 'servant' of design, then the research may be categorised as *research* with a little r.

The term Research *for* Design implies that design is not a subject of the research itself (otherwise it would be Research *into* Design), but rather an objective, aim or beneficiary of its outcomes. It is difficult to conceive of any case where creative design practice has been informed by Research that does not involve either the study of design practice or its involvement in Research as a method of inquiry. To some degree, therefore, RfD must draw on research *through* and/or *into* design.

Two relatively recent changes have caused blurring of differences between these two types of research. First, the amount of *research* conducted by practitioners has increased (Archer, 1995; Cross, 1999:5; Stappers, in Michel, 2007:83). As it has done so, differences in outward appearances between it and Research have narrowed to the point where it is almost impossible to separate them. Second, the number of design practitioners conducting Research has increased considerably (Stappers, in Michel, 2007:83; Yee & Bremner, 2011), and, according to Yee and Bremner (ibid.), they are more likely to conduct Research *into* and/or *for* design *through* design³. For them, the only thing that separates the research they conduct as practitioners and the Research they conduct as researchers are the arguments they make for contributions

3. Of the six design researchers reported, Mazé and Raijmakers, both practitioner-researchers, were the only two to conduct RfD.

to knowledge.

3.3.2.4. A/r/tography

Some aspects of the methodological approach taken in this research, particularly with regards to narrative resource development in the experimentation, practice and reflection period, are well explained by an approach that has its origins in art and education practices known as a/r/tography (Irwin, in Given, 2008:26). According to Irwin (ibid.), a/r/tography is a form of action research that follows no prescriptive plan or method, but rather ‘pursues an ongoing inquiry committed to continuously asking questions, enacting interventions, gathering information, and analyzing that information before asking further questions and enacting more living inquiry’. Principles of self-inquiry and collective inquiry underscored by the work of Merleau-Ponty and Jean Luc Nancy describe how inquiry unfolds and ‘meaning is constituted between things’ (ibid.) rather than on account *of* things.

3.4. Methods

Guided by RtD methodology, this section describes methods used to conduct the research. The research strategy forms around a combination of ethnographic and mixed-methods inquiry. With the objective of gaining a multi-faceted view of story work from the perspective of the design team and the resources in play, a predominantly qualitative approach to ethnographic studies is taken that draw on both qualitative and quantitative methods of data collection and analysis. Sources of data are declared, and narrative is found to act as a unifying medium.

3.4.1. Qualitative research

Discovery in the social sciences has moved away from deductive arguments associated with logical positivism towards inductive arguments made through approaches that value trial and error, serendipity, exploration and the construction of ‘ideal types’ (Stebbins, in Given, 2008:221).

With its critical interpretive view of the world, qualitative research stands apart from the detached objectivism and naive realism of its counterpart – quantitative research. ‘[A] field of inquiry in its own right’ (Denzin & Lincoln, 2011:2), qualitative research ‘consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations’ (ibid.). Once transformed, the researcher attempts ‘to make sense of or interpret,

phenomena in terms of the meanings people bring to them' (ibid.).

3.4.1.1. Quality and credibility

Patten (in Given, 2008:302) proposes five distinct sets of criteria for judging the quality and credibility of qualitative research: traditional scientific research criteria, constructivist criteria, artistic criteria, critical change criteria and pragmatism.

With leanings towards constructivism and pragmatism alignments are found with two of Patten's sets of criteria. With regard to constructivist criteria, methods of analysis may look for deep understanding of specific cases rather than verification for broad generalisations, an approach to 'capture and report multiple perspectives rather than to seek a singular truth' (in Given, 2008:302). Given suggests that the means by which arguments and claims are made consistent and trustworthy is of greater value than validity (ibid.). Here, Mason's measure of validity with regard to data analysis is useful:

In its most general terms, a judgement about whether data analysis is valid is a judgement about whether or not it measures, explicates or illuminates whatever it claims to measure, explicate or illuminate.

(Mason, 2002:132).

From a pragmatist perspective, establishing truth is not straightforward. Goodman (1978:123) contends that 'utility might serve as a better measure of nearness to truth', with 'coherence' as a measure of utility, and consistency a measure of coherence (ibid.). According to Reason (2003:1), Rorty's views of pragmatist judgement criteria are in agreement, for he holds to the notion that 'ideas and practices should be judged in terms of their usefulness, workability, and practicality and... these are the criteria of their truth, rightness and value'.

3.4.2. Ethnographic inquiry

Ethnography is one of many qualitative approaches to research (Mason, 2002:54).

'Ethnography (literally translated 'writing about culture') essentially involves a researcher observing and recording human behaviour in a particular setting' (Marvasti in Flick, 2014:355). First-hand observation and immersive experience are key features.

Ethnographic inquiry itself consists of a wide range of approaches, each distinguished by perspectives taken and activities undertaken (Mason, 2002:55). Mason describes four approaches to ethnographic inquiry: interpretivist; biographical, life history and

humanist; conversation analysis and discourse analysis; and psychoanalytic.

3.4.2.1. A balance approach

Interest in understanding how designers work collaboratively with story, narrative and narrative resources, is complemented by an interest in understanding how to create resources to support design story work and develop theory for how story, narrative and narrative resources work for design. What methods used in approaches to ethnographic inquiry support these dual interests?

My stance on how designers work collaboratively with story, narrative and narrative resources takes direction from an epistemological leaning towards social constructionism and pragmatism's view of the continuity of experience. The conversations that take place around a given story will never occur in the same way twice. Each conversation reflects a particular setting where place, time and people contribute to a novel experience. Here, an interpretivist approach to ethnographic inquiry may be appropriate for capturing, analysing and making sense of such settings. Interpretivist/humanist perspectives seek to explain 'how the social world is interpreted, understood, experienced, produced or constituted' (Mason, 2002:2). Interpretivist approaches can be applied to a wide range of settings where 'people, and their interpretations, perceptions, meanings and understandings, [are] the primary data sources' (ibid.:56). With such an approach, total immersion in settings is unnecessary and the 'outsider view' is complemented well by the 'insider view' (Blaikie, 2000:115 cited in Mason, 2002:56).

To achieve the aim of creating resources to support design story work the approach must look beyond how participants act to contributions made to storytelling by other actants, such as conversations, discourses, stories and narratives as well as supportive resources themselves. If resources are to be created that prompt, guide or intervene in storytelling, it will be necessary to know how the strategic conversations that take place around stories work for designers, and attempts must be made to understand the properties of objects and the 'mechanisms' at work in language, discourse and interactions. With language at its core and utterances and texts as sources of data, conversation analysis does not attempt to explain what is going on or what people's motives are, but takes a 'literal reading' to discover 'how people produce orderly social interaction' (Silverman, 2001:167 cited in Mason, 2002:56).

3.4.2.2. Para-ethnography

The research anticipates settings where design story work is studied through simulation and role-play by other designers or researchers, some of whom may be design practitioner-researchers. With this in mind para-ethnography, a branch of ethnography that accounts for such settings, is considered.

Para-ethnography seeks to account for some of the shortfalls of traditional ethnography, particularly with regard to unconventional settings and researchers who want to work with subjects who themselves are 'engaged in intellectual labors that resemble approximately or are entirely indistinguishable from [their] own methodological practices' (Holmes & Marcus, in Given, 2008:595). The approach responds to a changing world in which projects are situated in the 'context of complex global assemblages' (Marcus, 2013:197). Experiments in ethnography range far beyond anthropology, and similarity between researcher and subject are as significant and challenging as difference.

Traditionally, ethnographers have taken subjects to be 'others' with whom there is a need for 'radical translation' and deft interpretation. In contrast, para-ethnographers assume that they are dealing with counterparts rather than *others* (ibid.:207), who can be engaged with as 'theorists' in the development of theory (Islam, 2015).

3.4.3. Mixed-methods inquiry

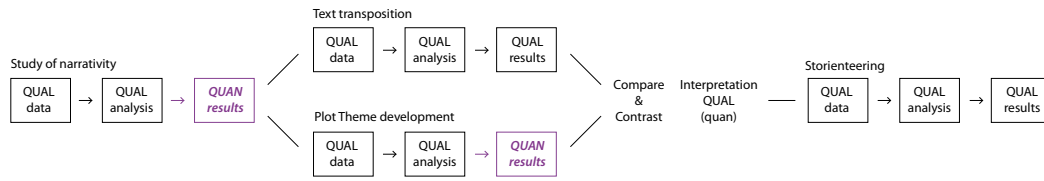
The research strategy is informed by Greene's definition of mixed-methods inquiry. According to Greene,

[m]ixed method inquiry is an approach to investigating the social world that ideally involves more than one methodological tradition and thus more than one way of knowing, along with more than one kind of technique for gathering, analyzing, and representing human phenomena, all for the purpose of better understanding.

(in Johnson, Onwuegbuzie & Turner, 2007:119)

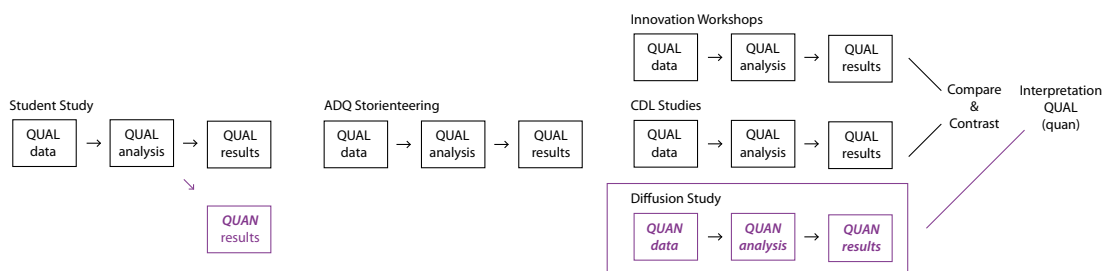
Greene's definition agrees with many others (ibid.). Notably, the pluralistic stance taken by the mixed-methods researcher is in alignment with the pragmatist world view when they gather 'all those types of data that best answer the research question' (Melles, 2008:4; Creswell & Plano Clark, 2011:46 cited in Rao, 2012:39). Two configurations of mixed methods are evident in the research.

Figure 3.1. Mixed methods triangulation.



Early design experiments were characterised by trial-and-error interrogation of approaches to design and study methods. What was sought in these approaches was breadth and coherence of understanding, which, for the most part, concerned itself with the generation and analysis of qualitative data. However, some design experiments yielded valuable quantitative data (for narrativity experiments, see Section 4.3.2.1.3 ‘Design experiment H: Scenario narrativity’; for Plot Theme development, see Section 4.3.3.1 ‘StoryFrame development’). This divergence and subsequent convergence of mixed methods follows one of the most common method configurations, that of ‘triangulation’ (Figure 3.1; Creswell & Plano Clark, 2011:62). The aim of such method configurations is ‘to obtain different but complementary data on the same topic’ (Morse, 1991:122 cited in *ibid*). Convergence techniques enable comparison and reasoned evaluations to be made between results drawn from two design experiments, while qualitative interpretation techniques inform approaches to formal studies conducted later in the research.

Figure 3.2. Mixed methods embedded.



As the formal studies progress and quantitative methods complement a predominantly qualitative approach, an ‘embedded design’ emerges (Figure 3.2). ‘The Embedded Design is a mixed methods design in which one data set provides a supportive, secondary role in a study based primarily on the other data type’ (Creswell & Plano Clark, 2007:67).

Here, with the aim of testing usage in lock-step with resource development, quantitative

methods of analysis are employed alongside or 'embedded' (ibid:67) in a predominantly qualitative design. For example, a study conducted with students provides indications of interest in, need for, and 'impact' of supportive narrative resources (see Section 5.2 '3-Narratives'). And, as a quantitative study embedded in a body of qualitative studies (ibid:62), the Diffusion of innovation study provides further confirmation and ongoing indications of interest, need and impact.

For details of 'mixed methods used throughout the research', see Appendix C1.

3.4.3.1. Forms of data

What is sought from the data are forms of expression that can be trusted to give a faithful account of participant experiences with resource-supported design story work. What is sought in representations that interpretively recreate and reconstruct past events is a set of 'relevances' that mimic those that played out in the events themselves (Jordan & Henderson, 1995:51). Thus, visual materials act as a complement to verbal materials. For example, personal and co-created sketches and notations, lists, plans, 'maps' and diagrams produced before and during studies complement textual transcriptions derived from audiovisual recordings after studies. Moreover, additional perspectives are gained through materials of the same type derived from different sources or produced at different times. For example, written accounts kept in field notes and responses to questionnaires during studies complement autobiographical recollections captured in memos made after studies (Emerson, Fretz & Shaw, 2001, and Atkinson, 1992 ct. in Mason, 2002:99).

Throughout this research field notes and memos were kept in a series of digital documents. This method of recording thoughts and activities provided a means of capturing such things as plans for and reflections upon design experiments and studies, as well as details and facts about such things as research activities, participants, dates and important conversations with colleagues. Where memos are used in the thesis they are numbered according to the order in which they appear (the first cited is number 1, the second is number 2, etc.). They are dated, DD.MM.YEAR, according to when they were written.

3.4.3.2. The corpus

Frequently throughout this research, design experiments were conducted as a means to test concepts and theories, and to prepare resources, materials and approaches used in studies. Particularly in the early stage of research, many of these experiments could

not have been conducted without a body of appropriate and reliable material at hand. Drawing on sources found in the literature and on personal archives of past work, a corpus was assembled that included examples of use cases, stories, scenarios and storyboards.

3.4.3.3. What counts as data

What is of interest to this research with regard to analysis of participant experiences are human situated actions that include gestures and utterances, as well as human-human and human-resource interactions. What counts as data, therefore, are expressions of participant thoughts and actions reified in either inscribed or recorded words, images and gestures.

3.4.3.4. Multiple, complementary views

With dualistic interests in work performed by both human and non-human actants, methods of data gathering, collection and analysis are sought that afford multiple, complementary views. Scenario sets that present a diverse range of perspectives are a good example of the need in story work for taking up multiple, complementary views and the benefits that can be derived from doing so (see; scenario planning in Chapter 4; also Simpson, 1992 in Carroll, 2000b:284). As an example of taking up multiple positions with regard to who is speaking, what is said, what takes place and what can be inferred, Schön's (1983) description of a design conversation between a tutor, a pupil and the materials of design present a content-rich, 'thick descriptions' of experience that moves beyond surface appearances and single events (Geertz, 1973 after Ryle, 1968). In such cases, meaning is derived from a 'contextual whole' (Dewey, 1938:66).

3.4.4. Narrative inquiry

Narrative inquiry is the means by which stories told by people are systematically gathered and analysed (Etherington, 2008:5). According to Clandin and Rosiek, narrative inquirers;

study the individual's experience in the world, an experience that is storied both in the living (the stories OF their experience) and telling (the stories IN their experience) and that can be studied by listening, observing, living alongside another, and writing and interpreting texts.

(2006:43)

3.4.4.1. What is represented in a text, and how should it be judged?

In what Norman (2005:xiv) refers to as the 'troubled crossroads where neoliberalism,

pragmatism, and postmodernism meet [we find ourselves sympathetic to a] quiet revolution... defined by the politics of representation, which asks 'What is represented in a text, and how should it be judged?'

Texts do not merely mirror an external 'reality' or world that is assumed to be immutable in its capacity to act as final arbiter. Rather, engagement with the text is viewed as an act of creation, one that 'creates the world' (ibid.). The practitioner-researcher who works with a text is, in this case, an author, a creator of the text, and what the practitioner-researcher is cannot be removed from the comparative process (Strauss & Corbin, 1990:6; Corbin, 1998:123, in: Charmaz, 2006:127).

3.4.4.2. Narrative reconstruction as a unifying medium

Narrative gives us the ability to 'construct the social world and the things that transpire therein' (Bruner, 1991:4). If truth, value and belief, etc., exist, they do so because their perception is afforded through narrative construction of reality (ibid.). But which version of events is trustworthy? Which is most useful for this research? How many accounts will be enough? (Carroll, 2000b:284). Can narrative act as a unifying medium?

Bergmann (1985) contends that reconstruction of past events 'occurs through a variety of methods and interpretive devices that, by transforming and reducing reality, invariably and unavoidably import meaning into events' (In; Jordan & Henderson, 1995:51). As representations of story work drawn from different sources and expressed in different forms are brought together, the story of the research itself becomes a unifying meta-narrative through which new meanings arise.

3.4.4.3. Narrative interpretation

The approach to analysis embraces the constructivist, perspectivist, postmodern principle of multiple points of view. With regard to language and discourse, this leads to the notion of multiple interpretations or readings of a text and the branch of knowledge known as hermeneutics (for details, see Section 2.2.1.2 'Characteristics of narrative').

Hermeneutics, the theory of interpretation, particularly with regard to 'texts', argues that 'knowledge and meaning is a type of narrative that always is open to new interpretations' (Given, 2008:481). Denzin and Lincoln (2011:xiv) contend that '[w]e have left the world of naive realism, knowing now that a text does not mirror the world, it creates the world'. For Bruner (1991:13), narrative offers a discursive form that 'rather than referring to "reality", may in fact create or constitute it, as when "fiction" creates a "world" of its own'.

3.4.4.4. Interpretive readings of the text

An interpretive approach to inquiry is common in discourse theory, for it enables researchers to engage in a 'reflective conversation with the text' (Mason, 2002:97). Interpretive approaches to reading the text 'argue for a researcher's immersion in the events of a study' (Putnam, 1983 cited in Alvarez & Urla, 2002:42), for reflexivity accepts the role of the researcher in the process of interpreting and thereby completing the text (after Bowen, 2009).

3.4.4.5. Who is acting in the narratives

The narratives examined include both human and non-human actants. Human actants include participants and researchers. Non-human actants consist of all resources to hand that take an active role in study activities.

3.5. Summary

In Chapter 2, findings from the literature support a dual focus that permeates the research; on the one hand concerned with how designers work with story and narrative, and on the other with how story and narrative work for design.

In this chapter a research framework has been developed that takes this dual focus into account. Stances have been taken on theories of knowledge (epistemology), theoretical perspectives, a methodology, and methods of study, analysis and dissemination.

Constructivism is taken as an epistemological middle ground between objectivism and subjectivism, and social constructionism is taken as a lens through which the story work that designers engage-in can be viewed and analysed. Research underpinned by a constructivist epistemology admits, and in a number of important ways supports, many of the central tenets of pragmatism.

Thoroughness, worth and rigour are thought to be achievable goals for a research methodology that embraces Research *into* and *for* design *through* design. For a RtD methodology that looks critically *into* design may claim to be thorough. While worthiness may be measured by what is achieved *for* design, and rigour by how such a mixed-methodology is conducted.

With the aim of studying story work in its natural setting, the research is predominantly qualitative. In alignment with constructivist and pragmatist leanings, quality and credibility are sought, not through verification for broad generalisations, but through

deep understanding of specific cases. Taking up a dual focus on *understanding practice* and *building theory*, two complementary approaches to narrative inquiry are adopted. In empirical studies of how designers work with story and narrative an interpretivist approach affords explanation of how ideas, concepts, stories and design propositions are produced. In order to understand how story and narrative work for designers, methods of analysis look beyond the actors to the agency of words and the mechanisms at work in the conversations themselves. Here, conversation analysis makes a literal reading of the text. Para-ethnography accounts for the fact that many of the studies are conducted with counterparts rather than 'others'.

Two configurations of mixed methods are evident in the research. In an early stage of the research a convergence of methods occurs in a triangulation design, while, as the formal studies progress, an embedded design emerges. Sources of data include video recordings of studies, field notes, sketches, questionnaires and memos. What counts as data are expressions of participant thoughts and actions reified in words and images either inscribed or recorded.

The role of language in the social construction of reality comes to the fore as the research considers how perceptions of the world are created or constituted, and whether, in interpretations that are made of diverse sets of data that take many forms yet speak of the same discourse, narrative will serve as a unifying medium.

Part 2

This second part of the thesis concerns itself with confronting challenges presented by the research. While Chapter 4 describes a suite of narrative resources used to study design story work, Chapters 5 and 6 describe how they were used in empirical studies.

Chapter 4 describes the creation of a suite of narrative resources and how they were informed and motivated by development of a series of self-reflective design experiments and studies. (Table 4.1 'Design experiments, resources and studies', Column 2).

Chapter 5 describes three of the six empirical studies that were conducted as a complement to resource development and self-reflective design experiments. In the first study (Study 1), students used storienteering resources successfully for the first time. Combined with traditional tools and methods, the second study (Study 2) saw members of a small design agency chart their future. In describing design research activities undertaken in the third study (Study 3), principles of perspectivism are demonstrated. Competing views are proffered of design as inquiry and design as storytelling.

The last three formal studies are described in Chapter 6. Descriptions begin with a second student study (Study 4), move on to address a series of Design Fiction workshops (Study 5) and conclude with a study in the diffusion of innovation (Study 6).

Chapter 4. Narrative resources

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

This chapter describes a collection of narrative resources that were developed to support story work throughout the studies. Formative assessment of the resources was guided by the need to gain practical understandings about *how designers may work with narrative resources* (C) and build theory about *how narrative resources may work for designers* (D).

4.1. Introduction

A design resource can be defined as *anything that manifests itself in design work to either fulfil a particular need or support of specific function, and may be changed in the course of design work*. Design resources afford a particular kind of utility, and are typically things that are either ready-to-hand or easily acquired or adapted to fit particular needs.

‘Narrative resources’ are those that fulfil the primary role of supporting narrative thinking and development.

One common purpose of narrative resources is to achieve consistency and coherence in story work. All narrative resources help bring together or bridge design activities where challenges are encountered, and all, therefore, have a transformative effect on design work. Whether the aim of story work is to transform artefacts, thinking or strategic goals, narrative resources support designers in making moves, changes and choices.

Furthermore, all narrative resources are viewed as ‘raw material’ for story work. As such they lend themselves to either adaptation or further development as needs dictate. The adaptive capacity of resources is discussed further throughout this chapter (for example, see Sections 4.2.3.1 ‘Content card development’; and 4.3.4 ‘Seed stories’) and their targeted creation is discussed in Section 6.4.3 ‘Targeted creation of new resources’).

4.1.1. Conceptualisation of resources

Concepts for resources were developed over an extended period of time as an open-ended act of ‘living inquiry’ (Irwin in Given, 2008:26), where being reflective meant conceptualising freely and imaginatively in deliberative brainstorming and ideation sessions, and being receptive meant drawing inspiration from objects and situations in everyday life that afford opportunities for creative adaptation (ibid.; see Section 3.3.2.4. ‘A/r/tography’). The process involved almost indiscriminate appropriation of things at hand, making objects, noting thoughts, letting ideas incubate and making evaluations, first on the basis of their potential to support narrative development, and, second on the basis of their tenacity as concepts that resonate over time.

4.1.2. Resource categorisation

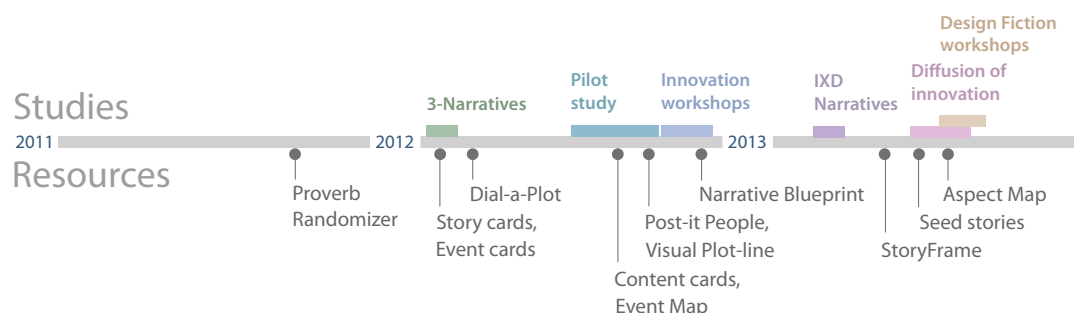
Narrative resources have been grouped to form three distinct categories. Terms assigned to the categories describe their primary role in story work.

Content Exemplars are resources that were found to inform narrative composition through the provision of story content.

Discourse Prompts are resources that were found to invigorate discourse and prompt narrative expression.

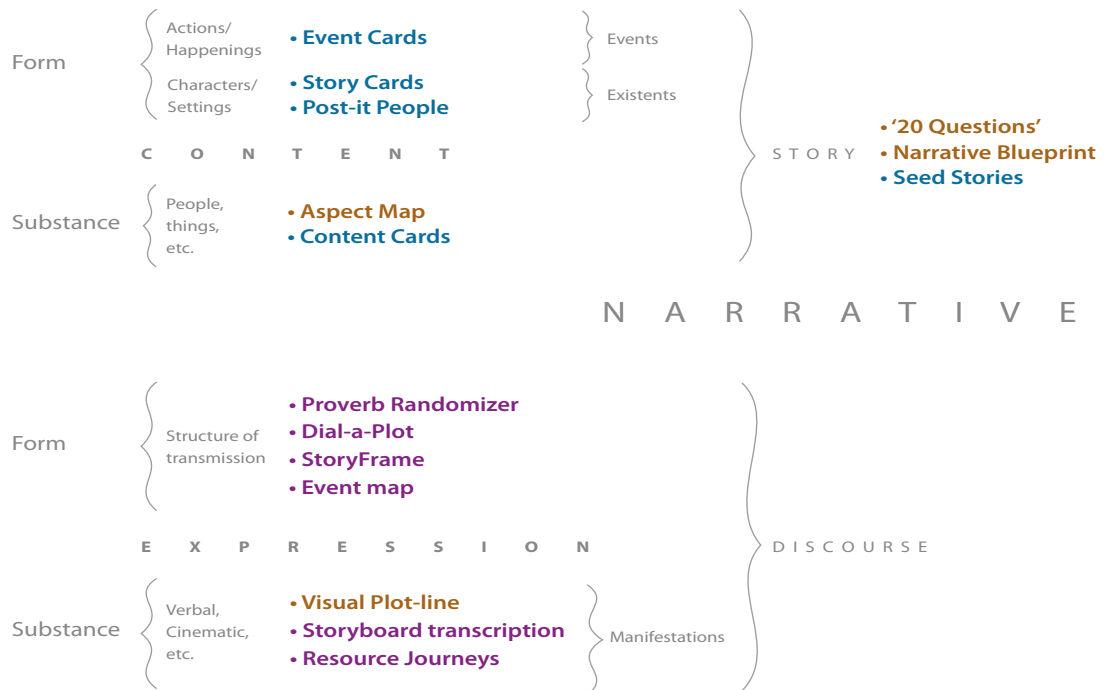
Narrative Fugitives are resources that emerged during research practice to fulfil unforeseen roles.

4.1.3. How resources are described in the thesis



Each resource description begins with a timeline (above) that indicates where in the programme of research resources were either conceived, first used, or, in the case of Narrative Fugitives, adopted (Figure 4.1.3). Descriptions are typically accompanied by examples, summaries of how resources were developed, and details of use.

Figure 4.1. Where narrative resources support story work.



Chatman's (1980) model of narrative is used once again to help describe where each resource supports design story work (Figure 4.1).

It's worth noting here that Content Exemplars and Discourse Prompts represent the two dimension of narrative; *Story/Content* and *Discourse/Expression* respectively, and that it is through integration of resources drawn from each of these dimensions that broad and general support for story spinning and narrative development is achieved (for a good example of this, see Section 4.2.2 'Event cards'). Narrative Fugitives do not appear to fit into the model, which makes them both interesting and valuable to study.

4.1.3.1. Resource pairings

As empirical studies will show, the work that designers engage in to create narratives is varied and iterative. Stories, conceptual propositions and ideas emerge and evolve in a sequence of activities that help to bring all elements in play together. The studies strongly suggest that some resource pairings are particularly useful, and that their usefulness stems from the fact that they support conceptualisation of narrative as a

whole by drawing together *story/content* and *discourse/expression* (see Figure 4.1).

Each alliance of attributes that is afforded by such pairings prompts designers to consider the relationship of narratives two primary components. Where such pairings have proved to be useful, descriptions of them are included throughout the chapter.

4.1.4. Development and use of storienteering resources

Table 4.1. Design experiments, resources and studies.

													Narrative resources				Empirical studies									
													No.	Content exemplar	Discourse prompt	Narrative fugitive										
													1	Story cards												
													2	Event cards												
													3	Content cards												
													4	Post-it People												
													5		Proverb Randomizer											
													6		Event Map											
													7		Dial-a-Plot											
													8		StoryFrame											
													9		Seed stories											
													10			Visual Plot-line										
													11			'20 Questions'										
													12			Narrative Blueprint										
													13			Aspect Map										
Self reflective design experiments													<ul style="list-style-type: none"> L. Plot Theme set K. 2nd reduction; Plot Themes J. Getting the story straight H. Scenario narrativity G. Card set experiments F. Text transposition, story to script E. 1st reduction; function pairing D. Adaptation of Propp's functions C. Narrative inference B. Scenario breakdown A. Text transposition; text to storyboard 													
														<ul style="list-style-type: none"> Design Fiction formal study v IXD Narratives study iv Innovation workshop 2 iii Pilot study ii '3-Narratives' i 												

In the centre of Table 4.1, resources are arranged by category (Content exemplar, Discourse prompt, Narrative fugitive). Alignments made with dots to the left show where links can be made to supportive, self reflective design experiments (A; earliest – L; latest). Whereas alignments made with dots to the right show where resources played a part in each of the five empirical studies (i; earliest – v; latest).

Taking the form of sketches, notes and prototypes, proposals for Content Exemplars and Discourse Prompts arose from a series of self-reflective design experiments conducted in the early, exploratory phase of research (Table 4.1, left side). Some of the earliest design experiments were conducted to explore methods of text transposition (see Appendices A1). These design experiments revealed that although such approaches may have value in routine applications (see Section 2.2.5.4 ‘Scenarios’), their capacity to encourage creative thinking or methodological adaptation was thought to be too restrictive. Refinement of these approaches was not pursued. However, the visual/textual language explored in those design experiments resurfaced months later in two narrative resources, Visual Plot-line (see Section 4.4.2 ‘Visual Plot-line’) and Event Map (see Section 4.3.5 ‘Event Map’). Descriptions of the remaining design experiments are given throughout the Chapter.

In just over 2 years, ten other self-reflective design experiments were conducted. By far the highest number (7 • dots) informed development of Dial-a-Plot and StoryFrame. Because of its usefulness in story spinning, Dial-a-Plot was also the most widely used in the studies (4 • dots).

Seven narrative resources were field-tested in the Pilot study (i); a testament to both the scope of activities undertaken by two participants, and to how valuable it was in furthering the development of narrative resources. Four of the same narrative resources (2, 3, 4 and 7) were used again in Innovation workshop 2. A longer study involving far more participants (6 plus 2x4 guests), it also led to recognition of three Narrative fugitives (10, 11 and 12). In the IXD Narratives study, three narrative resources were reused and configured with traditional methods, such as affinity diagrams and Zwicky’s (1967) morphological box (see Figure 5.1. Adaptation of Zwicky’s morphological box’). Finally, three new Narrative fugitives arose from the Design Fiction workshops.

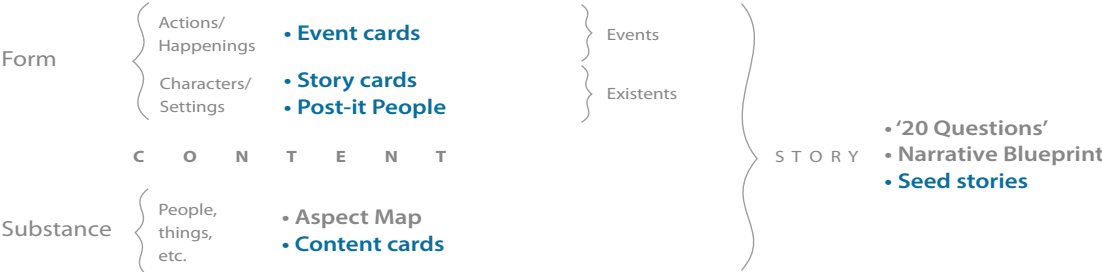
4.1.5. Naming the resource set

The term that has been adopted to describe narrative resource-oriented approaches to story work is *storienteering*; a portmanteau of ‘storytelling’ and ‘orienteering’. The case

for how design teams orient themselves to achieve particular goals at particular times through particular activities is made throughout the research.

4.2. Content exemplars

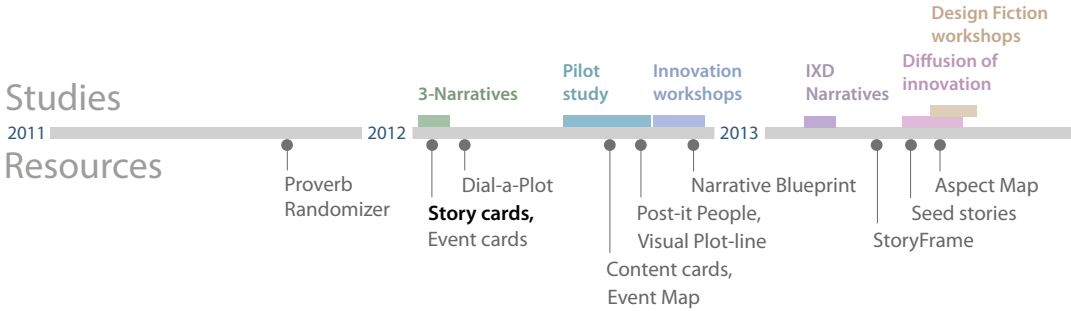
Figure 4.2. Resources that inform story content.



Resources that inform the development of story content afford ways of working with some of the basic elements of narrative, such as events, actions and settings, etc., (Figure 4.2). As ‘concrete’ particulars, *Content exemplars* help inform story work by directing attention to the range and nature of narrative’s constituent parts. This group of resources comprises:

- Story cards,
- Event cards,
- Content cards, and
- Post-it People.

4.2.1. Story cards



One of the earliest approaches taken to the design of supportive resources for storytelling investigated card sets. Over the course of several months, many different sets of Story cards were created and tested through a series of self-reflective design experiments and studies (see Figure 4.1, Experiment 7).

The potential for card sets to support story authorship was promising. The format of card sets is well suited to dealing with lists, categories and activities that involve the

selection and sorting of many different kinds of information. Cards are easy to create and edit, and they are familiar to most people from their experiences with board games. In this research the design of a storytelling card set served the important roles of helping this practitioner-researcher learn how stories work and how they can be told, and underpinning the development of several specialised card sets designed to deal with particular aspects of design narrative.

Figure 4.3. Actor cards (examples).

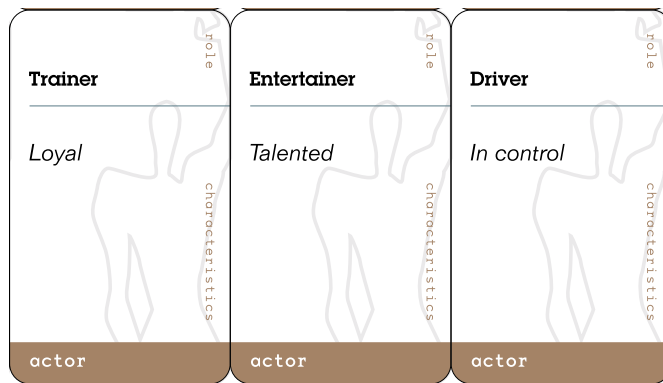


Figure 4.4. Trait cards (examples).

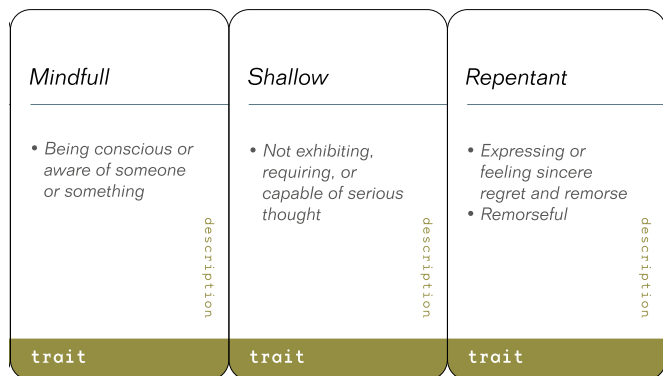
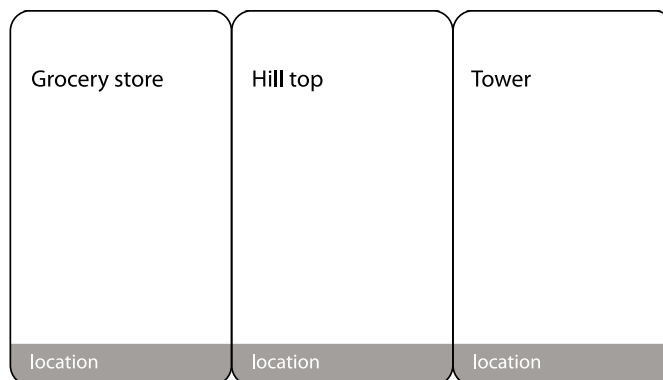


Figure 4.5. Location cards (examples).



While cards sets that dealt with such things as *items* and *aspects* were found to be too prescriptive for design and too cumbersome to weave into design stories, those that dealt with such things as *characters* (Actors, Figure 4.3; Traits, Figure 4.4), *places* (Locations, Figure 4.5), and *events* (Section 4.2.2 'Event cards') were found to be quite useful.

4.2.1.1 Story card development

Figure 4.6. Cards from the 'Once Upon a Time Card Game'.



Content for sets of design story cards was informed by a set of commercially available storytelling cards called the 'Once Upon a Time Card Game' (Figure 4.6). The game was played and analysed to learn the rules and discover the principles of storytelling with card sets.

The Once Upon A Time Card Game is designed to support collaborative storytelling in the genre of fairytales, hence the cards speak of such things as heroes and villains, kingdoms and villages, hardship and joy.

There are two types of cards, Once Upon A Time cards that help set-up a story, and Happy Ever After cards that help bring a story to conclusion. 'Once Upon a Time' cards focus on five common elements used in the construction of stories; *characters*, *items*, *places*, *aspects*, and *events*. Happy Ever After cards suggest endings, such as 'So the riddle was finally answered' or 'Which proves that a pure heart will always triumph in the end'. It was found that

'most of them are inappropriately involved with feelings [and situations] rarely associated with design' (memo 1, 06.03.2012).

Table 4.2. Translation of terminology.

Once Upon A Time Card Game		Design story work
Category/set	Fairytale Terminology	Design settings Terminology
Story ending	Her sorrow came to an end and her joy began.	Disappointment is replaced by satisfaction.
Character	King	Owner (of artefact, initiative, problem, enterprise, etc.).
Aspect	Cursed	Plagued, recurring problem.
Place	Kingdom	Home, Domain.
Item	Sword	Tool
Event	A death	A termination, an end, a serious error, etc.

Design experiments were conducted to translate the terminology (Table 4.2, and Table 4.1 'Design experiments, resources and studies' > Experiment D).

First attempts to translate the terminology for design did not go well. On rare occasions it was possible to find a reasonable match for an ending, a character or an event. But, frequently, matches were either completely arbitrary or impossible to find (for how individual cards were translated, see Appendix C2 'Adaptation of Once Upon a Time Cards').

4.2.1.1.1. Design experiment G: Card sets

Constant changes were made to the design of card sets, the number of cards played, and the order of play (for details of card set experiments and studies, see Appendix A4 'A4. Card set experiments'). By way of example, here, Card set play 3, one of the orders of play that yielded important insights, is described.

Card set play 3: Setup

Approaches taken to story-spinning in the first 2 Card set experiments involved responding reflexively to prompts from all the cards at once. Though this worked well when only a few cards were in play, it did not when many cards were in play. In this experiment, 6 Cards were in play. The approach, therefore, involved addressing cards in an ordered sequence and sketching out the story systematically through the use of tables in a word processing document. This approach allowed for sketch-writing at the level of short phrases rather than sentences, which facilitated rapid writing and editing. The storytelling process used in this experiment was thought to be better suited to collaborative work than that used in previous experiments.

In each card set experiment, the narrative element of emplotment is introduced through a unit of narrative called a *plot function*. For Ricoeur (1984), emplotment 'brings the

diverse elements of a situation into an imaginative order, in just the same way as does the plot of a story'. *Plot functions* are explained in Section 4.3.2.1.2 'Design experiment E: 1st reduction; function pairing'.

Card set play 3: Part 1

In this experiment, the *plot function* drawn at random was 'Unusual measures are taken to resolve a problem or to achieve a goal'

Three Event cards were drawn at random, the first 'A disappearance', the second 'A journey', and the third 'An appointment'

Events may be arranged in any order. After giving some consideration to the *plot function*, an order was settled upon and an imagined sequence of events was inscribed in the cells of a table.

	Event 1		Event 2	Event 3
	Something disappears. Someone wants it back (a goal?)	Advice is given on where to recover the lost item.	Recovery entails 'unusual measures' and a long and difficult journey.	A meeting is set to 'achieve the goal'.

Card set play 3: Part 2

2 Actor cards were introduced, 'The reluctant stakeholder' and 'The know-it-all'.

Drawing on reason and logic, situations were imagined that could set actors such as these in settings proposed by the sequence of events.

	Event 1		Event 2	Event 3
	Something disappears. Someone wants it back (a goal)	Advice is given on where to recover it	Recovery entails 'unusual measures' and a long and difficult journey.	A meeting is set to 'achieve the goal'.
Actor 1		Actor 2		
Victim of theft	Precious book	Authoritative person		

Card set play 3: Part 3

Finally, a Location Card. 'Public library', was introduced into the scenario. The imagined story went something like this;

If the location is a public library, the item that disappears might be a book. Perhaps a precious book, otherwise, why steal it? Advice may be given by a 'know-it-all'. Perhaps someone who is an authority on books or on thieves? The setting for a meeting needs to be distant. Why not Toronto?

Having imagined the scenario, the story was expressed by inscribing it beneath the table of events, actors and location.

	Event 1		Event 2	Event 3
	Something disappears. Someone wants it back (a goal)	Advice is given on where to recover it	Recovery entails 'unusual measures' and a long and difficult journey.	A meeting is set to 'achieve the goal'.
Actor 1		Actor 2		
Victim of theft	Precious book	Authoritative person		
				Location
				Toronto public library

A wealthy UK industrialist has located a precious book; the only known record of his family history. Shortly after discovering its whereabouts, it is stolen.

On the advice of an Oxford scholar who happens to be a world authority on book thieves, the industrialist is able to contact the book thief and make a deal. In exchange for returning the sought-after book the industrialist will give the thief another from his collection that is worth far more, but the exchange must take place on the roof of the Toronto Library at 2am on the night of the next full moon.

The most significant insight to arise from this experiment was that the approach supported a more 'open' process that makes visible, a) how the final narrative evolved, and b) how various aspects of the final narrative (satellite events, locales, characters, etc.) can be changed (memo 2, 24.04.2012).

This approach that so effectively supports incremental conceptualisation and expression of stories has since been used many times to deliver the '3-Narratives' brief to university students.

Further Card set experiments sought to steer story content more deliberately toward design settings, and in Card set experiment 4 the value of focusing on human traits, values, motivations and goals came to the fore..

4.2.1.2. Story cards in use

From such usage experiments it became clear that the value of cards sets lay in their potential to fulfil more complex roles than mere elemental prompts. Their value lay in helping designers consider the roles played in stories by human traits, actions,

motivations and goals. For, as these self-reflective design experiments showed, this is what helps to raise the kinds of questions that support design work and bring value propositions to the fore. It was by addressing such issues that design approaches were settled upon for a number of the story card sets.

4.2.2. Event cards

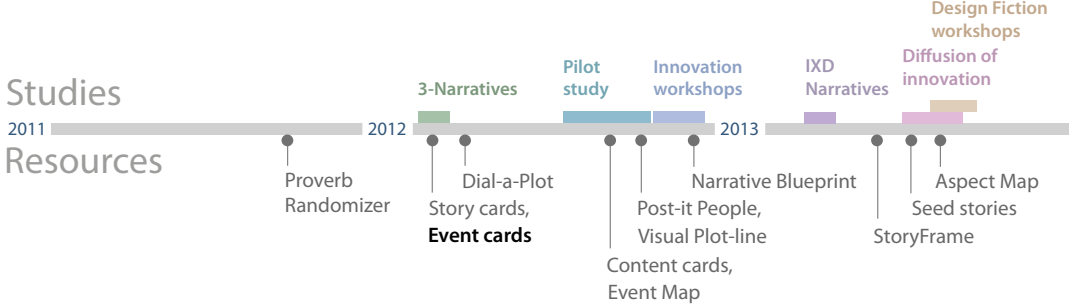


Figure 4.7. Event cards (examples).



Once a set of design-appropriate events had been created, Event cards (Figure 4.7) proved to be one of the most useful card sets. Their frequent use with Dial-a-Plot demonstrates why Content exemplars tend to complement Discourse Prompts.

Stories are often thought of as a series of events, so a set of cards that provide a starting point for thinking about how events can fit together support plot development. Event cards challenge scenario authors to co-ordinate the contextual information that underpins a story with a series of random events.

4.2.3. Content cards

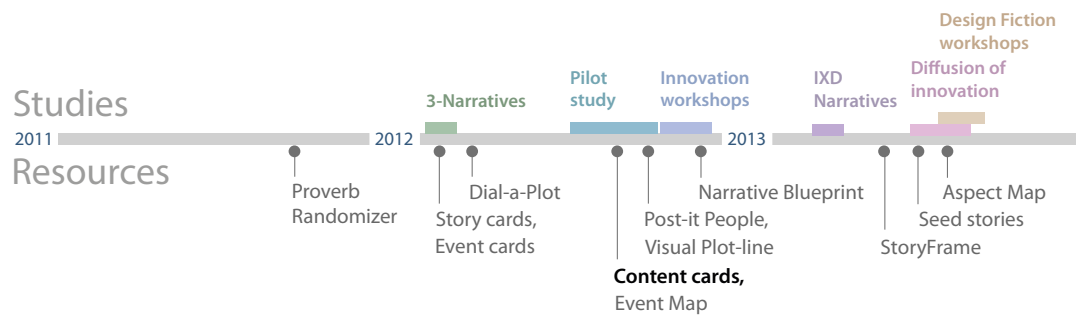
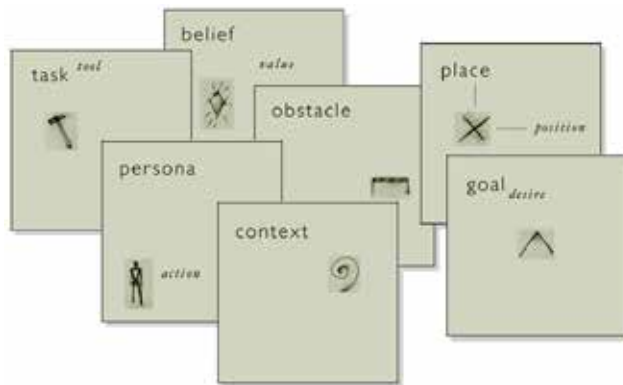


Figure 4.8. Content card set.



The role played by Content cards in story work differs from that played by other cards, hence their distinct shape, colour and inscriptions (Figure 4.8). While the primary role of Story cards – such as Event cards and Location cards – is *directive* in that they give information intended to guide activities, the primary role of Content cards is *acquisitive*, in that they harvest and store information that may otherwise be overlooked or lost. Used almost exclusively with Visual Plot-line (see Section 4.4.2 ‘Visual Plot-line’), their resemblance to Post-it Notes is not accidental. The cards’ blank space is used to inscribe details of the story, while the position they take up on the Visual Plot-line describes their relevance to particular events.

4.2.3.1. Content card development

As was the case with other card sets, Content card designs developed over a number of iterations through trial-and-error design experiments and studies. One significant development was the adoption of ‘goals’ and ‘obstacles’ from Carroll’s suggestions for what constitutes ‘good coverage’ in a set of scenarios. ‘A set of scenarios has a good coverage if it includes examples of the significant uses of a system and the major types of agents, goals, actions, events, obstacles, contingencies, and outcomes that constitute these uses’ (Carroll, 2000:256).

4.2.3.2. Content cards in use

Content cards were used in the Pilot study, session 4 (see Section 5.3.2.4 'Pilot study session 4: Toward a storyboard'), in Innovation workshop 2 (see Section 5.4.5.2.4 'Point of inquiry 4: Reasoning'>Orientation 5: Storyboard sketching'), and a bespoke set was created for use in the Design Fiction formal study (Section 6.3.5. 'Design Fiction formal study').

Figure 4.9. Bespoke Content card set.



The subject being explored in the Design Fiction formal study was the future of bereavement in a digital world. Strategic conversations can move quickly. For ease of use and identification, the bespoke set of Content cards were designed to provide distinct visual cues through shape, colour and graphic symbolism (Figure 4.9). For example, the two protagonists, John and Iris, are represented by a square and a triangle respectively; data is represented by an arrangement of small blue widgets; family by a green rectangle, health by a grey hexagon, and community by an orange semi-circle.

4.2.4. Post-it people

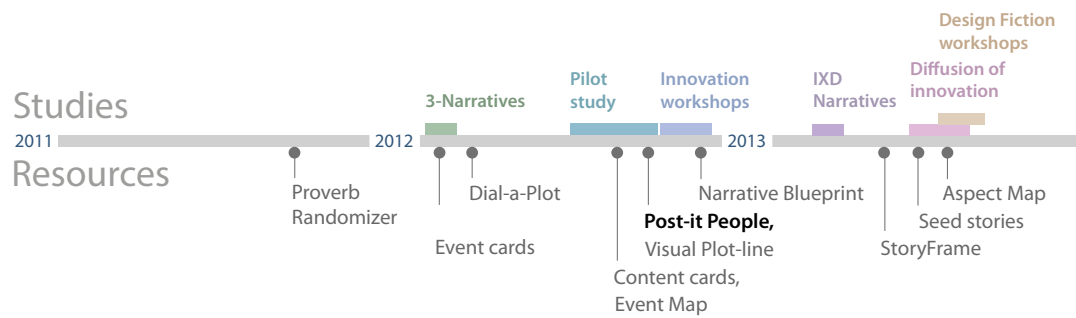
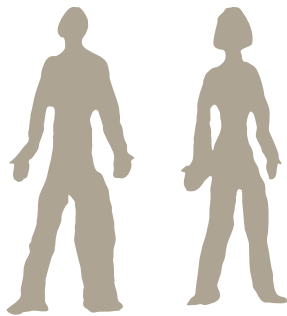


Figure 4.10. Post-it People.



In activities that involve the expression of stories, such as those that concern themselves with developing plot-lines (see Section 4.4.2 ‘Visual Plot-line’) and mapping out relevant aspects of story (see Section 4.4.4 ‘Aspect Map’), Post-it People provide a figurative prompt that complements the more-or-less factual prompts afforded by Content cards. The resource consists of laser-cut Post-it Notes (Figure 4.10). During narrative development, the two loosely-defined figures – one male one female (stylistically inspired by le Corbusier’s modular man) – act as graphic symbols that serve to represent key actors and move narrative thinking towards visual and pictorial qualities closely associated with storyboards. To fulfil this role they can be arranged in different ways and assigned names and character traits, etc.

4.2.4.1. Post-it People development

One of the design features of workPlay, the storyboard-based ideation and sketching tool that helped motivate this research (see Section 1.2 ‘Motivation’), was the stance taken on the value of ‘just-barely-good-enough visual representation’. Several approaches to low-fidelity figure rendering were explored.

Figure 4.11. workPlay figure stencil



One of the earliest design proposals was a laser-cut stencil of body parts that could be used to create figures and rough-out storyboard scenes (Figure 4.11). This resource helped with scene visualisation (left; see Appendix A4.4 ‘Card set experiment 4’). The modular approach inspired development of Post-it People.

4.2.4.2. Post-it People in use

Post-it People prove to be useful during narrative development, mainly where activities focus on the employment of stories (see Section 4.4.2 ‘Visual Plot-line’). Often used in conjunction with Content cards during development of Visual Plot-lines, Post-it People enabled rapid notation in the Pilot study (see Figure 4.28) and Innovation workshop 2 (see Figure 5.17).

4.3. Discourse prompts

Figure 4.12. Resources that support discourse expression.



Resources concerned with discourse expression tend to nudge rather than direct strategic conversations (Figure 4.12). Their concern with narrative manifestation and structuring sets them apart from resources concerned with story content (see Section 2.2.1 ‘Story and narrative theory’). This group of resources comprises:

- Proverb Randomizer,
- Dial-a-Plot,
- StoryFrame,
- Seed stories, and
- Event Map.

4.3.1. Proverb Randomizer

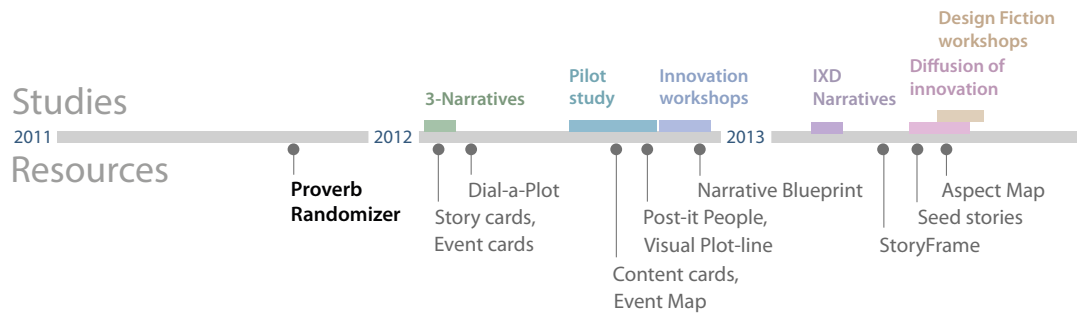


Figure 4.13. Proverb Randomizer.

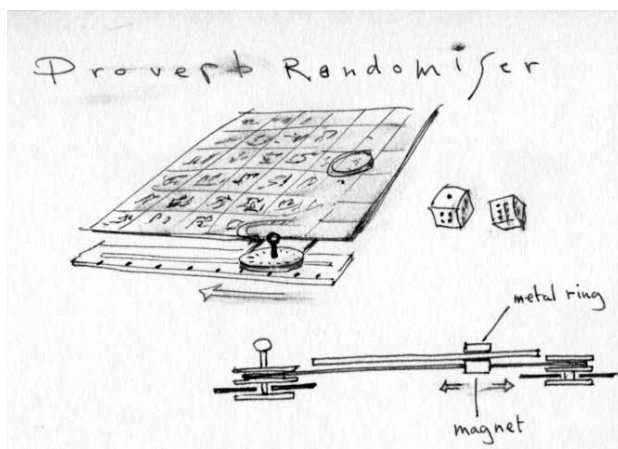


Proverb Randomizer was the first narrative resource to be designed. It is a game-like activity that comprises a chequered game board, a pair of three-sided dice and a set of cards (Figure 4.13). The board is divided into four quadrants, each of which can be distinguished by the work of a famous artist. Play commences by choosing a theme/artist and throwing the three-sided dice. Numbers on the dice give the coordinates of a proverb in the chosen quadrant. To enable players to work flexibly with other resources while spinning stories, the proverbs have been reproduced in a set of cards.

Proverb Randomizer prompts designers to rethink and adjust the content and plot of a scenario while reflecting on the role of human values in stories. Proverbs are commonly held truths that are often expressed as metaphors. Metaphors are useful descriptive linguistic devices that work through comparison. For example, the proverb 'a stitch in time saves nine' has nothing to do with sewing. Rather, the proverb enables comparisons to be made between the concrete concept of dropping a stitch with which most people are familiar, and the abstract concept of missing an opportunity to take care of something that will get out of hand if left unchecked.

4.3.1.1. Proverb Randomizer development

Figure 4.14. Proverb Randomizer concept sketch



Inspiration for Proverb Randomizer came from two sources. First from studying 'The Dutch Proverbs', a painting by Pieter Bruegel the Elder, while conducting design experiments in narrative inference (see Figure 4.24). Second, by imagining how such visual representations might prompt designers to form metaphorical connections during narrative development. Eco's (1996:92) 'Aristotelian Machine', a piece of furniture that supports the formulation of metaphors¹, served as inspiration for 'a board with a grid of squares on it, and in each square an illustration of a proverb, hopefully of some relevance to design situations' (memo 3, 00.10.2011; Figure 4.14). The elaborate mechanism was abandoned in favour of a simple game board with numerical coordinates.

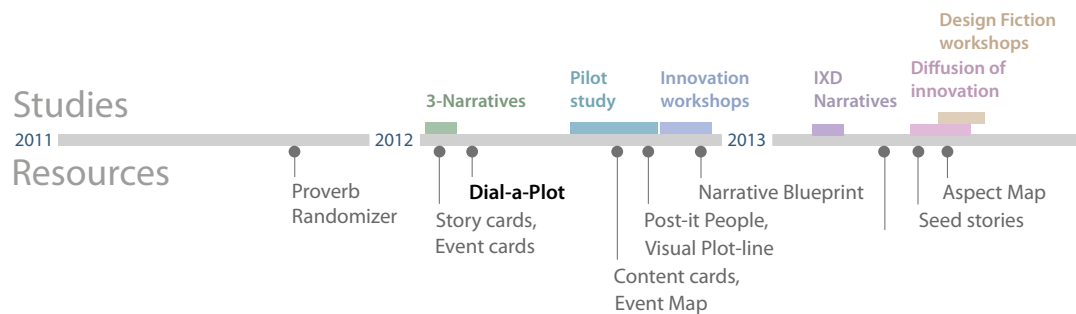
4.3.1.2. Proverb Randomizer in use

During use, the resource is *invigorative*, i.e., it 'deliberately induce[s] a high degree of turbulence and conversation' (van der Heijden et al., 2002:5). This function afforded

1. A sketch of which is in Appendix D3.2. Eco's description suggests that the machine might have been inspired by or based on Gottfried Leibniz's 'reason machine' or 'Characteristica universalis'? (see: Benson Mates' 'The Philosophy of Leibniz').

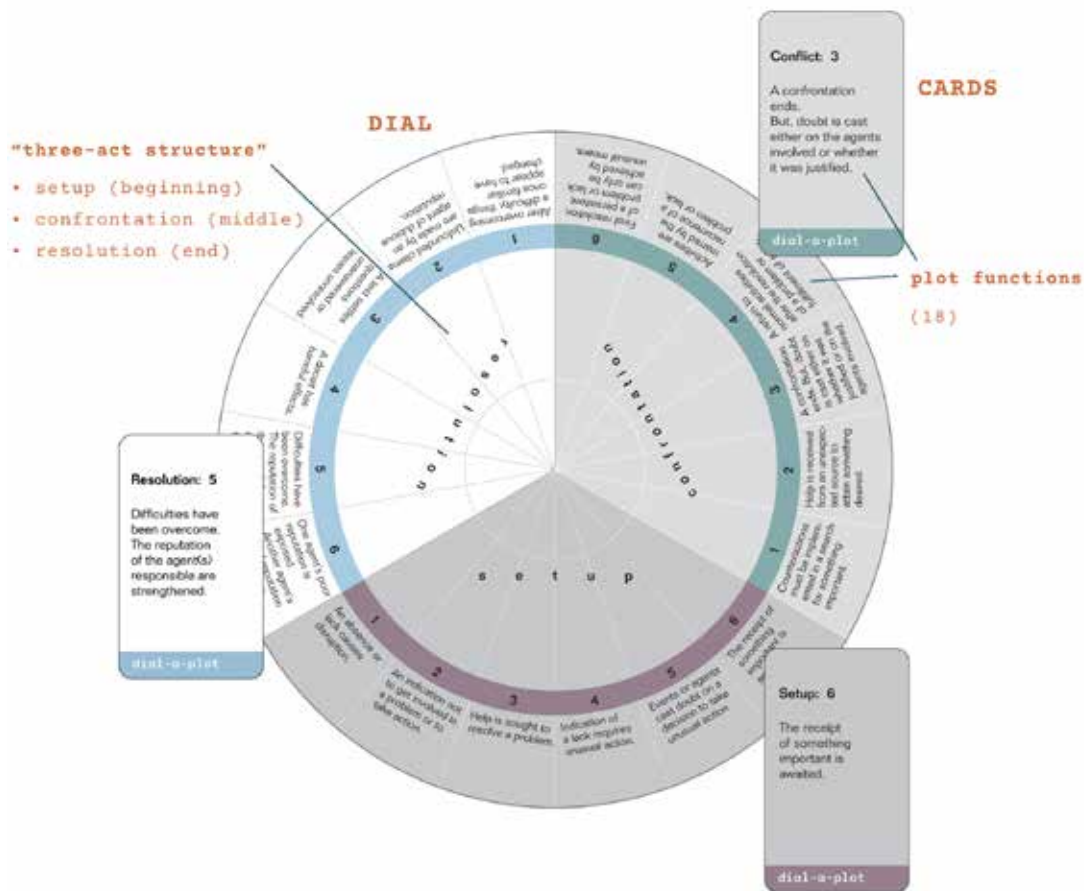
by the resource proved to be valuable in many of the design experiments conducted in narrative development. For example, in Card set experiment 4 (Appendix A4.4 ‘Card set experiment 4’) Proverb Randomizer helped to *agitate the story* and thus invite critical analysis, rethinking and reworking. And both in preparations made for the Pilot study (see Appendix B3 ‘Edinburgh scenarios’) and in Pilot study session 3, Proverb Randomizer provided inspiration for creative adaptation of narratives with the result of adding depth and resonance to stories (see Section 5.3.2.3 ‘Pilot study session 3: Storienteering’).

4.3.2. Dial-a-Plot



‘Scenarios [...] often lack the plot development and drama integral to a compelling story’ (Gruen et al., 2002:504). Dial-a-Plot aims to rectify this by supporting plot development during authorship or ‘story spinning’. It is through the narrative device of emplotment that all the elements of discourse are drawn into a meaningful whole. For Polkinghorne (1988:142–143), ‘narrative involves the gathering together of events into a plot in which signification is given to the events as they relate to the theme of the story’.

Figure 4.15. The makeup of Dial-a-Plot.



Of all the narrative resources, Dial-a-Plot probably represents the most successful synthesis of theory into practice. Its development was supported by more theory, more design experiments and more studies than any other resource. It is featured in the most studies because it was found to be the most useful and effective way to spin stories.

The dial is divided into three equal segments (Figure 4.15), each representing one of the acts described in the 'three-act structure' – a concept used in theatre and narrative construction that divides the plot-line of a story into a 'set-up' (beginning), 'confrontation' (middle) and 'resolution' (end). Eighteen numbered 'Plot functions' are arranged around the dial; six in each segment. *Plot functions* are a unit of narrative that has been adapted for story work from Propp's (1968:25) narratemes or *functions of Dramatis Personae*, i.e., characters (explained further in the next section).

There are 216 unique combinations of *Plot functions*. Story spinning begins with the throw of three dice. Numbers on the dice are matched to *Plot functions* on the dial. The three designated *Plot functions* then guide narrative development.

Dial-a-Plot's *Plot functions* are based on a canonical story structure that has largely remained unchallenged for almost 100 years.

Tests conducted by Mandler and Goodman (1982) indicate that story structure has strong psychological validity, where psychological validity refers to 'the extent to which story constituents influence processing, regardless of the ability to bring such knowledge to awareness' (ibid.:508). '[R]ecall is better when the sequence of propositions in the surface structure follows the ideal structure' (Mandler & Johnson, 1977:134). Anggreeni and van der Voort agree that 'good structure improves the quality of scenario within design context' (2007:9).

Guided by a sequence of *Plot functions* that correspond to a recognised pattern of story constituents, designers are able to compose well-structured stories. In this case, 'well structured' means an arrangement of important events and happenings that are organised into a logical and coherent beginning, middle and end.

4.3.2.1. Dial-a-Plot Development

Dial-a-Plot development was supported by an extensive series of design experiments which underpinned story and narrative theory building and the emergence of another narrative resource, StoryFrame. Here, four design experiments are described. Each is followed by a summary and discussion of outcomes.

4.3.2.1.1. Design experiment D: Adaptation of Propp's functions

In the introduction to the second edition of Propp's *Morphology of the Folktale* (1968), Dundes notes that Propp's analysis of Russian folk tales 'should be useful in analyzing the structure of literary forms (such as novels and plays), comic strips, motion-picture and television plots, and the like' (xiv). To test the point, I used Propp's 31 *functions* as a framework for illustrating his life story (see < http://malcolmjones.com/making/propops_trials.html>).

Propp, a Russian Formalist, sought to resolve long-standing debates about the structure of stories and unifying principles that were thought to underpin them. Most of Propp's contemporaries took the concept of 'themes' as a common and comparable unit of narrative. However, Propp (1968:21) argued for a unit of narrative that he referred to as *functions*. For Propp, *functions* are 'an act of character, defined from the point of view of its importance to the course of action'. Such *functions* are specific to particular parts of the tale.

Propp recognised that in the genre of Russian folk tales, some elements of narrative are ‘variable’ while others are ‘constant’ (1968:55). While the names and characteristics of ‘dramatis personae’ vary widely across all Russian folk tales, Propp considered the functions they perform to be *constant* and their number to be no more than 31. He, therefore, took *functions* to be ‘fundamental components’ of folktales (ibid.:56).

Propp’s *functions* are written in language that was appropriate for telling Russian folktales in the early part of the 20th century. Hence, some translation was needed to make them suitable for contemporary design.

Table 4.3. Method of ‘function’ adaptation (partial list).

No.	Function	Translation
14	Hero acquires the use of a magical agent	Agent is given assistance to meet the challenge
15	Hero transferred to the whereabouts of an object of search	Agent goes to where something searched for can be found
16	Hero and villain in direct combat	Confrontation between agent and opponent
17	Hero branded	Agent’s worthiness is brought into question

Tables provide opportunities for comparison. By listing Propp’s *functions* in a table (Table 4.3), new translations could be composed in the column next to them and side-by-side comparisons could be made. Over the course of several iterations, the terms and tone used in the *functions* became more suited for use in contemporary design story work (for the full table see Appendix C3 ‘Adaptation of Propp’s functions’).

4.3.2.1.2. Design experiment E: 1st reduction; function pairing

Propp noticed that there were interdependencies between particular *functions*. Some form natural ‘pair elements’ (1968.:27)², while others form groups according to ‘spheres of action’ (ibid.:79).

Propp’s decision to settle on *functions* as a unit of narrative was influenced by Veselóvskij’s insistence on making a clear distinction between *motifs* as ‘an indivisible narrative unit’ – or what Bédier (1893) refers to as ‘elements’ – and *themes*, which refer to ‘a complex of motifs’ (Propp, 1968:12). The difference in these units of narrative and the relationship between them are important to note, because when during design experiments and studies attempts were made to use *functions* of about the same size as Propp’s to prompt authorship of design stories, they were found to be too small. However, units of narrative closer to Veselóvskij’s ‘themes’ proved to be more useful.

2. Later, an argument is made for what Propp’s contemporaries viewed as ‘themes’.

For Veselóvskij, ‘certain motifs make their way into themes, or else themes combine with one another’ (ct. in Propp, 1968:12). Guided by Veselóvskij’s insights about the nature of ‘motifs’ and ‘themes’, Propp’s 31 *functions* were systematically paired or grouped to create 18 units of narrative that came to be referred to as ‘plot functions’.

Figure 4.16. Distillation of functions.



The method used in this process of distillation is demonstrated in Figure 4.16. Here, three of Propp’s *functions* are integrated into one *plot function*. Words are colour-coded to show how elements of the *Plot function* relate to those of the *functions*. The method involved grouping closely related *functions*. For instance, in the above example they are;

(Function 7) Member of family lacks or desires something.

(Function 1) Member of family absents self from home.

(Function 10) Hero leaves home.

Outcomes of design experiment E

By using trial-and-error design experiments and studies to test the phrasing of *Plot functions* and iteratively making refinements, a set of *Plot functions* was developed that were broadly interpretable in a number of different story-spinning situations.

Questions concerning forms of narrative that characterise scenarios and the possibility of them conforming to a common underlying structure permeated the research.

Are scenarios to design what poems are to literature? (memo 4, 03.06.2011).

Do scenarios constitute a literary genre?

Such questions were motivated by a desire to support scenario authorship, and further questions about whether support could come in the form of a set of specialised *Plot functions*. This led to a series of design experiments that sought to interrogate whether a specialised set of *Plot functions* could act as a common framework for variants of narrative that arguably reflect what is characteristic about scenario forms of expression.

4.3.2.1.3. Design experiment H: Scenario narrativity

What constitutes narrative has been the subject of debate since Aristotle's poetics. So, assessing the narrativity of a text by examining its constitutive elements would be no simple matter (Chapman, 1980:18–19). However, if the research was to engage in the study of scenarios in order to further design story work, and design experiments and studies were to be conducted to develop supportive narrative resources, any benchmark for evaluating outcomes must take into account what, with regards to scenarios, constitutes 'narrative'.

A design experiment was conducted on the narrativity of scenarios. It had two aims: the first to help confirm or debunk the common assertion that scenarios *are* narratives; the second to establish a defensible benchmark for scenarios and stories being tested and authored throughout the research. The design experiment drew on two sources of narratological theory, that of Chatman (1980), and White (1980). With the development of Plot Themes and StoryFrame, a later design experiment conducted on the same corpus of stories was able to provide additional verification of scenario narrativity (Section 4.3.3.1.2 'Design experiment L: Verification of Plot Theme sets').

In the literature, scenarios are often either asserted or assumed to be narratives. But do what are frequently referred to as narratives or 'narrative scenarios' in fact have the constitutive parts or prerequisite characteristics of narrative. Doubts stem from examples such as these:

Rosson and Carroll (2001) give an example of a 'narrative scenario';

Marissa was not satisfied with her class today on gravitation and planetary motion. She is not certain whether smaller planets always move faster, or how a larger or denser sun would alter the possibilities for solar systems.

She stays after class to speak with Ms. Gould, but she isn't able to pose these questions clearly, so Ms. Gould suggests that she reread the text and promises more discussion tomorrow.

(In Go and Carroll, 2004a:46),

While Go and Carroll (2004b) give an example of what is referred to as a 'textual narrative scenario'.

Walter has been browsing some clips pertaining to the project manager's views of the lexical network as they developed through the course of the project. One clip in particular seems to drag a bit, and he wonders how to fast forward

through the rest of it—perhaps he can just stop the ploy?

(Go and Carroll, 2004b:2)

Assertions that scenarios *are* narratives are to be found in statements such as:

The form view represents the format of scenarios; for example, *narrative* texts...

(Go & Carroll, 2004a:50)

The vocabulary of concrete *narratives* is accessible to and sharable by diverse stakeholders...

(ibid:50)

...scenarios therefore describe key situations of use in the form of *narrative*.

(Jarke, 1999:7)

Narrative, including scenarios...

(ibid:10)

...scenarios as *narrative* descriptions...

(ibid:14)

...dealing with scenarios (*narrative* rich, non-formal descriptions)

(ibid:24)

...scenarios provide a *narrative* account...

(Carroll & Rosson, 1992:191)

Design experiment H: Part 1. Assessment of narrative content

To interrogate the question of whether scenarios that are often assumed to be narratives actually are narrative, a list of assessment criteria was synthesised from the work of Chatman (1980:44–45), Pentland (1999:6–7) and White (1980).

The first set of criteria used to assess the narrativity of scenarios drew on descriptions given by Chatman (1980:44–45) and Pentland (1999:6–7). Two ‘so called’ scenarios were assessed. One is shown here (for the other, see Appendix A2.1. Figure A7 ‘Assessment of narrative content, example 2’). Once refined and found to work, the method was refined (see next experiment) and used to analyse the entire corpus.

Figure 4.17. Assessment of narrative content, example 1.

Title: Looking for the fast-forward button		
Narrative element	Instance	Text
Actor 1	Walter	Walter has been browsing some clips pertaining to the project manager’s views of the lexical network as they developed through the course of the project. One clip in particular seems to drag a bit, and he wonders how to fast forward through the rest of it—perhaps he can just stop the ployout?
Actor 1 beliefs		
Actor 1 feelings		
Actor 2		
Actor 2 beliefs		
Actor 2 feelings		
Event 1	Clip browsing	
Event 2	Clip dragging	
Scene setting	(Workstation)	
Situation/Action	Examination of course material	
Object focus	Video clips	
Temporal element	‘been browsing’	

Figure 4.17 presents a likeness of one of the database tables used to evaluate the narrativity of texts. Using this scheme, each text was analysed to assess whether it contained a sufficient number of characteristic elements of narrative to warrant being called a narrative. For instance, in this example there is only one actor, Walter, about whom almost nothing is revealed (no beliefs, no feelings). He is engaged in thinking about two events – clip browsing and clip dragging – in a scene and situation that is intimated rather than described. With no ‘real’ actions taking place and no secondary actors, feelings or beliefs in play, it appears to have few narrative qualities.

Experiment H: Part 2. Comparative analysis; Narrative, chronicle or annal?

Figure 4.18. Scenario narrativity, experiment 2.

Looking for the fast-forward button*		
Evidence of Narrative	Instances	Text
Main actor	Walter	Walter has been browsing some clips pertaining to the project manager's views of the lexical network as they developed through the course of the project. One clip in particular seems to drag a bit, and he wonders how to fast forward through the rest of it—perhaps he can just stop the playback?
Main actor - feelings	None	
Main actor - beliefs	Only instrumental	
Main actor - traits and values		
Secondary actor		
Secondary actor - feelings		
Secondary actor - beliefs, traits/ values		
Main event	Clip browsing	
Secondary events	Clip 'dragging'	
Scenes/settings	Workstation	
Situation/Actions	Examination of course material	
Objects of focus	Video clips	
Temporal element	'been browsing'	
Evidence of Annal	Instances	
No plot	Affirmative	
No identification of author	Affirmative	
No date of authorship	Affirmative	
No author rationale	Affirmative	
No opinion of the author	Affirmative	
No beginning or end	Arguably none.	
No claim to be factual or fictional	Affirmative	
Is eminently rational	Affirmative	

A second experiment was conducted on the same two texts (Figure 4.18, the second in Appendix A2.2 'Figure A8. Comparative analysis, example 2'). In this experiment narrative content was evaluated with criteria amended to include White's (1980) differentiation between narratives, chronicles and annals. The same text is found to have characteristics that are more in line with chronicles and annals than narratives. With virtually no plot, but merely a description of events, in the manner of a chronicle the text begins and ends abruptly and manages to reach no resolution. Though none of these things may have been necessary for the intended purpose of the scenario, a narrative it is not.

Outcomes of design experiment H

The outcome of design experiment H was, first and foremost, a qualitative method of evaluation for the narrativity of scenarios. A secondary outcome was quantitative. There was confirmation that of the 55 texts that were referred to as scenarios, only 23 were found to be narratives. 13 were simply Seed stories (see Section 4.3.4 ‘Seed stories’), 15 were user stories (Cohn, 2004), 1 was a chronicle, 1 was a use case and 2 remained uncategorised. This strongly suggested that there is little basis for the assertion that *all* scenarios are narratives. The question of whether scenarios constitute a literary genre was only partially answered. The experiments were able to show, though, that good stories and good scenarios do conform to a particular set of Plot Functions, which, arguably, constitute units of narrative. However, a bigger sampling, more expertise and more studies may settle such questions.

4.3.2.1.4. Design experiment J: Getting the story right

One of the aims of conducting self-reflective design experiments with Dial-a-Plot was to test whether it could support the development of narratives that would be both useful and meaningful for design work. In one of these design experiments an unedited, first-person account of a challenging situation was chosen from the corpus. Important insights made while conducting Card set experiment 4 informed the approach (see Appendix A4.4 ‘Card set experiment 4’), resulting in greater attention being given to the purpose of the scenario and to the importance of having a clear understanding of protagonist goals.

The Project Manager’s Dilemma

Shirley, a Project Manager, is faced with a difficult dilemma. In addition to her already full workload, she has been assigned to another project that has a very tight deadline. In six weeks UI designs need to be presented to a client in Hong Kong. The project is poorly documented, so the scope of the task is impossible to assess. An added wrinkle is that one of the principals on the project is located on a distant continent. The Project Manager’s choices are; to follow industry protocols and conduct a project assessment, develop a chaos report and create a plan of action that would most likely put meeting the deadline in jeopardy, or not conduct the protocols, go for the deadline and risk getting into difficulties over unexpected problems or things that might be missed, both before hitting the deadline and downstream.

The purpose of telling the story was assumed to be the acquisition of knowledge or insights about how trade-offs in management decision-making might be resolved. It was also assumed that the goal of the protagonist, Shirley, was to make the best management decision. However, both these assumptions were shown to be wrong. Using an early prototype of Dial-a-Plot, three *Plot functions* were drawn at random; setup, confrontation, and resolution. While reflecting on ‘the project manager’s dilemma’ and questioning how each *Plot function* could be woven into the story, narrative interpretations were made of each *Plot function*.

Setup: Events or agents cast doubt on a decision to take unusual action.

Shirley takes the [unusual action] of following industry standard protocols. Brian, her boss (Agent), trusts her [decision]. He is, however, concerned (doubt cast) because he knows the company can’t afford to lose this client.

Confrontation: Help is received from an unexpected source to attain something desired.

Shirley puts her plan into action. She assigns a couple of people from her team to start the assessment and another team member to look for possible ways to compress the process or run some of the reports concurrently. A novel method is found (Help received from unexpected source) that promises to compress project assessment without compromising the protocols. The method generates a report that reveals some very high risk and cost factors on some aspects of the work.

Resolution: A test settles questions unanswered or issues unresolved.

The work does not meet all the requirements on time (issues unresolved). But Shirley and her team deliver a coherent and solidly extensible design. When their work is [tested] by their client’s lab;

- *ending a) their work is rejected and they lose the contract (question settlement a),*
- *ending b) they are applauded for the things they did well and are given an extension on their contract (question settlement b).*

The scenario fits the story (purple highlights) and describes a coherent sequence of events. According to Carroll’s definition (2000b:47, based on Propp, 1958), it is a well-formed *narrative scenario*, with ‘a setting, actors, goals or objectives, and actions and events’. Yet the whole amounts to far less than the sum of its parts. It’s hard to see how

such a scenario could be of any use to a UX or interaction design team. The scenario was thought to be

'bland and somewhat predictable [providing] us with no insights on human judgement' (memo 5, 02.05.2012).

The wrong story had been told.

MacIntyre (1981:456 cited in Gergen, 2005) contends that '[n]arrative requires an evaluative framework in which good or bad character helps to produce unfortunate or happy outcomes'. According to Gergen (ibid.), outcomes, or 'valued endpoints', are one of the central criteria in narrative construction. Understanding how to redirect the scenario toward a more meaningful outcome for design came about only after reflecting critically on

'the setup of the characters and their motivations, i.e., the reasoning behind their actions' (memo 6, 02.05.2012).

For Shirley to be in such a state of conflict, she must either possess a particular character trait or have a very good reason to be afraid of taking such risks. Questioning what these character traits or reasons might be enabled the story to be retold from a new perspective.

Shirley is fairly new to the position of project manager. Brian knows that Shirley doesn't have enough experience to be confident in making the right call. Yet, due to a shortage of personnel he has no choice but to assign the project to her and hope that she succeeds in meeting the deadline and pleasing the client.

Shirley fears that she doesn't have enough experience to make the right decision. She reflects on the fact that she has a young family and a mortgage and needs the job. She is well aware that this kind of situation at work puts all her aspirations for family and financial security on the line. Erring on the side of what she believed to be caution, Shirley makes the decision to follow standard protocols. While implementing assessment procedures and reports, tensions rise between Shirley, her team and her boss. Members of the team feel that the fate of their jobs is tied to a poor decision made by an inexperienced manager. They question Shirley's competencies and wisdom. Shirley defends her decision, but inwardly harbours growing doubts.

When, on the deadline, the incomplete designs are delivered to the client and tested in their labs the quality of the work is applauded, but the contract offer is withdrawn and the client seeks help from one of Brian's competitors. However,

a year later the same client comes back to Brian with the offer of a much larger contract. Though in that time their competitor had delivered a completed product on time, it had been poorly tested. It failed after launch and cost the client dearly in market share. Shirley would never know. She no longer worked for Brian.

Outcomes of design experiment J

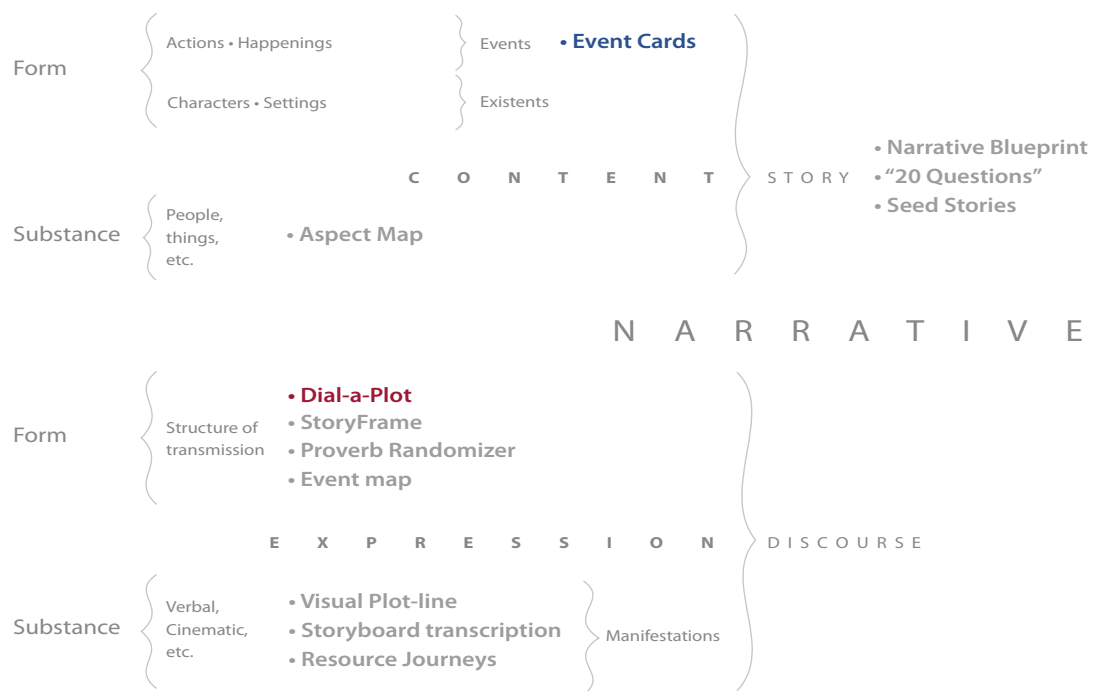
The ‘right’ story to tell was the one that drew attention to what motivated Shirley’s actions, because it demonstrates how human traits, values and beliefs shape interactions in the social networks reflected in stories. *This, above all else, is what designers need from stories when they are designing for experience.*

This insight is closely related to the notion of ‘causal linkages’ (Gergen, 2001:253; Section 2.2.4.1 ‘On the difference between story and narrative’). The view is supported by Nielsen (2002:101), who rejects Carroll and Cooper’s ‘flat characters’ in favour of character-driven scenarios. ‘The story develops because the character develops out of motivation and it is this that spins the plot’ (ibid.:102).

What can be concluded from this experiment is that if scenarios do not touch on human characteristics, such as traits, motivations, attitudes and beliefs, etc., and link them in a meaningful way to events, actions and valued endpoints, little can be learned from them about how to design for people, interactions or experiences.

4.3.2.2. Dial-a-Plot and Event cards

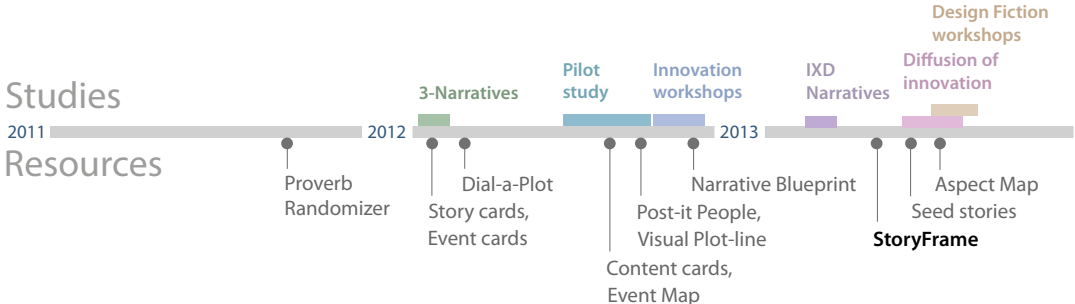
Figure 4.19. Where Event cards and Dial-a-Plot support story work.



Dial-a-Plot and Event cards share some common attributes. First, they both support areas narrative that concern themselves with form (Figure 4.19). However, where Event cards give form to narrative content and thus address what is portrayed in a narrative, Dial-a-Plot gives form to narrative expression and thus concerns itself with the structure of narrative content. Second, the primary role of both is to support the designer’s ability to create well-structured narratives. To this end, both concern themselves with temporal and syntactic aspects of narrative, i.e., the passage of time and the arrangement of events. It is this complement of affordances that makes their pairing so useful in story/scenario authorship.

On one hand, story spinning with Dial-a-Plot and Event cards incites a state of suspension or flux by calling into question all aspects of narrative form and substance. On the other, it provides a way for designers to find the right forms of expression and content for their work with a canonical ‘classic’ story framework that helps ground design thinking and rethinking in experiences with which they are amply familiar.

4.3.3. StoryFrame



StoryFrame is a framework for authoring or evaluating stories. It comprises a set of 9 Plot Themes derived from Propp’s (1968) original 31 functions of *dramatis personae*.

Figure 4.20. Example of a note-inscribed StoryFrame.

Story function	
There is a lack or need <i>or</i> wish	Need or wish to remember Iris wishes to be remembered. To provide comfort / care. Iris's investment for the care.
An actor recognises a lack or need. <i>or</i> wish.	Iris's legacy. Self-value statement. John's need for longing, reconnection for the future.
Something threatens to prevent <i>or</i> does prevent, an actor from satisfying the lack or need.	<ul style="list-style-type: none"> • Iris is no longer physically there. • data formats, data loss. •
An actor seeks help to satisfy the lack or need.	John uses Vivien to access John.
An actor receives help (from an unexpected source).	How does Vivien make sense of 'Iris'. Vivien.
An actor is required to complete a task or test to either, a) get the help, or b) satisfy the lack or need.	ASKS. carer to share information given.
An actor completes the task or test.	By receiving care.
The lack or need is concluded (with either positive or negative results.)	
A 'new order' is established. An actor's status is raised.	

For its use in studies, StoryFrame's Plot Themes were arranged in table form and printed out on paper (Figure 4.20, first column). Other ways of working with StoryFrame's Plot Themes are possible, but as yet unexplored. In as much as they guide the structuration of stories, Plot Themes perform a *directive* function. Whereas columns added to the table function *acquisitively* by providing blank yet structured spaces that invite participant's to respond *expressively* by making notes. The use of tables to help structure authorship of stories was, in part, informed by insights from Card set play 3 (see Section 4.2.1.1.1 'Design experiment G: Card sets').

4.3.3.1. StoryFrame development

Not all design story work concerns itself with the creation of new scenarios or stories 'from scratch'. Often the work involves editing, adapting or building upon pre-existing stories that are either being developed and refined, transposed from one medium or

mode of language to another, or critically analysed and deconstructed. It was found that Dial-a-Plot was not particularly useful in such situations. But, it was thought that a set of Plot Themes developed specifically for the purpose of spinning scenarios or stories might be.

4.3.3.1.1. Design experiment K: 2nd reduction; Plot functions to Plot Themes

In its then current state, the set of 18 *Plot functions* was too large, complex and full of repetition to support such experiments or to act as a practical resource for designers. The design experiment, therefore, began with an exercise to reduce the set of 18 *Plot functions* to 9. The process used the same principles of pairing, synthesis and distillation that had worked so well to reduce Propp's original 31 *functions* to 18 *Plot functions*. Tables enabled side-by-side comparisons to be made that, through a series of incremental changes, led to reducing the 18 *Plot functions* to 9 fundamental and irreducible story components that are referred to as 'Plot Themes'.

It was found that some concepts present in the phrasing of *Plot functions* were either too specific and therefore not open to broad interpretation or too readily associated with perspectives, beliefs or values not helpful for design. For example, it was found that value-laden concepts such as *secrecy*, *belonging*, *fulfilment* and *attainment* could be removed from the *Plot function* 'An agent secretly leaves their community to fulfil a goal' (Figure 4.16 'Distillation of functions.') to produce 'An absence or lack causes disruption'. Further reductions were possible, for, even *absences* and *disruptions* touch on human conditions associated with such things as *longing* and *loss*.

In the final set of Plot Theme all that remains of this particular *Plot function* is the concept of 'lack' or 'need' and the prospect of a 'threat' (see Table 4.4 'Plot Themes: Final set' below).

Outcomes of design experiment K

The outcome of this design experiment was a set of Plot Themes the value of which lay in its role it could play for design and design research as a means of story construction (authorship) and deconstruction (analysis).

Figure 4.21. A story grammar for Plot Themes.

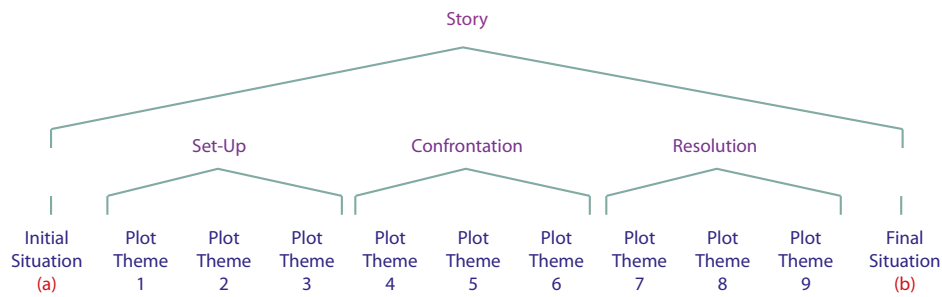


Table 4.4. Plot Themes: Final set.

	Plot Themes ('active events')	Acts
Initial situation (a)		Act 1: Set-up
Plot Theme 1	There is a lack or need	
Plot Theme 2	An agent recognises a lack or need.	
Plot Theme 3	Something threatens to prevent, or does prevent, an agent from satisfying the lack or need.	Act 2: Confrontation
Plot Theme 4	An agent seeks help to satisfy the lack or need.	
Plot Theme 5	An agent receives help (from an unexpected source).	
Plot Theme 6	An agent is required to complete a task or test to either, a) get help, or b) satisfy the lack or need.	Act 3: Resolution
Plot Theme 7	An agent completes the task or test.	
Plot Theme 8	The lack or need is concluded (with either positive or negative results.)	
Plot Theme 9	A 'new order' is established. An agent's status is raised.	
Final situation (b)		

The final set of Plot Themes (Table 4.4, Column 2) was mapped onto a story grammar (Figure 4.21), first proposed by Mandler and Johnson (1977:117; see Appendix A3) and later presented in Wilcock (2005:10). Positioning Plot Themes within an established story grammar increased their usefulness and credibility as a practical, self-contained narrative resource (later known as StoryFrame, see next Section 4.3.3 'StoryFrame').

In Wilcock's model (2005:20), Plot Themes take on the role of 'active events' (Pemberton, 1984:219) 'bookended' by an *initial situation*³ (Figure 4.21 a; Table 4.4, a), the role of which is to 'set the stage by introducing the protagonist and other characters' (ibid.:118) and a *final situation* (Figure 4.21 b; Table 4.4, b), the role of which is to make the outcome of the story clear – often through causal links to the initial situation. The Plot Themes can be divided into 3 Acts (Table 4.4, Column 3) that represent the story's 'set-up' (Plot Themes 1–3), 'confrontation' (Plot Themes 4–6), and 'conclusion' (Plot Themes 7–9).

3. Mentioned by Propp (1968:25) as 'not a function, it nevertheless is an important morphological element'.

4.3.3.1.2. Design experiment L: Verification of Plot Theme sets

During reduction of the Plot functions, design experiments were conducted with the aim of testing how well proposed Plot Themes were working. Determinations of quality and usefulness were made on the basis of how readily scenarios drawn from the corpus could be interpreted as a series of Plot Themes. However, a second and equally important aim was to verify the findings of an earlier study on the narrativity of scenarios (See Section 4.3.2.1.3 'Design experiment H: Scenario narrativity').

Assignment of Plot Themes to elements of narrative in scenarios took an iterative trial-and-error approach that involved comparative analysis, compromise, reason and logic. The following examples demonstrate how texts drawn from the corpus were interpreted using this approach. The first example, 'Taxi required' (see Appendix B1 'Taxi required'), suggested that the Plot Theme set worked well, because it was possible to find elements of narrative in the scenarios that reflected what was expressed in each of the Plot Themes. This also suggested that 'Taxi required' was a well structured story. However, it was very difficult to find the same kind of matches in the second example, 'Sharon's visit to the science fiction club meeting'.

Example 1. 'Taxi required'

Act 1

Initial situation.

It's the end of the week. Elizabeth has no food.

Plot Theme 1: There is a lack or need.

Elizabeth needs to go shopping.

Plot Theme 2: An agent recognises a lack or need.

Elizabeth is too tired after shopping to catch the bus.

Plot Theme 3: Something threatens to or does prevent an agent from satisfying the lack or need.

A taxi is too expensive to get on her own.

Act 2

Plot Theme 4: An agent seeks help to satisfy the lack or need.

Elizabeth goes to the 'Shopping forum' for help to set things up.

Plot Theme 5: An agent receives help (from an unexpected source).

Once Elizabeth has set it up, the shopping forum is able to help everyone get

connected.

Plot Theme 6: An agent is required to complete a task or test to either, a) get the help, or b) satisfy the lack or need.

Each device needs to be operated correctly in order for the arrangements to be successful.

Act 3

Plot Theme 7: An agent completes the task or test.

Elizabeth and each of her friends successfully operate the devices.

Plot Theme 8: The lack or need is concluded with either positive or negative results.

Elizabeth is able to order a taxi when she goes shopping.

Plot Theme 9: A 'new order' is established. An agent's status is raised.

Elizabeth no longer has any worries about arranging an affordable and manageable shopping trip.

Final situation.

Elizabeth has friends and food.

Example 2. 'Sharon's visit to the science fiction club meeting'

Act 1

Plot Theme 1: There is a lack or need

*Sharon feels the need to contribute her ideas to the science fiction club meeting.
(Sharon is late for the meeting)*

Plot Theme 2: An agent recognises a lack or need.

The importance of Sharon's need to go to the club meeting is recognised when exams threatened to prevent her from going.

Plot Theme 3: Something threatens to or does prevent an agent from satisfying the lack or need.

Exams the next day threaten to prevent her from going. A dinner date and a missed bus also seem to conspire to make her late.

Act 2

Plot Theme 4: An agent seeks help to satisfy the lack or need.

None

Plot Theme 5: An agent receives help (from an unexpected source).

None

Plot Theme 6: An agent is required to complete a task or test to either, a) get the help, or b) satisfy the lack or need.

Sharon must get the attention of the participants if she is to make her point.

Act 3

Plot Theme 7: An agent completes the task or test.

(Lies outside the scope of the scenario, but is inferred)

Plot Theme 8: The lack or need is concluded with either positive or negative results.

(Lies outside the scope of the scenario, but is inferred)

Plot Theme 9: A 'new order' is established. An agent's status is raised.

None.

Interpretation of this text began well, but faltered in Act 2, and completion of Act 3 depended entirely on generous interpretations of what was inferred to lie 'behind the scenes'. Did the fault lie in the Plot Theme set or the scenario? When the scenario was analysed in Design experiment H, it appeared to have all the prerequisite elements of narrative. Yet, what the Plot Theme appeared to reveal, was that it was poorly structured. As such, it wasn't easy to appreciate the point of the story or empathise with the supposed difficulties being encountered by the main actor.

Outcomes of design experiment L

Two insights emerged from Design experiment L. The first insight supports the importance of Plot Theme sets in achieving narrative coherence. During Plot Theme assignment the initial situation functions as a cognitive 'anchoring' device, helping to fix, if only temporarily, the purpose of the story. If there is either no initial situation or the initial situation is unclear it can be difficult to assign the first Plot Theme and even harder to form a coherent narrative that aligns well with all the Plot Themes in the set.

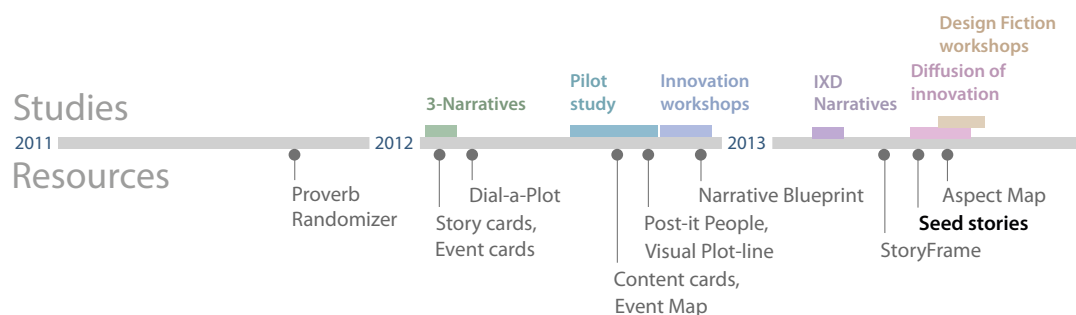
Here, the coherence that is sought may be measured by the logical ordering of actions and events and how well they raise questions or field the right kinds of propositions for design.

The second insight concerns itself with how choices arise with regards to narrative threads and how such choices come to be resolved. It was found that where more than one good match between Plot Theme and scenario element was possible, difficult choices needed to be made and each choice had the potential to bring a different thread of the narrative to the fore. Best choices could only be made by attempting to match all the Plot Themes to elements of narrative in the scenarios and seeing whether the thread ran all the way through the story or petered out.

4.3.3.2. StoryFrame in use

In research and design settings, StoryFrame acts *directively* as an agenda for discussions about stories and their constituent parts, such as actions and events, actors and settings, etc. The resource helps keep narrative structuration of these parts in view and on track. It performs the additional role of acting *acquisitively* by inviting participants to record their thoughts, which then act mnemonically to hold in plain view both the pre-inscribed Plot Themes and personal notations. In this form StoryFrame has underpinned the authorship of Seed stories (see Section 4.3.4 ‘Seed stories’; and Appendix A9.2 ‘Seed story: Pilot study 1’) and design fictions (see Section 6.3.5. ‘Design Fiction formal study’). In research settings, StoryFrame has been used to analyse story structure (see Section 4.3.3.1.2 ‘Design experiment L: Verification of Plot Theme sets’).

4.3.4. Seed stories



‘Seed stories’ are small stories that provide starting points and/or end points for narrative development work (for example, see Section 6.3.3.3 ‘The Seed story’). Seed stories harness the human tendency to draw on personal experience to make sense of ambiguities and bring closure to doubtful situations through story completion.

Figure 4.22. Seed story (example).

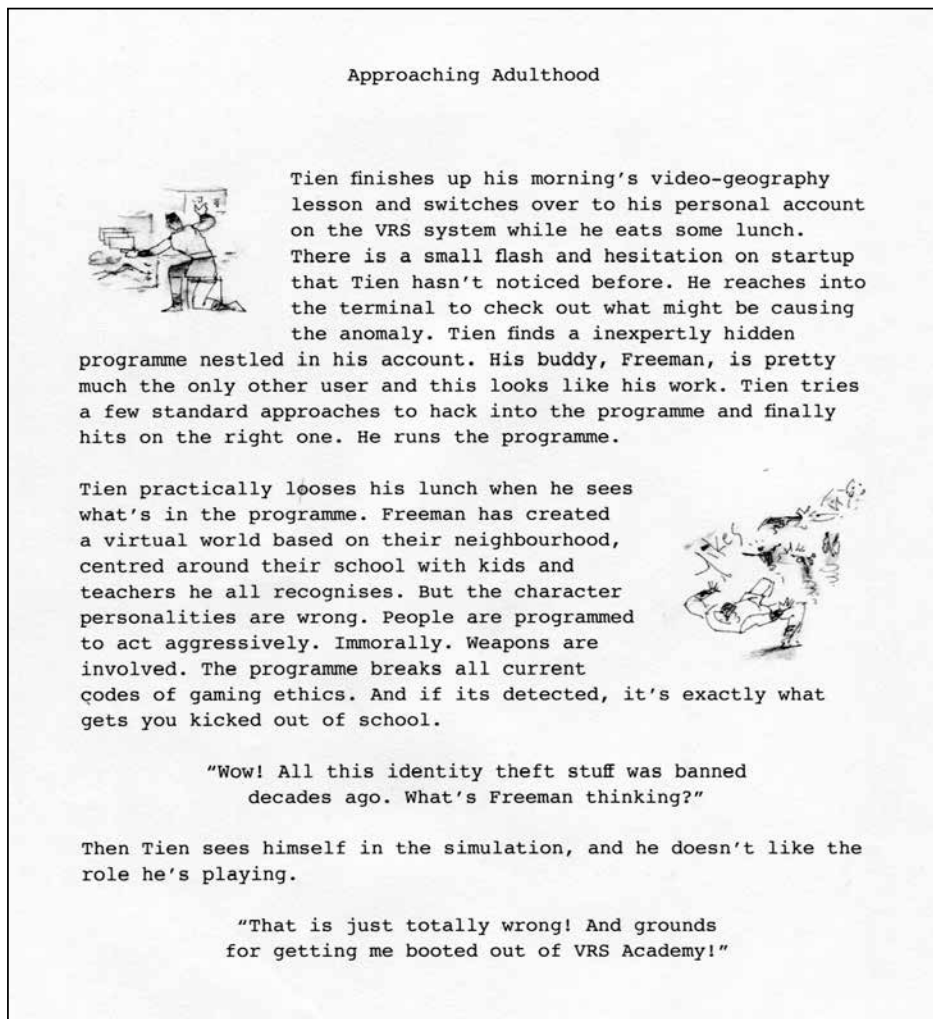


Figure 4.22 is an example of a Seed story used in one of the later studies (see Section 6.3.4.3 'Story spinning').

4.3.4.1. Seed story Development

The idea to use Seed stories to prompt narrative development was inspired by *sentence completion*, an interview technique used in Human Computer Interaction research (Cockton, et al., 2009). The technique of sentence completion has origins in therapeutic assessment. Donoghue (2000:48) contends that subjects find it easier to overcome communication barriers and express otherwise suppressed thoughts when they are asked to complete a sentence.

Mandler (1984) has considered how theoretical principles related to sentence completion might be applied to narrative development work. Following the work of Bartlett (1932), Propp (1968) and others, Mandler's study reveals that, regardless of

nationality or culture, people have the same level of recall for particular parts of stories. Beginnings are memorable. However, endings are not memorable if lacks or needs raised by the story have already been resolved. Also, as noted by Bartlett (above, and see Appendix B6 'War of the ghosts'), if the order of an otherwise canonical story is changed it is less memorable.

Figure 4.23. Gestalt principle of closure.



Two other phenomena help to forge theoretical links between text-based and image-based techniques: 'closure', a Gestalt principle that occurs when the mind's eye completes an object that is merely inferred by the shape or placement of adjacent objects (Figure 4.23); and apophenia, the tendency to see patterns in seemingly random collections of facts, images or objects (Siegrist, Cvetkovich, & Gutscher, 2001:1047).

For Alvarez and Urla (2002:40) 'story is an embedded and fragmented process in which gaps are filled in by the teller and audience'. For Chatman (1980:29), '[t]he audience's capacity to supply plausible details is virtually limitless. Examples of unexpected gaps in the continuity of narratives include words missing in a sentence, frames missing in a storyboard or scenes missing in a movie. Audiences that are sufficiently motivated to fill such gaps, that is, to make such 'leaps' of imagination, take part in what is called 'narrative inference'⁴.

Figure 4.24. An experiment in narrative inference.

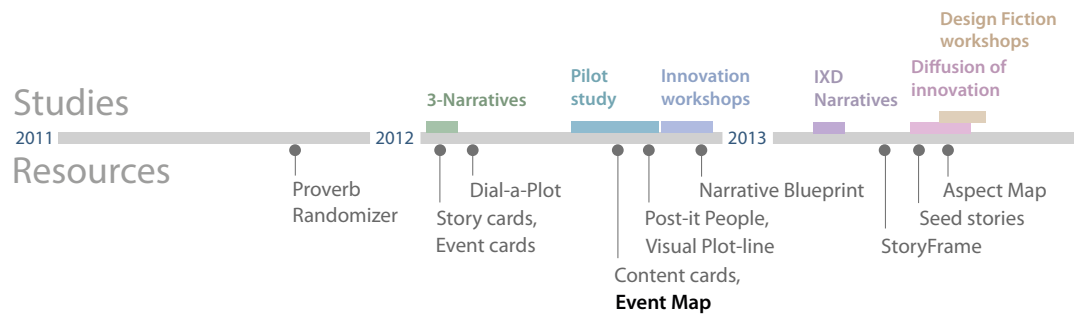


The phenomenon of narrative inference was tested in a self-reflective design experiment. Twelve sections were cropped at random from Pieter Bruegel the Elder’s painting ‘The Dutch Proverbs’. The sections were arranged in what looked like a sequence of storyboard frames (Figure 4.24). With the sequence arranged thus, ‘our minds inveterately seek structure, and... provide it if necessary’ (Chatman, 1980:45). A story is inferred by apparent movements of events and the passage of time.

4.3.4.2. Seed stories in use.

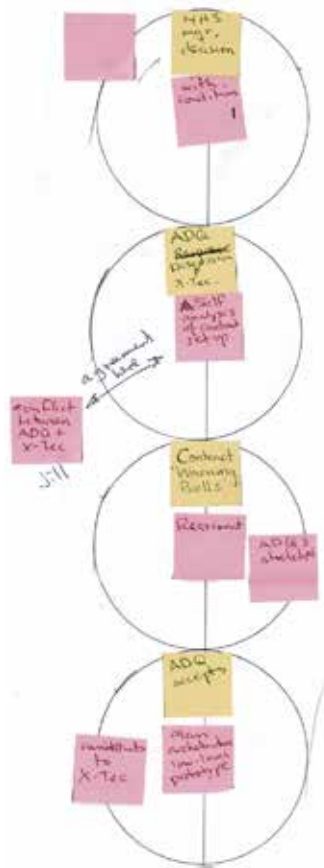
Seed stories were used only once throughout the studies. However their usefulness was self-evident in the Design Fiction workshops (see Section 6.3.3.3 ‘The Seed story’). Using Seed stories, groups of participants were able to very quickly focus their attention on design-relevant contextual information of human concern, such as settings, actions, events, motivations and goals, etc., and engage them in reflective, deliberative and creative conversation.

4.3.5. Event Map



Stories can be described as a sequence of events (Quesenbery & Brooks, 2010). Events, therefore, are one of the primary elements of story and narrative. Symbolic representation of story events, as either a linear sequence or otherwise, form part of the ‘analyst’s metalanguage’ for conceptualising and discussing story and narrative structure (Chatman, 1980:54). Event Map’s role in story work is to create a logical structure for the order of events. This helps authors to consolidate their understanding of what is of primary importance in their stories and arrange the actions and events of narrative accordingly.

Figure 4.25. Event Map (example).



Typically paper-based, Event Map consists of a series of circles (Figure 4.25). Each circle represents a 'block' of narrative (Chatman, 1980:55). Typically each block of narrative describes one or more event. Events are of two kinds; 'kernel events' and 'satellite events'. Kernel events are represented on the example by yellow Post-it notes. They consist of events that are essential to the plot-line or purpose of the story. What makes kernel events 'essential' can be judged by whether changes that are made to them result in changes to the structure of the story. 'Satellite' events are represented on the example by pink Post-it notes. Consisting of events that help to flesh out the story, they may be changed without effecting the essential structure of the story. Except for the first event, each event is causally connected to and contingent upon happenings that occur in preceding events, thus creating a 'chain of events'.

4.3.5.1. Event Map development

Figure 4.26. Event Map.

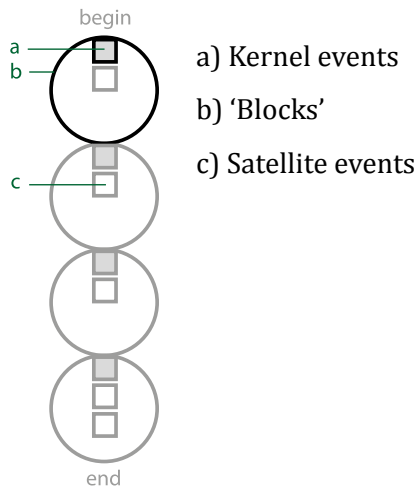
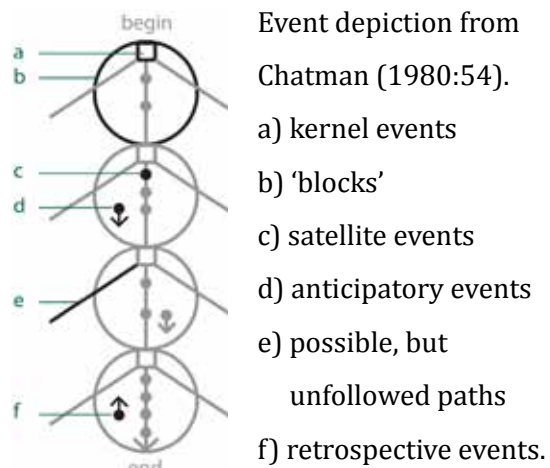


Figure 4.27 Chatman's Event depiction.



Event Map (Figure 4.26) was not developed so much as it was adapted, almost verbatim, from Chatman's rendering and description (1980:54; Figure 4.27). However, methods used to render Event Maps were developed through practice. For example, round plastic lids make good templates for drawing the circles, and coloured Post-it notes make identification of events clear and positioning easy.

4.3.5.2. Event Maps in use

Event Map was used only once in the studies. In the Pilot study it was used to support transposition of a story from written scenario to Visual Plot-line.

Figure 4.28. Event Map in the context of narrative development.

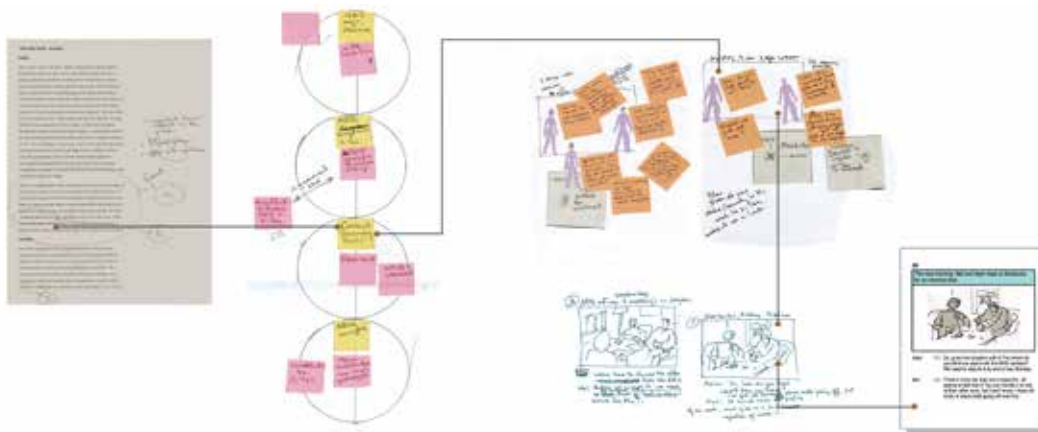
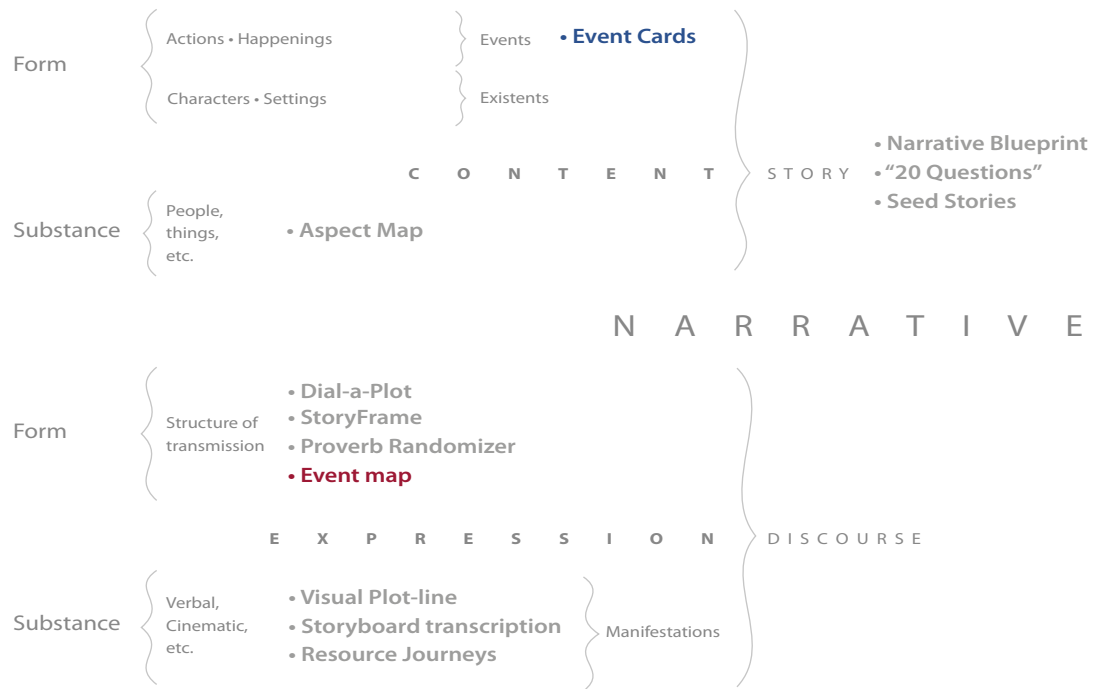


Figure 4.27 shows the role that the event map played in helping to organise and structure events during narrative development in the Pilot study (see Section 5.3.2.4 'Pilot study session 4: Toward a storyboard'; enlargement in Appendix 5.2).

4.3.5.3. Event cards and Event Map

Figure 4.29. Where Event cards and Event Map support story work.

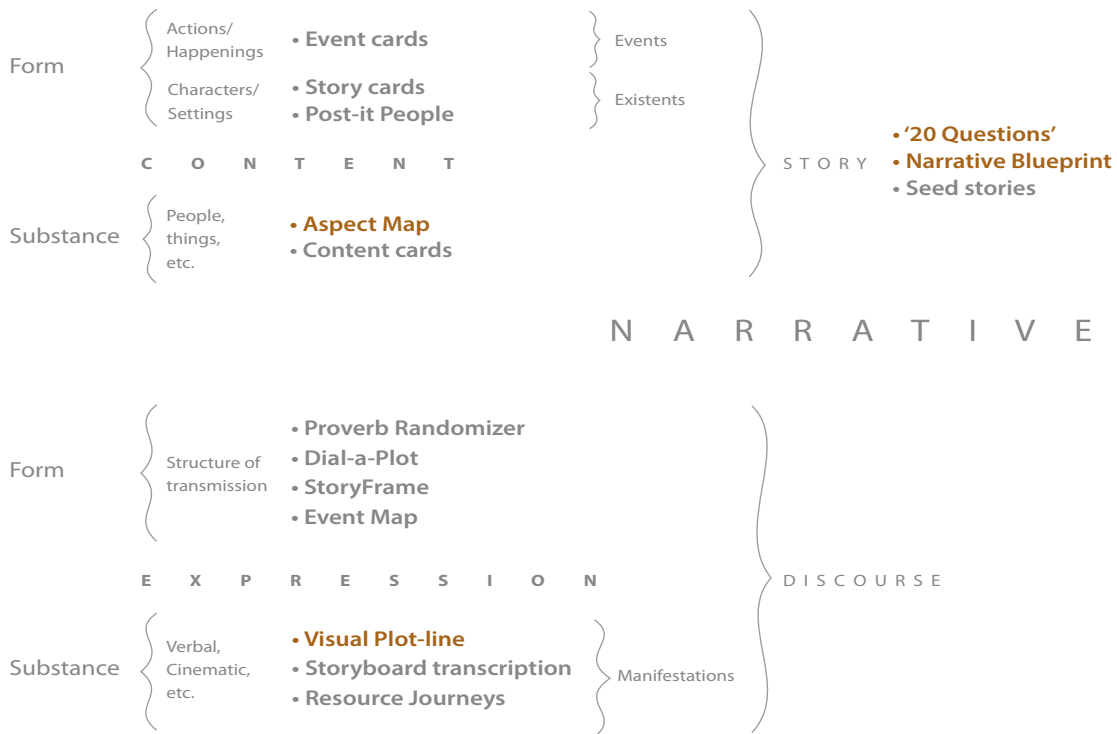


Harmonisation of story and discourse is supported by their complementary pairing of Event cards and Event Map (Figure 4.29). Both resources deal with narrative form. However, while Event cards deal with a narrative’s Form of Content, Event Map deals with a narrative’s Form of Expression.

The first question that arises when designers engage in authoring or relating a story is ‘Which events are significant?’. While working with Event cards, logical ordering comes into question. Whereas, while working with Event Map, the events themselves come into question. The two resources, therefore, act as complementary ‘sounding boards’ in conversations set on resolving questions of narrative form.

4.4. Narrative fugitives

Figure 4.30. Resources that emerged from practice.



The last group of resources are referred to as Narrative Fugitives, first for the way their usefulness became apparent through practice, and second for the way they fulfil multiple roles that help design teams straddle the story/discourse divide (Figure 4.30).

Narrative Fugitives include;

- '20 Questions',
- Narrative Blueprint,
- Visual Plot-line, and
- Aspect Map.

When design teams are engaged in both design and story work, making moves, changes or choices can be challenging. Resources that act as both a means to consolidate what is known and a catalyst for envisaging ways forward perform particularly complex roles.

All the narrative fugitives were opportunistically conscripted from either research or design practice after affordances of this kind became evident.

4.4.1. '20 Questions'

Figure 4.31. The '20 Questions' (partial)

1. What is the formal, working relationship of the communities in question?
2. How are the communities distinct, what defines their differences?
3. What are the routines that relate most closely to the boundary issue?
4. How do these fit into the rest of the workflow?

'20 Questions' was the first design resource to be recognised as a Narrative Fugitive. It was developed to serve a particular need in Innovation workshop 2 (Figure 4.31; for full list see Figure 5.18 '20 Questions'). It worked well.

Critical analysis, reflection and further empirical study of its use in the second student study (Section 6.2 'IXD Narratives study') confirmed its effectiveness in drawing out information of value to design teams through storytelling. What was learned from this was that the list of questions must be very carefully designed to initiate desired conversations that not only provide answers to questions but either raise or touch on issues that are of importance to design and set in a context that is useful for design.

4.4.1.1. 20 Questions development

In the case of the innovation workshops, question composition was guided by a modified version of Cockton's Design Arenas (2017:751–755) to ensure that the conversations they invigorated would touch on creative and evaluative issues related to design purpose, beneficiaries and artefacts (see Appendix C8 'Question composition').

4.4.2. Visual Plot-line

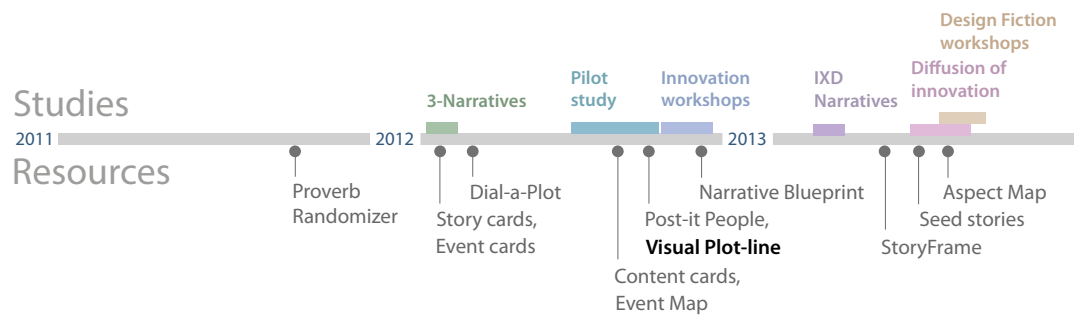
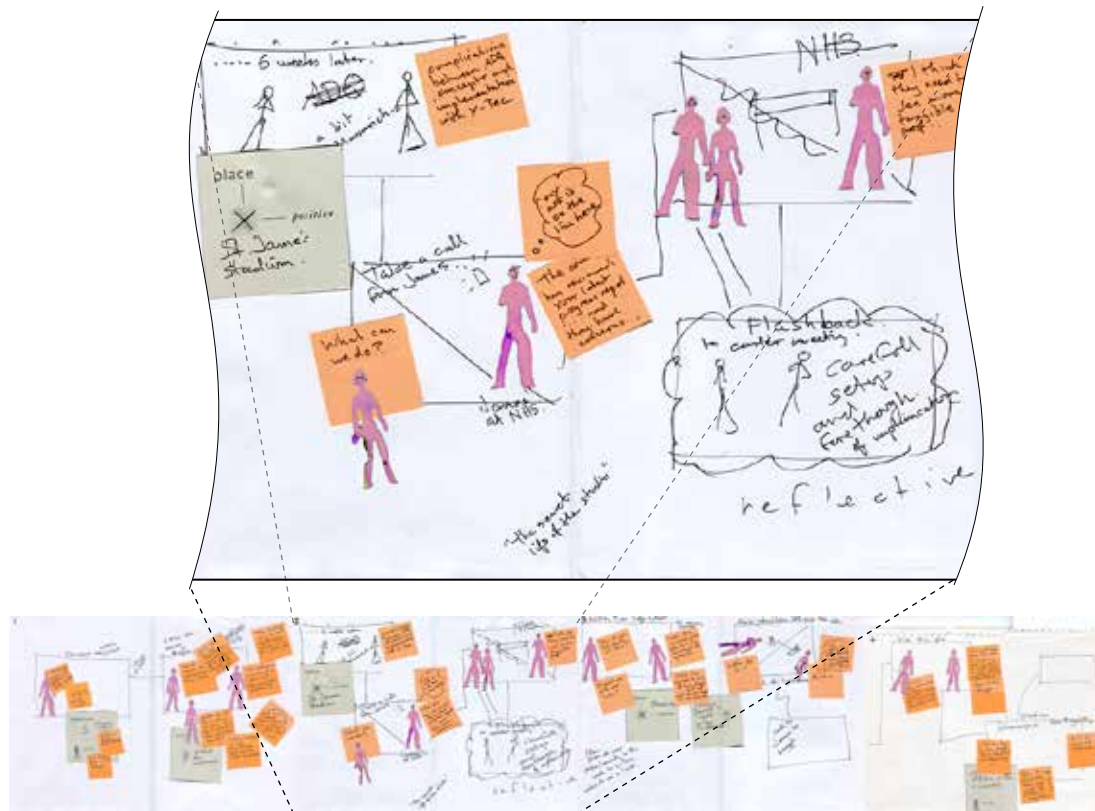


Figure 4.32. Example of Visual Plot-line with enlargement.



Visual Plot-line represents a second example of a narrative fugitive conscripted from practice. This form of visual story sketching was adopted as a narrative resource and dubbed 'Visual Plot-line' after the usefulness of having a roughly sketched plot-line (Figure 4.32) was recognised during one of the first pilot studies (Section 5.3 'Pilot study'). Visual Plot-lines may appear to be nothing more than rough-and-ready storyboards. But they serve many purposes.

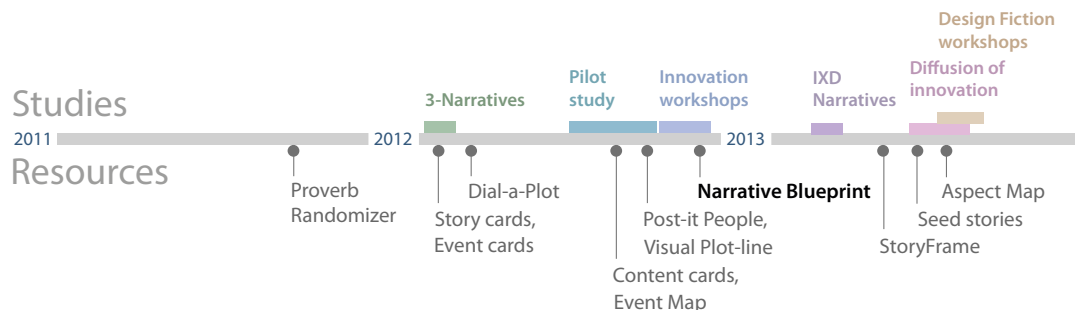
First, using this form of visual expression designers are relieved of some of their dependence on written text, thus helping them to confront ambiguities inherent in spoken and written words and address what might be happening in the story in a

concrete way that deals with particulars rather than abstract generalities.

Second, Visual Plot-line provides a practical cognitive ‘stepping stone’ to storyboards via the visual expression of story content and temporal aspects of ‘emplotment’⁵ (Ricoeur, 1984). In collaborative settings where confidence in orienting to the right story can come into question, this resource helps design teams overcome difficulties inherent in thinking about the whole story while dealing with its many and often disparate parts. Visual Plot-line enables rapid capture of the essential elements of narrative such as actants, events, actions and happenings. Using hand-drawn graphics, annotations, Content cards and Post-it People, the story is sketched out either on a whiteboard or large sheet of paper. Once expressed, the Visual Plot-line can be used as a framework for creating narrative (re)presentations in a variety of media, such as refined prose, storyboards or video enactments.

The aim of visually describing the plot-line of the story is to turn what is often only described in rough, general and abstract terms open to wide interpretation into a narrative form that, though equally rough, deals with particulars in concrete terms about which interpretations can be discussed and agreed.

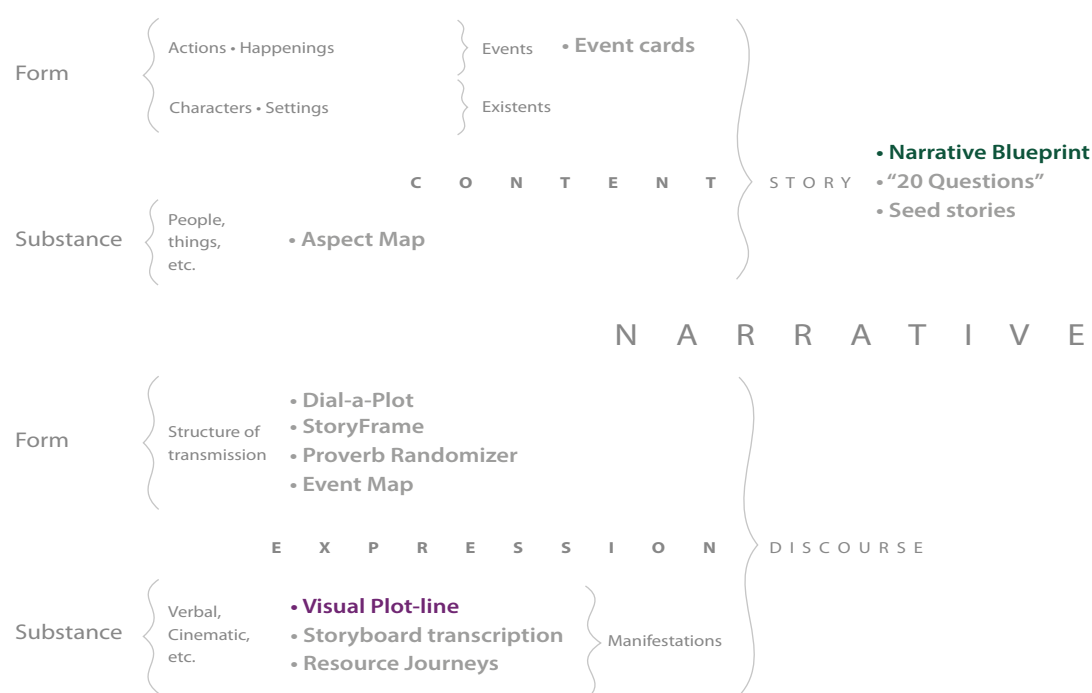
4.4.3. Narrative Blueprint



The potential for something that looked like an affinity diagram to act as a narrative resource for story work was realised in the last few hours of an empirical study (see Section 5.4.5.2.5 ‘Point of inquiry 5: Experimentation’ > ‘Orientation 8: Experience mapping’). In that workshop, a Post-it note-based resource helped a design team overcome an impasse in the development of a case story and support recognition of a keystone idea (see Section 5.4.6.6 ‘Plot Theme 6: A task must be completed’).

4.4.3.1. Narrative Blueprint and Visual Plot-line

Figure 4.34. Where Narrative Blueprint and Visual Plot-line support story work.



Fruitful comparisons can be made between the support designers receive from Visual Plot-line and Narrative Blueprint (Figure 4.34). Both resources afford opportunities to organise and scaffold elements of narrative, however they do so in different ways and therefore become useful at different times.

Though it deals mainly with narrative content, Visual Plot-line’s primary role in story work is *acquisitive*. It complements *expressive* activities, such as rapid sketching and visualisation, at a time when story structure and narrative content are ill-formed. Narrative Blueprint, on the other hand, is primarily *integrative*, helping to draw story work and stories together at a time when narrative content is well developed and design choices need to be made.

Every thought inscribed on Visual Plot-line or concept posted on Narrative Blueprint has the potential to be *directive*, i.e., to speak back, to say something or point to something that may be either expected or unexpected. Such inscriptions anchor discussion by providing continuous reflection on what has been discussed. They also *invigorate* discussion by prompting idea generation and new ways to look at things. They both act as ‘information radiators’ or ‘big visible charts’ – terms used in agile development – albeit ones oriented towards narrative development.

4.4.4. Aspect map

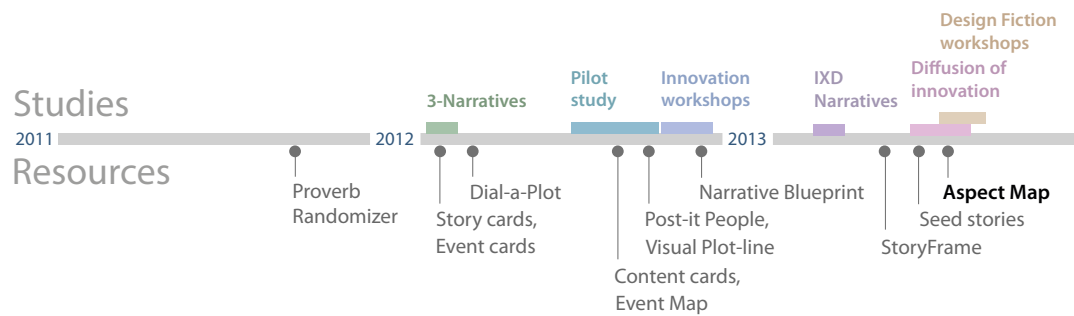
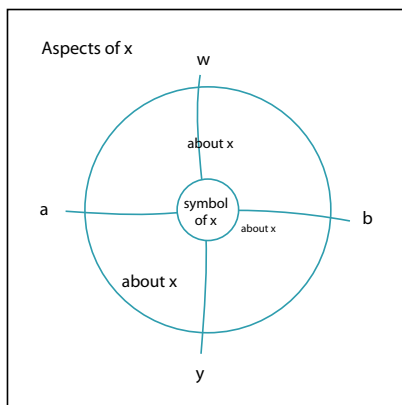


Figure 4.35. Aspect Map (template).



Though developed as a bespoke narrative resource for the Design Fiction formal study, the last study to be conducted in this research (see timeline above), the ease with which these simple graphic devices can be adapted to almost any narrative subject made them worthy of being considered a narrative resource. Aspect Maps, of which Figure 4.35 is a template, are a type of ‘cluster map’ that give design teams a way to spatially map multiple aspects of subjects of inquiry. They facilitate information gathering and organisation (grouping/clustering) as well as affinity-based ideation.

The studies have shown that Aspect Maps help designers make transitional moves towards design by supporting abstract reasoning and sense-making, particularly with regards to contextual information (see Chapter 5 and Section 6.5 ‘Summary’).

For example, the usefulness of Aspect Maps in soliciting thematic concepts, helping to scope them out, making them visible and enabling design teams to consolidate and structure thinking around them was well demonstrated in the Design Fiction workshops (Section 6.3 ‘Design fiction workshops’).

Figure 4.36. Aspect Maps in use.

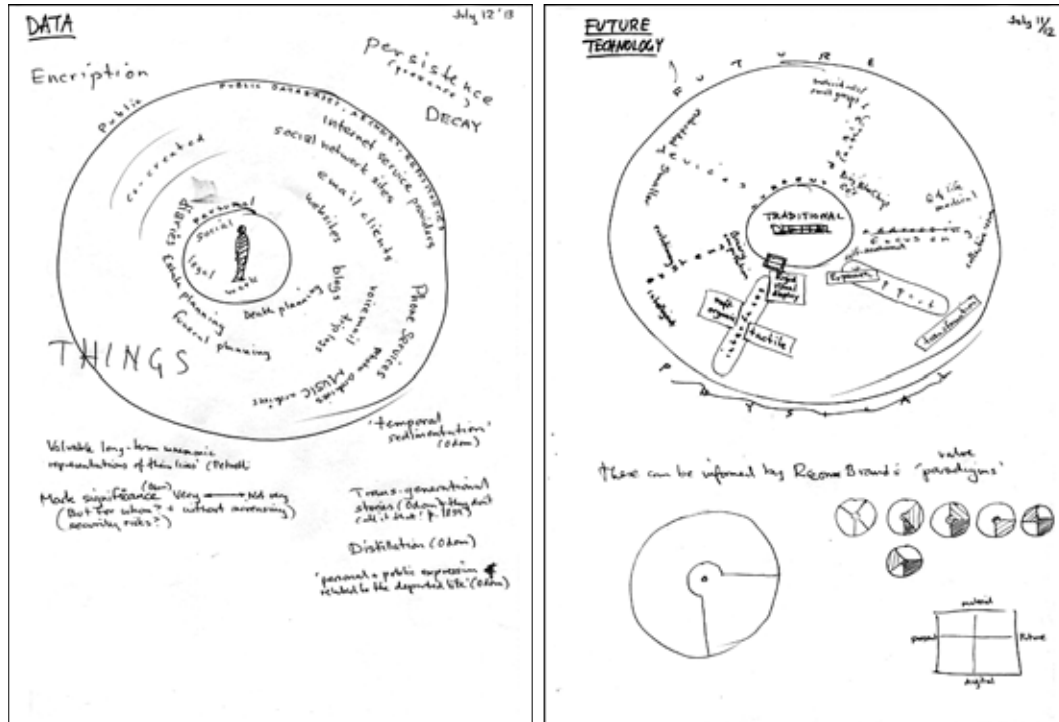


Figure 4.36 shows two of three Aspect Maps that were developed in advance of the first Design fiction workshop where they were to be used for the first time (For other examples of Aspect Maps see Figures 6.5, 6.10 and 6.13).

A basic geometric shape, such as a circle, square or triangle, is used to delineate a ‘space’. Meaning is attributed to the space by assigning it the symbolic function of standing-in for a particular topic or area of interest. The shape then acts as a frame of reference within and around which concepts, ideas or themes related to the topic can be arranged. The space/subject can be divided as needed. Collaborative interactions with Aspect Maps have shown that their value extends beyond the mere arrangement and storage of important ideas and information to helping mediate questions about the way participants engage in discourse, the topics and their decision-making.

Here, it should be noted that both affinity diagrams and Narrative Blueprints fulfil the same role as Aspect Maps, i.e., that of providing an *expressive* form for contextual information in narrative development.

4.5. Summary

In this chapter a collection of narrative resources has been described. Used to support story work throughout the studies, they have been referred to as *storienteering* resources. They form three groups: Content Exemplars underpin narrative composition

through the provision of story content, Discourse Prompts invigorate discourse and prompt narrative expression, and Narrative Fugitives appear to act in diverse ways across the story–discourse divide.

Chapter 5. From Exploration to Formal Studies

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Knowledge and theory drawn from each of the perspectives taken up by the literature review informs research practice and underpins theoretical outcomes. Specifically, knowing *how designers work with story and narrative* (A) serves the dual purpose of revealing how their needs might be better supported through novel approaches and narrative resources, and, in evaluation of empirical studies, forms the basis for evaluation of *how designers work with narrative resources* (C).

5.1. Introduction

This chapter describes a period of research in which two early studies adopted an exploratory approach, while a third marked the beginning of formal studies. The chapter begins with a brief description of an empirical study conducted with second-year image-making students where concepts for resources and approaches to story work were tested for the first time. Outcomes from the ‘3-Narratives’ study (Section 5.2 ‘3-Narratives’) fed insights and new knowledge back into ongoing design experiments, the aim of which were to develop approaches to story work and expand the repertoire of narrative resources. To test the findings from these experiments ‘in the field’, a second empirical study was conducted in a small design agency. By integrating novel narrative resources with traditional methods, the Pilot study sought to observe the entire life cycle of a story from the planning and authoring stage to creation of a presentation-quality storyboard.

The last case study in this series comprised two Innovation workshops. Two teams addressing a novel research question provided the opportunity to make prolonged and rigorous observation of resource-supported story work.

Self-reflective design experiments that were ongoing throughout the *experimentation, practice and reflection* phase of research enabled rudimentary assessments to be made of *storienteering* resources. These were encouraging, but left many questions unanswered. For example, Propp's (1968) *functions* were the outcome of post hoc narrative analysis. From Propp's *functions* a set of *Plot functions* had been derived. These had been the subject of self-reflective experiments and studies to discover whether they could act as a priori guidance for story authorship. Encouraging as these were, they could not account for what might happen in collaborative settings. Storienteering resources needed to be tested 'in the field'. An opportunity arose to do this in an informal study conducted with 16 second-year undergraduate image-making students in the Graphic Design programme at Northumbria University.

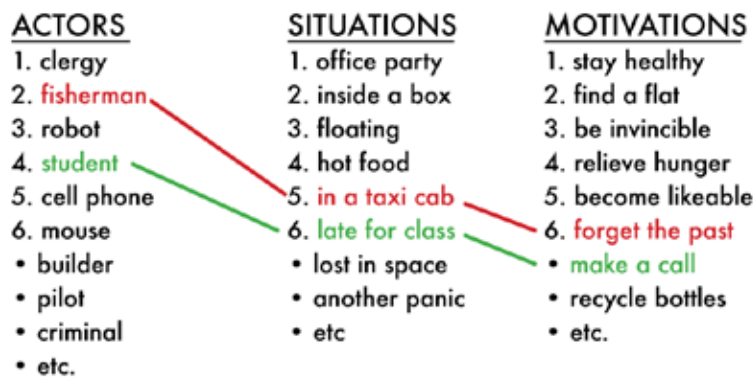
5.2. '3-Narratives'



In this study, students were set a 4-week brief called 'One story: Three narratives'. Inspired by Madden's (2005) '99 ways to tell a story', the brief challenged each student to develop a story from a single Plot Theme and, using different media, *expressive* techniques, focalisations and genres, etc., tell the story in three distinctly different ways.

Students were introduced to story work through a series of presentations that were designed to inform and inspire. These covered such topics as: plot categorisation (Booker, 2005); identification of narrative elements, such as places, events, actors and their actions, goals and motivations; choice of genre, domain (i.e., setting), tense and media; how to create storyboards (see Appendix A1.5 'Text transposition; story to script'); how to use them as an authorship tool; and how to combine *storienteering* resources, such as Dial-a-Plot with published methods.

Figure 5.1.. Adaptation of Zwicky’s morphological box.



Published methods included Lipman’s ‘brainstorming helper’ (1994, in Quesenbery & Brooks, 2010:113) and Zwicky’s (1967) ‘morphological box’¹ (Figure 5.1).

The design of Zwicky morphological approach to ‘discovery, invention, research and construction’ appears to have been motivated by some of the principles that underpin use of such narrative resources as Dial-a-Plot and StoryFrame, for they try to encourage ‘detachment from prejudice and...refrain from all pre-valuations’ (1967:273). The ‘morphological’ approach taken to visualising ‘interrelations among objects, phenomena and concepts’ (ibid.) was adapted to the random selection of narrative elements, such as actors, situations and motivations.

Story authorship was achieved by taking a measured, step-by-step, approach that saw attention focussed on one aspect of narrative construction at a time. The narratives that students produced in this way appeared to benefit from having been guided by one of Dial-a-Plot’s eighteen Plot Themes, for they were uniformly well-structure. The Plot Themes enabled students to recognise familiar situations, such as seeking help to resolve a problem (see Table 4.4 ‘Plot Themes: Final set’, Setup Plot Theme 3), or resorting to unusual measures in order to resolve a persistent problem or lack (Confrontation Plot Theme 6). During delivery of this brief some adjustments were made to the wording of one Plot Theme because it proved to be difficult to interpret. However, the approach to storytelling that was taken in this brief proved to be both adaptable and robust. Since it’s first use in 2012 it has been delivered annually by several different tutors.

5.3. Pilot study



The Pilot study consisted of four two-hour sessions that involved both seminar and workshop activities conducted over a ten-week period from 30 July–4 October, 2012. The primary aim of the study was to make empirical observations of the entire life cycle of a story from the planning and authoring stage to creation of a presentation-quality storyboard. A secondary aim was to make further assessments of the usefulness of *storienteering* resources, this time, to design practitioners. Two participants took part in the study. P1 and P2 were partners in a small design agency. All sessions were held on their business premises. P1 had a background in creative writing and strategic thinking and had worked in product development, while P2 had worked as an in-house graphic designer at the NHS for thirteen years.

5.3.1. The approach

The configuration of resources and methods used in the approach differed considerably from those used in the ‘3-Narratives’ study (see Section 5.2. “3-Narratives”) Here the scenario being spun needed to resonate with the two participant-design practitioners. P1 and P2, chose to develop a scenario that would help them to resolve questions they had about the way they might deal with future business challenges. In this study, therefore, well proven strategic planning and scenario planning methods were integrated with five prototype *storienteering* resources; Dial-a-Plot, Event cards, Event Map, a ‘rough storyboard’ (later named ‘Visual Plot-line) and Proverb Randomizer. In preparation for the study, self-reflective design experiments were conducted to gain confidence in how strategic planning and scenario planning methods might be integrated with *storienteering* resources (see Appendices A5.1 and B2).

5.3.1.1. The role of the researcher in the study

Since this was the first time that *storienteering* resources were going to be used in an untested collaborative approach to story work, the role played by this researcher/practitioner was that of a facilitator, instructor and guide immersed in the activities. The scenario was co-developed with P1 and P2.

5.3.2. The sessions

The description of each session is preceded by a concise graphical overview.

5.3.2.1. Pilot study session 1: Strategic planning

Figure 5.2. Order of activities; session 1.



Session 1 was devoted to helping P1 and P2 think about how to plan for the future. Activities were introduced with the assistance of a session document (Figure 5.2), an A3 paper-based handout. The document described how strategic planning techniques would be used to help assess individual and business partnership capabilities. It questioned where their business might fit within local communities and markets, and it described strategies for understanding how to spot trends and plan for new directions and growth (Schwartz, 1991). Through brainstorming and debate, P1 and P2 were able to express some of their aspirations for the future, grounding them in reasoned observations about such things as local economic conditions and the social and technological forces that drive them.

5.3.2.2. Pilot study session 2: Scenario planning

Figure 5.3. Order of activities; session 2.



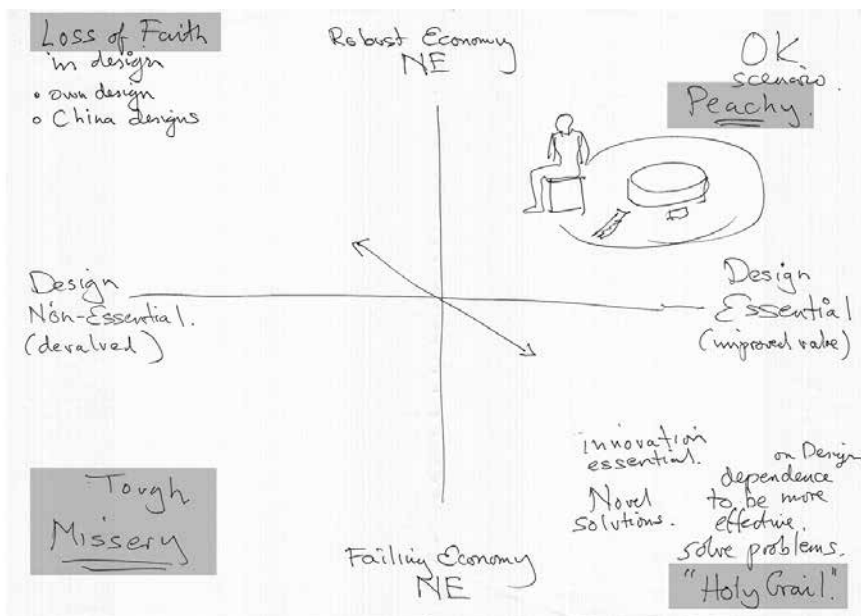
In session 2, Scenario Planning activities focused on the creation of a scenario matrix (Figure 5.3, far right); an arrangement of scenarios that reflect complementary outlooks. PESTLE trend analysis – a *scenario planning* technique that considers Political, Economic, Social, Technological, Legal and Environmental trends – was used to gain an understanding of some of the many driving forces in play and consider whether they were *predetermined elements* (certain to persist) or mere *critical uncertainties* (open to change).

Figure 5.4. Predetermined elements and critical uncertainties



Through reflection and debate, an affinity diagram of predetermined elements and critical uncertainties was assembled (Figure 5.4). It spoke of a poor economic outlook in North Eastern UK, continued government bias toward investment in science and technology, increased competition from abroad, a burgeoning role for design, concerns about partnership dependencies and acquiring sufficient professional competencies to deal with future challenges.

Figure 5.5. Final scenario matrix



In *scenario planning*, scenarios are typically given cryptic names to make them memorable. The final matrix (Figure 5.5) spoke of futures that were either going to

be 'peachy' or full of 'misery', and where design practices would either suffer a 'loss of faith' or be embraced as the 'holy grail' in a world of insurmountable problems.

The 'peachy' scenario.

In a robust NE economy where the value of design increases and it is considered essential, the reputation of design continues to grow, as does dependence on it.

The 'misery' scenario.

In a failing NE economy where design is non-essential design loses all the ground that it's gained in the past three decades. Finding work becomes extremely tough. Hard times prevail.

The 'loss of faith' scenario.

In a robust NE economy where design is devalued and considered non-essential, technologies and changing economic paradigms mean that everyone is a designer. The profession dwindles and work goes offshore to China.

The 'Holy Grail' scenario.

In a failing NE economy where design however retains and increases in value, government and business look to design for answers. Recovery depends on innovation, novel solutions, creative problem solving.

P1 and P2 chose to spin the 'Holy Grail' scenario (for complete scenario, see Appendix B4 "Holy grail" scenario'), a story of economic decline that nonetheless represented opportunities for collaboration, personal growth and hope.

As it would throughout the research, making a deliberative move in the conversation from the utility and logic of contextual matters to a very different kind of utility and logic afforded by story and narrative proved difficult. During these deliberations, changes were made to the approach being taken in scenario planning (from Schwartz, 1991 to Schoemaker, 1995), and, with regard to both content and expression, the scenario matrix underwent several changes.

5.3.2.3. Pilot study session 3: Storienteering

Figure 5.6. Order of activities; session 3.



In Session 3, further work was done to develop the logic of the story, and a suite of *storienteering* resources, including Dial-a-Plot and Event cards, helped to underpin narrative authorship and development for the first time (Figure 5.6). Several attempts were made to ensure that dichotomies reflected in the scenario matrix represented things that would help address the concerns that P1 and P2 harboured about the future.

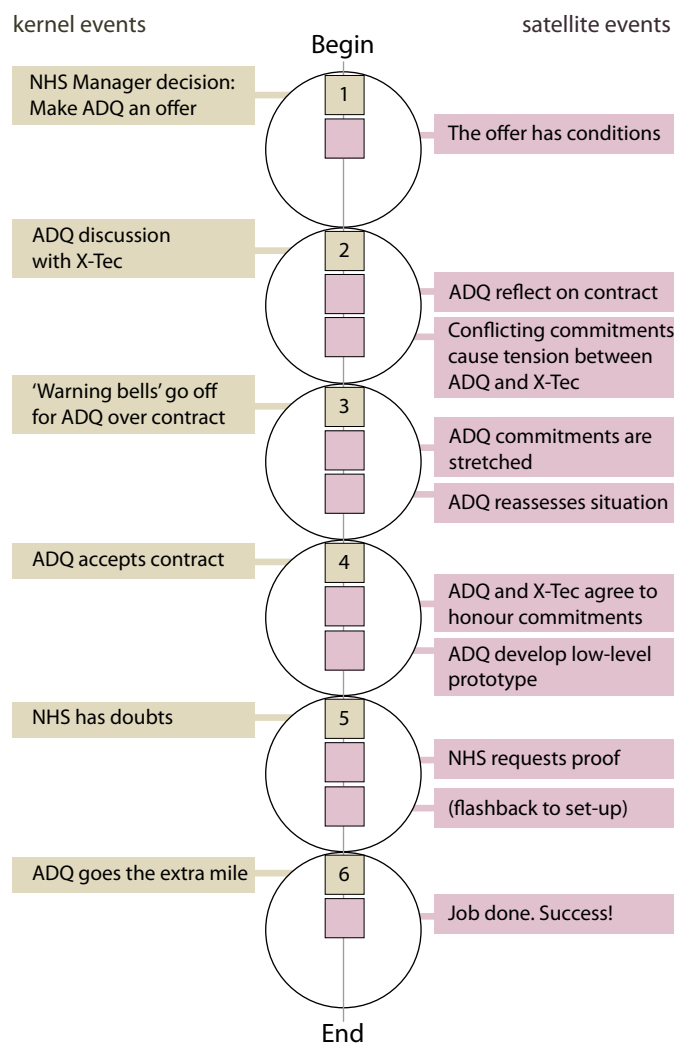
By pairing Plot Themes with particular events, each of the story's three acts – 'set-up', 'confrontation' and 'resolution' – were methodically address and fleshed out in a narrative. Proverb Randomizer was used to give added resonance to the story.

5.3.2.4. Pilot study session 4: Toward a storyboard

Figure 5.7. Order of activities; session 4.

With the aim of testing whether the story was coherent and useful for raising the right kinds of questions, activities in Session 4 sought to make refinements to the scenario's form of expression. The story had been spun, but many details of its content and structure were too vague to underpin crafting of a presentation-quality storyboard. In this session, Event Map, a rough storyline and what came to be known as Visual Plot-line played key roles (Figure 5.7).

Figure 5.8. Pilot study Event Map



Event Map was used to help consolidate story structure and logic. The work is concerned with getting events in the right order, making sure they form a chain of causal links and the settings and actions they portray are plausible.

'The sticking point of the story, the part that was most difficult to resolve, were questions around why alarm bells go off for ADQ (Kernel event 3) and how they come to grips with the difficulties.' (Memo x, 07.08.2018)

Looking remarkably like a use case conversation (See Figure 2.11), the Event Map shown in Figure 5.8 summarises the series of kernel and satellite events that take place in the 'Holy grail' scenario (for the story, see Appendix B4 "Holy grail" scenarios).

Figure 5.9. Mapping out the story.



The scenes and storyline were then sketched out in rough, and Post-it People and Content cards were used to create a Visual Plot-line (Figure 5.9). A refined storyboard was created post hoc (see Appendix 5.3 'Pilot study: Final storyboard').

5.3.3. Insights and outcomes from the study

This study, which in 8-hours of collaborative work saw the creation of a scenario from conception to presentation storyboard, succeeded in simulating a process that is typically distributed more widely across time, locale and personnel. Working on what seemed like two distinct levels – one broad and abstract, the other highly focused and concrete – rapid, multi-modal development of the scenario's narrative structure and content provided more '*opportunities for reflection and rethinking*' (memo 7, 00.09.2012).

For example, P2 explained how, working through the structure of the story with Event Map drew actions and happenings into question:

P2: This [Event Map] was our model, for sure. [It] makes it more credible, and that is what we are trying to do when we are thinking things through. Because here we say 'Ah, alarm bells. What is that? What alarm bells!'

The first insight that arose from this study was the importance in story work of syntagm and contiguity. Syntagm refers to the ordering of signs (or linguistic units) in a sequence (Cohan & Shires, 2005:14), while contiguity refers to the placement of signs (or linguistic units) within a sequence (ibid.). In all the narrative structuring work, for instance during development of the Event Map, rough storyline and Visual Plot-line, where the order in which events occur come in question, relationships and thereby meanings formed by scanning across the sequence both forwards and backwards if already expressed, or speculating forwards and backwards if not yet expressed. Visual media such as these proved to be more conducive to this type of scanning than written texts, thus enabling events, scenes and plot development to be proceed rapidly.

P2: There's a linearity, that we're not going to get stuck in our own stuff.

A second insight was made with regards to these narrative resources as a result of assessing the affordances of particular levels of detail, or 'granularity'. The simplicity of materials and looseness of renderings that typify storienteering resources appeared to help set the participant's expectations aside and alleviate the tendency to resist committing ideas to paper. For P1 and P2;

P1: Even though it's discussing very difficult things a lot of the time... [i]t's not so pressured because of the fun part of it, the imaginary part of it.

P2: It's important that it's low skill. You don't need an artist or an illustrator to do it.

Finally, the study led to a greater understanding of how some narrative resources agitate the strategic conversation and cause participants to rethink and reframe the story. When this first happened it was thought to be problematic; possibly something wrong with the prompts or the way in which they were being used. But on reflection, it was realised that disruption or agitation of some kind is precisely what is needed in order to encourage participants to think critically about story content. For instance, when, during elaboration of the story the Location card, ‘Sports event’, was drawn at random from a pack, P1 and P2 thought that it was completely at odds with the events and setting being discussed in the scenario. But, through animation of the conversation, a scenario was envisioned that made a plausible case for creating a public health awareness campaign that targets spectators and players at sports events.

5.4. Innovation workshops



The first formal study consisted of two innovation workshops conducted in collaboration with two research colleagues from Northumbria University (P3, P4) and three research colleagues from TU Delft (P5, P6, P7). The first two-day workshop took place at TU Delft, Netherlands while the second took place at Northumbria University, in the UK. The workshops are taken as an empirical case study in design story work where observations could be made of designers engaged in the use of narrative resources to resolve a design challenge.

The Delft Team’s interests lay in Research *into* and *for* Design. Their aim was to acquire practical and theoretical knowledge of how the design of boundary objects can be approached and how their deployment can effect positive change in troublesome situations. To realise their aim, they sought to answer the question: ‘Is it possible to design a boundary object?’

The Northumbria Team’s interests lay in Research *through* Design. They shared a common interest in exploring the practical application of the W2C framework (Cockton, 2012a), but also sought to answer questions related to their own research.

5.4.1. Boundary object theory

Boundary objects originated in the social sciences with a museological case that sought to understand interactions between social worlds, or Communities of Practice (CoPs).

Figure 5.10. Seminal example of a boundary object.



Star and Griesemer (1989:24) made the case that, for stakeholders in the Museum of Vertebrate Zoology, the state of California performed a mediating function in boundaries that arose between their respective interests. Figure 5.10 shows how different CoPs viewed the State of California. In such boundaries, objects have a role to play, and how objects behave in such cases is one of the things that has piqued design researcher's interests. According to Shaw (2007:46), boundary objects 'are assemblages of artefacts, representations, standardized forms and techniques occupying positions of mutual intelligibility on boundaries between heterogeneous social worlds with intersecting interests'. A defining characteristic of boundary objects is that they are 'both plastic enough to adapt to local needs' and 'robust enough to maintain a common identity across sites' (Star & Griesemer, 1989:393).

5.4.2. Aims of the study

Following the Pilot study the approach taken in the Innovation workshops offered a further opportunity to empirically question findings from the literature. Chief amongst these and of growing significance to the research was Erickson's assertion of *design as storytelling* (1996; see Section 2.1.2.1 'Design as storytelling'). If design itself is an act of storytelling, then scenarios are mere snapshots or 'out-takes' of the story of design work. Discovering the extent to which designers consciously make connections between

design work and scenarios appeared to be a fundamental question that needed to be answered in order to understanding how scenarios could be made more worthwhile. The workshops enabled prolonged observation of a team of designers explicitly and self-consciously telling stories and using narrative, the aim of which was to author scenarios. Close and critical examination of such activities afforded the kinds of insights that could help validate Erickson's assertion and thus inform the research.

A further aim was to test prototype narrative resources and gather empirical data on their use and efficacy in order to inform design refinements and develop theory (see warranted assertions described in Chapters 7 and 8).

Though they bear witness to the act of storytelling, this research has little interest in analysing the stories that were composed by participants. Rather, interest lies in the strategic conversation that represents designers telling stories, for this is where one would expect to learn about their experiences with resources.

5.4.3. The approach

Innovation workshops are a design for innovation strategy widely used in Human-centred Design (IDEO), Participatory Design and business and industry². Their goal is to discover and develop novel concepts and reify them as plausible ideas. Methods used in innovation workshops are similar to those used in rapid contextual design (Beyer, Holtzblatt & Baker, 2004:3). Thus, in these Innovation workshops an approach to collaborative design work was taken that included a complement of co-creative and evaluative methods. These included; generative activities, such as sketching, brainstorming, purposeful play and rapid prototyping, as well as storyboarding and 'visioning'; and deliberative activities, such as 'filtering' and 'affinity building' (ibid.). What was sought in the Innovation workshops was 'alignment around big ideas' (Nieters, Joost & Bollman, 2010).

5.4.4. Methods of analysis

Descriptions of the workshops take a constructivist stance on truth with interpretive readings that take up distinct yet complementary perspectives (Given, 2008:302), i.e., ones that add depth and dimension to understandings. The readings of the texts have a persuasive agenda, the 'pre-text' (Shapiro, 2001:318) of which is to establish a relationship between *design by inquiry* and *design by story*.

2. Nieters, Joost & Bollman, 2010 list companies such as Deutsche Telekom's StreetLabs and Innovation workshops, Yahoo!'s YoDeLs, Sapient's Fusion Workshops, IDEO's - Deep Dive Workshops, and Cisco's Discovery Workshops

Table 5.1. Breakdown of the readings.

Texts	Readings			
	Reading 1: Design as inquiry		Reading 2: Design as storytelling	
	Point of inquiry	Description	Plot Theme	Description
Innovation workshop 1	1	A doubtful Situation		
	2	Institution of the problem		
	3	Determination of the problem		
	4	Reasoning		
	5	Experimentation		
Innovation workshop 2	1	A doubtful Situation	1	There is a lack or need
	2	Institution of the problem	2	Recognition of the lack or need
			3	Resolution is hindered
	3	Determination of the problem	4	Help is sought
	4	Reasoning	5	Help is received
	5	Experimentation	6	A task must be completed or an impasse overcome
			7	The task is complete, the impasse overcome
	6	Warranted assertibility	8	The lack or need is satiated
			9	A new order is established

Table 5.1 gives the breakdown of the readings. The text consists of two transcripts (Column 1), one for each workshop.

The first reading concerns itself with both texts, It takes the view that design work is an act of inquiry. Each workshop is described according to Dewey's (1938) *six points of inquiry* (Columns 2 and 3). In Workshop 1 only five of the six points were completed, while in Workshop 2 all six were completed.

The second reading focuses on Innovation workshop 2 (Columns 4 and 5). It takes the view that design is an act of storytelling. Workshop activities are viewed as a story that unfolds according to the 9 Plot Themes (Column 5).

5.4.4.1. Reading the texts

Throughout the texts, the three research colleagues at TU Delft are referred to as the 'Delft Team' and the three researcher-practitioners at Northumbria University are referred to as the 'Northumbria Team'.

The second workshop involved role-play and design simulation. To understand the challenges of creating a boundary intervention, the teams developed a fictional scenario. In the scenario, a fictional design team proposes a boundary intervention in a fact-based case that involves two research teams. To avoid confusion over use of the

term 'team', the real teams are capitalised and the fictional teams italicised.

5.4.5. First reading: Design as inquiry

In the first reading Dewey's (1938:107–117) six *points of inquiry* are taken as a framework for narrative description. Each workshop begins with a doubtful situation for which amelioration is sought. The first workshop fails to reach that goal, however the second succeeds.

A cautionary note about use of the term 'problem'. In order to avoid getting embroiled in long-standing debates over design's use of the term (Dorst, 1997b), it is used in this reading only. Elsewhere throughout the thesis the term 'problem' is used with caution. Where it is used here, its meaning is understood to stem from Dewey's common sense, humanist perspective. For Dewey (1910:3), a problem is '[w]hatever [...] perplexes and challenges the mind so that it makes belief at all uncertain'. Ordinary people follow the same kind of process of observation, hypothesising, experimenting and so on as the scientific method, i.e., 'they infer and judge as "naturally" as they reap and sow' (Dewey, 1938:102). Inquiry begins with an unusual event or happening that presents itself as a doubtful situation. Institution of the problem occurs when the challenge of resolving the problem is accepted and efforts are made to frame it in familiar terms. Once 'framed' in familiar terms, the subject of inquiry can be reframed or abstracted and reasoned about, a process that Dewey refers to as 'determination of the problem'. Aided by periods of reasoning and experimentation, improvements to the situation are proposed and assessed on the basis of how well they work and, therefore, whether they are warranted (see Chapter 3, 'Theory building in pragmatism').

This terse summary and the description offered by the first reading does little justice to Dewey's insistence on an 'open-ended, flexible, and experimental approach to problems' (on Dewey cited in Internet Encyclopedia of Philosophy). The workshop activities give the impression that design work proceeded in an orderly manner from problem recognition to problem framing to problem resolution when, in fact, protocol analysis of the conversation tells quite a different story (see Section 8.1.1. 'Method of analysis').

5.4.5.1. Innovation workshop 1

The first Innovation workshop was conducted at TU Delft on 10–11 October, 2012. Activities began with participants making a position statement about their research interests and theoretical underpinnings. Several boundary cases were discussed.

During the discussion, proposals were made for ways that design might view the cases and areas of 'common ground' were sought. Through brainstorming and deliberation, it was concluded that a design approach could be taken to interrogate boundary objects.

The Teams presented their findings to a group of four colleagues, whereupon the discussion took up new perspectives. Lessons learned from the day's discussions were carried forward to the second day of the workshop. A new boundary case was introduced and three of the colleagues who had joined the discussion on the previous day contributed to the work (for a storyboard of these discussions, see Appendix B5 'Boundary Object Workshop 1 Storyboard'). The complement of participants broke out into two groups to develop independent design proposals, which were then presented to each other. The workshop concluded with a review of what had been learned and what could be carried forward.

5.4.5.1.1. Point of inquiry 1: A doubtful situation

Figure 5.11. The briefing at Delft.



The first workshop began with the Delft Team briefing the Northumbria Team on a number of case studies (Figure 5.11). Each case described conflicts of interest between CoPs, and interventions that had been initiated through the introduction of boundary objects. The Northumbria Team were confronted with a challenge that manifested itself on two fronts. First, they needed to understand the subject area, the cases and related theory. Second, they needed to resolve the question of whether design in general, and they themselves in that particular setting, could enlighten those who seek to intervene in such cases. Uncertainties arising from this challenge caused the Northumbria Team to have doubts about the situation they faced.

5.4.5.1.2. Point of inquiry 2: Institution of the problem

Figure 5.12. Posing the design challenge.



Acknowledging their doubts about the situation (Figure 5.12), the Northumbria Team came to accept that through debate and discussion the question of whether it was possible to design a boundary object was one that design could explore.

P5: What we really want to know is, can you design one? How do you design one? What are the principles of designing one?

Figure 5.13. 'We do it all the time'.



P3: I believe, one can design one. But then we just realised that within the discussion of just half an hour or so. And basically I think that now we know this is a design situation (Figure 5.13).

As the Northumbria Team asked questions and fielded concepts they became familiar with both the subject of inquiry and their situation.

5.4.5.1.3. Point of inquiry 3: Determination of the problem

Figure 5.14. Asking concrete questions.



On the afternoon of the first day, a panel of guests provided the Teams with critical feedback and creative suggestions (Figure 5.14). These helped the Teams reassess their view of boundary objects and consider design priorities (Dorst, 1997a:38). The questions the

Northumbria Team wanted answers to before designing dominated the conversation as their attention turned to composing a fictional boundary case.

5.4.5.1.4. Point of inquiry 4: Reasoning

Engaging in a strategic conversation around the composition of a story allowed the Northumbria Team to consider design priorities while working in a form that was conducive to reasoning and experimentation. The group (now ten members) engaged in a brainstorming session exemplified by abductive or ‘generative reasoning’ (Cross, 2004:432; also Section 2.1.1.2 ‘Creative design’), during which the narrative coherence they sought for the scenario depended on plausible explanations for a boundary case. Often couched in generalities, the discussion went on for some time, addressing topics at a high-level of abstraction. From the concepts that were fielded and discussed, many inferences and conjectures were made. However, none were sufficiently well-formed or salient to gain everyone’s approval.

Figure 5.15. Supportive insights.



Throughout the conversation, reasoning and conjectures were concerned not merely with getting the story straight, but with getting the *story work* straight.

For example, a suggestion was made that ‘the way we learn most’ is by asking ‘concrete’ questions (Figure 5.15). In one example of many where generative reasoning and ‘concrete questions’ were in evidence, P3 guided a question-and-answer session with the aim of defining the precise sequence of events and details of settings in which interactions between actors and boundary objects might occur. The following are selected utterances from that session.

[01] P3: ‘What would we do to influence our colleague, our boss, that goes to the board of directors to act in our favour?’

P6 responds with a conjecture.

[04] P6: ‘I want him to engage with my project so that he is going for it, like I’m going for it.’

From which P7 makes an inference.

[06] P7: 'Yeah, but maybe it's even more a matter of having a really clear understanding of what you're saying. So he has enough background to explain.'

Pressing for ever-more concrete details, P3 continues to use questions to solicit further conjectures.

[11] P3: 'What would you do?'

[12] P6: 'Try to understand his way of thinking.'

[14] P3: 'How would you do that?'

[15] P7: 'I'd give a good example, so he could use that.'

Now P3 makes inferences from P7's response and turns them into questions.

[16] P3: 'So would you write that example on a piece of paper? Would you send another email because you've already sent other emails? Would you call them directly or hand something over?' (writes on the wall)

P6's response is a conjecture that is significant for its impact on the sequence of events.

[20] P6: 'But before you make an appointment, you have to trigger that it's really good for him and interesting to have an-'

[21] P3: 'How would you trigger that?'

P6 offers a plausible explanation, leading P7 to draw a conclusion that strongly suggest the conversation is on the right track.

[26] P6: 'I would leave something on his desk, anything that would trigger it.'

[27] P7: (laughs): 'A boundary object!'

5.4.5.1.5. Point of inquiry 5: Experimentation

During the workshop there had been an abundance of conceptual, narrative and methodological experimentation. One experiment that was tried at the end of Day 1 involved creating a set of questions to help guide selection of a more suitable boundary case for the sessions that would take place the following day. These included questions, such as;

What defines the communities on each side of the border?

How many players are involved on each side?

What's the problem at the border?

What do the players want from each other (what are their interactions)?

Who are the people? And, What are their backgrounds?

Posing these questions did result in finding a more fruitful boundary case. But, perhaps more importantly, it inspired the development of '20 Questions' (see Section 4.4.1 '20 Questions'), a narrative resource that played a pivotal role in the story work conducted in Innovation workshop 2.

Despite many creative experiments, by the end of Day 2 with no agreed unifying concept for what constitutes a boundary case and little agreement on how the body of knowledge and theory that might underpin such a case could be captured in the narrative components of a scenario, the Northumbria Team were unable to develop any strategies for design or reach their goal of making paper prototypes.

5.4.5.2. Innovation workshop 2

The second Innovation workshop was conducted at Northumbria University, 26–27 November, 2012. The order of activities was similar to that of the first workshop. However, rather than focussing attention on deliberative inquiry and problem resolution, emphasis was placed on story work and *serious play* (Schrage, 1999). The approach involved simulation and role-play. To better understand the kinds of issues that arise in boundary cases, the Delft Team were asked in advance of the workshop to choose a new boundary case. Selection was based on how well cases could address a list of questions prepared by the Northumbria Team.

On the first day the Teams engaged in role-play by enacting a question-and-answer game and, through this, began to identify salient elements of narrative that would serve as a starting point for scenarios. The scenario was authored and refined through a combination of traditional design methods and *storienteering* activities (described throughout the section). The day's activities were summarised and presented to a group of four invited colleagues who contributed to the group's critical reflections. On the second day of the workshop, theoretical perspectives were consolidated, the Teams engaged in detailed mapping of the scenario and paper prototypes were developed.

Orientations

In the second Innovation workshop the Teams engaged in ten clearly defined activities, each with a distinct purpose. Post hoc critical reflection on these blocks of activities strongly suggests that, for design, they perform an orientating function, i.e., they help design teams focus on particular goals or objectives and find ways to address and achieve them. They have thus been referred to as 'orientations'.

Figure 5.16. Orientations of Innovation workshop 2.



In this part of the first reading, context is given to discussions of each orientation by a graphic way-finder. Drawn from a 9-Panel overview (see <<http://malcolmjones.com/making/Innov2.html>>) Figure 5.16 depicts the 10 orientations of Innovation workshop 2. The following list shows where orientations occur as the Teams work through the ten *points of inquiry*.

Point of inquiry 1: A doubtful situation.

Point of inquiry 2: Institution of the problem.

Orientation 1: Reviewing

Orientation 2: Questioning

Point of inquiry 3: Determination of the problem.

Orientation 3: Card Sorting

Point of inquiry 4: Reasoning.

Orientation 4: Story Spinning

Orientation 5: Storyboard Sketching

Point of inquiry 5: Experimentation.

Orientation 6: Concept Mapping

Orientation 7: Theory Building

Orientation 8: Experience Mapping

Orientation 9: Paper Prototyping

Point of inquiry 6: Warranted assertibility.

Orientation 10: Evaluating

Because most of the events that occur in each orientation are described twice (Reading 1 and Reading 2) some descriptions in Reading 1 have been kept purposefully succinct.

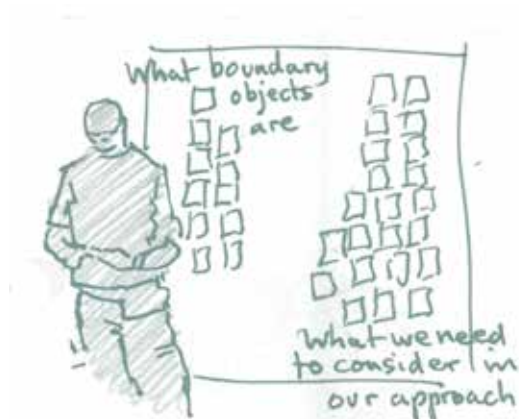
5.4.5.2.1. Point of inquiry 1: A doubtful situation

Doubts remained about whether, in the time available and the resources at hand, the Teams could meet the challenge of designing an approach to creating boundary interventions.

5.4.5.2.2. Point of inquiry 2: Institution of the problem

By way of acknowledging the doubts and accepting the challenges that the situation presented, the Northumbria Team took action to minimise uncertainties in advance of the workshop. First, a detailed yet flexible plan was developed that laid out goals and objectives, yet attempted to make allowances for unforeseen developments. Second, the Delft Team were asked to select a new case study from their corpus based on a list of carefully prepared questions (Figure 4.31 ‘20 Questions’). Third, to avoid repetition, the first activity scheduled for the Northumbria workshop was oriented towards sharing outcomes from analysis conducted on materials from the first workshop (see Appendix A13.2 ‘Thematic analysis of Innovation workshop 1’).

Orientation 1: Reviewing



The Teams’ ability to review and critically reflect on what had been achieved at Delft was supported by research practice. In particular, a novel transcription technique was used for the first time to conduct thematic analysis of the proceedings and consolidate outcomes (for the technique, see Section 7.2.2 ‘Research aid 2: Storyboard transcription’; for how it was used, see Appendix C7 ‘Thematic analysis of Boundary Object Workshop 1’). From the many concepts under discussion at Delft, two broad themes emerged that would inform design work: ‘properties of boundary objects’ and ‘things to remember when designing for boundary interventions’. The storyboard transcript was shared by projecting it on a large screen, while prepared Post-it Notes enabled the concepts to be shared via an affinity diagram (above).

Concepts related to the theme of 'things to remember' included;

- begin by asking questions,
- can't consider the object without considering all the contexts,
- look at social dynamics, and
- look to root causes, not just surface effects.

Concepts related to the theme of 'properties of boundary objects' included;

- typified by a shared goal,
- joint recognition of a problem,
- related to dependencies, and
- cases are dynamic.

Orientation 2: Questioning

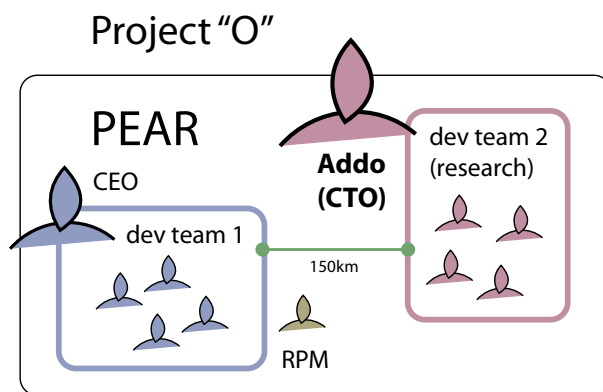


Questions were posed to the Delft Team using a semi-structured interview technique, modified with a playful twist. Emulating the popular television show '20 Questions', Team members took on the roles of game show host and contestants (for the questions, see Figure 5.18 '20 Questions').

While the strategic conversation that took place around the questions and answers helped the Northumbria Team familiarise themselves with the boundary case, chosen Team members used Post-it Notes to record references made to three predetermined themes: *routines*, *interests* and *motivations*. While *routines* (Houssian, 2011) and *interests* were chosen for their affinities with boundary object literature (Suchman, 1995:59; Carlile, 2002:12-13), *motivations* was chosen to bring human values, traits and goals to the fore to invigorate story work (Cooper, 1999; Blomquist & Arvola, 2002; Pruitt & Adlin, 2006).

The case story, as related by case expert P5, is summarised here to aid comprehension of the study's proceedings.

Figure 5.17. Schematic of actors and relationships in the boundary case story.



P5s description of the case began with a diagram (Figure 5.17) that depicted all the actors involved, their communities of practice, work settings and relationships.

Project 'O' is one of many Research and Development (R&D) initiatives undertaken by the large technology enterprise, Philips Research. The project is managed through PEAR Corp., a company affiliate which conducts product R&D for the parent company. Two teams are involved in development work. Team 1 is a product development team managed by the Chief Executive Officer (CEO; Figure 5.17; blue). Team 2 is an R&D team managed by the Chief Technology Officer (CTO), Addo (Figure 5.17; pink). The teams occupy labs that are 150 kilometres apart.

The CEO and the CTO share a vision for the product development cycle. Yet, there are tensions between them, and an internal power struggle that they are engaged in is causing serious rivalry, performance and productivity issues between their teams. For example, in negotiations for resources, the R&D team struggles to secure funding for such things as personnel, equipment and space. Many of the R&D team's initiatives are stonewalled or rendered useless by the product development team, causing them to become despondent. When team members are witnessed texting and falling asleep during briefings, Addo realises that something needs to be done to restore harmony between the teams and get the product development cycle back up to speed.

5.4.5.2.3. Point of inquiry 3: Determination of the problem

As was the case at Delft, the act of formally composing a scenario helped the Northumbria Team consolidate their understanding of the subject of inquiry and consider priorities. However, though the Northumbria Team had agreed on a schedule of activities that led from questioning to story spinning, no one was sure how insights

gained through questioning could inform composition of a coherent narrative. Could a 'card sort' (Martin & Hanington, 2012:50) shed light on how the story might be re-purposed for design?

Orientation 3: Card Sorting



Working collaboratively, notes taken during questioning were arranged by theme and sub-theme (see Appendix A6.2 'Affinity diagram'). Post-it Notes describing either *events*, *happenings*, *situations*, *objects/artefacts*, *driving forces* or *goals* formed sub-themes under the main themes *routines*, *interests* and *motivations*. Though in a quantitative sense the 'diagram' suggested thematic affinities, the clusters of sub-themes did not immediately suggest a starting point for spinning a story. This resulted in something of a methodological impasse, while options were weighed for how to move forward.

5.4.5.2.4. Point of inquiry 4: Reasoning

Orientation 4: Story Spinning



The schedule of activities called for the use of storioteering resources to prompt the Teams' to engage in the kinds of strategic conversations that take place around narrative development. Introduced to Dial-a-Plot and Event cards, the Teams' engagement in a game-like activity around story spinning that had elements of

randomness and chance brought about a change in everyone's way of thinking about the work. The mood went from being serious to being playful. As was the case at Delft, critical reflection and generative reasoning were in evidence throughout the strategic conversation. As the Teams gained confidence in working with the narrative resources, the inferences they made from each other's observations led to ever more plausible explanations of what the group believed to be an exemplary boundary case. Here, plausibility of explanations was kept in check by P5, the case expert.

Orientation 5: Storyboard Sketching



The Teams expressed the scenario on a large piece of paper that began to look something like a rough storyboard.

Everyone was encouraged to participate in sketching out events, identifying actors and describing actions and settings. Two narrative resources, Post-it People and Content Cards enable rapid notation. The

activity's importance was recognised post hoc, whereupon the 'rough storyboard' was adopted as a narrative resource and given the name, Visual Plot-line.

The Visual Plot-line encouraged collaboration by affording each Team member opportunities to engage in the strategic conversation via preferred modes of language, whether verbal, visual or kinaesthetic, and attend to them with associated modes of expression, such as note-posting, drawing or writing. Compared to traditional approaches to scenario authorship, which favour verbal expression, Visual Plot-line afforded an unbiased form of expression. It might be argued that with this heightened level of engagement came a sense of vested interest, i.e., ownership.

The aim of manifesting ideas visually and tangibly is to enable embodiment of both interpersonal and collaborative critical reflection and reasoning. In addition, acknowledging the fact that on completion of the Visual Plot-line only the basic elements of the story had been developed and the story was therefore incomplete, it was possible to view the scenario as a *reasoned conjecture*.

5.4.5.2.5. Point of inquiry 5: Experimentation

If the scenario depicted in the Visual Plot-line was a conjecture put forward by the Northumbria Team to help them understand the kind of boundary intervention they could create, then the conjecture needed to be tested. Could the Northumbria Team develop a theoretical framework for the creation of boundary interventions using the scenario as an exemplary case? If so, how would they do it? The Teams had a scenario in hand. With the aim of finding ways to develop the scenario and use it to help them achieve their goal, the Teams began a series of design experiments.

Orientation 6: Concept Mapping

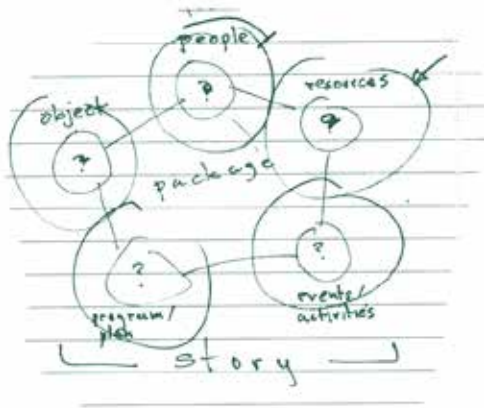


Though the basic elements of the scenario had been sketched out, many important details were missing. New questions had arisen that demanded more information about contexts of use before answers could be found.

Focusing their attention on what the boundary objects and intervention activities might be, the Teams conducted an experiment in brainstorming to see if they could generate some ideas. Story work was moved to a different space and Post-it notes used to field ideas underpinned a strategic conversation about objects, such as T-shirts and web-based messages, and activities, such as field trips, knitting bees and cooking sessions.

The outcome of this experiment was a concept map with a number of workable propositions for boundary objects and intervention activities (Figure 5.22).

Orientation 7: Theory building



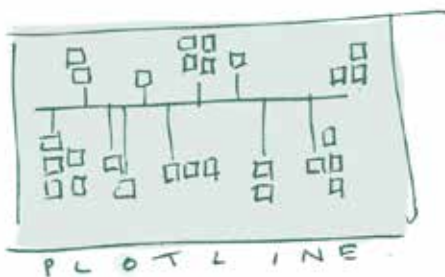
During the concept-mapping activity, more details came out about the case. As they did, some of the more persistent concepts began to resonate with the Teams, suggesting that they had either practical or theoretical significance.

The Teams engaged in a further design experiment, that of theory building. Before

design propositions could be made, the many theoretical models that underpinned positions held by members of each Team needed to be consolidated and aligned with the challenge at hand. For the role these played in the Teams' strategic conversation, see Appendix A6.1 'Theoretical models').

The outcome of this experiment was the realisation that theoretical stances taken up with regard to five 'domains', or aspects of design work, needed to be brought into alignment in order to shed light on the complex network of interdependent factors that come into play in the creation of boundary interventions. The domains were; program, events/activities, people, objects and resources.

Orientation 8: Experience mapping



The Teams had the outline of a scenario describing events, actions and actors. They had a number of plausible options for boundary objects and intervention activities, and they had a rudimentary theoretical framework. They now had what they needed

to conduct another design experiment, one that would bring them closer to understanding the experiences of those in the scenario, their interactions with objects and their engagement in a programme of intervention activities.

The Teams used Post-it Notes to link ideas for boundary objects and intervention activities to a programme timeline. The idea of a train journey emerged and took hold.

Orientation 9: Paper Prototyping

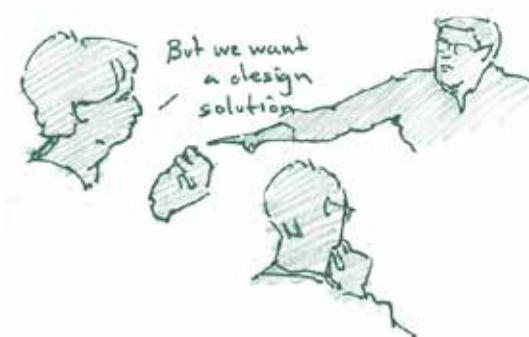


The 'train journey' idea offered a plausible explanation for why key actors in the scenario would engage in a boundary intervention programme. For the Northumbria Team, instead of raising further questions, it answered many long-standing questions. With it, the

Northumbria Team's proposal for an intervention gained sufficient coherence and resonance for them to reach their goal of making paper prototypes.

5.4.5.2.6. Point of inquiry 6: Warranted assertibility

Orientation 10: Evaluating



To ensure that outcome-related assertions made by the Northumbria Team were warranted, the Teams once again engaged in role-play. Taking-on the roles of actors in the scenario and taking the prototypes as props, a scene was enacted in which the proposed boundary intervention was systematically critiqued.

5.4.5.2.7. The intervention story

After the workshops were concluded, the intervention story that the Teams had sketched out was refined and written out.

Addo, CTO of PEAR Corp., wraps up a meeting with Frank Rodeau, an ex-employee turned consultant. Frank leaves Addo with a small box entitled 'PACT PACK'. Addo brought Frank in to help him resolve communication issues between his research team and the development team of partner company, Phips Corp.

Some weeks ago, the development team missed an important product release deadline that Sales and Marketing are still fuming about. The development team claim that their ability to deliver the long-overdue update to the flagship B2B software package was compromised by unrealistic requirement specs from the research team (and, by association, Addo) proposing significant changes to the low-level structure of the programme. Addo believes that the research team's directives were necessary and that the development team were given a realistic time frame in which to implement them; they just 'dragged their feet'. It was not the first time there had been conflicts between the teams. It was time to take action.

Addo arranges the contents of the box on his desk. He notices that everything has a travel theme. There's a folded map that describes what's in the box. There are cards and instructions, individually wrapped 'resources' and a memory stick with a luggage tag.

Four weeks later, in a highway restaurant located about halfway between Phips Corp. and PEAR Corp., Addo lunches with Robert and Suresh, representatives from each of the teams.

Robert: 'Everyone in the development team is kind of suspicious about the motivation for the small gifts and personal cards from members of the research team. Nobody's responded to them yet.'

Addo: 'I'm sorry to hear that, Robert. Do you think it might work out over time, or are people just not interested?'

Robert: 'Honestly, Addo, I don't know.'

Addo, looking at Suresh: 'How do the research team feel about it?'

Suresh: 'A few of us really enjoy making up the gifts and cards so we agreed to do that for those that don't. I think everyone's mostly on board ... it may just take time.'

Addo: 'Should we hold off on introducing the field trip for a while, so we give the

cards and gifts more of a chance to take hold?

Suresh and Robert: 'Sure.'

Two months later Addo receives a call from Frank.

Addo: 'Hi, Frank. The PACT PACK finally seems to be taking effect. The cards and gifts led to someone suggesting they all go on a 'field trip' to Games Expo. Four of them attended a workshop and got an idea to develop a game together, and a couple of people in the development team have since created a small app to facilitate the exchange of cards.'

Frank, thinking (innocently): 'Gosh, who'd have thought?'

Addo: 'We have a launch deadline coming up next month, so maybe we'll see whether your rather sneaky intervention has also engendered more productivity.'

Frank: 'Let me know on that, would you? To keep the thing going, the programme should also focus on supporting a work environment that does not discourage these kinds of inter-team activities during work time. It requires a change of mindset on the part of everyone else in the communities to focus on values not solely to do with material productivity.'

Addo: 'That's a tall order, but I guess we tackle this one step at a time.'

5.4.5.3. Summary of the first reading

In the first reading of the texts, Dewey's (1938) six *points of inquiry* have been taken as a framework to guide narrative interpretation of story content. The interpretation reinforces arguments for design as an act of living inquiry.

Events that took place in the workshops were viewed from a perspective that concerns itself with addressing and resolving a doubtful situation. In the second workshop, the Northumbria Team fulfilled the first point of inquiry (doubtful situation) when doubts lingered over their ability to meet the challenge of creating for a boundary intervention. They fulfil the second point of inquiry (institution of the problem) by putting three measures in place to minimise uncertainties; a firmer approach, a better case story, and a head start on design by drawing on lessons learned from Delft. Having taken control of how they would become familiar with the problem, the Northumbria Team fulfilled the third point of inquiry (determination of the problem) when they drew a case story out and began the process of abstraction through discussion of concepts and Post-it notes. Story-spinning with Dial-a-Plot and Event cards enabled the Teams to frame the problem and Visual Plot-line cast it in terms that allowed for reflection and

fulfilment of the fourth point of inquiry (reasoning). With the goal of gaining a more-or-less complete picture of an exemplary case story, activities that followed completion of the Visual Plot-line constitute the fifth point of inquiry (experimentation). Concept mapping, theory building and experience mapping techniques brought the Northumbria Team in reach of their goal. When they were finally able to create paper prototypes to demonstrate the principles upon which their proposal for approaches to boundary interventions rested, the final point of inquiry (warranted assertibility) was fulfilled.

5.4.6. Second reading: Design by story

The second reading focuses on Innovation workshop 2. Plot Themes are taken as a framework for interpretive description of workshop activities as design by story.

The aim of interrogating the text in this way is to gain a better understanding of how designers can be supported in storytelling. To achieve this aim, one objective is to discover more about designers as storytellers by interrogating how stories come to be told and how designers know when they have the right story. A second objective is to interrogate the ways in which design work of this particular kind makes use of stories.

The reading is divided into sections and subsections titled with the following Plot Themes and orienting activities:

Plot Theme 1: There is a lack or need.

Orientation 1: Reviewing

Plot Theme 2: Recognition of the lack or need.

Orientation 2: Questioning

Plot Theme 3: Resolution is hindered.

Orientation 3: Card Sorting

Plot Theme 4: Help is sought.

Orientation 4: Story Spinning

Orientation 5: Storyboard Sketching

Plot Theme 5: Help is received.

Plot Theme 6: A task must be completed.

Orientation 6: Concept Mapping

Orientation 7: Theory Building

Orientation 8: Experience Mapping

Plot Theme 7: The task is complete.

Orientation 9: Paper Prototyping

Plot Theme 8: The lack is assuaged.

Plot Theme 9: A new order is established.

Orientation 10: Evaluating

5.4.6.1. Plot Theme 1: There is a lack or need

Orientation 1: Reviewing



Both Teams left the first workshop with insights; some related to boundary cases and boundary objects, others related to design and story work (for details see Appendix C7 ‘Thematic analysis of Boundary Object Workshop 1’). The Teams also left the workshop missing things they knew would be necessary if they were to complete their work.

What the Delft Team lacked was a theorised and empirically substantiated precedent for boundary interventions. They looked to the Northumbria Team to help them develop theory and resources and acquire the empirical knowledge they sought.

5.4.6.2. Plot Theme 2: Recognition of the lack or need

Orientation 2: Questioning



Questions prepared for the case expert were composed with deliberation about what was needed to support story work and thus design.

Figure 5.18. '20 Questions'.

1. What is the formal, working relationship of the communities in question?
2. How are the communities distinct, what defines their differences?
3. What are the routines that relate most closely to the boundary issue?
4. How do these fit into the rest of the workflow?
5. How do these communities 'talk to each other'? (Language and discourse conventions)
6. What are the common and what are the distinct interests of the parties?
7. What interactions do they have with each other? (formal and informal)
8. What do they use to support communication and understandings in these discussions and interactions?
9. How do each community regard the other? With respect, grudging acceptance, etc., is there a difference of 'rank' or importance?
10. What might some of the communication difficulties be over? (perhaps in general, but also where closely associated with the boundary case) Language, type of information, form of information, personalities or differences in rank, etc?
11. Can a specific boundary crossing issue between these communities be identified?
12. What are the semantics of the 'problem' discussions or interactions? How do each community form meanings around them?
13. How long has the boundary crossing problem been around?
14. What solutions have been attempted in the past? How did it work/not work, and why?
15. How does the problem effect the community?
16. What might the effect of a successful boundary crossing in this problem area be?
On people's jobs, on how things get done, etc.
17. What attempts have already been made to cross the boundary?

To ensure that the right topics were addressed and the right issues were touched upon, principles of design theory (Design Arenas³), boundary object theory (routines, interests, motivations) and narratology (events, actants, actions, etc.) were integrated into the phrasing of questions (Figure 5.18). For example, with regards to question 13, How long has the boundary crossing problem been around? The following were considered:

From a narratological perspective, this question concerns actants and how their actions are set in a sequence of historical events. It concerns itself with understanding the boundary problem by questioning community or individual

3. Cockton, 2017:751–755

interests and *motivations*. This is boundary object theory raising questions for design; if a prolonged problem, why/how has it persisted? Does it have anything to do with *routines*? Who acknowledges its existence? Who has allowed it to persist? For design, the question is a probe intended to solicit information about the depth of the problem, which has immediate implications for *artefacts* and *beneficiaries*, and longer term implications for *evaluation* (of artefacts).

Acting as narrative prompts embedded in the questions, principles such as these ensured that the conversation that went on around them were useful for design. For example, when the case expert was asked how the communities involved in the case regard each other (Figure 5.18 Question 9), for the first time in the conversation human motivations, emotions, values and beliefs were brought to the fore and some surprising driving forces emerged. The two team managers (the CEO and the CTO, Addo) had recently been involved in breaking up the company. One outcome of 'the split' was ongoing disunity between both the managers and their teams.

As the most likely cause of conflict between the two teams, the 'break-up' event was thought to be central, or *key*, to the Northumbria Team's understanding of the case. The break-up acted as a *keystone idea*, an important unifying and memorable concept for design work, on which the Northumbria Team could base a scenario.

5.4.6.3. Plot Theme 3: Resolution is hindered

There was an impediment to resolving the Delft Team's lack. What the Delft Team sought to achieve was contingent upon the Northumbria Team finding a way to approach boundary interventions through design. Like the Delft Team, the Northumbria Team left the first workshop missing things they knew would be necessary if they were to complete their work. What the Northumbria Team lacked was sufficient privileged views of a boundary case to create a precedent-setting approach to boundary interventions. To gain what they lacked, the Northumbria Team needed everyone to reach consensus on an exemplary case so design proposals could be put forward and evaluated.

By asking the right kinds of questions, the Teams had uncovered a story. The questioning had yielded a 'key' event or idea that helped give the case story definition and identity. Yet, much of the story remained vague and open to wide interpretation. It had unfolded in fragments through a long and complex conversation, so nobody could be sure that their account of the story matched everyone else's; a point that was borne

out later in the study. After the questioning, therefore, there was a period of doubt and reflection as the Teams considered their next move.

The Teams had agreed on an order of activities that would help them move from case inquiry to story spinning. But no one was sure how, in practice, insights gained through the '20 Questions' activity would inform composition of a coherent scenario. While stories may have value as distant, ill-formed myths, scenarios do not. The worth of scenarios begins with their ability to bring part of a larger story that may yet be distant and vague into the present, and to do so with clarity and alacrity. Negotiating a passage from case inquiry to story-spinning demanded some kind of 'conversion' (Cross, 2000:78), 'translation' (Muller, 2004) or 'synthesis' (Alexander, 1973).

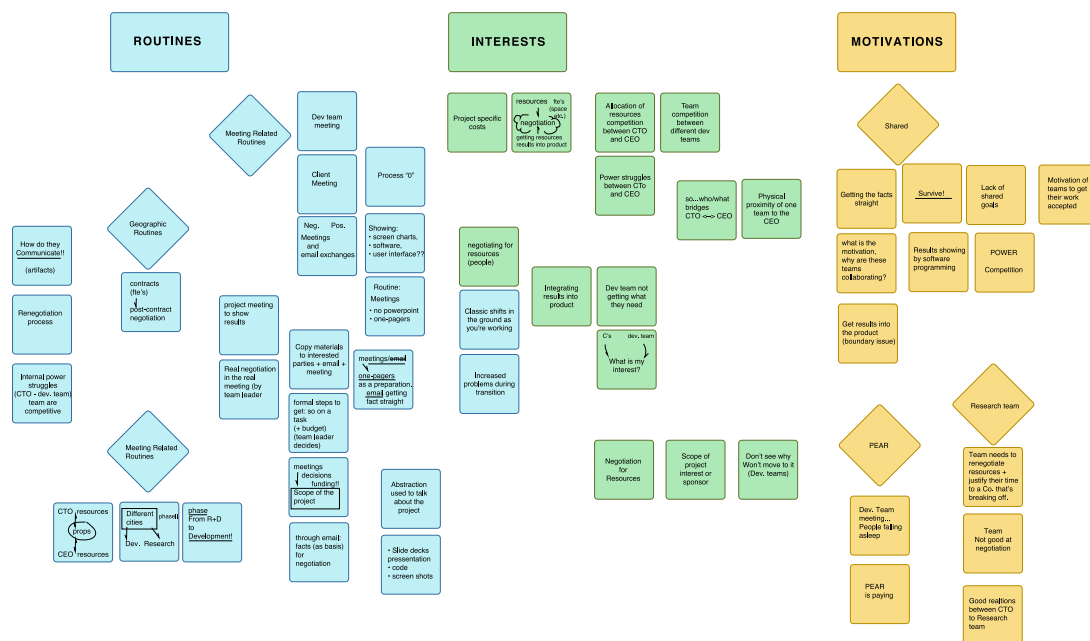
When the Teams made their next move, it was not insignificant that they reached for the only tangible representation they had at hand to help make sense of the story – some theme-inscribed Post-it Notes.

Orientation 3: Card Sorting



Could a 'card sort' (Martin & Hanington, 2012:50) help to shed light on how the story might be told?

Figure 5.19. Affinity diagram.



The theme-inscribed Post-it notes were posted on a wall and grouped according to perceived affinities (Figure 5.19; Appendix A6.2 'Affinity diagram'). However, no immediate connections could be made between the clusters of concepts and themes, and how they might provide a springboard for a narrative resource-based approach to design.

In order to engage in scenario authorship and composition, the Teams' attention needed to be drawn away from information seeking and sorting and, instead, be directed towards making sense of what was known and finding ways to both harness and build on that knowledge in order to determine what could be designed.

MJ: This may be a stretch, but I think we should start telling a story.

5.4.6.4. Plot Theme 4: Help is sought

To spin a story, help was sought from narrative resources, notably drawn from different categories: a Content exemplar, Event cards (Section 4.2.2 'Event cards'); a Discourse prompt, Dial-a-Plot (Section 4.3.2 'Dial-a-Plot'); and what became the first Narrative fugitive, Visual Plot-line (Section 4.4.2 'Visual Plot-line').

Orientation 4: Story Spinning



Participants were encouraged to put aside preferred methods or preconceptions they had about how to tell a story. Through a roll of the dice, the Teams received three Plot Themes, and, drawn at random from a pack, three Event cards.

Figure 5.20. Working with Plot Themes and Event cards.



Plot Themes and Event cards invite narrative interpretation and idea generation as plausible links are sought between what is known to underpin a story and how that

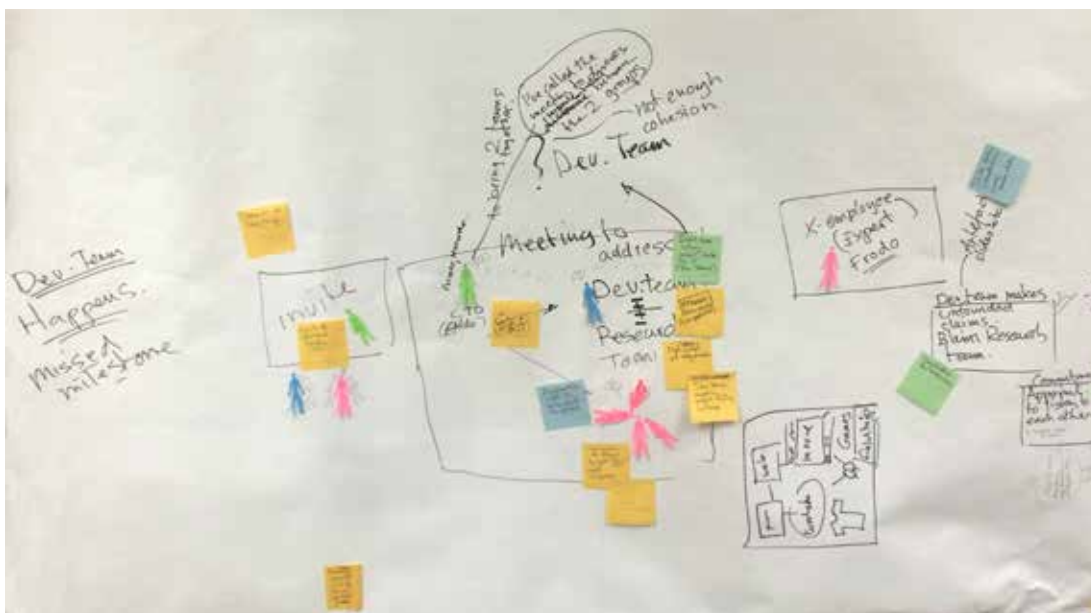
story might be told through suggested actions, settings and events. Figure 5.20 shows how Dial-a-Plot functions and Event cards were paired-up. Within moments, the playful orientation to games prompted one member of the Northumbria Team to offer a scenario that drew plausible links between the case story and the three Plot Theme/Event pairings that was admittedly ‘something unreal’ (see Appendix B7 ‘P3’s Scenario’).

However ‘unreal’ the story, it was beneficial for the Teams, first, because it demonstrated how Dial-a-Plot works as a Discourse prompt and, second, because its humour and near implausibility helped everyone get into a playful and creative frame of mind. For example, the scenario prompted a member of the Delft Team to suggest that it embodied a moral relevant to the case story – that it is important to ‘like your team’.

Orientation 5. Storyboard Sketching



Figure 5.21. Visual Plot-line.



Story spinning took place through a strategic conversation held between Team members and their materials. While Dial-a-Plot and Event cards acted as Discourse prompts, development of a Visual Plot-line (Figure 5.21; for enlargement see Appendix A.6.3 ‘Visual Plot-line: Boundary Object Workshop 2’) allowed the Teams to reify and reflect on their understanding of the story. The Teams used storyboard sketching

techniques and annotation to describe events, scenes and dialogue and Post-it People to identify actors and groups. By addressing one Plot Theme/Event pairing at a time, they were able to methodically piece together the story from set-up to resolution.

5.4.6.5. Plot Theme 5: Help is received

The Visual Plot-line gave the Teams their first glimpse of a boundary intervention. For the first time in either of the workshops, the Teams were able to see how actors and boundary objects interact, how events and actions unfold and how these relate to each other temporally, spatially and experientially. For the first time in the discourse, ideas held by one participant could be compared with those held by another in the presence of a common frame of reference.

This led to a re-evaluation of how the story would function in the Northumbria Team's move towards creating a boundary intervention – a response that, in this researcher's experience, is common. What ensued was discussion, agreement and, unexpectedly, disagreement. As Team members reflected critically on the role that the scenario may play in the story work, a heated debate broke out that raised doubts about the approach being taken and the value of the scenario represented by the Visual Plot-line.

Though they had developed a framework for the story that allowed them to gain a better understanding of what creating a boundary intervention entailed, the Northumbria Team faced another impasse.

5.4.6.6. Plot Theme 6: A task must be completed

The Northumbria Team were keen to explore how the insights that they had gained through story spinning might inform the design of prototypes. But it seemed that before the Northumbria Team could acquire the privileged views they needed, they had to complete the task of coming to grips with not only the scope and complexity of creating a boundary intervention, but also the story work at hand. The Teams had to learn how to spin a contextually rich and salient story about the case. But to do so they had to learn how to work together, how to overcome impasses and how to build consensus. What followed may be viewed as either a series of activities or tasks, each of which had discrete aims. Each enriched and expanded the Teams' understanding, and each afforded new perspectives on the case, the story and the story work.

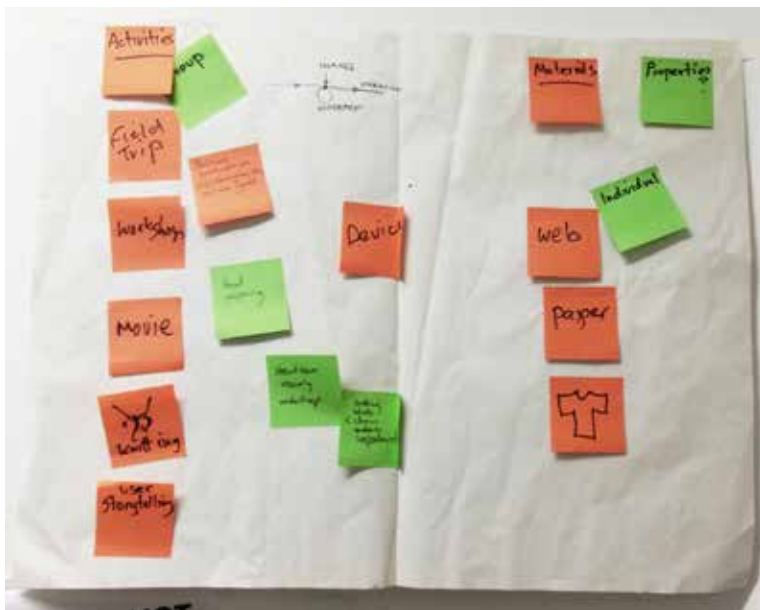
Orientation 6: Concept Mapping



A suggestion was made to 'hack' some 'wild ideas about what [artefacts] might work'. The Teams agreed to expand their exploration of the story by brainstorming ideas for plausible boundary objects and intervention activities, whereupon a valuable methodological suggestion was made. The Teams recognised that the difficulty that they were experiencing in moving-on with design work was that the conversation could not move on as long as it took place around the Visual Plot-line. In an insightful and pragmatic move, P6 suggested

[we] take another sheet of paper where we do this. We really extract it (the conversation) from the [Visual Plot-line].

Figure 5.22. Artefacts and activities concept map.



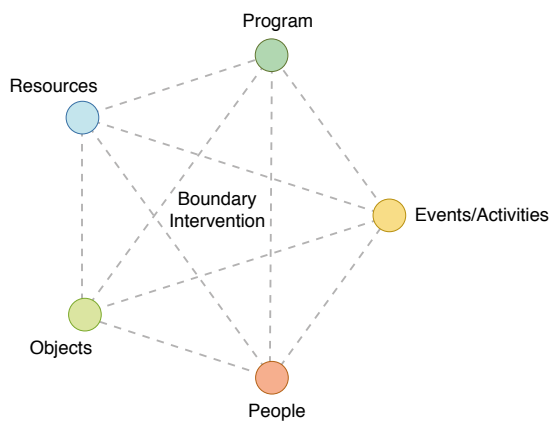
The Teams gathered around another sheet of paper and, using Post-it notes, fielding concepts for objects, activities and programmes that might encourage the team's to work together more harmoniously and productively (Figure 5.22). What might act as social bonding devices? A team T-shirts? A card or recipe exchange? An away day? The mapping activity provided opportunities for creative speculation, as well as critical analysis (Given, 2008:108). As questions were posed about artefacts, activities and routines, more questions arose about how particular interactions between these might take place in various settings.

Orientation 7: Theory Building



On completion of each orientation, the Teams gained a new perspective on the boundary intervention story and understood more about the scope of what was needed to support their creative work. They were close to proposing an approach to the creation of boundary interventions, but their proposal still lacked a programme of engagement. Selection and evaluation of design directions was hampered by the fact that sources of knowledge and understanding were fragmented across a disparate collection of design objects and resources. These often took the form of theoretical models (see Appendix A6.1 'Theoretical models').

Figure 5.23. Consolidation of theoretical positions in five domains.



To remedy this, a decision was made to consolidate the many theoretical positions that were held between the Teams, and summarise them in a diagram that would act as a mnemonic device (Figure 5.23). Clockwise from the top, the domains that the Teams considered essential in the creation of boundary interventions were:

Program: The program or plan that describes the approach and the lifecycle of the intervention.

Events/Activities: Events, such as actions and happenings, that take place in the program.

People: Those involved in the program.

Objects: Objects that have significant roles to play in the program, such as artefacts or activities that act as sensitising agents.

Resources: Resources that people draw on to make the intervention possible.

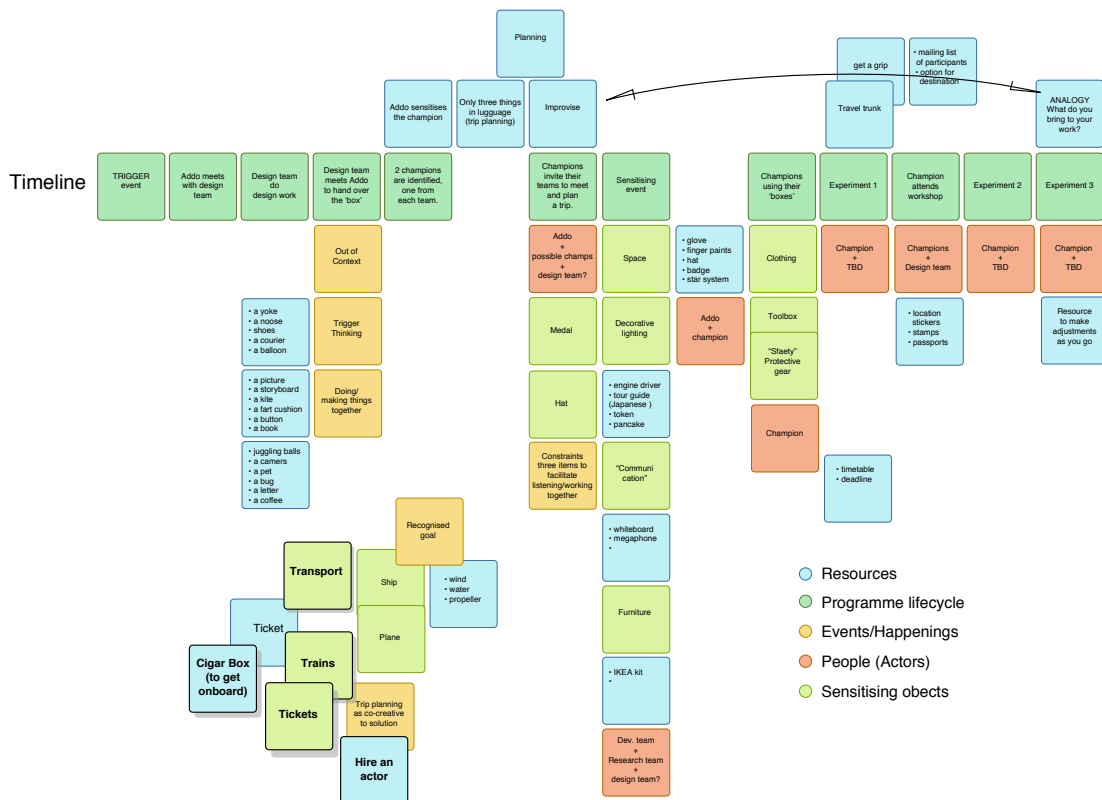
The theoretical domains diagram played an important role in bringing sources of fragmented knowledge into focus by providing theoretical underpinning for both the Teams' proposal and its evaluation.

Orientation 8: Experience Mapping



In the next retelling of the story, each participant was given the task of developing detailed story content for one of the five domains and, where appropriate, suggesting how they might relate to other domains. Domains were assigned at random by numbering them and throwing dice.

Figure 5.24. Narrative Blueprint.



The programme domain concerned itself with how the intervention would be deployed and how its aims would be achieved. An important characteristic of such programmes is their temporality, i.e., they occur over time. When concepts related to programme began to be posted on a wall they formed a timeline. As other Team members reflexively

added notes relating to their domain the timeline grew and at the same time began to act in other ways. The clustering of notes arranged around common or related themes in the manner of an affinity diagram invigorated the conversation and stimulated idea generation and sharing. As the content grew the arrangement came to act as both an 'experience map'⁴ and a blueprint for an intervention (see Figure 5.24; for enlargement see Appendix A6.4 'Narrative Blueprint').

5.4.6.7. Plot Theme 7: The task is complete

Orientation 9. Paper Prototyping



Figure 5.25. Paper prototypes.



The proposed design was reified as a paper prototype. Figure 5.25 shows how the Northumbria Team envisioned the boundary intervention 'package'. Based on the case story provided by the Delft Team, the package was designed as a multi-component, multiple media resource for intervention champions embedded within target organisations. Though each component fitted with the theme of a train journey they also acted as prompts, guides and inspiration for cross-community empathy, cooperation and engagement. For example, the collection of resources would be delivered in a cardboard travel chest containing such things as; a folded map of the progress that each team would make on the journey, a paper invitation that looked like a train ticket, a voting paddle that looks like a station-master's wand, and a memory stick of information disguised as a luggage tag.

4. 'An experience map is a visualization of an entire end-to-end experience that a 'generic' person goes through in order to accomplish a goal' <<https://www.nngroup.com/articles/ux-mapping-cheat-sheet/>>

5.4.6.8. Plot Theme 8: The lack is assuaged

Resources assembled around the room stood as reminders of activities and conversations completed. The Teams were satisfied they had acquired a sufficiently rich picture of the case to speculate about what could be designed.

5.4.6.9. Plot Theme 9: A new order is established

Orientation 10: Evaluation



The Northumbria team were able to achieve their aim of proposing designs for an approach to boundary interventions by creating paper prototypes. To satisfy themselves that their proposal was worthwhile, the Northumbria Team elected to evaluate their designs by engaging in role play. A scene was enacted in which the proposed boundary intervention was systematically critiqued.

5.5. Summary

In this chapter three studies have been described; two represent the early exploration phase of research while the third marks the beginning of the formal study stage of research.

5.5.1. Reflections on the ‘3-Narratives’ study

The chapter began with a brief description of an empirical study conducted with second-year image-making students, where, concepts for resources and approaches to story work were tested for the first time. Informal assessment of the approach, based in part on the number of successful narratives and in part on the quality of the narratives⁵, concludes that the *Plot functions* did a good job of supporting story work. They enabled common impediments such as doubts about where to begin a story and how to describe a story’s course of events to be set aside. Instead, students’ attention was focused productively on interpreting story content in different ways and experimenting with different forms of expression.

5.5.2. Reflections on the Pilot study

A second empirical study was conducted in collaboration with partners in a small design agency. By integrating novel narrative resources with traditional methods, the

5. See Appendix C1 ‘Mixed-methods used throughout the research’

study sought to observe the entire life cycle of a story from the planning and authoring stage to creation of a presentation-quality storyboard.

In little more than 8 hours of collaborative work and a further 20 hours of refinement, a plausible scenario about the future was composed (see Appendix A5.3 'Pilot study: Final storyboard'). The scenario resonated sufficiently for the participants to declare that they felt better prepared for future situations of the kind described in the scenario.

P1: I have to say, I find this kind of thing always difficult [...] I think 'What's the point?' But, actually, I can see the point. Because it might be an imaginary scenario, but all of the things that are there are very real, very interesting dilemmas. And they are things that we WILL encounter and we have encountered.

5.5.2.1. The approach

Though the approach taken to scenario development followed a traditional pattern, beginning with a written text and culminating in a naturalistic storyboard, the way *storienteering* resources drew attention to thinking the story through rather than simply getting the story down began to suggest fruitful alternatives were possible.

5.5.2.2. Scenario planning is not straightforward

Working with Schoemaker's scenario planning method was not straightforward. A critical review of Session 2 cast doubt, first, on whether the concepts that had been identified were driving forces or merely *focal issues* that underpin driving forces (Schoemaker, 1995:29) and, second, on whether the 'right' story was being told. The first attempt to pinpoint the focal issue of the scenario planning exercise resulted in 'not actually much of a story, more of a situation' (P1). Good research, judgement, skill and care are needed to both get the right story and the story right.

5.5.2.3. The usefulness of narrative resources

The study demonstrated the usefulness of narrative resources. The pairing of Dial-a-Plot and Event cards was instrumental in helping P1 and P2 transform what they had learned about themselves and the critical elements and driving forces at work in their future into a narrative that afforded discussion and deliberation.

Proverb Randomizer prompted the use of metaphors that enlivened a conversation about human values and goals. Immediately upon drawing the proverb 'A stitch in time saves nine' both P1 and P2 used metaphors to 'repeat and rephrase' the proverb (Cassell, Gill & Tepper, 2007:46). P1 suggested the investment they would make in

aligning themselves with future trends was like ‘putting the tent pegs in place - stopping the whole thing from blowing away’ while P2 added that ‘you don’t keep climbing a rock face without putting the pitons in place’.

Development of the scenario matrices demanded a very different way of thinking and working than development of the narrative. Though Event Map was not procedurally straightforward to complete, it and the rough storyboard enabled the Teams to move story work on. There was a shift in activities oriented towards one purpose; that of *getting the right story*, to those oriented towards another purpose; that of *getting the story right*. There was an equal shift in the Team’s orientation towards thinking and working in one way; typified by researching, planning and strategising, to thinking and working in another way; typified by synthesising, creating and story-spinning.

The importance of such insights about resource functions becomes more evident as the research progresses. In this regard, it’s worth noting here that similarities can be seen between the way resource couplings function to afford multiple views of a story, and the various forms given to Use Cases function to afford multiple views of a case (see Section 2.2.6 ‘Use cases’).

Event mapping brought the ordering of events and the logic of the story into focus for P1 and P2. It prompted them to cast their thoughts forward to anticipate what might happen, and back to appreciate how such events might come about. The final order and number of kernel events was surprising. In order to develop a coherent narrative, some events needed to be added while others needed to be rearranged. While doing this, it was realised that one kernel event in particular resonated and imparted additional meanings to several other events (see Figure 5.8). More than any other event in the future scenario, Kernel event 3, which raises concerns about whether ADQ is able to take on a large contract, touches on their aspirations, hopes, concerns and fears; the things that motivate choices and actions. In the same way that keystone ideas resonate and impart additional meanings to the most prominent ideas in a narrative, this kernel event stood out as one without which all the resonant meanings in the story would be lost. The possibility arose of naming it a ‘keystone event’.

Though rough and ready and making little sense to anyone other than those who created it, the notes, markings and annotations on the rough storyboard represented the conversation that had already taken place and prompted others that needed to take place. ‘[E]ndowed with a structure that can be isolated from the whole of the message’,

the rough storyboard with its details of narrative content stood as a manifestation of Bremond's 'layer of autonomous significance' (in; Chatman, 1980:19-20). So useful was it that in later studies the rough storyboard was adopted into the collection of narrative resources as 'Visual Plot-line'.

5.5.2.4. Resolution

The week after the last session was conducted, P1 and P2 had a real-life situation that bore a striking resemblance to the one that had been described in the 'Holy Grail' scenario. When the subject of confronting one's own beliefs and desires was raised, P1 and P2 were articulate in showing empathy for their 'future selves'.

P1: I identified with some situations [...] And [realised that] actually we can lose a lot. And I guess that's the thing. It's a risk. And the risk is, there's a reward, we need or we want. But if we lose, we can really crash. And I was identifying with it, actually, and I think it was coming from all these copyright issues. Our future selves? I know how they feel, yeah!

P2: They are not sleeping at night.

5.5.3. Reflections on the Innovation workshops

The last case study in the series consisted of two innovation workshops. The workshops, conducted with colleagues from Northumbria and Delft universities, afforded the opportunity to observe designers and design researchers working together with the support of story, narrative and narrative resources to address a challenging research question: is it possible to design an approach to boundary interventions?

The interpretivist view of events has afforded a constructivist stance on truth, giving two readings that take up distinct yet complementary perspectives on design work (Given, 2008:302). Following Dewey (1938), the first reading views design work as an act of inquiry, while the second views design work as storytelling.

It became evident from this study that one of Dial-a-Plot's primary functions was to challenge design teams to transform information often couched in general and abstract terms into narrative particulars that are unequivocally particular and concrete. The case story only became meaningful, concrete and memorable once unfamiliar actors acquired identifiable personality traits and motivations that, in relation to each Team member's experience, could be connected by logic or reason to happenings, actions and events. Though fictional, the missed milestone event experienced by Addo's research team exposed tensions in the CEO's development team and hinted

at possible underlying motivations for actions which made the story, and analogies that could be made between the story and the actual case, memorable. Though part of the conversation that takes place around Dial-a-Plot involves logic and rationality, an examination of where meanings arise – for instance in the discovery of keystone ideas and through humour, confrontations and agreement – are a reminder of how important the roles of motivations and emotions are in story work (Schwartz, in van der Heijden et al., 2002:xi-xii).

A second insight about how Dial-a-Plot functioned in the study stems from the heated debate that took place about the role of the case scenario. Although Dial-a-Plot introduced an element of chance and randomness into the story work, the story content itself – that is, what and who the story was about and where and how the story took place – was never random. The Substance and Form of Discourse may have been fictional or ‘made up’, but the Substance and Form of story Content was drawn from, and was therefore directly related to, contexts that were of paramount interest and concern to the Design Team.

Figure 5.26. The heated debate.



The point that was so vigorously debated concerned whether the scenario depicted in the Visual Plot-line was ‘too made up’ (Figure 5.26).

It is through a direct link between contextual research material and story content that design teams begin to form their ideas about design. Gaps exist until links are made (Cross, 1997:428). It is these gaps that are so confounding to comprehend, and these links that are so difficult to make that they resist being approached incrementally by systematic methods. It appeared to be the case that Dial-a-Plot provided a cognitive ‘springboard’ that helped the Design Team make a tentative ‘leap’ towards an outcome that, because of its playfulness and openness to a set of random Plot Themes, was able to be viewed as hypothetical – a scenario. Yet, to have made that leap and to have forged

a link between inquiry and creative design work, however tentative or contingent it may have been for the Design Team, shed light on how they could work with and reshape the contextual information and, in time and through iteration, come to know what was salient for design. Dial-a-Plot helped the Design Team suspend design judgement without causing creative momentum to stall. In doing so it enabled them to steer the story towards a desired end. As participants in the Pilot study put it:

P1: It might be an imaginary scenario, but all of the things that are there are very real, very interesting dilemmas.

P2: It's fantasy, but it helps you sort out things.

Chapter 6. Later studies

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

Later studies continue to focus on gaining an understand of practice with regard to *how designers work with story, narrative* (A) and supportive *narrative resources* (C).

6.1. Introduction

In this chapter formal studies continue with an IxD Narratives study and two studies that ran concurrently: a series of three Design Fiction workshops and a study in the diffusion of innovation made possible by engaging in the proto-dissemination of *storienteering* resources. Proto-dissemination concerns the dissemination of ‘work in progress’ (James & Busher, 2009:125), such that it provides timely feedback and early indications of impact (for details explanation, see Section 6.4.1 ‘Proto-dissemination’).

IxD Narratives study

The IxD Narratives study was an empirical study in multiple concurrent storytelling that demonstrates the flexibility of resource-based approaches to story work. Using a novel configuration of published methods and narrative resources, teams of interaction design students authored rich interaction scenarios for a learning support system.

Design fiction workshops

A ten-week scoping study for a methodologically innovative research project provided the opportunity to study the targeted creation of narrative resources. Four new resources were created (Visual Plot-line, StoryFrame, Seed stories, Aspect Map), empirically tested and evaluated. A report is given and insights are drawn from responses to questionnaires.

Dissemination of resources

In an experiment designed to gauge interest in narrative resource-supported story work, *storienteering* resources were put directly into the hands of design practitioners. Integrating the dissemination of resources into the research plan enabled a *diffusion of innovation* study to be conducted that shows interest in downloading storienteering resources has been steady since the launch of a website in 2013.

6.2. IxD Narratives study

A study in IxD story work was conducted with 29 students enrolled in a 1st year interaction design course at Northumbria university. Students had been assigned a 2-week Human-centred Design brief to design a learning support system for university students.

Since this study was conducted with approximately the same number of students, useful comparisons can be made with the approach taken in the ‘3-Narratives’ study (see Section 5.2. ‘3-Narratives’).

6.2.1. Approach

The approach consisted of four activities:

1. Word lists.
2. Role Play with ‘20-Questions’.
3. Consolidation of themes.
4. Story-spinning.

The role of story work in the IxD study was quite different from that in the ‘3-Narratives’ study. Rather than being conducted solely in support of skills acquisition for sequential image-making, it was conducted at the front-end of an interactive systems design project in support of creative and strategic thinking. In addition, differences can be seen in the purpose or function of stories. Where, in the ‘3-Narratives’ study stories were based on *Plot functions* and were purposefully fictional, in the IxD study stories needed to be more expansive and dedicated to resolving particular ‘real world’ challenges.

Taking these considerations into account when planning for the study resulted in developing a bespoke combination of resources configured from earlier studies (see Figure 4.1, iv). Instead of Dial-a-Plot and Event cards, Zwicky’s word lists (1967)

performed the role of a *Discourse prompt*. And although the ‘20 Questions’ resource was

used¹, the questions were rewritten to support the brief.

6.2.2. Activity 1: Word lists

Students were given *informative* presentations about story work and storienteering to prime the activities, and the cohort was divided into small groups. Students were then shown how making word lists under such headings as; *actions*, *motivations* and *situations*, could inspire creation of random settings for stories. Once familiar with the basic principle behind the activity, they were asked to field ideas for word lists that were appropriate for their subject of study and suited to supporting conceptualisation of designs. For instance, everyone agreed that a list of *actors* would be useful, and 'tablet' was proposed as one of the words under that heading. The lists were colour-coded and similarly coloured dice were thrown to create random combinations of words that evoked settings for stories. Since the purpose of this activity was to encourage conversation, debate and ideation, none of these stories were reified digitally or on paper.

6.2.3. Activity 2: Role play with '20 Questions'

Activities moved-on to role-play with '20 Questions'. As was the case with Innovation workshop 2, it was difficult to create exactly 20 questions; 16 was enough (Figure 6.1.).

1. First used in the Innovation workshops (Section 4.4.1 '20 Questions')

Figure 6.1. '20 Questions' for the IxD brief.

1. Who are the main stakeholders in your system? (these should consider the owners (software developers) the agent (University) and users (students of all kinds).
2. What are different stakeholder needs in a university intranet system, and how do the needs of each stakeholder you've identified differ from each other? (needs differ from wants in that they are focused on achieving a goal quickly and easily)
3. How do their 'wants' differ from their needs, if at all?
4. Does the current intranet system satisfy most or all of the different stakeholder's needs?
5. If it falls short, how?
6. What motivates students to log into the university intranet system?
7. What motivates other stakeholders, such as the University (the agent) or the software developer (owner), to design the current systems it is?
8. How do you see these motivations being met? (particularly if they are in conflict)
9. How will your system support core features of a student intranet system, such as management of learning modules and other curriculum-related materials?
10. What features differentiate your system from that of others, i.e., what are it's particular strengths? (current system, those elsewhere, other candidate systems)
11. Would you compromise some of the features of the existing system in order to introduce new features of your own design?
12. Which ones?
13. Why? Give a rationale.
14. What kind of web and mobile integration does your system offer?
15. What unique benefit does it provide?
16. Can you describe a use case or scenario that reflects some of the key benefits of using your system?

Figure 6.2. Role-play with '20 Questions'.



Simulating a design setting in the classroom by taking on the roles of case expert and questioners, the '20 Questions' resource enabled each team to engage in conversation and debate about the contexts for their designs (Figure 6.2). During the activity, questioners used Post-it notes to record references made to themes that were agreed by everyone to be central to their designing by story and narrative. The themes were; 'actors', 'situations', 'features' and 'benefits'.

6.2.4. Activity 3: Consolidation of themes

Figure 6.3. Creating and reviewing affinity diagrams.



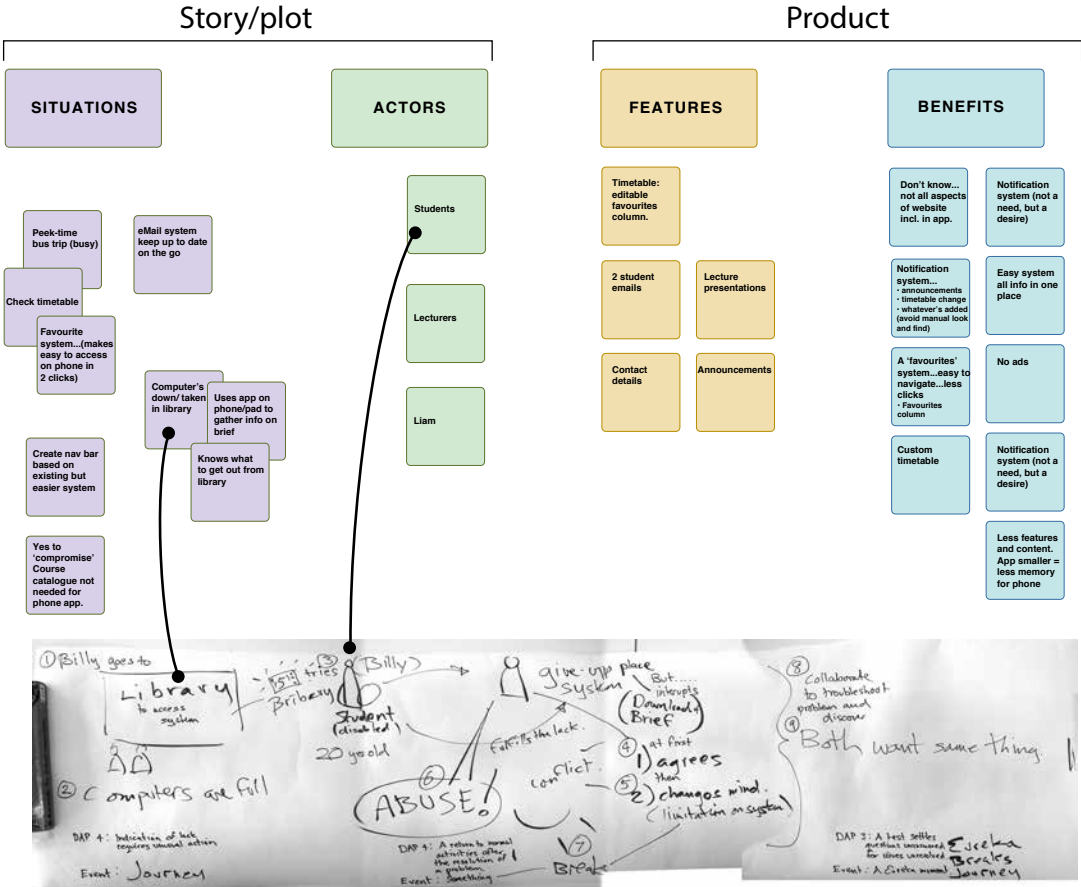
The theme-inscribed notes were then moved to a wall, whereupon affinity diagramming techniques were used to find alignments and patterns in what then could be treated as data (Figure 6.3). As was noted in Innovation workshop 2, orienting to toward a narrative when one is confronted with a logical arrangement of contextual information is no easy task.

6.2.5. Activity 4: Story-spinning

Therefore, taking one group's work as an example and following the approach to story-spinning that was taken in Innovation workshop 2, a demonstration was given of how Dial-a-Plot, Event cards and Visual Plot-line could be used to rapidly develop

the plot-line of one of many possible scenarios. Here, the roles that students had taken up during the '20 Questions' activity were taken up again. During development of the Visual Plot-line, case experts were asked to give advice on the facts of the case, while questioners were able to give their interpretation of what had been discussed and what had been revealed.

Figure 6.4. Linking themes in narrative development.



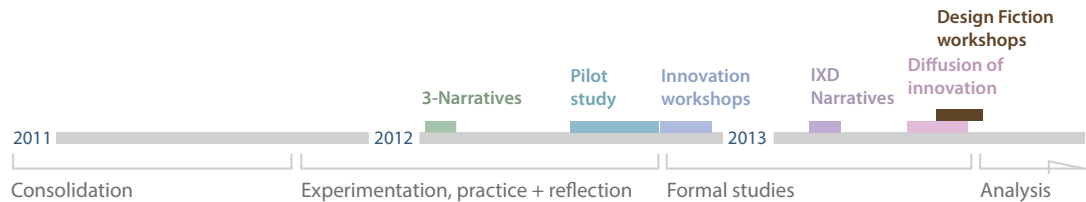
A post-study diagram (Figure 6.4; for enlargement, see Appendix A7 'Storienteering in interaction design') shows how some of the themes drawn from the student group's affinity diagram link to scenes (events, happenings) inscribed on the Visual Plot-line. After the demonstration, other student groups were able to create their own Visual Plot-lines.

6.2.6. Outcomes

No formal analysis of this study was conducted. However, post hoc critical reflection suggested two things. First, that approaches to story-spinning with narrative resources and narrative resources themselves could be adapted to larger collaborative settings. Second, that, although simulated in a student project, these approaches and resources

proved to be as useful in interactive design as they had been for resolving a theoretical question about boundary interventions (see Section 5.4 ‘Innovation workshops’).

6.3. Design fiction workshops



In June 2013, a 10-week internship was taken up at the Horizon Digital Economy Research Institute, Nottingham, UK. ‘Charting the Digital Lifespan of tomorrow: Research through Design Fictions’ was a 3-year EPSRC-funded research project that focused on the design of socio-technological systems to support near-future generations whose use and dependency on digital media will span a lifetime. The project focused on transformational stages of life, such as ‘approaching adulthood’ and bereavement.

In the early stages of the project timeline, design fictions were to be used as part of a Research *through* Design (RtD) methodology. In anticipation of this, a scoping study had been planned, the purpose of which was to develop approaches and resources for independent authorship of design fictions that would support design work scheduled to take place later in the project. Throughout the internship, I worked with principal researchers PR9 and PR10, who also engaged as active participants in the studies.

6.3.1. The aim

The workshops were taken as case studies since they afforded opportunities to test the robustness of theories and heuristic practices underpinning the targeted creation of narrative resources. The work raised important questions about how existing resources and approaches might be adapted and how new resources and approaches might be developed to fit particular situations. Study outcomes were to be used by principal researchers to support strategic conversations with stakeholders at a later date (Design for Research). The main aim of the case study, therefore, was to assess the extensibility of narrative resources and resource-based approaches.

6.3.2. The approach

The approach was adapted from the configuration of scenario planning and narrative resources used in the Pilot study (see Section 5.3.2.2 ‘Session 2: Scenario planning’), and followed the same Research *through* Design methodology used in the Innovation workshops. Here, however, with designers rather than researchers as beneficiaries and support needed for an impending ‘real-world’ design project, greater emphasis was placed on the Research *for* Design component.

The fact that design research practice was being used to inform and support the work of other design researchers, greater emphasis was placed on Research *for* Design.

Two pilot studies and a formal study in Design Fiction storytelling were conducted to evaluate novel approaches that used equally novel narrative resources.

6.3.3. Design fiction workshop 1

The first Design fiction workshop was a 40-minute seminar/semi-formal interview with two design researchers who were working on another Horizon project. P11 has a psychology background, and P12 an interaction design background. Principal researcher, PR10, observed while this researcher conducted the study.

6.3.3.1. Aim of the study

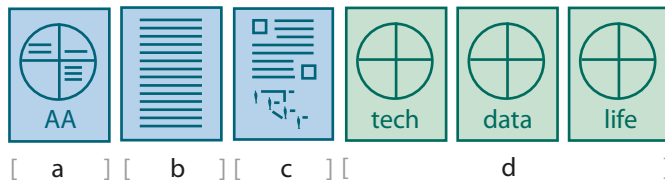
The aim of this study was to evaluate the extent to which a Design Fiction expressed through a particular configuration of narrative resources captures or invigorates discussion around questions and issues related to a given topic.

6.3.3.2. Orienting activities

There was no plan to author a Design Fiction during this short study. Rather, in advance of the workshop an existing Discourse prompt, Plot Themes, was adapted to help author a Design Fiction. It later became known as StoryFrame.

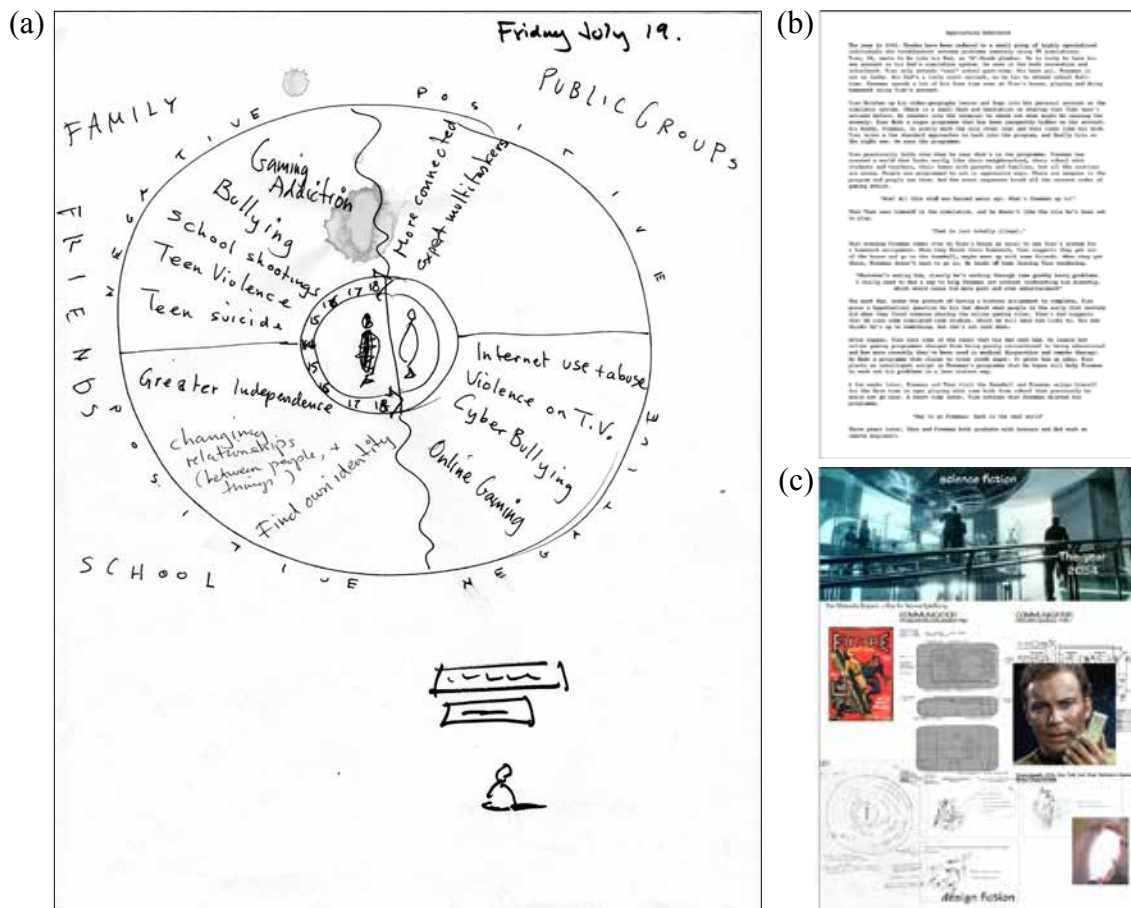
In advance of the study, a number of novel resources were developed in order to orient participants to the research subject and the evaluation they would make of the Design Fiction. Many of the resources were intended to have multiple attributes, at times serving to prime participants by informing and inspiring action, at others sensitising participants to particular topics or issues.

Figure 6.5. Resource package: Design fiction workshop 1.



For each study, icons from the graphical notation system (see Section 7.2.1.1 ‘Graphical notation system’) help to summarise resource packages (Figure 6.5). The icons are colour-coded to describe the way they function for design. Blue is *directive*. Green is *acquisitive* (for full list, see Section 2.2.9.5 ‘Resource functions’)

Figure 6.6. Narrative resources as sensitising materials.



Three of the four narrative resources that were used in Design fiction workshop 1 acted as sensitising materials; an Aspect Map pre-inscribed with themes related to the subject of Approaching Adulthood (AA; Figure 6.5, a; Figure 6.6, a), a Seed story (Figure 6.5, b; Figure 6.6, b) and an information sheet (Figure 6.5, c; Figure 6.6, c; for a readable version see Appendices A9.3). In addition, three un-inscribed Aspect Maps were used to *harvest* concepts about technology, data, and lived experience (Figure 6.5 d).

6.3.3.3. The Seed story

The year is 2062. Trades have been reduced to a small group of highly specialised individuals who troubleshoot extreme problems remotely using VR simulations. Tien, 16, wants to be like his Dad, an "A"-Grade plumber. He is lucky to have his own account on his Dad's VR simulation system. His best pal, Freeman is not so lucky. His Dad's a lowly civil servant, so he has to attend school full-time. Freeman spends a lot of his free time over at Tien's house, playing and doing homework using Tien's account

Tien finishes up his video-geography lesson and logs into his personal account on the VR simulator system. There is a small flash and hesitation on start-up that Tien hasn't noticed before. He reaches into the terminal to check out what might be causing the anomaly. Tien finds a rogue programme that has been inexpertly hidden on his account. His buddy, Freeman, is pretty much the only other user and this looks like his work. Tien tries a few standard approaches to hack into the program, and finally hits on the right one. He runs the programme.

Tien practically falls over when he sees what's in the programme. Freeman has created a virtual world that looks eerily like their neighbourhood, their school with students and teachers, their homes with parents and families, but all the character personalities and routines are wrong. People are programmed to act aggressively. Weapons are involved. The event routines break all current codes of gaming ethics.

"Wow! All this identity theft stuff was banned aeons ago.

What's Freeman up to?"

Then Tien sees himself in the simulation, and he doesn't like the role he's playing.

"That is just totally wrong....and illegal."

That evening Freeman comes over to Tien's house as usual to use Tien's system for a homework assignment. When they finish their homework, Tien suggests they get out of the house and go to the GameMall, maybe meet up with some friends. When they get to the GameMall, Freeman doesn't want to go in. He goes home, leaving Tien wondering.

“Whatever’s eating him? Clearly he’s working through some pretty heavy problems. I need to find a way to help Freeman without confronting him directly. That would cause him more pain and embarrassment”

The next day, under the pretext of having a history assignment to complete, Tien poses a hypothetical question to his Dad about what people in the early 21st century did when they found someone abusing the online gaming rules. Tien’s dad suggests that Tien runs some simulated case studies. His mum thinks he’s up to something, but she’s not sure what.

After supper, Tien runs some of the cases that his dad sent him. He learns how online gaming programmes changed from being purely recreational to being educational and how more recently they’ve been used in medical diagnostics and remote therapy. He finds a programme that claims to help with youth anger problems. Tien has an idea. He plants an intelligent script in Freeman’s programme that he hopes will help Freeman to work out his problems in a less violent way. A few weeks later, Freeman and Tien visit the GameMall and Freeman enjoys himself for the first time in ages playing with some kids from school that previously he would not go near. When Tien next logs into his account, he notices that Freeman has deleted the rogue programme.

“Way to go Freeman! Welcome back to the real world”

Three years later, Tien and Freeman both graduate with honours and find work as remote engineers.

6.3.3.4. The approach

The research and the approach that would be taken to the study were explained to the participants, and resources were introduced and discussed. Participants were then asked to read the prepared Seed story and comment on whether it and the collection of resources could support strategic conversations on the subject of approaching adulthood in a technologically advanced future.

While the Aspect Map prompted participants to consider the positive and negative aspects of both the ‘real world’ and virtual world, the Seed story provided contextual information that helped participants imagine how some of the issues facing teenagers in an advanced technological future might play out. Meanwhile, the information sheet,

which described the theoretical relationship between science fiction and Design Fiction and gave examples of successful products and technologies inspired by science fiction, sensitised participants to the approach's origins and gave weight to its use.

6.3.3.5. Responses

P12 suggested that the approach could work 'as a brainstorming session, provoking and stimulating ideas', but also thought it wasn't 'convergent enough' to support creative design work. The Seed story was viewed as 'something that stimulates ideas and brings all these issues to the top' (P11). P12 concurred that it provides 'very good background' for discussions that enabled participants to 'view these nice possible options for possible scenarios', but was not generative enough to enable participants to conceptualise future technologies (PR10). The following suggestion from P12 informed the approach taken to Seed stories in the next study.

MJ: How do we have Design Fictions without using that 'trick' of talking about technology to project something into the future?

P12: You don't provide an ending [...]. Perhaps your story stops where [the protagonist is] having emotional problems, and then start the discussions.

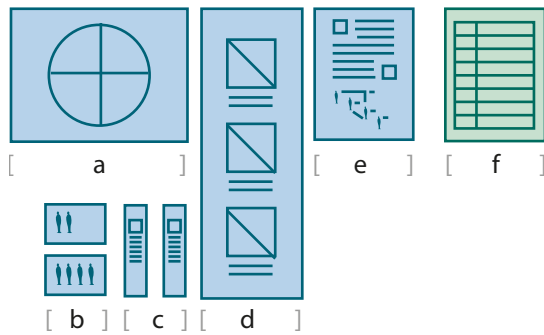
6.3.4. Design fiction workshop 2

Design fiction workshop 2 had the same aims and objectives as Design fiction workshop 1. That is, in support of design work that would take place later in the 'Charting the Digital Lifespan of tomorrow' project, to test the usefulness and efficacy of a Design Fiction authored with a set of prototype resources and bespoke approaches.

The approach was modified in response to feedback from the first study. For example P12s comment (above) prompted a review of priming materials. As a result, one planned approach was abandoned because it seemed to be too prescriptive (see <http://malcolmjones.com/making/approachAdulthood.html>) and, instead, the Seed stories were reduced and simplified to provide little more than a brief beginning (see Figure 6.12). Having no end encouraged participants to use their imagination to complete the story.

Again, two participants took part in the study, both of whom were researchers chosen for their backgrounds in fields other than design. P13 has a systems engineering background, and P14 a computer science and UX background. Principal Researchers PR9 and PR10 were present.

Figure 6.7. Resource package: Design fiction workshop 2.



Narrative resources used in this workshop included; An Aspect Mapping kit with theme tags (a), protagonist identity cards (b), printouts of protagonist's conversation (c), sensitising material (d), a Seed Story (e), and StoryFrame (f).

6.3.4.1. Orienting activities

Figure 6.8. Priming email.

Emails from the future

Sent: 25 July 2013 09:46
 To: jeff@redingham.ac.uk, Victoria.Shead@redingham.ac.uk
 Cc: Sarah.Hartman@redingham.ac.uk, steve@redingham.ac.uk

Following transmissions picked-up today from year 2062. Quality poor.

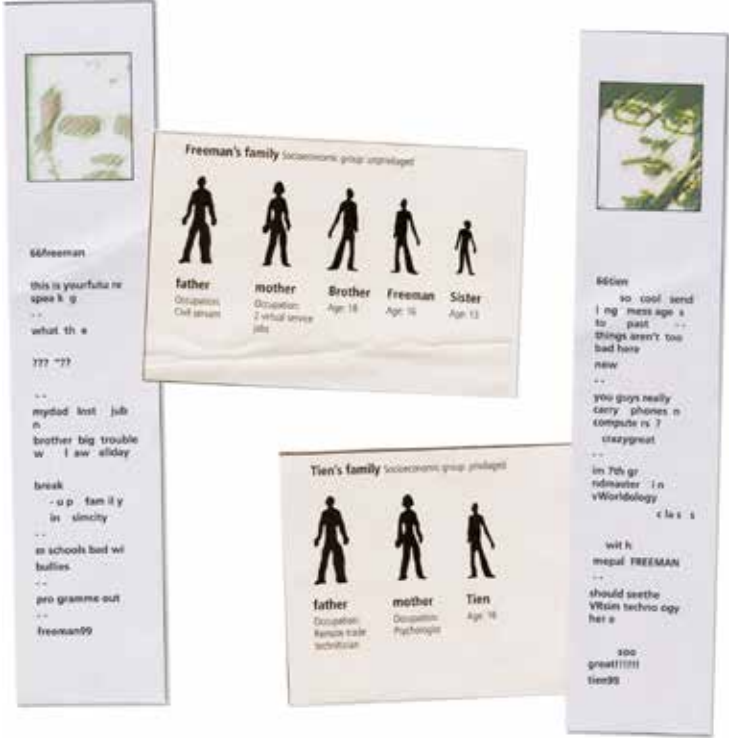
66tien
 so cool send i ng mess age s to past -- things aren't too bad here
 now
 --
 you guys really carry phones n compute rs ?
 crazygreat
 --
 im 7th gr ndmaster i n vWorldology
 c la s s

wit h
 mepal FREEMAN
 --
 should seethe VRsim techno ogy her e
 soo great!!!!!!
 tien99

66freeman
 this is yourfutu re spea k g
 --
 what th e
 ??? "??
 --
 mydad lost jub n l aw allday
 brother big trouble w
 break
 - u p fam il y
 in simcity
 --
 m schools bad wi
 bullies
 --
 pro gramme out
 --
 freeman99

In order to prime participant engagement, an anonymised email was sent to them on the morning of the study (Figure 6.8). It contained a garbled message from the future that introduced the protagonists, Tien and Freeman, and hinted at their predicament.

Figure 6.9. Sensitising materials; ticker tape printouts and identity cards.



Two props helped participants to understand the scope and content of the story. Figure 6.9 shows 'ticker tape' printouts of the two protagonist's messages from the future along with their identity cards, which describe familial details.

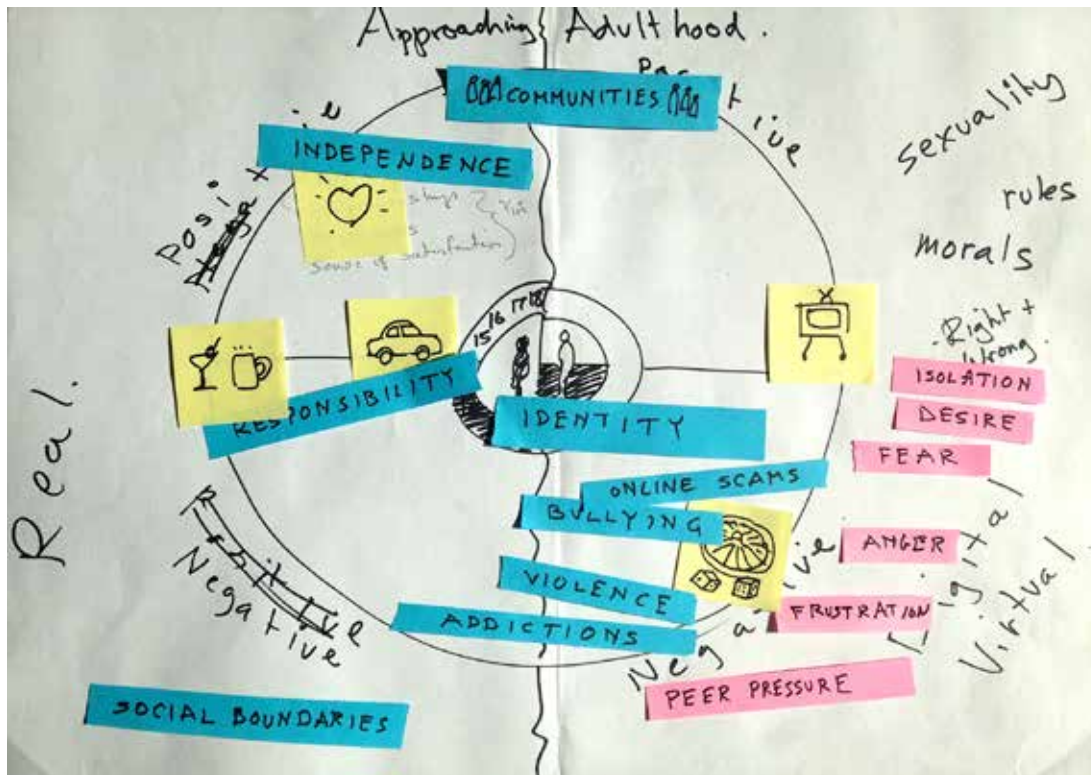
Figure 6.10. Sensitising materials; printed banner.



Sensitising participants to the social and technological aspects of Tien and Freeman’s future world was further achieved through a printed banner (Figure 6.10). The banner addressed three broad themes that had been identified in the early stages of the study (see Appendix C10 ‘Charting the future of digital bereavement’).

6.3.4.2. Aspect mapping

Figure 6.11. 'Approaching adulthood' Aspect Map.

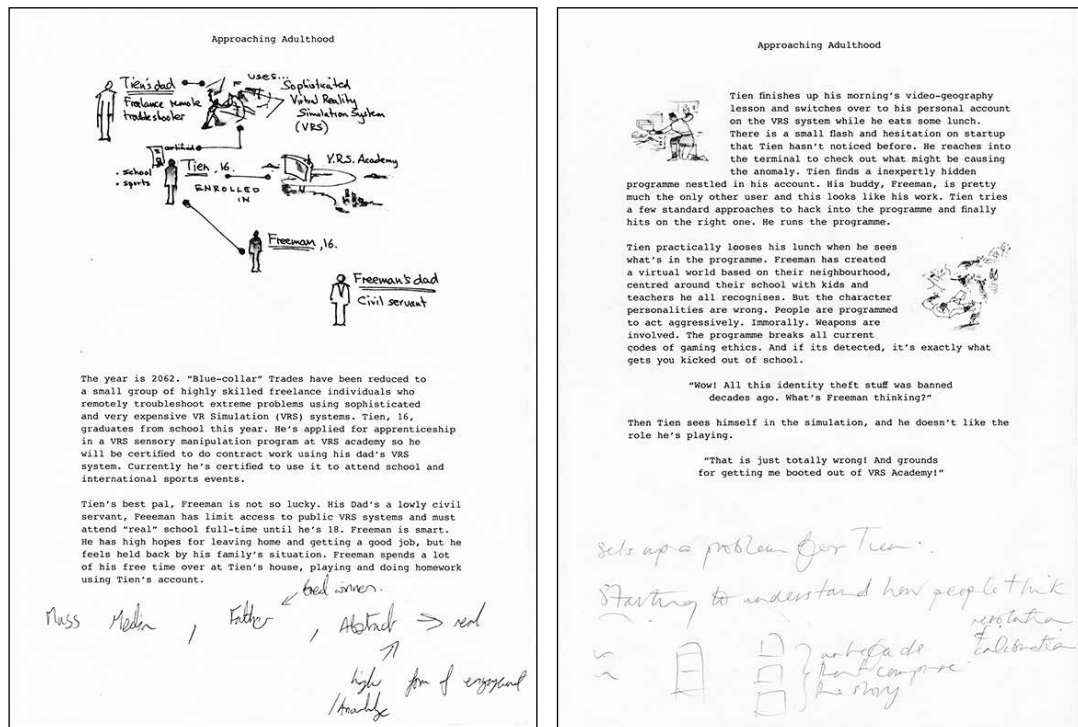


Instead of presenting participants with a pre-inscribed Aspect Map, they were invited to collaboratively map the subject of 'Approaching adulthood' using a prepared 'kit'. The kit included a sheet of paper inscribed with a circle, a set of theme 'tags' (themes inscribed on strips of paper), visual cues (yellow notes), and markers. Figure 6.11 shows the map that was produced with the kit.

6.3.4.3. Story spinning

Participants were asked to put themselves in the position of those in the story, to draw on episodic memory and personal experience to consider what it might be like to be a teenager coming of age in such a world.

Figure 6.12. Priming materials: Illustrated back-story and Seed story.



Collaborative story spinning began with reading an illustrated synopsis of the back-story (Figure 6.12, left; Appendix A10.1 'The back-story') and the Seed story (right; for enlargement see Figure 4.22). StoryFrame guided completion of the Design Fiction.

On completion of the Design Fiction, participants were asked to respond to the following question, Can these resources used in this way support the development of Design Fictions of this kind amongst research stakeholders?

6.3.4.4. Response to Design fiction workshop 2

The approach that was taken to conducting the study succeeded in supporting a rapid and robust conversation on a futuristic topic. In 90 minutes participants had learned enough about a challenging topic and supportive resources to author a fiction that could underpin design work.

The narrative resources enabled participants to engage in activities rapidly. For P13, the priming resources '...get your brain visualizing', while for PR9 the Seed story helped make imaginative leaps, and StoryFrame was good for 'grounding the leap, otherwise it can be frustrating... you end up in such an abstract space with nothing to hook into'.

The resource-based approach supported exploration of the research topic from multiple perspectives, which allowed participants to identify and discuss a wide range

of related topics and issues, such as ‘personal freedom’, ‘life roles’ and ‘happiness’ (PR9), ‘responsibilities’ and ‘moral dilemmas’ (P13), ‘social standing’ and ‘privilege’ (P14), as well as ‘truth’, ‘honesty’, ‘deception’ and ‘honouring friendships’.

6.3.5. Design Fiction formal study

A formal study in resource-supported Design Fiction authorship was conducted on August 22, 2013 at Northumbria University, Newcastle.

Two principle researchers (PR9 and PR10), six guest participants and myself (MJ) took part in a three-hour Story Spinning workshop. Guest participants were chosen for the diversity of their backgrounds, however all had connections to universities either as lecturers, researchers or graduate students: P4 from interaction and product design, P16 from computer science, and P17 from communication design; P19 from fashion, P18 from software engineering, UX and interaction design; and P15 from HCI design theory.

The subject of the Design Fiction was bereavement, a subject for which the principle researchers had already developed a fictional socio-technological system called VIVIEN (Virtual Information Vault and Inference Extraction Network).

6.3.5.1. Aim of the study

The aim of the study was, first and foremost, to make a summative evaluation of the bespoke approach to Design Fiction authorship that had been developed and refined through self-reflective design experiments and two studies. Evaluating the usefulness and efficacy of the novel narrative resources was of particular interest, as was the question of how in Design Fiction authorship, a fruitful balance can be achieved between descriptions of story content and propositions that either raise or address design research questions such that the conversation supports design work.

6.3.5.2. The approach

Three activities were planned for the workshop. However, only two were completed. The first activity was supported by StoryFrame. Its aim was to analyse and expand on two given Seed stories and map Subject Themes onto an Aspect Map (an activity later recognised as *Framing* (see Section 8.2 ‘Framing’)). The second activity involved reflecting on the Aspect Map and Plot Themes in order to create a Visual Plot-line (later recognised as *Forming* (see Section 8.3 ‘Forming’)).

The Design Fiction was prepared in advance of the workshop. It consisted of two vignettes, 'short written prompts' (Hughes & Huby, 2004:38) that are referred to as Seed stories. While one described the 'set-up' of the story, the other described its 'resolution'. To prime participants for story work the set-up Seed story was emailed to them on the morning of the workshop, whereas the resolution Seed story was given to participants upon arrival. StoryFrame played the same role as it did in the second Design fiction workshop; helping to draw out and structure the story. But the Aspect Map played a different role. Rather than being used at the outset to sensitise participants to the future world, first it acted *acquisitively* to capture participants' thoughts as they learned to grasp the fiction, then it acted *directively* to support the creation of a Visual Plot-line.

Figure 6.13. Resources package: Formal study.

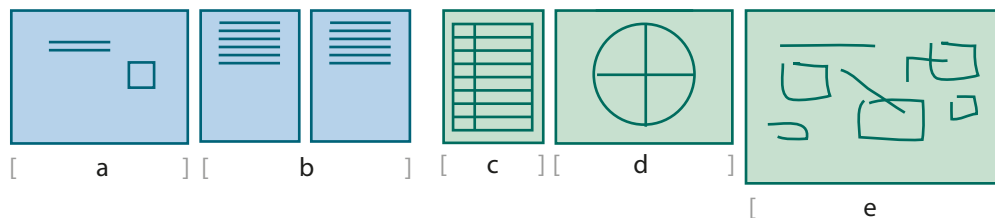


Figure 6.13 shows the narrative resources used in the formal study. They included a Session Document (a), two Seed stories (b), an un-inscribed StoryFrame resource (c), an Aspect Map (d) and Visual Plot-line (e).

6.3.5.3. Seed stories

Actants in the seed stories are life partners, Iris and John, and 'VIVIEN', a fictional, futuristic bereavement service designed to ease the burden of losing a loved one. In order to both stimulate the readers imagination and imbue the story with a sense of reality, each Seed story was expressed in a different narrative form. The first Seed story took the form of an incident report from the year 2040. In it, Iris' interaction with VIVIEN represents a commitment to preserve part of herself for John.

Following transmission picked-up today from year 2040:

Quality: Good.

Source: VIVIEN

Begin transmission:

--

VIVIEN: request signature.

Iris presses her finger to the keypad.

VIVIEN: confirm identity.

Iris: 'There. It's done.'

Iris comforts herself with the thought that she's made an investment in an inevitable future.

VIVIEN: allocate server space.

It's an investment for John – friend, lover, husband for 35 years – an investment for his future.

VIVIEN: begin data compilation.

Iris has had the worst kind of news imaginable. One day soon she'll be gone and John will be on his own.

VIVIEN: care.

--

End transmission.

Taking the form of a motion-picture script, the second Seed story described a scene in a palliative care ward that takes place sixteen years later.

02:46, December 14, 2056. Palliative care resident bedroom, interior.

There's a soft knock on the door. John is asleep. Oxygen gauges flicker and the heart monitor shows increased activity. John stirs a little on his pillow.

Another soft knock on the door.

John: Is that you Iris?

The door swings slowly open.

John: Iris?

Iris: Hello John.

John: Iris? Is that really you?

Iris: Yes John. It is me. How are you?

Silence.

John hears Iris walk over to the bed. He feels the air in the room move, then a slight pressure on the bed covers near his hand.

A long silence.

John has lost his sight and can now barely move.

John: You're not Iris are you?

Iris: I am everything that Iris once was
(John feels a hand cupped in his).

Iris: I am here.

John: Help me remember.

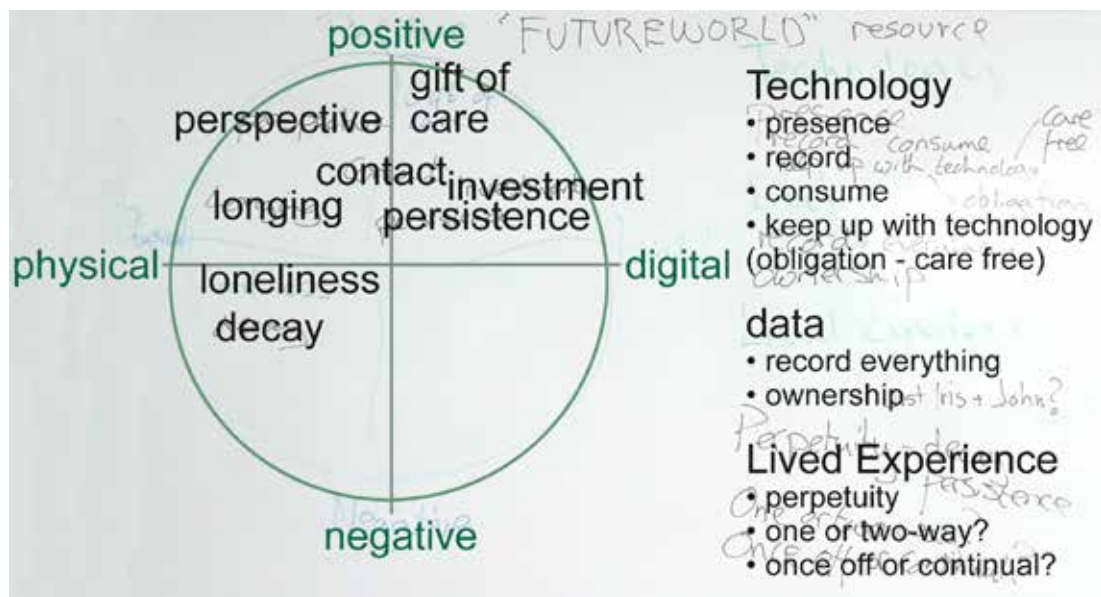
6.3.5.4. Introduction to the workshop

Participants were introduced to the approach, the topic of Design Fictions and the subject of bereavement by means of a paper-based Session Document. The narrative resources were explained and everyone was given a copy of StoryFrame.

With MJ acting as discourse moderator and PR9 and PR10 acting as prompters to keep the research questions in focus, the group engaged in a strategic conversation to author the Design Fiction.

6.3.5.5. Activity 1: Interpreting Seed stories: Mapping the future world

Figure 6.14. The 'Future World' Aspect Map.



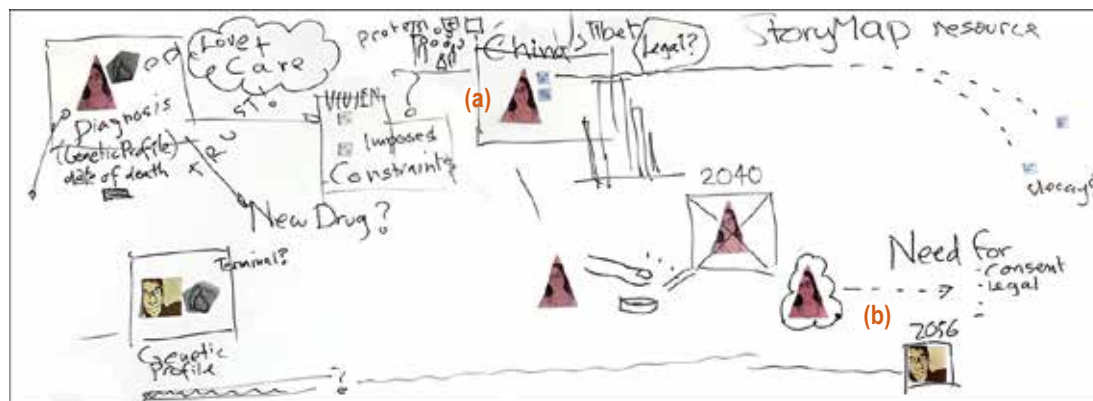
The outline of an Aspect Map was drawn on one of the whiteboards. With StoryFrame sheets in hand, participants were asked to consider how each Plot Theme might be interpreted based on what they could infer from the Seed stories, and, as concepts were fielded, to consider which were worthy of noting on the 'future world' Aspect Map. Eight concepts were fielded (Figure 6.14 within the circle); gift of care, perspective, contact, investment, longing, loneliness, persistence, and decay). During story-spinning a further nine concepts were listed under the headings; 'technology', 'data', and 'lived experience'.

Table 6.1 The Design Fiction

Plot Theme	Design fiction
There is a lack or need.	John and Iris have trouble dealing with the social discourse around Iris' impending death.
An agent recognises a lack or need.	Iris recognises that John is having difficulties managing the discourse. John recognises that he is having difficulties.
Something threatens or prevents an agent from satisfying the lack or need.	Facebook does not allow John to manage the social discourse well.
An agent seeks help to satisfy the lack or need.	VIVIEN is there to help.
An agent receives help.	John receives help from VIVIEN when he sees an ad.
An agent is required to complete a task or test to either, a) get the help, or b) satisfy the lack or need.	VIVIEN must find ways to manage the social discourses associated with Iris' passing.
An agent completes the task or test.	VIVIEN sends a gift box to John.
The lack or need is concluded with either positive or negative results.	John and Iris no longer feel they need to worry about their social discourse. VIVIEN seems to have done the right thing.
A 'new order' is established. An agent's status is raised.	VIVIEN saves the day. But John is also seen in a new light by Iris when he is visibly touched by her presence.

Demonstrating the usefulness of StoryFrame in story-spinning activities, Table 6.1 summarises the design fiction about Iris and John that emerged from the strategic conversation that took place around each of the nine Plot Themes.

Figure 6.15. Visual Plot-line.



6.3.5.6. Activity 2: Story Spinning: Creating a Visual Plot-line

With the story verbally expressed and the Aspect Map complete, the group's attention was drawn to an adjacent whiteboard where the next activity involved reifying the story as a Visual Plot-line (Figure 6.15). The group rethought and retold the story by once again methodically working through the Plot Themes. As they did so, details of the story became clearer and more precisely described. For instance, it was decided that Iris would have to go to somewhere like Tibet to press the button that will activate the VIVIEN programme (Figure 6.15, a). And, significantly – for it represents the keystone idea – it was proposed that the motivation for John and Iris agreeing to invest in the programme is their need for a legal signatory that will ensure John's ongoing care when Iris is gone (Figure 6.15, b).

There wasn't enough time to complete the last scheduled activity – representation – however the group had engaged with the approach and succeeded in sketching out a fictional world that embodied important experiential questions and propositions.

6.3.5.7. Insights from the Design Fiction formal study

Insights from the Design Fiction formal study are drawn from answers given to a written questionnaire completed at the end of the formal study (see Appendix C11 'Design Fiction Formal Study: Questionnaire feedback').

The extent to which the design fiction touched on interesting research questions

When asked to what extent the Design Fiction touched on interesting research questions about digital bereavement, P15 suggested it raised questions about 'Virtual agency, trust, [and] longevity' whereas, for P16, it 'raised interesting legal and ethical issues'. P16 was 'not sure that they raise technological or HCI-type issues', though did not rule out the possibility that they could. Valuable questions that P19 connected with were 'legacy of self', 'identity and its communication through the portal of technology'.

Suggestions for improvements to resources and approaches

Suggestions for improvements as to how the Design Fiction might be presented included, 'presenting it as a forking path-type fiction' (P17), and 'interactive hypermedia to present the many options generated for the [Plot Themes]' (P15).

The experience of collaborative storytelling

When asked about their experience of collaborative storytelling, participants found it to be 'great', 'positive' and 'stimulating'. One participant thought that it was '[i]nteresting how the course of the story became modified and the various contributors to the story happily allowed modifications to their conversation' (P19).

The usefulness of storienteering resources

Two participants mentioned that StoryFrame was 'helpful for getting started' (P17 and P16). By inferring a sequence of events, in some situations StoryFrame may serve the same function as Event Map. P15 found that '[s]ome [Plot Themes] were distractions most of the time'. Adhering to Plot Themes too rigidly may interfere with the flow of discourse during authorship. However, such cautions could well apply to all methods and resources. For the Plot Themes in question, a counter-argument can be made for themes that, like the Proverb Randomizer, 'deliberately induce a high degree of turbulence and conversation' (van der Heijden et al., 2002:5).

For P17 ‘the [Visual Plot-line] was a great way of bringing the group together’, and for P16 it also ‘helped to see what was missing and prompted suggestions’. The Aspect Map was thought to be a ‘good log’ (P16) or ‘useful repository’ (P19). Although for P17 it was ‘too hierarchical while in creative mode but would be really helpful later when reflecting’. Finally, the Seed stories ‘stimulated ideas’ (P16), and allowed P19 to ‘reread, check and gestate to develop ideas’.

6.4. Dissemination of resources



Empirical studies have their limitations. One significant limitation is the fact that the researcher is an ever-present influence. If *storianteering* resources were to be offered as support for making scenarios more worthwhile, they and their methods of use needed to be conveyed to design practitioners or be self-evident. How could they be put into the hands of design practitioners without over-prescribing use? Several plans were considered before deciding to disseminate *storianteering* resources via a common promotional technique used by practitioners themselves; that of drawing attention through a combination of direct mail printed materials and a web presence. The ‘campaign’ was viewed as a case study in the ‘diffusion of innovation’.

6.4.1. Proto-dissemination

It is not uncommon in design research for dissemination of findings to occur after studies and analysis have concluded. However, there are arguments for engaging in dissemination much earlier where it can ‘provide feedback to the researcher on their work and focus’ (Donn, 2005:11).

The challenge of communicating findings to beneficiaries helped to consolidate theory. Doing it before the completion of data analysis and before conclusions about *storianteering* resources had been drawn served several purposes. First, it served to make RtD ‘more democratic, transparent, and reflective’ (Branham, Harrison & McCrickard, 2010:2). Second, it informed the targeted creation of resources. Third,

it provided a quantitative complement to qualitative evaluation of the worth of narrative resources.

6.4.2. Diffusion of innovation

Vermeeren and Cockton (2013:1) define diffusion as ‘the process by which an innovation is communicated through certain channels over time among the members of a social system’. In this case the ‘innovation’ was an offering of *storienteering* resources: ‘channels’ were printed posters, direct mailings, corporate publications, social media and the Internet and ‘members of a social system’ were design practitioners active predominantly in the UK. Awareness of the existence of *storienteering* resources was achieved through the staged mailings of more than 300 A2 worksheets to design agencies, notices placed in professional publications such as Digital Union and Digital FUSION, discussions on social media such as LinkedIn and a website/blog where requests for worksheets can be made, resources can be downloaded and supportive information can be accessed (storienteer.info). ‘Take-up’ was measured by the number and distribution of resource downloads and requests for worksheets.

6.4.3. Targeted creation of new resources

Wakkary and Maestri (2008) cite Dewey’s concept of ‘doing and undergoing’ to describe people’s resourcefulness in adapting to their surroundings even as their surroundings adapt to them (1934). The concept accounts for both ‘what we experience and how we experience it’ (Wilson, 2006:407). The resourcefulness and propensity to adapt things at hand that is expected of designers when they use resources is also characteristic of the approach taken in the targeted creation of resources. In the approach that was taken by this researcher, traditional divisions between designer and user break down, but not as they do in participatory design. Rather, from beginning to end, the ‘life’ of a narrative resource is allowed to evolve in a ‘heterogeneous network of social and technical elements’ (D’Addario, 2010:5) where resources acquire functional attributes over time in a continuous process of discovery and adaptation akin to that of an open-source software system or adaptive technology. In such systems, a resource’s origins are indistinct because some resources are little more than re-purposed objects with potentialities for use. Thus, no assertions can or should be made for originality or ownership. Though one designer may begin the process of resource adoption, others may continue to adapt the resource ad infinitum.

6.4.3.1. Identification of audience

The campaign sought to target design-driven enterprises that use scenarios or stories as an *expressive* resource in areas such as design, R&D, management or promotion.

Though, as a profession, design practitioners may appear to be a homogeneous community, in reality they are often embedded in partnerships, agencies or large organisations, such as Philips or Dyson. Only in small partnerships or agencies are designers listed in commercially published contact lists, otherwise reserved for managers, owners and decision makers.

A proprietary database of design workers was created to help identify high-probability adopters of *storienteering* resources (see Appendix A8 'Design worker personas').

This was used to choose a commercially published contact list, from which 180 contacts were sourced. An additional 35 contacts were sourced from the Design Business Association.

6.4.3.2. How resources were shared

It is common in qualitative research to debate epistemological stances and theoretical perspectives. With ways of knowing at the centre of these debates, it is also common for qualitative researchers to explore the relationship between form of representation and form of understanding (Eisner, 1997:4). According to Eisner (*ibid.*), explorations such as these 'are rooted in an expanding conception of the nature of knowledge and the relationship between what one knows and how it is represented'.

How can what was known about narrative resources be represented in such a way that intended beneficiaries will recognise their worth? Nye (in Given, 2008:20) contends that 'researchers should plan for three publications: those aimed at scholarly audiences, those written for practitioners, and those aimed at lay people'.

The challenge of communicating new resources and approaches to design practitioners lay in understanding them as an audience by recognising their aversion to taking on board yet more tools², taking directives from design research³, understanding the circumstances in which they might first encounter *storienteering* resources, and finding the right language and 'tone of voice' to speak to them with.

To engage in a conversation with design practitioners, therefore, the 'voice of the design

2. In recent years, design practitioners have been exposed to numerous tools for designing (see Section 2.1.1.6 'Emerging approaches').

3. Tensions between research and practice (Schön, 1983:37; Bayazit, 2004:28; Buie, Hooper & Houssian, 2013) and theory and practice (Obrist, et al., 2013) appear to underpin design practitioners' scepticism of the value of academic Research.

researcher' was set aside in favour of the 'voice of the design practitioner'. Taking up industry-standard graphic communication and marketing techniques, a campaign was designed to promote *storienteering* resources to design practitioners.

6.4.3.3. Worksheets

Worksheet and website designs emphasised the utility and incompleteness of the resources by presenting widely spaced fragments of information that encouraged the reader to make non-linear connections with other fragments of information. In doing so, each worksheet demonstrated the sense-making and orienting principles that are inherent in resource-based approaches to design story work.

Figure 6.16. Dial-a-Plot worksheet.

storienteer.info

Storytelling, from orienteer verb
 • 'orlent orowld' (to a story) find one's position
 in relation to unfamiliar surroundings.
 (Oxford English Dictionary)

Dial-a-plot is a resource for composing design stories. It is part
 of a suite of orienteering resources that can be combined
 with existing design methods and tools to help navigate the
 often difficult process of design storytelling. It introduces the
 element of chance (dice throws) and the challenge of (re)writing
 a story to fit a set of novel propositions.

..the backstory on dial-a-plot

Vladimir Propp was a Soviet scholar and folklorist. Propp
 showed that all folktales consist of an ordered system of
 thirty-one narrative units which he referred to as "plot
 functions". Propp's plot functions have been adapted for
 use in design and embedded in a game-like activity intended
 to stimulate creative thinking and group discussion.

*Scene from a fictional
 depiction of how Vladimir
 Propp composed his work
 on "The Morphology of
 the Folktale" (only, not
 discussing the story or plot
 functions (to) combined:
 overredundant)*

*"All stories rely on the listener's
 ability to fill in the blanks using their
 own experiences and imaginations."
 (Kermode & Maclean 1986: 212)"*

3. story-spinning

Stories emerge from insights, discussion, and
 iteration.

§ With sources of knowledge about the story's
 context and purpose on hand, compose a
 story beginning that carries these sources
 with the function on the Setup card, a story
 middle that carries them with the function
 on the Confrontation card, and a story end that
 carries them with the function on the
 Resolution card.

*Dial-a-plot, combined with Zener
 Cards, affinity diagram and context
 map, brings to other expressions
 of the story as a rough map. Being
 maps can shared patches that act
 as stepping stones to scenarios
 or storyboards.*

Setup: 1	Setup: 2	Setup: 3	Conflict: 1	Conflict: 2	Conflict: 3	Conflict: 4	Conflict: 5	Conflict: 6
<i>An obstacle or task causes disruption.</i>	<i>An indication not to get involved in a problem or to take action.</i>	<i>Help is sought to resolve a problem.</i>	<i>Counterparts must be implemented in a search for some- thing important.</i>	<i>Help is received from an unexpected source to attain something desired.</i>	<i>A confrontation ensues. But, should it cast either on the agents involved or whether it was justified.</i>	<i>A return to normal activities after the resolution of a problem or fulfil- ment of a task.</i>	<i>Activities are marked by the recurrence of a problem or task.</i>	<i>Resolution of a particular problem or task can only be achieved by unusual means.</i>
#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101
Setup: 4	Setup: 5	Setup: 6	Resolution: 1	Resolution: 2	Resolution: 3	Resolution: 4	Resolution: 5	Resolution: 6
<i>Indication of a task requires unusual action.</i>	<i>Events or agents can decide on a decision to take unusual action.</i>	<i>The receipt of something reported is unusual.</i>	<i>After overcoming a difficulty, things once familiar appear to have changed.</i>	<i>Unfamiliar things are made by an agent of chance negotiation.</i>	<i>A test without questions answered or lesson unlearned.</i>	<i>A deed has harmful effects.</i>	<i>Difficulties have been overcome. The recipients of the agent's responsible are strengthened.</i>	<i>One agent's poor reputation is exposed. Another agent's good reputation is thwarted.</i>
#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101	#101-0-0101

Each worksheet bears the markings of pre-press registration and colour proofing systems (Figure 6.16, top and bottom margins), suggesting a 'work in progress'. The implication being that they are open to adaptation and refinement and the recipient is invited to take part. In line with the utility of the resources, the colours, composition and typographic treatments explain rather than appeal. Each worksheet features one of

the *storienteering* resources with 'game' pieces, such as boards, cards and dice, as well as descriptive prose, instructive texts, contextual information that includes sources of theory and diagrammatic depictions of possible use situations.

6.4.3.4. Promotion strategy

The promotion strategy aimed to pique practitioners' interest in the offering by mailing three different worksheets at regular, four-week intervals over a two-month period. The worksheets directed attention to a website with information about *storienteering*, links to receive worksheets by mail and a suite of downloadable resources. In addition to the mailings, two design organisations with community-facing publications were contacted and asked to post announcements, and worksheets were handed out to interested parties at academic meetings, presentations and conferences. To help gauge take-up of the resources, all points of contact with recipients of the resources were recorded.

In addition, all correspondence materials, such as mailing envelopes, website posts, industry notices, etc., assured recipients that the resources were offered free of obligation or future solicitations, such as questionnaires, emails or unrelated mailings. Here, resisting the temptation to fall back into the role of the researcher who would, as a matter of course, seek feedback of some kind, meant that the study would not yield any qualitative data. However, in this case, numbers, i.e., quantitative data, speaks volumes.

6.4.3.5. Scope of dissemination

320 design workers received worksheet sets by surface mail (2013).

As of 27 December, 2019;

67 subsequent requests for worksheet sets by surface mail.

66 individual worksheet sets handed out at meetings, presentations and conferences.

7,418 resource downloads from the website.

2,227 resource worksheet downloads from the website.

5,738 website views.

8 website subscribers.

6.4.3.6. Rationale: Publish early and often

There is good evidence to suggest that research often fails to make an impact because it is published too late. 'Published research in the field of interactive computing (and technology research in general) often lacks evidence of systematic thinking about the long-term impacts of current trends' (Mankoff, Rode & Faste, 2013:1629). As a

result, ‘research may accidentally emphasise near term thinking’ (ibid.). The change of focus from scenarios and scenario-based design to stories and near-future design reflects concern for the timeliness of research outcomes and their relevance over time. What is proposed in the offering is extensible, evolutionary, ‘co-adaptive’ design story work support that – like Fischer and Giaccardi’s (2004) conception of meta-design or ‘interactive art’ and their model of seeding, evolutionary growth, and reseeded – will grow and adapt to the needs of the community of practice that elects to adopt it.

6.4.4. Significant adopters

The most significant adopters of *storianteering* resources to date have been Salvatore Iaconesi⁴ and Oriana Persico⁵ who ‘formalised a process to perform Near Future Design’ (Sterling, 2014) with a configuration of *storianteering* resources.

In October 2013 at the Frontiers of Interaction conference in Milan, Iaconesi and Persico ran a workshop called ‘Near-Future Design V’s Design Fiction’. The workshop was part of an initiative of the Istituto Superiore per le Industrie Artistiche [Higher Education for Industrial Arts] (ISIA) in Florence to champion the role of near-future scenarios in interaction design. The workshop largely consisted of collaborative storytelling activities designed to focus attention on the difficulties of conceptualising possible future worlds from a focal point that is inextricably fixed in the present.

Story building was underpinned by *storianteering* resources and approaches. A series of *storianteering* resources – such as Dial-a-Plot, Event Map, Visual Plot-line and Aspect Maps – guide participants through the process of organising contextual information about the future world, working with concepts, building well-structured stories and scenarios and sketching multi-modal narratives that underpin the composition of Design Fictions.

In his position as a professor at the ISIA, Iaconesi has promoted use of the *storianteering* resources to his students.

6.5. Summary

IXD Narratives study

An empirical study in multiple concurrent storytelling was conducted with a cohort of interaction design students. The contribution that this study makes to the research

4. socio-technical systems activist, interaction designer, educator and performer.

5. Researcher, communication specialist, artist, writer and expert on the formal analysis of cultural and social trends.

is that it broadens the scope of studies and is a further example of the adaptability of resource-based approaches to story work. Nine groups of students learned to use the same approach for different ends. Each group told a different story and used them to frame and field different design propositions.

Design Fiction workshops

A ten-week scoping study provided the opportunity to study the targeted creation of narrative resources. Four new resources have been described: Aspect Maps, Seed stories, sensitising sheets and StoryFrame. These were empirically tested and evaluated in two pilot studies and a formal Design Fiction workshop.

As a result of these studies, general observations can be made about the usefulness of narrative resources, including questions raised about their significance in helping participants get to and recognise the keystone idea. Is it significant that P4 – whose attention to story context and in particular driving forces led to fielding the keystone idea – consistently held the StoryFrame sheet and periodically touched or turned over the Seed stories throughout the story spinning session? Others also made use of the narrative resources by referring to them and annotating them, but did not do so as much and did not field ideas that had the same degree of resonance for design.

Further questions were raised about the authorship of Seed stories. It was difficult to find the right balance between scope (where to begin and end the story) and granularity (how much detail to go into), and the degree to which descriptions touch on or raise research-related questions. The following observation was made by P14 in the first Design fiction workshop:

What are the things that are the same, that you want your participants to identify with and maintain in the story, and the few things that are going to change and be different, based on the technological innovations?

Elaborating on the concept PR10 retorts:

Yeah. So creating that core of familiarity and something that it's related-to in the story [Constant] and then, the few things that are stretching the imagination [Variables]. And I guess it's those few different things that need to be most clearly linked to the research questions.

P14's observation, perhaps unwittingly, describes one of the principles underpinning Propp's analysis of Russian folk tales, i.e., that some elements of narrative are constant while others are variable (1968:8). It appears, therefore, that it is through a balance

of carefully chosen narrative constants and well-placed narrative variables that, in the case of the former, participants are able to understand and identify with the story and, in the case of the latter, find openings to raise questions or field propositions. Without constant themes, participants may be unable to juggle all the variables presented to them by the story and are therefore unable to either interpret them or extrapolate concepts from them in order to field propositions.

Part 3

Part 3 of the thesis concerns itself with theory building, data analysis, and putting forward claims and warranted assertions. As insights from design experiments and studies begin to suggest ways to answer questions, attention turns away from generative design toward analysis and evaluation.

In Chapter 7 progress is made toward developing a theory of narrative resource-based story work. Prevailing theories about the makeup and behaviour of resources are challenged. Underpinned by two novel aids to critical reflection, a series of self-reflective experiments are undertaken that explore alternative theories that rest on the primacy of functions. Insights are discussed and conceptual propositions build, one upon the other, as conclusions begin to be drawn about how story, narrative and narrative resources work for designers. Further experiments explore the role played by keystone ideas in strategic conversations, and how they emerge in lock-step with questions, concepts and stories. A definition is offered and keystone ideas are considered for inclusion in the fast-growing suite of narrative resource.

Adopting narrative as a unifying medium for data analysis, Chapter 8 seeks to link macro views of story work that concern themselves with how designers design, with micro views of designer/resource interactions at the level of material properties, functions and attributes. Putting theory into practice, visualisation techniques that make the co-evolution of concepts, questions, stories and, in particular, keystone ideas, visible also enable them to be studied, analysed and evaluated.

Chapter 9 concludes with a statement of limitations, claims for contributions to knowledge and proposals for further work.

Chapter 7. Towards theory

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

This chapter describes a series of activities undertaken to help answer research questions concerned with *how story and narrative work for designers* (B) and *how narrative resources work for designers* (D). Insights are drawn from the studies, self-reflective thinking experiments are conducted and conceptual propositions are put forward; some in support of theory building, others in support of approaches to analysis or arguments for assertions and claims.

7.1. Introduction

Two novel visualisation techniques are introduced. Their role in theory building was to aid critical reflections and analysis of resource supported story work. The first, a ‘cartographic’ technique for visualising resource journeys, draws-on a library of graphs that constitutes a notation system. The second, a storyboard transcription technique that supports critical reflection on studies and improves narrative analysis by overcoming some of the many limitations of text-based video transcripts.

Theory building began by questioning prevailing theories. HCI’s categorisation of design resources was based on the view that they were unchanging and therefore able to be “typed” according to a prescribed use. This stance was challenged with one that views resources as dynamic with regards to affordances and functions, and situated with regards to other actants. Conceptualised in this way, a series of self-reflective experiments were conducted to investigate the primacy of functions and the dynamic attributes and affordances of resources as they relate to story work.

Five conceptually generative thinking experiments are described. The discussions around these form propositions that build, one upon the other, toward gaining a comprehensive understanding of narrative resource-supported design story work. Hence, an exploration of **The primacy of functions** (Section 7.3.1), leads to questions of **How functions come to be attributed** (Section 7.3.2). This, in turn informs detailed five-part analysis that delves into **Resource functions in inter-actant engagements** (Section 7.3.3). Drawing on these insights and with the aim of making connections between discoveries on the micro-level of moment-by-moment events and those on the macro-level of discourse, a proposition is put forward for **How resources function in discourse** (Section 7.3.4). With insights being gained about how resources function, it was possible to make assertions about **How narrative resources support story work** (Section 7.3.5). The final self-reflective experiment adds breadth to those assertions by revealing **How keystone ideas emerge in strategic conversations** (Section 7.3.6).

7.2. Aids to critical analysis

Discourse on theory in new areas of inquiry, such as story work, are typically hampered by either a lack of adequate language and vocabulary or a lack of typologies and naming conventions (nomenclature).

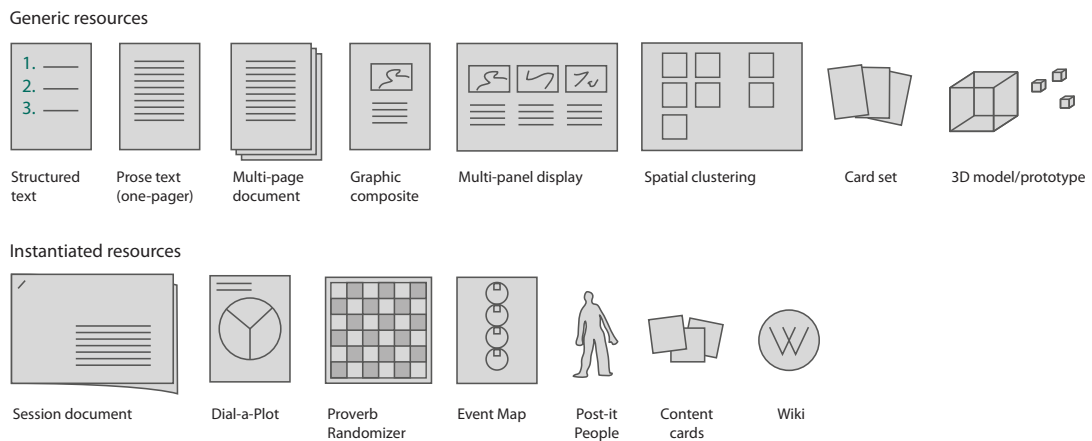
Many experiments were conducted to find methods of analysis that would yield data upon which a unified theory of narrative resource-based story work could be built. Harboring questions about whether it was possible to make visible those aspects of discourse that motivate and govern the co-development of questions, concepts, stories and ideas, aids to critical reflection and analysis were sought that would expose their relationships and dependencies.

7.2.1. Research aid 1: Graphical notation of resource journeys

7.2.1.1. Graphical notation system

'The history of science bears testimony to the fact that the advent of a good notation can have effects beyond merely expediting communication. The symbolic notation of chemistry, for example, served as catalyst for the development of theory in providing a framework within which existing knowledge could be systemised' (Mechner, 1959:133).

Figure 7.1. Selected components of the Graphical Notation System.



A graphical notation system was developed to help describe and analyse story work. Figure 7.1 shows selected graphics from the set. The set of graphics constitutes a ‘meta-language’ (Chatman, 1980:54)¹ that broadens the vocabulary of language used to articulate an understanding of design approaches and resources. The set divides narrative resources into two categories; *generic resources* and *instantiated resources*.

Generic resources

‘Generic resources’ describe the material properties of form and characteristics of inscriptions that constitute the basic building blocks of paper-based narrative resources. Viewed in terms of *material properties* and *graphical characteristics*: the former includes portrait formats, landscape formats and card sets; the latter includes structured text, prose, illustrations and graphics, such as ‘elementary objects’, ‘containers’, ‘graphic multiples’ and ‘labels’ etc., (Engelhardt & Zambrano, 2008).

Instantiated resources

‘Instantiated resources’ represent instantiations of generic resources or unique combinations of material properties and graphical characteristics. The set shown in Figure 7.1 are coloured grey to suggest that they are not in use, i.e., they are not performing particular functions. When describing particular episodes of story work, a colour coding system is used to depict functions attributed to resources (for the meaning of resource functions, see Section 2.2.9.5 ‘Resource functions’). In this schema, **orange** = *expressive*, **green** = *acquisitive*, **blue** = *directive*.

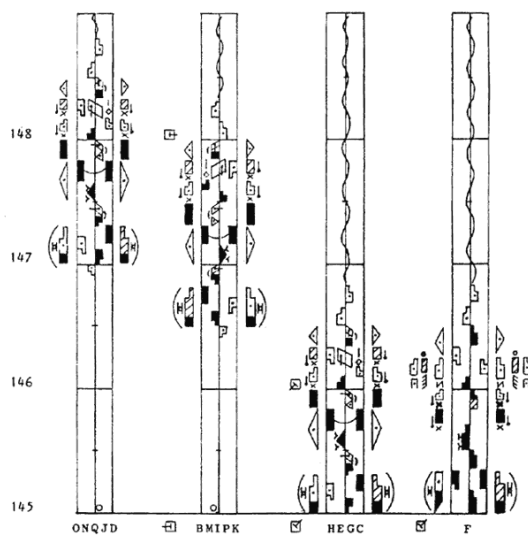
1. ‘...since events and existents, story and discourse operate at a deep structural level and independent of medium, one does not look for their precincts in the actual words (or images or whatever) in a given text. They can only be discussed in the analyst’s metalanguage, which is a paraphrase (another manifestation) of the narrative.’ (Chatman, 1980: 54).

7.2.1.2. Resource Journeys

The graphical notation system plays a central role in the vocabulary used to describe resource use. What have been dubbed ‘resource journeys’ proved to be valuable aids to analysis in story work.

Resource journeys emerged from the seed of an idea that resources may be viewed as protagonists in stories of design work. Like central characters in a novel, resources have a life that can be described as a series of events, happenings and interactions that take place in particular settings with other actants over time; and the life they lead changes them. Resource Journeys, therefore, are graphical representations of design work that place resources at the centre of action.

Figure 7.2 Labanotation.



The compositional arrangement adopted in Resource Journeys was inspired by a form of dance notation called labanotation (Figure 7.2). In labanotation, movements of the body are depicted on a centreline where forward motion is plotted vertically from bottom to top, and graphical devices arrayed on either side depict positions and gestures of the limbs.

Just as the human body is central in dance movement, narrative resources perform a central role in story work; they are, as it were, the protagonist. As such, resources are arranged down the middle of the page, while on either side a visual and textual summary of human actions and events provides context for the narrative. In this way Resource Journeys are able to depict the activities that take place in story work and describe the roles that narrative resources play within them.

Figure 7.3. Resource Journey of the Innovation workshops.

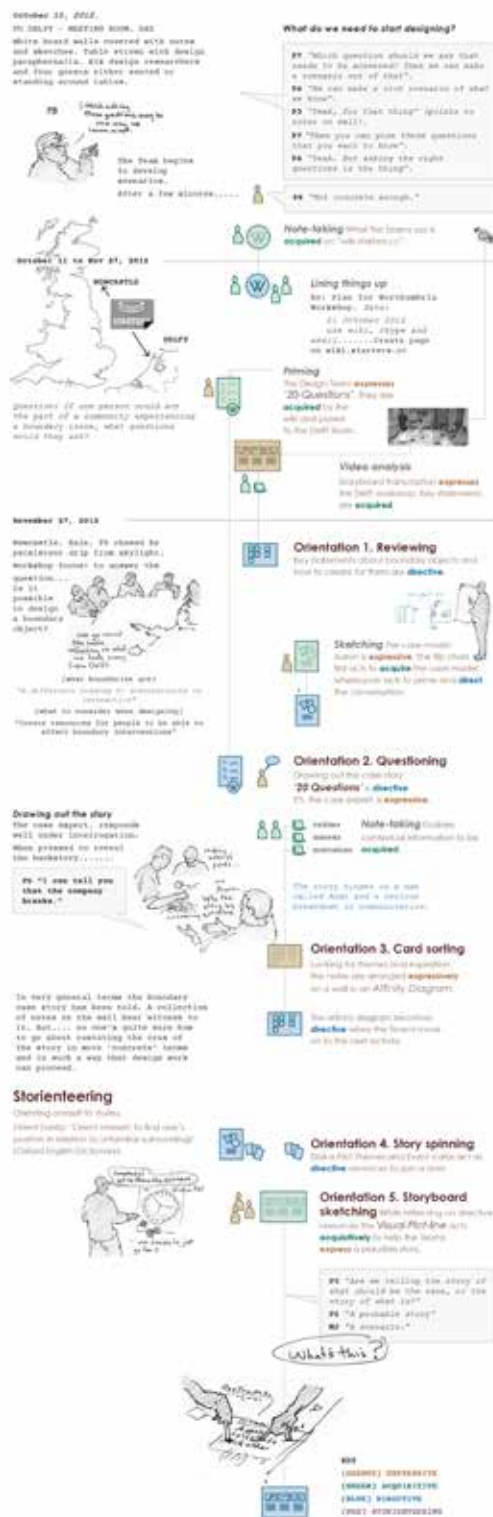




Figure 7.3 portrays resource use and functionality in the Innovation workshops (for detailed view, go to: <<http://malcolmjones.com/making/ResourceJourney.html>>).

Though extremely concise (for many of the finer details are left out), the resource

journey demonstrates the principle of function attribution and distribution. On the left of the centre line, human contexts are described in the form of a narrative script that, through dated sections and inset illustrations, summarise key events and happenings. To the right of the centre line, descriptions of primary activities are arranged in the form of structured texts. In the case of Innovation workshop 2 these constitute orientations, of which only 5 were included.

Three resource functions are sufficient to demonstrate how resources in general get realised over time through inter-actant engagement. The Resource Journey features the *expressive*, *acquisitive* and *directive* functions. Here, function attribution begins when a resource gets conscripted into use. From that point, a line traces the resource's journey as it performs different roles for different people at different times.

The first resource that appears at the top of the diagram is a proprietary wiki-site. The site was used to record information and insights from day 1 of the first Workshop in order to inform the proceedings on the following day. At that time, the wiki-site could be attributed with having a number of different functions, one of which was *acquisitive* , i.e., it was capable of *acquiring* information. When, at the beginning of day 2 participants began to review the previous day's findings, discussion was supported by referring back to the same information on the same wiki-site, which, for those participants in that particular setting, was able to perform a different function, that of being *directive* , i.e., informing or directing.

Further down the diagram at 'Orientation 2', information imparted during '20-Questions' is *acquired* by Post-it notes. In an exploratory act that involves *expressing* ideas and opinions, at Orientation 3 Team members arrange the notes by theme to create an affinity diagram. At Orientation 4 where the Teams move on to scenario spinning, they draw on the *directive* attributes of both the affinity diagram and Dial-a-Plot. Taking advantage of the *acquisitive* attributes afforded by the Visual Plot-line, the *directive* attributes of Dial-a-Plot support *expression* of the story. At a certain point in the activities, Visual Plot-line *acquired* sufficient information to become *directive* (bottom of diagram). It began to have different affordances for different people. For 'rules applied in the coding of resources', see Appendix C14.

7.2.2. Research aid 2: Storyboard transcription

Figure 7.4. Example of storyboard transcription.



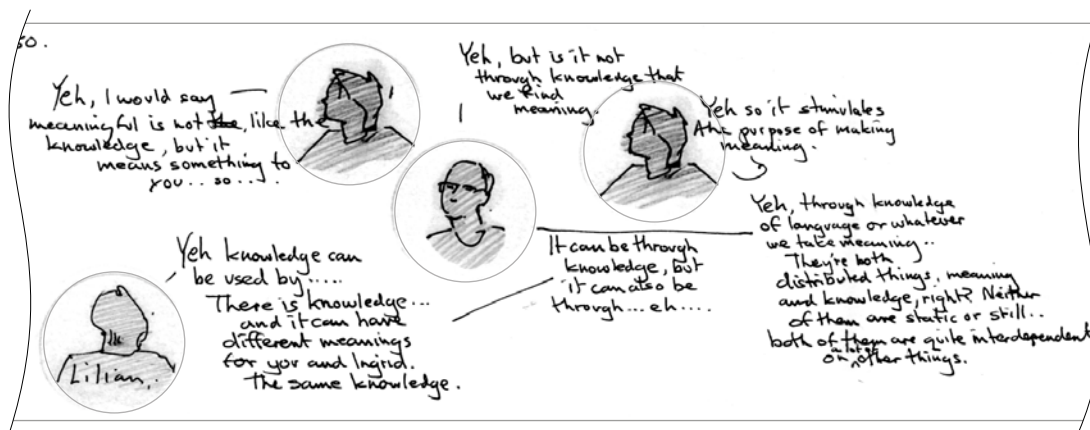
Created from video recordings, Figure 7.4 is an example of one of the corpus of storyboards that supported narrative interpretation of the studies. Citing analysis of a toddler engaged in self-reflective play, Bruner (1980:87) makes a case for how action is integral to meaning-making. Here, his description is adapted to suggest that what was sought in the development of the storyboard transcription technique was ‘an integral structure that could encompass what [was said with what was] done with what [was] felt with what [was] believed’ (ibid.:89). For Mason:

transcription is always partial partly because it is an inadequate record of non-verbal aspects of the interaction (even if you try to insert these in the form of field notes into the transcription afterwards), and also because judgements are made (usually by the person doing the transcription) about which verbal utterances to turn into text, and how to do it.

(2002:77)

Storyboard transcription affords persistent, static, yet temporally complete visual and verbal representation of interactions, such as speech, actions and events. It alleviates the need for elaborate transcription codes or repeated video scrubbing (searching back and forth). The technique enables researchers interested in ‘process-oriented studies’ (Pentland, 1999:1) to conduct fine-grained narrative analysis of conversations where interpretation is enhanced by relevant paralinguistic cues, such as posture, gesture and gaze (for description, see Appendix C15 ‘Storyboard transcription’; for how the technique was developed, see Section 7.2.2 ‘Research aid 2: Storyboard transcription’).

Figure 7.5. Label system use to expedite storyboard transcription.



Acknowledging that not all designers are adept at figure sketching and that freehand sketching can be time-consuming, a circular transparent sticker system was developed to expedite production (Figure 7.5). A sticker template was downloaded. One sketch (photo would work too) of each participant was laid out and repeated using a page layout program. Then, sheets of transparent stickers were printed. Though limited in its range of visual expression, the cues none-the-less give context to the conversation. Interspersed with freehand sketches of such things as hand and arm gestures, the technique becomes quite *expressive*.

7.3. Toward a theory of narrative resource-based story work

The following sub-sections describes experimental work undertaken to explore methods of analysis, approaches to evaluation, and the development of theory. Described are the insights that arose, and the support that each insight lent to the those that followed as story work began to take on a tangible, interrogable form.

7.3.1. The primacy of functions

Krippendorff, Tahkokallio and Vihma (1994:152) contend that we must '[a]ccept as axiomatic that humans act not on the physical qualities of things but on what they come to mean to them'.

A number of experiments were conducted, first to interrogate the primacy of functions, then to confirm their importance in the conceptualisation and analysis of narrative resource-based story work. The interrogation was motivated in part by questions raised about the naming of resources.

7.3.1.1. 'Types' questioned

The literature that underpins design resources has a legacy in HCI methods research (Woolrych et al., 2011) that tends to take an evaluative, post hoc perspective on design. Faced with the challenge of creating narrative resources towards the end of the consolidation phase of this research, a question arose about whether such post hoc theoretical perspectives could inform or guide the creative process. The same question had been posed about whether Propp's (1968) *functions* – the outcome of post hoc narrative analysis – could support narrative authorship (see Section 5.2. "3-Narratives").

The Twin-Tides community had classified resources accordance to properties that were assumed to be both intrinsic and stable, i.e., ever present and unchanging. Attributive adjectives, such as 'expressive' and 'directive' were used to describe them. For instance, an *expressive* resource was described as one that 'communicate[s] options' (Cockton, 2013a:4). Questions were posed. Do *expressive* resources have intrinsic properties that lend themselves to expression regardless of use? Or, is *expressiveness* a quality or function attributed to them according to use? A series of experiments were conducted to find out if it was possible to classify narrative resources according to Woolrych et al's., 'resource types' (2011:956; see Appendix C4.2 'How resource functions won-out over 'resource types)').

During these self-reflective design experiments, repeated efforts to categorise individual resources by type failed because attribution of categories appeared to be contingent upon contexts of use (see Appendix C4.2 'How resource functions won-out over "resource types"'). The same resource appeared to act in different ways for different people in different situations. This led to the conjecture that resources act in more varied ways than previously thought. Influenced by Propp's insistence on the primacy of *functions* over genres, a view of resources took shape that saw distinctions made between properties and attributes (as shown in Figure 7.6; also see Appendix C4.1 'The makeup of resources'), and, in the case of resource attributes, multiple dynamic functions. This finding was shared within the TwinTide community, and the new approach to resource categorisation was accepted (Vermeeren & Cockton, 2013).

For many resources it is problematic to categorize them as being of a certain type, as they can have more than one function, i.e., they have multiple practical ways of using them, but the objects are also polysemiotic. For example, as well as communicating ideas, sketching can also support their generation and structure the process of selecting and refining promising options.

(*ibid.*:2)

7.3.2. How functions come to be attributed

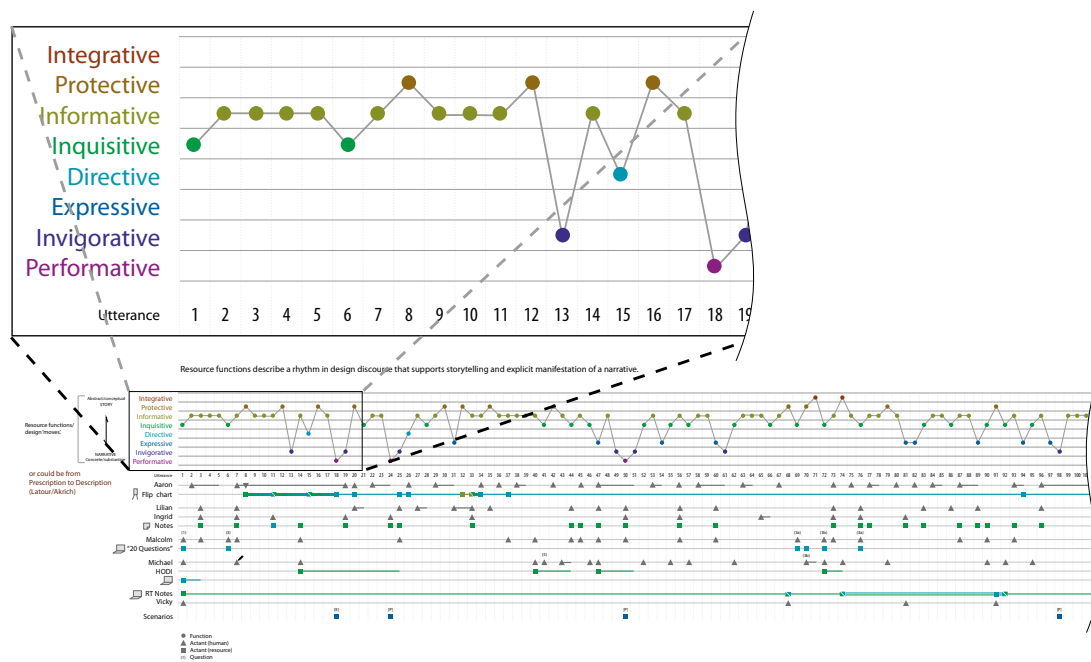
A search for approaches to data analysis and insights into how narrative resources work for designers motivated the first self-reflective experiment from which conceptualisations of story work arose. The experiment drew on theoretical concepts that underpin resource functions and modes of thinking to question whether content analysis of participant utterances can yield insights into how functions come to be attributed to resources.

The approach involved aligning Cockton's resource functions (2013b) with Bruner's modes of thinking (1985), and posing the following question;

Is there any evidence that functions associated with resources manifest themselves in the conversations that take place around them?

In (2013b), Cockton lists 10 resource functions (see Section 2.2.9.5 'Resource functions'). A review of their suitability for the experiment led to two functions, *adumbrative* and *ameliorative*, being set aside because they appeared to focus on approaches rather than resources. The remaining eight functions were assessed on the basis of whether their attribution could be said to spring from a leaning toward narrative or paradigmatic thinking.

Figure 7.6. Function attribution in story work.



The data consisted of 100 utterances that mark the start of the '20 Questions' activity in Innovation Workshop 2, hence, many concern themselves with questions and

answers. Each utterance was assigned a number, and these formed the main horizontal axis of a scatter plot diagram (Figure 7.6, enlarged section). Resource functions were colour coded to aid identification of points on the scatter plot diagram, and arranged on the vertical axis to the left of the scatter plot according to their affiliation with Bruner's (1985) modes of thought. For example, properties of the *integrative* function (uppermost on the diagram) were considered to have affinities with *paradigmatic* concerns for deductive-nomological explanation, the search for universal truths (Polkinghorne, 1988:17), and bringing about order. Lowermost, with its focus on human activity and interaction, properties of the *performative* function were considered to adhere to narrative explanations of the world (ibid:64) concerned with the creation of meaning and knowing by doing. The properties of resource functions that lie between were considered to have varying degrees of affinity or tendency toward one or other mode of thought and were arranged accordingly (for method, see Appendix C6.2).

Though not found to be particularly useful, themes coded below the line of utterances (Figure 7.6, lower section) sought to track W2C functions, as well as human and non-human actants (for an enlarged version of the whole diagram, see Appendix C6).

Since the entire conversation dealt with posing questions and fielding information and ideas, most of the utterances yield a pattern of function attributes that fluctuate between the *inquisitive* and *informative* functions. Each *inquisitive* • (dot) represents a question being posed. While each *informative* • (dot) represents information or ideas being fielded. When, at U6, the question 'What does that routine involve?' is posed to the case expert, the pattern of close-knit functions continues as details of routines unfold. But, at U13, an *invigorative* function attributed to a comment made by the case expert breaks the pattern. The comment 'This person (Addo) is paying for it' touches on the traits of one of the central actors in the story. Since it addressed issues of responsibility that were not looked-for in the question, but, nonetheless, shed more light on the situation, its role in the narrative is 'wetter', as in, it adds depth of content to the story, than many of the other 'dry' and factual utterances.

7.3.2.1. Insights on function attribution

Detailed analysis conducted on the content of utterance suggests that the *expressive*, *invigorative* and *performative* functions of narrative forms of expression, such as scenarios and anecdotes, introduce divergent thinking that spurs the conversation

on and spreads concepts and ideas out. While *integrative* and *protective* functions associated with affirmations and assertions, such as explanations, conjectures and corrections, introduce convergent thinking that brings things together to keep the story straight and the process of storytelling on track.

Though not yet explored, further interpretations may be made from the fluctuations that occur in function attribution. For example, they may represent shifts in orientation toward either abstraction or reification, prescription or description and either reflective or deliberative reasoning (See; Appendix C6 ‘Attention pattern analysis’).

[Further studies]

The scatter plot diagram served the self-reflective and analytic activity well. With some modifications and refinements, it inspires the approach taken to visualising story work through graphical data charts (see Chapter 8).

7.3.3. Resource functions in inter-actant engagements

The aim of conducting this self-reflective experiment was to better understand the way functions are attributed to actants in the course of story work. It underpins a second experiment conducted in a similar way that is reported in Chapter 8 (see Section 8.3.2 ‘Detailed analysis of U540’).

In this experiment, narrative analysis techniques were used to view design story work itself as a narrative. Actants in the narrative of the design story work included anything that had a *performative* role to play, such as actions and utterances of designer-participants and the tools, materials and resources they engage with.

One such inter-actant engagement was coded using a combination of constituent elements of narrative related by Chatman (1980), and an ontology of resource functions developed by Cockton (2013b).

The interaction took place in the Design Fiction workshop Forming episode between the participant P16, the utterance U379 and the narrative resource StoryFrame.

Table 7.1. Components of narrative.

Narrative elements		
	(Story) Content	(Discourse) Expression
Form	(FC)	(FE)
Substance	(SC)	(SE)

Themes used to code the episode were drawn from Chatman's (1980) matrix of narrative elements; Content, Expression, Form and Substance (Table 7.1) and Cockton's list of resource functions. The episode is described in four parts.

7.3.3.1. Part 1: The Resource (StoryFrame)

Part 1 describes unperformed Functions that can be attributed to the resource's latent agency or *performative* potentialities.

The StoryFrame resource takes the form of a page on which is inscribed a graphical table. The first column displays a list of Plot Themes that act as *directive* phrases or sentences, while blank fields in the second column act *acquisitively* to harvest propositions. The Plot Theme directing this conversation is 'an actor recognises a lack or need'.

Substance of Expression [SE] is verbal. Language is [*Performative*].

Form of Expression [FE] given to verbal expression is written words inscribed on paper, a structured text that is [*Expressive*]

Substance of Content [SC] consists of Plot Themes, the purpose of which is to inform narrative development. In this respect it is [*Informative*].

Form of Content [FC] speaks of value realisation. It is a 'call to action' that spurs story work on. It is, therefore, [*Directive*].

7.3.3.1. Part 2: Participant engagement with the Resource

Part 2 describes Functions that come into play when the participant is primed to engage with the as yet 'unrealised' resource.

The participant P16 is role-playing the part of a designer. To be useful, the designer must engage with the resource and recognise its utility. The resource presents itself as an object with material characteristics (Form and Substance of Expression) that function in a *performative* and *expressive* way. Potentialities for use lie in the resource's Content, which has the potential to *inform* and *direct* thought, action and, more specifically, stories. But these Functions can be attributed to the resource by the designer only if the designer recognises that they might be useful for resolving a lack or assuaging a need.

Substance of Expression [SE]. The designer has an unfulfilled need to spin a story.

The need leads them to take reasoned action that is receptive – open to absorbing

information, taking-in influences, listening to suggestions. With no suitable Function in the W2C set, a new one, [Assimilative], is field tested.

Form of Expression [FE]. The Form that the assimilative action takes is that of inquiry. It is [Acquisitive].

Substance of Content [SC]. The Substance of the designer's actions, i.e., the content of their reasoning is [Protective] of both the story and the process of story work.

Form of Content [FC]. The Form that their reasoned action takes is [Integrative]. The designer opportunistically takes advantage of the affordances of things at hand, such as the resource, to draw the threads of their story together.

7.3.3.2. Part 3: Comparative analysis of Resource/Participant interaction.

Part 3 seeks to establish complementary pairings between Functions attributed to the resource described in Part 1 with those attributed to the participant described in Part 2. Functions attributed to the designer are shown in green, whereas those attributed to the resource are shown in red.

Substance of Expression - The *assimilative* stance taken-up by the designer intent on creating a story is complemented by the *performative* presence of the resource.

Form of Expression - The *acquisitiveness* of the designer is complemented by the *expressive* properties of the resource's inscribed words.

Substance of Content - By accepting the Substance of the resource's Content the designer is being *protective*, because they trust that the kind of *informative* action that the resource might invoke, such as ideation, sketching and critical debate, may support the kind of collaborative conversation that enables them to get the right story and get the story right.

Form of Content - The designer's desire to be *integrative*, to draw-on input in order to get the job done, predisposes them to accepting the resource' *directive* influence.

7.3.3.3. Part 4: Functions of utterance 379

Part 4 describes Functions that can be attributed to the utterance at U379. These are shown in blue.

Invigorated by the resource, the designer responds reflectively by generating an idea and fielding it in the conversation.

[379] P16: She (Iris) decides to talk to VIVIEN because she needs to give love and care. So we need for her to get to talk to VIVIEN.

Substance of Expression [SE] is *performative*. It is verbal, in this case a speech act.

Form of Expression [FE] is *expressive*. The *performative* Function of the speech act is an utterance of words.

Substance of Content [SC] is *invigorative*. The question is a proposition intended to invigorate the conversation.

Form of Content [FC] is *acquisitive*. The Content takes the Form of a question.

7.3.3.4. Insights on resource functions

First, this experiment makes the case for multiple functions being present in any interactant engagement. As is evident from the breakdown of functions attributed to each actant in the above interaction, very aspect of substance, form, content and expression has the capacity to perform different functions.

Second, some functions appear to be constant while others are open to change. One example of constancy in functions can be found in similarities between functions attributed to the Form and Substance of Expression of the resource and utterance.

In both case, the *performative* function is attributed to Substance of Expression, and, although there are differences in the mode of verbalisation, the *expressive* function is attributed to Form of Expression. Further experiments (for example see Section 8.3.2.7 'Summary of insights') confirm that this appears to the case in all instances where narrative resources have been analysed in this way.

Functions appear to be more varied and changeable when they are attributed to the Form and Substance of Content. But functions attributed to like-for-like aspects of an actant, also appear to form complementary pairings. For example, with regard to Substance of Content, where the resource is *informative* the participant utterance is *invigorative*, and with regard to Form of Content, where the resource is *directive* the participant utterance is *acquisitive*.

Thus we can say that in part, through the Form and Substance of Expression, the participant responds to the resource in kind, engaging in a discourse through verbal expression; and in part, through the Form and Substance of Content, the participant responds reflexively to the resource with actions to which functions can be attributed that complement those of the resource.

Such inter-actant engagements appear to become fruitful when functions that can be attributed to the actions or affordances of one actant complement those that can be attributed to the actions or affordances of another, i.e., when needs and affordances complement each other. Viewing the conversation as a narrative and asking how actants function in accordance with the four elements of narrative has shown that a resource's usefulness may be linked to function couplings.

These insights led to two concepts that informed further conceptualisations of theory concerned with how functions support the investigation of story work. In the following section, *Complementary functions* are seen to be at work at the level of design activities, explanations of which benefit from the concept of *function reciprocity*.

Viewed in relation to functions, the term *complementary* refers to the degree to which a function attributed to one actant complements that attributed to another. Reciprocity provides a way of characterising and assessing the complementarity of functions that is particularly well-suited to narrative analysis, for the term refers to a realisation of mutual benefit. It brings humanist, narrative qualities to the fore that admit questions, such as How might each actant benefit from their engagement with the other?

What became apparent from conducting this experiment is that when functions attributed to two or more actants complement each other, opportunities arise for fruitful engagement and mutual benefit. When functions do not complement each other, we may assume that active engagement between actants is unlikely. This forms the beginning of an understanding of the role played by functions in design story work.

7.3.4. How resources function in discourse

Critical reflections on research materials, such as resource journeys and storyboard transcripts, reveal repeated occurrences of a causal sequence at the centre of which are narrative resource attributed with particular functions. The sequence begins with the emergence of affordances attributed to a resource that functions in a particular way to help fulfil a particular goal. The sequence can be conceptualised like this;

(Resource) **Affordance** → **Function** → **Fulfilment** (of goal)

It is reasonable to assume that the sequence is evident in every instance of resource use, because one of the defining characteristics of resources is that they are sought when a particular need arises. As insights begin to emerge about narrative resource creation and use, the sequence becomes significant, since it underpins the argument for

situated attributes as a defining characteristic of narrative resources, an argument that gains traction in Chapter 8.

The three-part sequence is evident in both *resource-driven* situations ($A \rightarrow F \rightarrow F$) and *goal-driven* situations ($F \rightarrow F \rightarrow A$). And, since the argument has already been made that a resource's function is an attribution rather than an intrinsic property, situations exist where both versions of the sequence are present.

7.3.4.1. Resource-driven sequences

Resource-driven sequences begin with the affordances of a resource and end with the fulfilment of a goal. Forming a cognitive bridge between the two are functions. The sequence is abbreviated to $A \rightarrow F \rightarrow F$. Two examples are given.

7.3.4.1.1. Resource-driven sequence: Example 1

A *resource-driven* sequence occurs in Innovation workshop 2 when the Teams begin to spin a story with Dial-a-Plot and Event cards. The guidance afforded by Plot Themes and Event cards may be *directive*, but once *acquired* responses are generally *invigorative*; the imagination is invigorated. The *invigorative* function of the resource helps to fulfil the goal of spinning a story. The following utterances selected from the transcript describe the sequence.

Affordance of the resource

[272] **MJ**: So, An indication of a lack requires unusual action.

Function of the resource

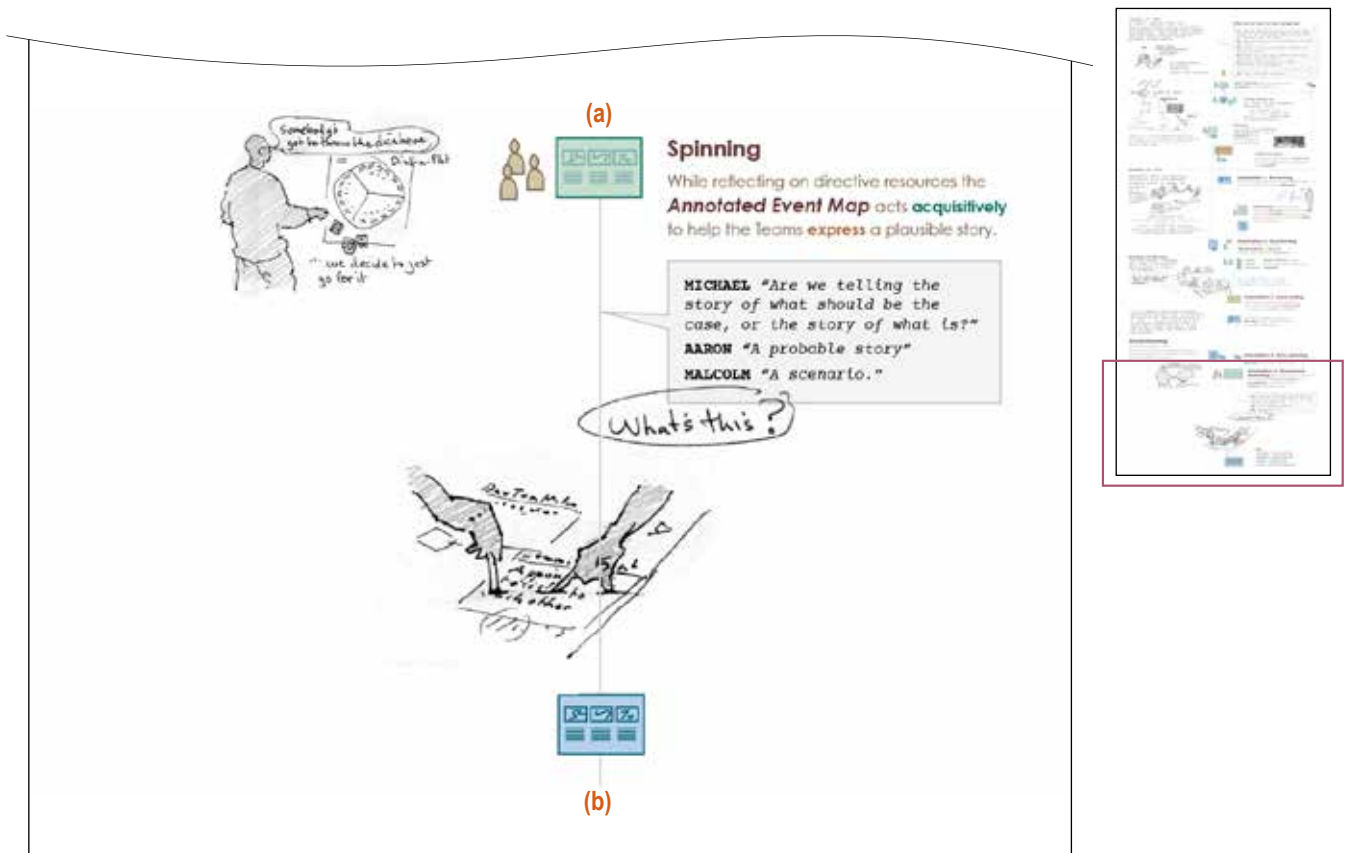
[281] **MJ**: Basically what you do now is, thinking about how this scenario might work, try to fit those things into these different parts of the story.

Fulfilment of the function

[293] **P3**: I think I envision that they, of course, are in this situation...

7.3.4.1.2. Resource-driven sequence: Example 2

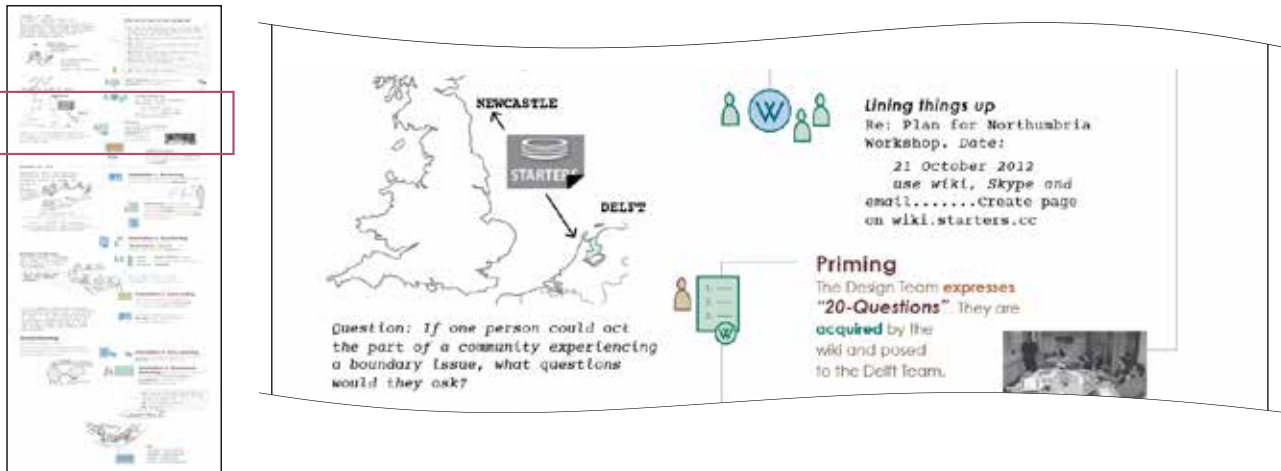
Figure 7.7. A resource-driven sequence.



A *resource-driven* sequence occurs later in the same workshop. Figure 7.7 uses the Resource journey to describe both the sequence in question (blow-up) and where it occurs in relation to the two Innovation workshops. By *acquiring* the Teams' *expressions* of story, the Visual Plot-line relinquished its *acquisitive* function (Figure 7.7, a) and took on a *directive* function (Figure 7.7, b). The transition of functions helped the Teams make their next move. Here, a resource-in-use afforded the opportunity to fulfil a particular goal. The new position that the Teams had taken with regards to the Visual Plot-line's function enabled them to decide what to do next and move on to fulfil their goal of capturing a complete case story.

7.3.4.2. Goal-driven sequences

Figure 7.8. A goal-driven sequence.



7.3.4.2.1. Goal-driven sequence: Example 1

The first example of a design setting where a goal is identified and a resource is sought to help fulfil the goal occurs when, after Innovation workshop 1, the Northumbria Team realised they needed more specific information about an exemplary boundary case and began to look for a resource that could help them acquire it. '20 Questions' was developed because it performed the important function of facilitating information gathering. The Northumbria Team posed the questions to the Delft Team as a priming activity before convening Innovation workshop 2 (Figure 7.8; also see Figure 5.18 '20 Questions').

7.3.4.2.2. Goal-driven sequence: Example 2

A second *goal-driven* sequence occurred when the Northumbria Team were within reach of their goal to create an exemplary boundary intervention and they sought a way to test ideas for objects and programmes. Harnessing the *directive* function of the five theoretical domains (Figure 5.14) they found the affordances they sought in the way a spatial arrangement of Post-it Notes acted as a 'narrative blueprint' of the intervention (see Section 5.4.6.6. 'Orientation 8: Experience mapping').

7.3.4.3. Bi-directional sequences

We may now consider the possibility that in Resource-driven sequence: Example 2 what caused the Northumbria Teams to attribute a new function to the Visual Plot-line was setting their sights on a new goal. Having sketched out the story, the Teams' attention was drawn away from the short-term goal of spinning a scenario towards the long-term goal of developing a complete picture of the case story. With the Teams' acknowledgement that they needed a resource with particular affordances that would help them reach their overarching goal, the Affordance → Function → Fulfilment sequence is replaced by a Fulfilment → Function → Affordance sequence. The Visual Plot-line was 'ready-to-hand' (Heidegger, 1962:100). It presented the Teams with as yet unrealised affordances. When Team members were tentative about questioning whether the Visual Plot-line could help them fulfil their goal, some embraced its *performative* function, accepting it as a conceptual 'sandpit' for acting-out and testing ideas. Others appeared to view it as a design requirement and were thus suspicious of its *directive* function. Those who took this view tended to reject it.

7.3.4.4. Insights on how resources function in discourse

In the work conducted on resource development an assumption was made that, in practice, the need for a resource would precede its use (i.e., a *goal-driven* sequence) and the need might be no more complicated than to tell a story. However, the discovery that Fulfilment→Function→Affordance sequences are both reversible and bi-directional – and that there are critical moments in design work where important methodological as well as deliberative decisions are made that manifest themselves as challenging transitions – suggests that this may be one area of story work where resources may come into their own. Might one of their primary functions be to support transitions from one type of activity to another?

7.3.5. How narrative resources support story work

Further insights into how narrative resources support story work are revealed in a causal sequence that bears some resemblance to that of the resource-driven, goal-driven and bi-directional sequence of resource functions described in the previous section. There, the sequence described micro-level resource functions, whereas here a sequence describes a macro-level design activity. The sequence concerns reorientation and story reiteration. It can be summarised as;

Rethink • Reframe • Refit

The description of how keystone ideas emerged in Innovation workshop 2 (see Section 7.3.6 'How keystone ideas emerge in strategic conversations') serves as an example of this activity-level sequence, because it represents a move away from concerns for story particulars and concrete ideas towards more general and abstract concepts concerned with how the story fits the Team's design goals. With each iteration of the story, design teams appear to rethink both the story they are telling and the approach they are taking to story work. They also appear to reframe the story in light of any changes they may make to their approach and reconsider how their approach and the story fit their goals.

On the first day of Innovation workshop 2, participants engaged in no less than ten orienting activities, each with distinct goals (see Section 5.4.5.2 'Innovation workshop 2' > 'orientations'). Transitions from one activity to the next were marked by periods of reflection and speculation as Team members looked back on what had been done and forward to what needed to be done. The periods began with either a doubtful or insightful event that caused the Northumbria Team to rethink, reframe and refit the story. In their investigation of collaborative storyboarding, Branham et al., (2008) draw attention to 'the mechanisms that allow for transitions from one activity to the next', observing that '[o]ften, the state of the representation acts as a catalyst for transition when it is apparent a certain subtask is complete'.

In rethinking, both the designing and the designs themselves are brought into question, because each plays a part in constituting the other. Events that can trigger rethinking are typified by either the conclusion of an activity, newly gained insights, or coming to an impasse.

In such situations, design teams look for approaches and resources that allow them to reframe the story to produce an outcome that will either put to rest their doubts about how to move on, enable them to take advantage of new insights or overcome the impasse. Such moves are both *protective* – concerned with keeping design work on track – and *ameliorative* – concerned with attaining good outcomes. Each reframing of the story brings to the fore questions of fit. Will the story and the Teams' new approach still serve their purpose with regard to artefact development, beneficiaries and methods of evaluation?

Design work necessarily concerns itself with quality and seeks to orient itself towards good outcomes. But are good outcomes more likely to be achieved when design work's evaluative position is seen to be 'progressive', i.e., moving towards an improved

situation, rather than 'regressive'², i.e., moving towards a worsening situation? (Gergen & Gergen, 1983:166). Gergen and Gergen cite a third type of narrative: the 'stability narrative', in which very little changes (ibid.:165).

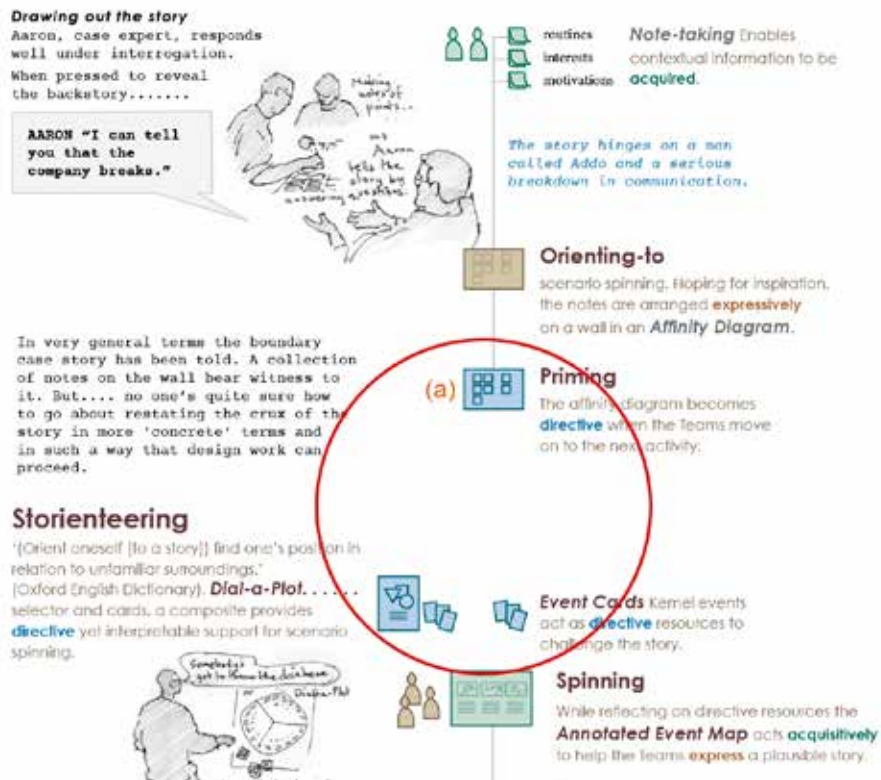
7.3.5.1. Narrative resources support periods of uncertainty

Design moves made in periods between orientating activities can be likened to a sail-boat tacking in order to reach a particular destination. Sail-boats are unable to manoeuvre unless they are being carried along by momentum from the force of wind. Control over steering is entirely dependent upon that forward movement. In the same way, design work cannot manoeuvre sufficiently to consider different ways of knowing and doing unless it can maintain enough creative momentum to propel it towards motivating goals, or without having a plan (however contingent upon what actually happens) to guide such actions. An experienced design team may overcome periods of doubt, indecision or methodological uncertainty by finding new ways of looking at the work. By 'tacking', i.e., changing direction, they are able to maintain creative momentum, an *invigorative* move that helps them stay in 'familiar waters'. A less experienced team, one that cannot find alternative ways to look at work, or an experienced team that finds itself in 'unfamiliar waters', may lose creative momentum and stall.

Two examples described in the previous section help to illustrate how narrative resources support such periods of uncertainty.

2. Lawson (2004:117) touches on this.

Figure 7.9. The 'gap' between contextual research and creative design.



In the second example given of a resource-driven sequence (Figure 7.7 'A resource-driven sequence') an impasse occurred on conclusion of an activity. Nobody was quite sure how the contextual information expressed in the affinity diagram (Figure 7.9 a) could be reframed as a scenario. What helped the Teams move away from thinking paradigmatically about such things as cause-and-effect towards thinking narratively about such things as actants' stories were prompts arising from the presence of narrative resources (Dial-a-Plot and Event cards) that invigorated a conversation and led to action. Throwing the dice and imagining new ways to look at the case story set activities and thus the 'Teams' thinking and doing on a new course. The change that took place in the narrative of design work may now be viewed as one characterised by a move from a regressive to a progressive narrative. With the analogy of the sail-boat in mind, what is interesting to note here is that although a progressive narrative is always preferred, the regressive narrative that occurred performed the same function: providing motivation for a change in thinking and design direction. Just as the tacking sail-boat reaches a critical point where, without wind and momentum, it may stall, design momentum was momentarily in jeopardy, but was regained once the Teams agreed to rethink, reframe and refit the story. Thus, good outcomes may depend as much on maintaining creative momentum as they do on steering a course towards a

progressive rather than a regressive narrative. Either course appears to be preferable to a 'stability' narrative where little, if anything, changes, for this is the equivalent of a creative block or what in sailing parlance would be referred to as 'the doldrums'.

In the second goal-driven example given (see Section 7.3.2.3.2 'Goal-driven sequence: Example 2'), the Teams again came to an impasse. The impasse arose after the Teams used concept mapping to explore objects and programmes for an intervention (in Chapter 5 see 'Completion of the task Orientation 6: Concept Mapping'). They had a goal in sight, but did not know how to reach it. They had new insights, but could not proceed with paper prototyping without first evaluating them. Story content needed to be 'fleshed out', but in what way lay in doubt. The impasse prompted the Teams to rethink both their approach and the story that they were developing.

They improvised. On the spot they adapted and refined known design methods to create a narrative resource that would serve their purpose. The creative act of laying out all their ideas in a 'narrative blueprint' enabled them to reframe the story, gain more insights and refit them in an approach that would help them to meet their design goal.

7.3.6. How keystone ideas emerge in strategic conversations

The third self-reflective experiment from which insights and conceptualisations arose concerned itself with understanding keystone ideas, not merely as aids to storytelling, but as aids in the study of design story work. The conceptualisation of ideas emerged in lock-step with insights gleaned from critically reflecting on early studies and finding ways to visualise and study the emergence of keystone ideas in strategic conversations.

7.3.6.1. Purpose at the root of keystone ideas

Though unrecognised at the time, evidence of the conceptual origins of what grew to be known as keystone ideas are to be found in an early self-reflective Card set experiment (see Appendix A4.1 'Card set experiment 1'). This was one of a number of trial-and-error story-spinning exercises that showed that good design stories, that is, ones that inspire or provide openings for the development of salient ideas, needed prompts of particular kinds. In this experiment, two 'dimensions' from the CREWS Scenario Classification Framework (see Figure 2.7 'Scenario Classification Framework'), *Form* and *Purpose*, were used to help guide development of the story. While *form* proved to be a very difficult guiding concept, *purpose*, which is also one of the four W2C arenas, proved to be very useful for raising important questions.

As I started to build the narrative around the two character's situation at an oasis [...] I became aware that the story needed to lead toward a particular purpose, [that of] 'consensus'. What could they come to a consensus over, and how do I weave that into the story? This consideration started to influence the story.'
(memo 8, 10.04.2012)

It seemed that by imbuing events and actions that were taking place in the story with a strong sense of purpose, the story itself presented more opportunities for being purposeful for design. Thereafter, with each study that was conducted the importance of either finding in stories or weaving into them concepts and ideas that held the key to understanding the purpose they could serve for design, grew.

7.3.6.2. A link between driving forces and keystone ideas

The Pilot study pre-dates recognition of keystone ideas. However, scenario planning techniques used in the study took into account trends and driving forces which can be categorised as either *predetermined elements*, i.e., forces that tend to stay constant over time, or critical uncertainties, i.e., trends that may very well change (Schultz, 2011). If, after the Pilot study, P1 and P2 had been asked to identify the keystone idea in the 'Holy grail' story, they would have most likely pointed to the uncertainties they had about being able to partner with others in order to pitch for and successfully complete larger contracts, a concept that is abundantly evident in the scene where 'alarm bells go off'.

In the second Innovation workshop, the case experts' revelation about the break-up of the company reinforced the importance in story work of identifying a central theme, concept or keystone idea. No scenario planning techniques were used in the workshop and no mention was made of driving forces or critical uncertainties. Yet, arguably, underlying trends and driving forces, whether at a global scale, national scale, regional or even personal scale, must have been at work to motivate the break-up of the company. From the case expert's description of the CTO and CEO, both had different management styles and held very different views on what the teams should focus their efforts on. The break up was most likely the result of a combination of social, economic and, possibly, legal forces. From such speculations the notion grew that there may be a defensible link between driving forces and keystone ideas.

In advance of the Design Fiction formal study, PESTLE trends and driving forces (see Section 5.3.2.2 'Session 2: Scenario Planning') had been used to map out the future terrain of digital bereavement (see Appendix C10 'Charting the future of digital

bereavement’). In the session document and briefing given before the study, attention was drawn to the role of PESTLE trends and driving forces in understanding possible futures. Not a great deal was made of them, and nothing more was said about them. However, post hoc analysis of the conversation leading up to the point where P4 fields what becomes to be recognised as a keystone idea shows that methodical consideration was being given to the impact of shifting fortunes as a result of social and economic trends (see Table 7.2 ‘Final steps toward the keystone idea’). The keystone idea in question is rooted in the principle of legal necessity. This clear indication of a direct link between PESTLE trends and keystone ideas prompted a series of experiments in data visualisation and analytical studies to look for ways to, first, bring such links into plain view, and second, analyse them in greater detail.

7.3.6.3. Tracing the emergence of a keystone idea

This self-reflective experiment began by tagging and coding the section of dialogue leading up to recognition of the keystone idea in the Design Fiction formal study (analysed in detail in Section 8.2.2 ‘Framing: Design Fiction workshop’).

Figure 7.10. Storyboard transcript technique used in thematic analysis.



Storyboard transcription was used as an aid to narrative analysis. Storyboard strips were numbered, joined together and mounted on a wall (Figure 7.10).

To arrive at a set of concepts that represent common and persistent design interests, an element of discourse was sought that would assist in their identification. Questions were found to serve this purpose well, for they were easy to identify in the text and often solicited responses that led to fielding concepts and ideas.

Using colour-coded Post-it notes, twenty-one questions were tagged and coded in the text (see Appendix C12, ‘Analysis of the Design Fiction formal study’ Table C10). A

database was set up to facilitate categorisation and sorting of questions (see Appendix C13 ‘Database setup used to analyse questions’). Questions were sorted and ranked from 1–10 to identify those that were of most interest and use to design. Only 15 questions were deemed to be of direct relevance to design. However, a second reading of the text revealed that in some utterances, questions were implied rather than explicitly expressed. This led to the count being revised to 16 design-relevant questions.

With these 16 questions visually dividing the text and acting syntactically as points of departure for concept development, small Post-it notes were positioned next to utterances that made reference to concepts put forward in response to readings made of the Seed stories, gestures, dialogue acts, and other concepts that arose in the strategic conversation in response to prompts from StoryFrame (see Appendix C12 ‘Analysis of the Design Fiction formal study’ Table C10, Column 2).

In Chapter 8, detailed protocol and narrative analysis is conducted to reveal how design concepts and ideas evolve in lock-step with questions and stories. As a primer before viewing that work, the following describes how one question is raised in the Design Fiction formal study, and, while being intermittently set aside or addressed, is answered by what becomes recognised as the keystone idea.

The coding system (shown in red on the storyboard) refers, first, to Final Storyboard (FS), second, to storyboard panel (e.g. 01, 03, etc.; some are not shown), and third, to utterance (.1, .2, .3, etc.).

Figure 7.11. Final Storyboard: Panel 01.



A question is posed on Panel 1 (Figure 7.11, FS01.6).

MJ: ‘How does VIVIEN manifest itself?’

Three utterances address the question. Then, with FS01.13 the question is dropped. The continuing discourse focuses on making observations about the potential that

the future world presents to change people's expectations of bereavement and why someone might use a service like VIVIEN.

Figure 7.12. Final Storyboard: Panel 03 (part a).



The question is picked up again on Panel 3 (Figure 7.12, FS03.1).

P16: 'There are no interfaces in this, it just happens'.

It is picked up again at FS03.2.

MJ: 'There's gotta be some touch-points somewhere'.

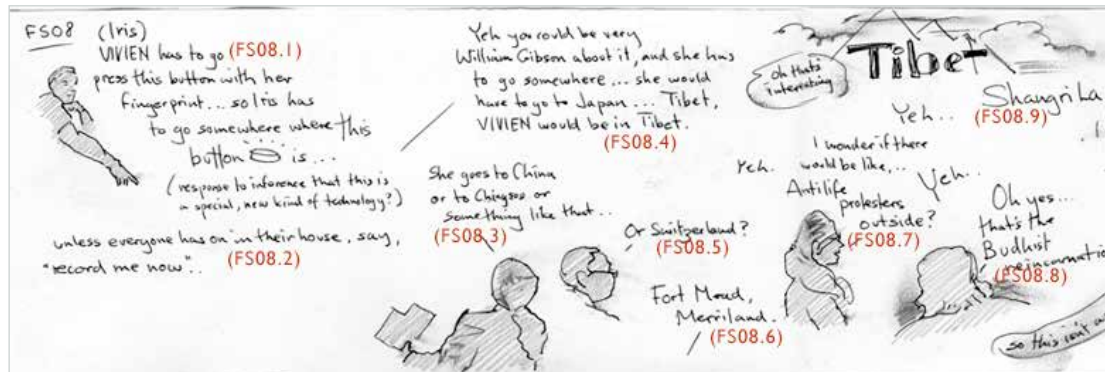
Figure 7.13. Final Storyboard: Panel 03 (part b).



Some discussion follows, but it ends when another question is posed toward the end of Panel 3 (Figure 7.13, FS03.12).

MJ: 'What, then, is Iris' motivation for doing this?'

Figure 7.14. Final Storyboard, Panel 08.



After some time, the question re-emerges on Panel 8 (Figure 7.14, FS08.1).

P16: 'Iris has to go somewhere where this button is',

The question prompts conceptual exploration that develops momentum over this and the following panel.

Figure 7.15. Final Storyboard: Panel 10.



On Panel 10 the discussion diverges at (Figure 7.15, FS10.5).

With so much discussion around how VIVIEN manifests itself and so little resolution, the question returns to dominate the conversation (see following Table 7.2, first panel FS13.7). This, very concrete question concerns itself with human values and social norms. It marks the first in a series of final steps that build a case for a keystone idea.

PR9: There could be something in there, whether it's John that, kind of, gets in touch with VIVIEN or vice versa. Because, what would that be?

All but 1 of the last 7 utterances that mark the final steps toward the keystone idea are questions.

Table 7.2. Final steps toward the keystone idea.

Step	Question	Participant	Utterance No.	Panel code	Rank
1	There could be something in there, whether it's John that, kind of, gets in touch with VIVIEN or visa versa. Because, what would that be?	PR9	541	13.7	09
2	How would Iris deal with John when she's doing all this business? I mean, what's she telling him?	MJ	542	13.8	05
3	What's the interaction there? Between Iris and John?	P4	545	13.9	08
4	Because in a way why would he (John) not know about it (Iris' deal with VIVIEN)?	PR9	546	14.1	03
5	But she'd be going so that she could continue to care for him.	PR10	548	14.3	07
6	Could there be a financial motivation that her being present in some way being to do with being able to sign-off on all this stuff?	P4	553	14.5	09
7	What's the legal status of Iris? Can she sign-off?	P16	556	14.8	10

Table 7.2 describes how the keystone idea emerged in lock-step with questions that began to be asked near the beginning of the workshop. The final steps are marked by questions numbered in Column 1 and shown in Column 2. The code in Column 3 refers

to the participant who fielded each question, while utterance numbers in Column 4 give an indication of pacing. Column 5 refers to the coding system used to identify utterances on the storyboard, and Column 6 shows the rank attributed to each question where 1 is of lesser significance and 10 is of greater significance to design work.

Step 1. The question that oriented the conversation toward the emergence of the keystone idea was raised by PR9 at panel 13.7. It was a very concrete question concerned with the way contact might be made and sustained between John and VIVIEN.

Step 2. It raised a similarly concrete question about how Iris might deal with John.

Step 3. P4 links the question to one of the unresolved Plot Themes (*An actor receives help from an unexpected source*).

Step 4. PR9, who raised the first question, gives added meaning to the line of thinking by drawing Q1, 2 and 3 together in a further question that addresses motive.

Step 5. Though not framed as a question, PR10 keeps the momentum of idea generation going by continuing to question the motives in play.

Step 6. This prompts P4 to field an idea that appears to answer, not only the first question, but all the others in play.

Step 7. P16 then affirms the significance of P4's proposition and illustrates the legal implications with a scenario that raises questions about VIVIEN/Iris' legal status and role in matters of power of attorney.

In the conversation that follows this sequence of questions, the idea is evaluated by gauging its impact on the story and questioning its usefulness for design work (15.1-16.5; for the complete storyboard go to <http://malcolmjones.com/making/DFiction_Stbd1.html> and <http://malcolmjones.com/making/DFiction_Stbd2.html>).

7.3.6.4. Definition of a keystone idea

Definition: *an idea that comes to stand as a nexus, focal point, main purpose or semantic epicentre of a story, which binds and makes meaningful all other story ideas and narrative threads.*

From the critical reflection and analysis that has been conducted on keystone ideas it is now possible to say that they are only recognised to be *key* after they have been reflected upon in the 'frame' (Dorst, 1997b) or context of a story or narrative. According to Chandler (Quesenbery in Pruitt & Adlin, 2006:530), '[a] good story cannot

be devised; it has to be distilled'. That is to say, what makes a story 'good' cannot be realised until it has been 'devised' and its essential qualities, including its central idea, have been weighed in relation to other ideas within the story as a whole. The concept of a whole or complete story is closely related to that of 'coverage' referred to by Carroll (2000:255), and Sutcliffe (2003:8; discussed in Section 2.1.3.2 'Problems and limitations of scenarios').

In *Writing for Comics*, Moore (2003:6) draws attention to the importance of getting to the 'central' idea of a story that is distinct from the sequence of events or the plot. In design, the purpose of a story must be evident (see Section 7.3.6.1 'Purpose at the root of keystone ideas'). Purpose is easier to comprehend during authoring and reading if it is encapsulated in a concept or idea that is recognisable, memorable, valuable and essential in the way that it acts as a nexus for key actors, actions and events in the story.

Every idea originates as a suggestion, but not every suggestion is an idea. The suggestion becomes an idea when it is examined with reference to its functional fitness; its capacity as a means of resolving the given situation.

(Dewey, 1938:110).

Arguably, it is the 'functional fitness' of ideas that makes them salient. For Kress and van Leeuwen (2006:210), salience is 'the degree to which an element draws attention to itself'. In actor-network theory an idea becomes 'strategic through the number of connections it commands' (Latour, 1996:6). Goldschmidt (2014:44) claims that 'the most critical thing in a design process is the solidification of a major idea, or combination of ideas, that could bring together all the major aspects the design had to respond to'. And, for Carroll (2000b:285), a good scenario 'emphasizes key causal factors so as to evoke action on the part of designers'. Keystone ideas begin to address Carroll's problem of 'generating and identifying good scenarios or good sets of scenarios, where 'good' means scenarios that raise and illuminate key issues of usability and usefulness' (2000:255). Here 'illuminate' is the operative word, since keystone ideas shed enough light on the challenge to make resolution through design possible.

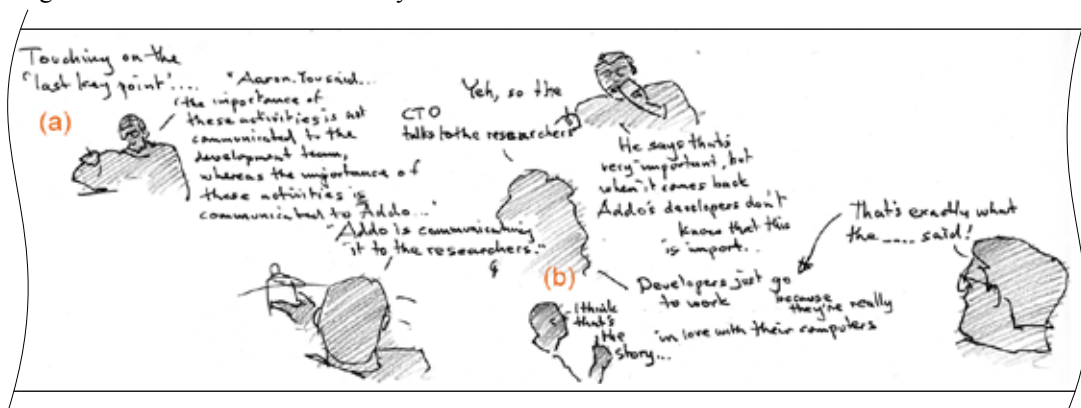
7.3.6.5. Keystone Ideas as narrative fugitives

As evidence mounted for the importance of keystone ideas in story work, an appreciation grew for their properties, characteristics and affordances and for their suitability as a Narrative fugitive – a resource that designers come to recognise during practice and are able to draw on to support story work.

In Innovation workshop 2, one of the things that helped the Teams get the story straight was their ability to recognise good ideas, that is, ones that help bring coherence to a story and a sense of purpose to design work. Keystone ideas help authors to establish 'a valued endpoint' for a story and select 'events relevant to the endpoint' (Gergen, 2005:100–104). In the approach taken on the first day of Innovation workshop 2, two ideas of this kind emerged.

The first keystone idea emerged in the '20 Questions' activity. Details that addressed how miscommunication between Team members manifested themselves were clear, but the root cause was not. If the Teams could not pinpoint the cause of the communication issues, proposals for interventions would remain elusive. When details emerged about the company break-up they seemed to point to an ongoing power struggle between the CTO and the CEO, a power struggle that was being played out by their *teams* over product development issues. Was this where the boundaries had been drawn that led to the *teams'* communication issues?

Figure 7.16. Identification of the keystone idea.



The break-up of the company was recognised to be of potential importance (Figure 7.16 a). But, its real importance could only be gauged when details of the story that had been discussed were rethought and reframed with the 'break-up' event taken into account. That is, the part (the idea) had to be seen in the context of the whole (the story). Team members saw potential for the idea to mobilise actions and events that had hitherto alluded them.

I think that's the story (M); Figure 7.16 b).

The second keystone idea emerged during the Narrative Blueprint activity at the end of Day 2. After completing the Visual Plot-line, the Teams began to ideate about artefacts that could act as boundary objects in an intervention kit. Through a series of

cognitive associations or small 'leaps' of imagination Team members proposed ideas for sensitising themes and objects, such as 'transportation', 'ship', 'plane' and 'train'. These led to ideas for events, such as 'trip planning' and 'ticket' purchase. These ideas inspired Team members to suggest that the sensitising event might be a train journey, sensitising objects might be train tickets serving as invitations, and the initiation 'box' or 'package' might be a steamer trunk or travel case. The intervention programme might stipulate restrictions on travel baggage which could draw attention to the value of pooling resources while on the journey; a principle that could be transferred to the workplace.

What made the journey theme resonate with the Teams was the fact that it fitted every requirement and resolved almost all outstanding questions about which concepts might work. Just as the 'break-up' idea helped to frame the context for design, the 'journey' idea helped to frame design propositions.

Both ideas had a common role to play in design story work. They acted as unifying, central and salient foci capable of holding all other significant ideas in a kind of network or 'frame' (Dorst, 1997b) of logic that imparts meaning and lends coherence to the narrative of design work.

7.4. Summary

In this chapter a programme of critical reflection and conceptualisation has been undertaken that represents moves made toward building theory. The aim has been to answer research questions concerned with *how story, narrative and narrative resources work for designers*. Insights from the studies have been discussed and conceptualised; some in support of theoretical propositions, others in support of approaches to analysis or arguments for claims.

Two novel aids to research in the areas of critical reflection and analysis have been developed. Resource Journeys help describe how resources function and how narrative resources support periods of story work marked by transition (see Section 7.3.5.1 'Narrative resources support periods of uncertainty'). Whereas, the worth of storyboard transcription has been further demonstrated in the way it helped conduct narrative analysis of keystone ideas. Both have aided critical reflection of the studies and been instrumental in conceptualising and analysing the data.

A significant first step was made toward building theory when the prevailing perspective on design resources was revised by proposing a view of resources as *dynamic* with regards to affordances and functions, and *situated* with regards to such attributions in inter-actant engagements. Conceptualisations of resource functions and their role in helping to explain how story, narrative and narrative resources work for designers were developed further through a series of self-reflective experiments, propositions from which have contributed to a body of knowledge and understanding.

Insights drawn from the exploration of functions underpinned the first self-reflective experiment, which concerned itself with *how functions come to be attributed*. By combining theory from Cockton's resource functions and Bruner's (1985) modes of thinking, detailed analysis conducted on the content of utterances revealed that they do lend themselves to function attribution, and that the functions they perform help designers to take up different views or positions with regards to questions, concepts and stories that are often distinct yet complementary.

The experiment informed approaches to data visualisation that became central to analysis conducted in the following Chapter. Where in this chapter the scatter plot diagram worked as an aid to exploring how functions come to be attributed to utterances, in the following chapter 'data charts' serve as an aid to exploring where attention is directed in strategic conversations.

Broadening the scope of the inquiry, the next self-reflective experiment looked at *resource functions in inter-actant engagements*. Detailed analysis was made of a single inter-actant engagement between a resource, a participant and an utterance. Outcomes from the experiment confirm that functions attributed to a resource complement, and in a *performative* way complete, those attributed to a participant or an utterance. This insight leads to the conceptualisation of *complementary functions* and *function reciprocity*. One question that arose from this experiment concerned the universality of some functions. Analysis conducted in the following chapter helps to answer the question (see Section 8.3.2.7 'Summary of insights').

Steps were then taken to find out whether what had been learned about functions from the first two self-reflective experiments could help forge defensible links between views of story work at the micro-level of moment-by-moment interactions, and those at the level of discourse, i.e., conversations and activities. Functions continued to act as a common agent in a re-conceptualisation of story work. For, as this experiment has

shown, through them connections such as causal links can be made between the affordances of resources and the fulfilment of goals. Three causal sequences have been proposed that demonstrate the pivotal role played by functions. The first begins with the affordances of resources, while the second begins with the attainment of goals. Taking the situatedness of functions into account (see Section 7.2.1.3 ‘The situatedness of functions’), the third, a bi-directional sequence, accounts for settings or situations where affordances and goals change over time.

In the discussion about *how narrative resources support story work* a case is made for the value of recognising a second causal sequence, this time at the macro-level of design activities. The sequence concerns itself with concepts, stories and approaches and how, in order to bring into alignment design stories and goals, designers rethink, reframe and refit both their stories and their approaches. Two examples explain the principles of the concept. Of note with regards to insights from this experiment, the concept of ‘framing’ came to influence choices made during the naming of orienting episodes (see Appendix D4.1.1 ‘Categorisation of orientations’).

Finally, the last development to arise from the series of experiments builds on techniques for conceptualising story work to interrogate *how keystone ideas emerge in strategic conversations*. Throughout the studies, questions arose about how some ideas come to be recognised as significant or even essential to design work where others appear to be less significant or essential. Recognition of every keystone idea in the studies came as a result of observations and reasonings made by this researcher. Student studies conducted since this research concluded suggest that others can be guided to look for and find keystone ideas. But, it is not easy. Case studies may be the best way to both explain what to look for and provide guidance on how to find them.

The first clues are afforded by contemplating the roots of keystone ideas, which, when traced back to early card set experiments, reveal the need to consider *purpose* in design story work. Further clues and guidance are afforded by a critical review of keystone ideas throughout the studies, which reveals that their recognition in story work is typically preceded by paying attention to driving forces – a concept borrowed from Scenario Planning. To test the conjecture and provide further insights, a reporting technique that combines visual depiction with textual description has been developed to help trace the emergence of one keystone in a strategic conversation.

With a growth in knowledge and understandings that stemmed from studying keystone ideas came the opportunity to propose a definition, and consider whether beneficiaries of the research would also be served by viewing keystone ideas as Narrative fugitives.

Chapter 8. Analysis

	Understanding practice	Building theory
Story, narrative and design	A. How do designers work with story and narrative?	B. How do story and narrative work for designers?
Narrative resources	C. How do designers work with narrative resources?	D. How do narrative resources work for designers?

While undertaking a programme of critical analysis, this chapter continues to focus on questions of theory building. Theoretical perspectives that concern themselves with *how story and narrative work for designers* (B) serve the dual purpose of providing a foundation on which to build theory and, in data analysis, a rationale for evaluating *how narrative resources work for designers* (D).

8.1. Introduction

Acting as a starting point for analysis is the hypothesis that design concepts and ideas evolve in lock-step with questions and narrative propositions, which take place through actions that involve material change, i.e., acts that contribute to change in such things as objects, artefacts, texts, stories and conversations. The aim of conducting micro analysis of conversation, stories and functions attributed to mediating objects such as narrative resources is to track the evolution of concepts and ideas as they coalesce around questions, take shape in story and narrative and come to resonate as design propositions.

As P16 put it during the Design Fiction formal study:

There needs to be some way of showing how participants arrive at the final story.

8.1.1. Method of analysis

The data is analysed using a combination of protocol analysis and narrative analysis. Protocol analysis can be structured around a series of steps (Guindon, 1990:316).

Here the *steps* consisted of ‘orientations’. Design activities are typically oriented toward attaining a particular goal (see Section 5.4.5.2 ‘Innovation workshop’). Many such activities have been described in the studies (see Chapters 5 and 6).

Orientation categories were determined through a synthesis of Plot Themes, Dewey’s (1938) *six points of inquiry*, and two trusted taxonomies drawn from the literature; Nielsen’s (1995) scenario *purposes*, and Schön’s (1983) aspects of design work (see Appendix D4.1.1 ‘Categorisation of orientations’). This resulted in four categories; Framing, Forming, Fielding and Finishing. Descriptions were drawn-up to help define orientations as a means of characterising episodes of story work (see Appendix D4.1 ‘Defining orientations’), which enabled definitions to be developed for the four categories; *framing, forming, fielding* and *finishing*.

Table 8.1. Determining the best episodes to analyse.

Studies		Framing	Forming	Fielding	Finishing
Pilot study	Session 1	YES			
	Session 2	YES			
	Session 3		YES		
	Session 4			YES	
Innovation workshops	Workshop 1	YES	YES		
	Workshop 2	YES (a)	YES (b)	YES	YES
IXD Narratives		YES	YES		
Design fiction workshops	Workshop 1			YES	
	Workshop 2		YES	YES	
	Formal study	YES (c)	YES (d)		

Orientations were then used as assessment criteria to evaluate the roles played by activities undertaken in each study (Table 8.1; for details see Appendix D4.1.2 ‘Confirmation of orientation categories’).

Second, this exercise served to verify that orientations afforded a useful and trustworthy way to characterise episodes of story work, and, through qualitative assessment, served as a means to choose the best episodes to analyse. Two *Framing* episodes and two *Forming* episodes were chosen for how well they revealed orientations to story work and how suitable they were for comparative analysis (Table 8.1, a, b, c, d). Video recordings of the selected episodes were transcribed and utterances were numbered. In most cases the convention used to assign numbers was one utterance = one number. Complex utterances that, for example, touched on many different subjects, and long utterances, were subdivided and numbered separately.

Third, a coding scheme was developed (see Appendix D4.3 'Determination of Subject Themes'). The coding scheme was allowed to evolve during analysis (Gero & McNeill, 1998:6). With the aim of making the emergence of keystone ideas central to questions being asked in the analysis, a question was posed about the role that PESTLE trends might play in their identification (see Section 7.5 'Understanding keystone ideas'). It was while attempting to answer this question that a way was found to code and interpret the data in such a way that the emergence of keystone ideas in the strategic conversation could be viewed and analysed.

Fourth, a novel method of data visualisation was developed to enable coding and comparative analysis of data. The approach taken to visualise the data extends the high-level views of story work afforded by Resource Journeys deeper into the realm of conversation and situated action. 'Data charts' are explained (Section 8.1.2 'Data charts'), as are the characteristics of their features and the techniques for reading them. Using this predominantly visual method, the four 'orienting' episodes were coded.

Fifth, an interpretive stance on narrative analysis relates speech to participant actions, and study events give context and meaning to some of the findings.

8.1.2. Data charts

Data charts were designed as an aid to studying story work. They represent conversations that take place around story and narrative development. The most significant visual feature of data charts is one that is shared with Resource Journeys and inspired by labanotation (see Section 7.2.1.2 'Resource Journeys'): the flow of action, which may also be viewed as time or lived experience, is marked on the vertical axis from top to bottom. In the case of data charts, numbers representing utterances in a conversation are arranged in a centre line. Coded markers that represent aspects of the conversation are arranged on either side of the centre line. In this way comparisons can be made, marker alignments can be observed and patterns noticed and interpreted. Using this charting system, data from the four episodes was made visible and thus amenable to protocol analysis and narrative interpretation.

Links to enlargements of the four data charts:

Framing: Innovation workshop

<<http://malcolmjones.com/making/InnovFraming.html>>

Framing: Design Fiction

<http://malcolmjones.com/making/DFiction_Framing.html>

Forming: Innovation workshop

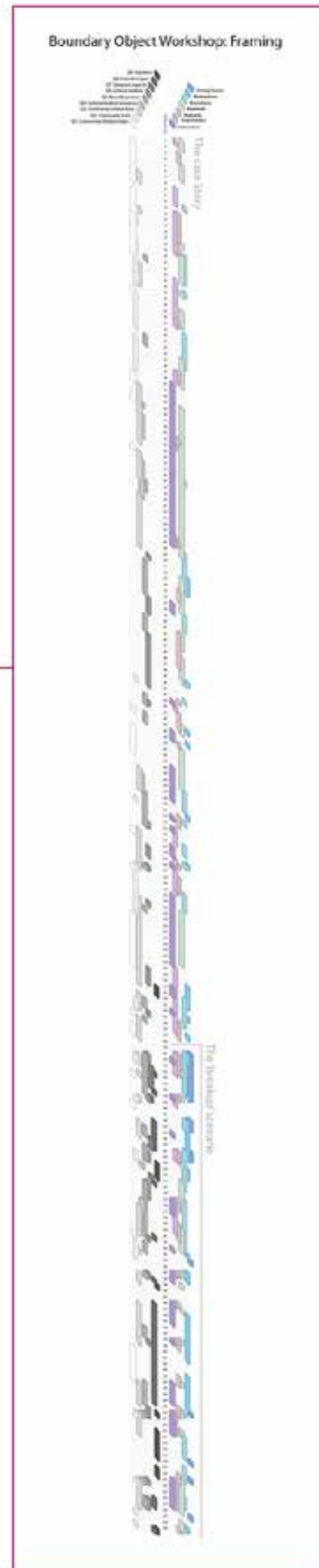
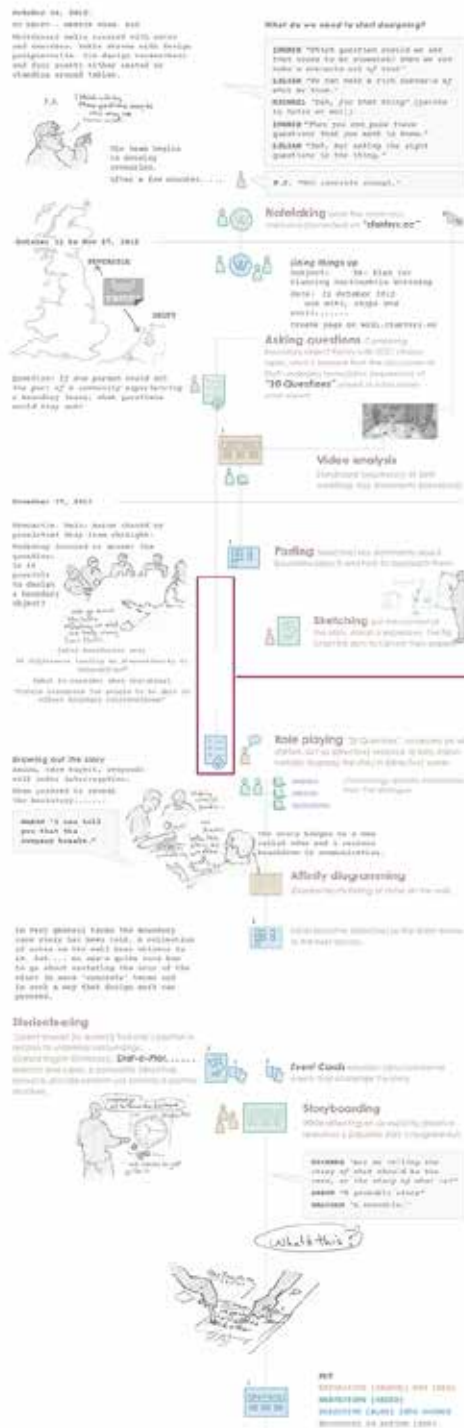
<<http://malcolmjones.com/making/InnovForming.html>>

Forming: Design Fiction

<http://malcolmjones.com/making/DFiction_Forming.html>

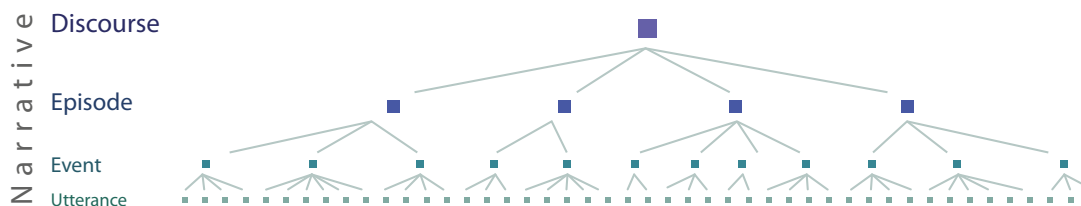
Figure 8.1 (opposite page) describes the relationship between Resource journeys and Data charts. In this example, a red rectangle on the Resource journey (left) indicates approximately where the utterances examined in the data chart (right) took place in Innovation workshop 2. This diagram, therefore, speaks to both the performance given by narrative resources in support of a strategic conversation – the overall resource journey – and the development of a story within that journey that unfolds in lock-step with questions, concepts, ideas and propositions made possible through that conversation. More detailed descriptions are given of the data charts throughout this chapter via a series of snapshots (e.g., Figure 8.8. etc., below).

Figure 8.1. Where data charts fit in resource-based approaches.



8.1.3. Describing the episodes

Figure 8.2. Model of narrative structure.



Wilcock's model of narrative structure (2005:20) provides a framework for conceptualising the temporal and hierarchical relationship between what can be viewed as a whole discourse and its constituent parts. From large to small, the parts consist of episodes, events and utterances. The model (Figure 8.2) is used throughout the chapter to show where data chart representations of orienting episodes fit in the context of each discourse.

Discourse refers to the overall inquiry undertaken in each study. *Episode* refers to a sequences of orienting activities that share common design goals or objectives and thus can be said to belong to a particular orienting category, such as *Framing*, *Forming*, *Fielding* and *Finishing*. Events refer to individual activities, and utterances make up the conversations that take place around them.

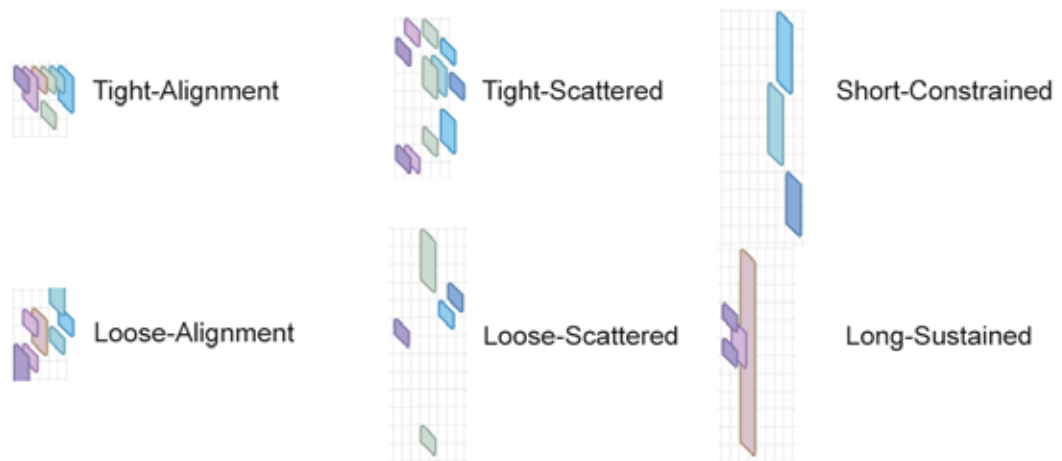
8.1.4. Orientation Categories

Definitions for *Framing* and *Forming* are given at the beginning of Sections 8.2 'Framing', and 8.3 'Forming' respectively. Since *Fielding* and *Finishing* episodes were not included in this analysis, their definitions are given in Appendix D4.1.3 'Definition of orientation categories'.

8.1.5. Markers and marker features

Data is represented on the charts by graphical markers that are laid out on a square grid. Utterance numbers are arranged vertically down the middle of the chart. Markers representing evidence of question or Theme use in an utterance are arrayed on either side of each utterance. The length of each marker depends on the number of consecutive utterances that make reference to that particular question or Theme. They are colour-coded for ease of identification. Horizontal alignment of markers indicate a co-occurrence of references made to questions or Themes in the conversation. Interpretation of the data led to identification of the following marker alignment types.

Figure 8.3. Marker alignment types.



‘Multiple alignment’ is defined as any instance of a single utterance or two consecutive utterances where more than four questions or Themes are either implicitly touched on or explicitly addressed.

Tight alignment: Multiple alignment of four or more marker types in a single utterance.

Loose alignment: Multiple alignment of four or more marker types over two consecutive utterances.

Loose scattered: A collection of four or more marker types of single or double markers that are scattered longitudinally.

Tight scattered: A cluster of four or more single (a) or double (b) markers that are scattered, yet tightly packed laterally and longitudinally.

Short constrained: A lone chain of six or fewer conjoined markers. Denotes attention paid briefly to a single item.

Long sustained: A chain of seven or more markers. Denotes long, sustained attention to an item in a conversation that may be constrained or divergent.

The number of questions or Themes that constitute an alignment of markers need not be fixed at four. However, in trial-and-error self-reflective experiments, four were found to produce a sufficient number of alignments to reveal patterns in the ebb and flow of interests without providing so many that peaks and troughs would not stand out. Goldschmidt (2014:58) describes how the number of links needed for a link to qualify as critical ‘depends on the “grain” of the analysis’, where ‘grain’ ‘pertains to the

propensity of the researcher to establish links' (ibid.). In the self-reflective experiments that were carried out, four was found to be a sufficient number of questions to demonstrate integration of knowledge and ideas, while at the same time providing enough instances in the conversation to create a discernible pattern of progress towards gaining deeper understandings.

8.2. Framing

Orientations categorised as *Framing* are considered to arise in the initial stages of enquiry. They are characterised by posing questions and the search for resonant meanings in contextual information. For Carroll (2000b:45), orientations of this kind represent attempts 'to see the situation in many different ways'.

Table 8.2. Breakdown of Framing episodes.

Framing episodes					
Study (Activity)	Resources (Directive)	Design/ Research Questions	Utterance Numbers	Subject Themes	Resources (Acquisitive)
Innovation workshop (case expert Interview)	20 Questions'	9	1–229	<ul style="list-style-type: none"> • Interactions • Stakeholders • Interests • Routines • Boundaries • Motivations • Health of the company 	Affinity diagram
Design Fiction formal study (story-spinning)	StoryFrame Seed stories	3	1–301	<ul style="list-style-type: none"> • Interactions • Benefit • Presence • Persistence • Investment • Ownership • Manifestation 	Aspect Map

In this section protocol analysis is conducted on two *Framing* episodes: the Innovation workshop and the Design Fiction formal study (Table 8.2, Column 1). In each case, narrative resources with *directive* function underpinned the conversations (Column 2) and design/research questions motivated the conversation (Column 3). Analysis centres around utterances (Column 4). In the case of the expert interview there were 229 utterances, whereas in the Design Fiction story spinning episode there were 301 utterances. Design story Subject Themes were sought as the generative outcome of the conversation (Column 5), and these were *harvested* via *acquisitive* resources (Column 6).

8.2.1. Framing: Innovation workshop

Figure 8.4. Framing episode: Innovation workshop.

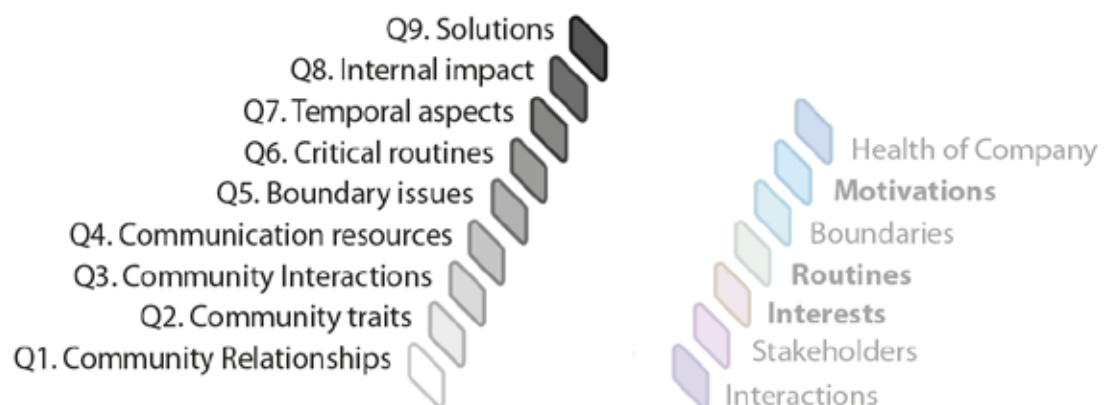


The episode in the workshop where the conversation oriented towards *Framing* began with ‘20 Questions’, moved on to the creation of an affinity diagram, and ended when the Teams began to spin a scenario with Dial-a-Plot. Analysis of the *Framing* episode focuses on the ‘20 Questions’ activity (Figure 8.4).

8.2.1.1. Questions posed in Innovation workshop

In the conversation that took place around the case expert interview, many of the ‘20 Questions’ were never explicitly asked. However, analysis of the text shows that over the course of the conversation most of the questions were addressed either explicitly or implicitly. Taking this into account and reflecting critically upon duplications and similarities, the original list of sixteen questions was reduced to nine (for how this was done see Appendix D4.2 ‘Reduction of the ‘20 Questions’’).

Figure 8.5. Questions addressed: Innovation workshop, Framing.



In the data charts, questions addressed in each episode are numbered and abbreviated (Figure 8.5). They are arranged on the data chart in the same order that they were posed in the study, moving from the general to the particular. To gain a broad base

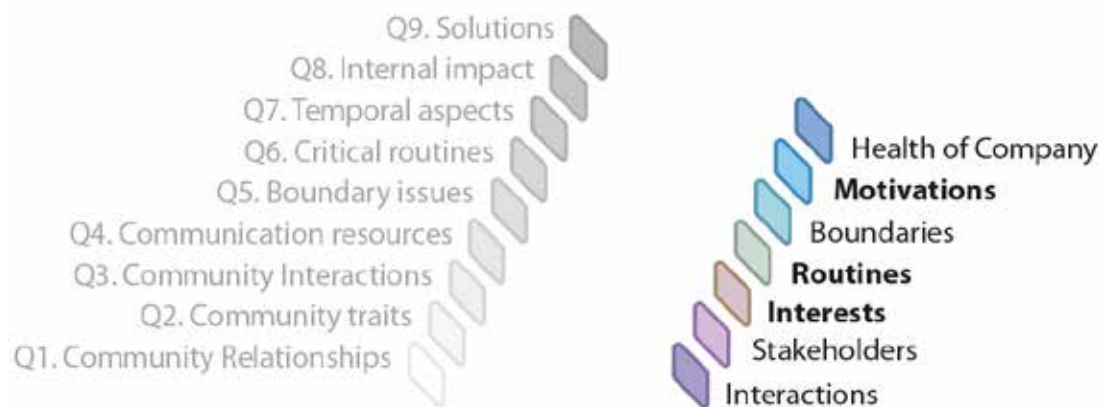
of contextual understanding, they began by questioning *community relationships* (Q1), *community traits* (Q2) and *community interactions* (Q3) before probing more deeply for detailed information with concrete questions about *communication resources* (Q4), *boundary issues* (Q5), *critical routines* (Q6) and *temporal aspects* of happenings and events (Q7). Perspectives on the *internal impact* of the boundary issues (Q8) and what possible *solutions* had been tried (Q9) were also thought to be of particular interest.

8.2.1.2. Subject Themes: Innovation workshop, Framing

Subject Themes result from the categorisation of concepts that are either fielded or discussed in the course of story work. A set of seven Subject Themes were developed to facilitate analysis of the way information was abstracted from the conversation that took place around the '20 Questions' activity. Choices were made on the basis of how well the set as a whole would support design story work. Themes were drawn from three sources. Three were determined in advance of the '20 Questions' activity (shown in **bold**). 'Interests' and 'routines' were chosen for their affinities with boundary object literature, while 'motivations' was chosen for its significance in narrative development (see Outcomes in Section 4.3.2.1.4 'Design experiment J: Getting the story right').

The remaining four were the result of conducting thematic analysis of the data, the aim of which was to support the forging of defensible links between keystone ideas and one of the underlying principles of Scenario Planning; the trends and driving forces of PESTLE analysis (see Section 5.3.2.2 'Session 2: Scenario Planning'). Repeated readings were made of the transcript, during which concepts were categorised as either critical uncertainties or predetermined elements. Taking the nature and frequency of concepts into account, they were grouped into four overarching Subject Themes; 'interactions', 'stakeholders', 'boundaries' and 'health of company' (for method of analysis, see Appendix D4.3 'Determination of Subject Themes').

Figure 8.6. Subject Themes: Innovation workshop, Framing.



Subject Themes appear on the right hand side of the data chart (Figure 8.6).

The way in which Themes are arranged describes a progression of focus from 'local' or microscopic predetermined elements to broad and general critical uncertainties. The first Theme, *interactions*, concerns itself with contact between actors in such things as meetings and negotiations. While the second Subject Theme, *stakeholders*, concerns itself with capturing the actors involved in such interactions. Each stakeholder, be they an individual or group, has *interests* and *routines*. Critical uncertainties begin to creep into the narrative when consideration is given to the nature of community *boundaries* and the *motivations* that often underpin them. Finally, the most critical questions arise over the *health of company*. Though the order in which they appear on the data chart had little impact on how utterances were interpreted, patterns formed by the proximity or alignment of coloured markers that were either complementary (distinctly different) or analogous (similar) did help with Subject identification and pattern recognition.

8.2.1.3. Distribution of questions: Innovation workshop, Framing

To view the full chart, visit <<http://malcolmjones.com/making/InnovFraming.html>>.

Set at right-angles on a square grid, the horizontal arrangement of questions and vertical arrangement of utterances provide the axial co-ordinates for the creation of a graph. Colour-coded markers placed on the graph indicate where utterances touch on particular questions. Looking down the graph, it is possible to see where each question was posed in the conversation and how much attention was given over to them.

Table 8.3. Where questions enter the conversation.

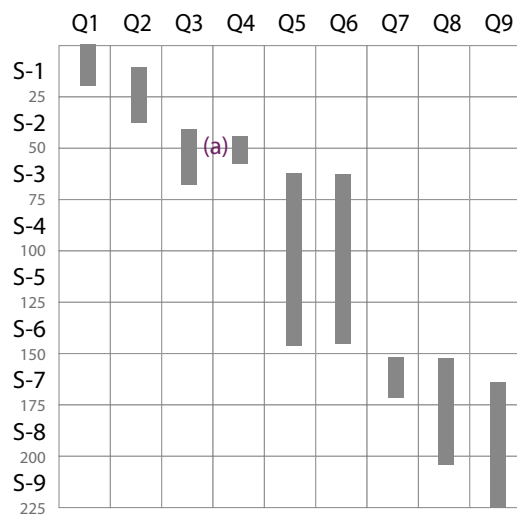
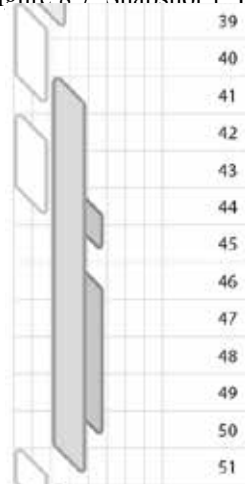


Table 8.3 gives a simplified overview of where questions were posed and how much attention was paid to them throughout the episode. Questions are arranged across the top and episode sections are arranged down the left side (S-1, S-2, etc.). Each section represents 25 utterances, for a total of 229 utterances (slightly more than the graph shows).

As one might expect, the pattern of markers plotted on the graph moves steadily from the top left corner where Q1 *community relations* is being addressed to the bottom right corner where Q9 *solutions* is being addressed. But although the progression is steady, it is not smooth.

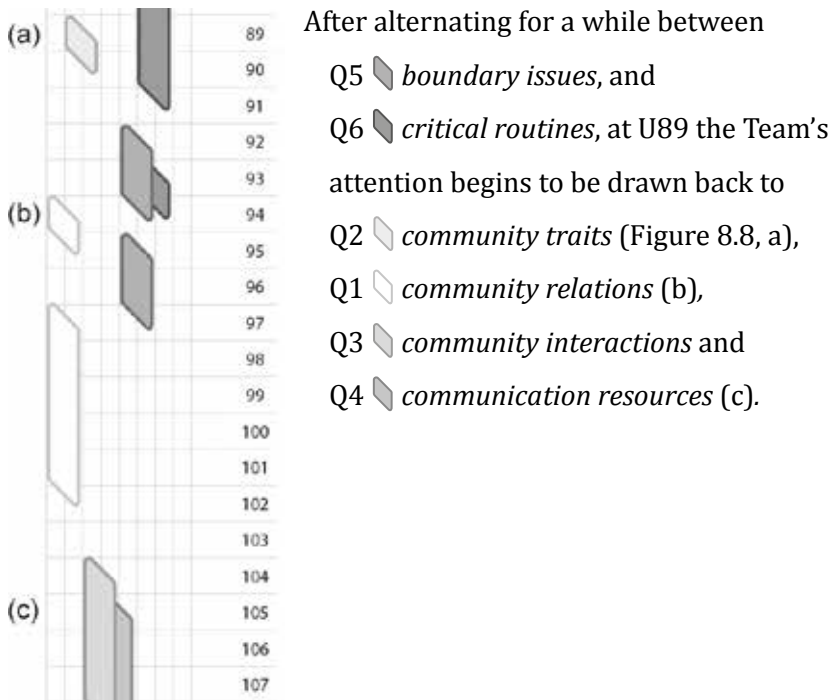
At first, the conversation rarely touches on more one than question at a time, and, for the most part, once addressed questions are put aside. But, as the conversation progresses the frequency of addressing multiple questions increases.

Figure 8.7 Snapshot 1: Innovation workshop, Framing.



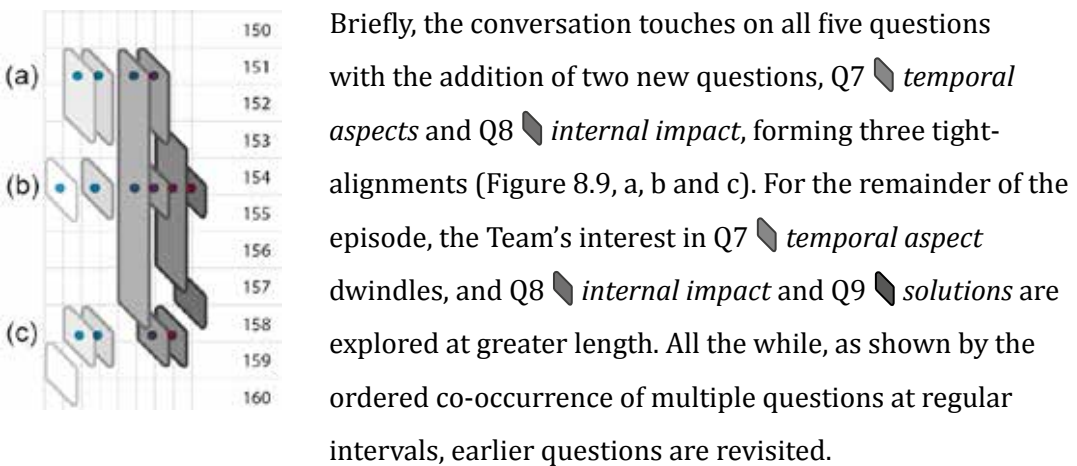
During the Team members' discussion of Q3 *community interactions*, Q4 *communication resources*, is drawn into the conversation.

Figure 8.8. Snapshot 2: Innovation workshop, Framing.



At U140 the Teams briefly touch on Q9 *solution* and thereafter touch on or address all nine questions. More generally, at first the conversation moves rapidly between five of the first six questions in play (U141–8).

Figure 8.9. Snapshot 3: Innovation workshop, Framing.



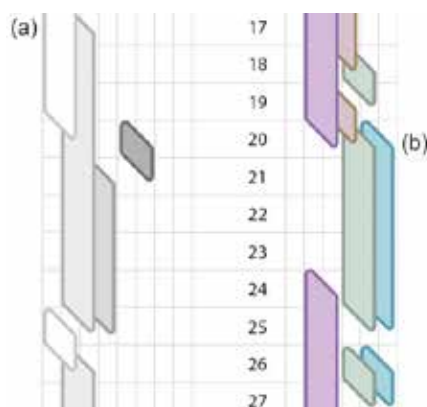
8.2.1.4. Distribution of Subject Themes: Innovation workshop, Framing

On the data graph to the right of the column of utterance numbers, a column of coloured markers represents where attention is paid to Subject Themes being addressed in each utterance. With the aim of showing the role played by Subject Themes (which

represent concepts) in the emergence of *the* keystone idea, a concise overview is given of how they are distributed throughout the episode with details of their features and interpretations of the patterns created by them.

In response to the first question, which was concerned with the working relationship of the communities, a discussion about *stakeholders* begins to draw *interests* and *routines* into the conversation.

Figure 8.10. Snapshot 4: Innovation workshop, Framing.



At U17 the conversation turns to Q2 *community traits* (Figure 8.10a), where first the Subject Theme of *routines*, then *boundaries* enters the conversation (Figure 8.10b).

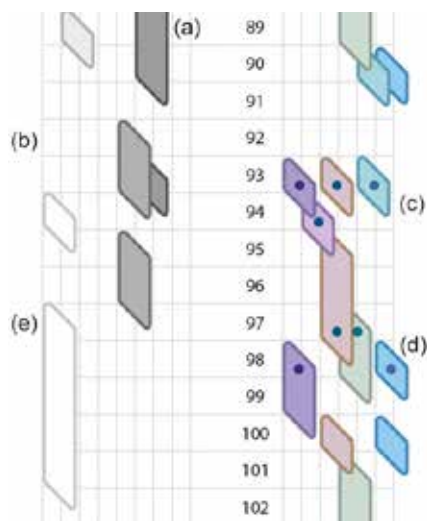
[U20] P6: If you're talking about the routine of negotiation, do they all use the same or are there also boundaries here?

The four Subject Themes – *stakeholders*, *interests*, *routines*, and *boundaries* – then dominate the conversation to U40. At U40 in response to questions of *community interaction* (Q3) and *communication resources* (Q4), Themes evident in a lengthy discussion that ends at U67 turn towards the subjects of *interaction* and *routines*.

[U69] MJ: So, which routines are most closely related to the boundary issue?

Complementing the alternating pattern created by the Teams' dual attention to Q5 *boundary issues* and Q6 *critical routines*, back-and-forth exploration of the same Themes draws *boundaries* back into the picture and that of *motivations* into focus for the first time.

Figure 8.11. Snapshot 5: Innovation workshop, Framing.



With the conversation focused on Q5 *boundary issues* (a) concerned with *boundaries* and Q6 *critical routines* (b) concerned with *routines*, at U90 the same dispersed pattern of markers suggests that searching or exploring Subject Themes becomes more rapid (Figure 8.11).

Co-occurrence begin to form with multiple Themes at U93–94 (c) and U97–98 (d). Both represent storied explanations given by the case expert. These take place at a point in

the conversation where progress on addressing new questions has stalled and the conversation turns back to Q1 *community relationships* (e).

Figure 8.12. Snapshot 6: Innovation workshop, Framing.



The co-occurrence of Subject Themes and Questions create a loose-alignment of markers at U113–14 where the case expert uses an anecdote to address a very concrete question about what

the *teams* in the case lack¹ (Figure 8.12, a). After offering the anecdote, prolonged attentions is given over to Q3 *interactions* and the Subject Theme, *stakeholders* where questions turn to address feelings and motivations, a line of questioning that soon leads to recognition of the company's ill-health – the issue that forms the basis of the case story's keystone idea.

Figure 8.13. Snapshot 7: Innovation workshop, Framing.



The case expert denies that there is any 'badness resulting' from the *teams'* dysfunctional relationship (U117–18). However, when the

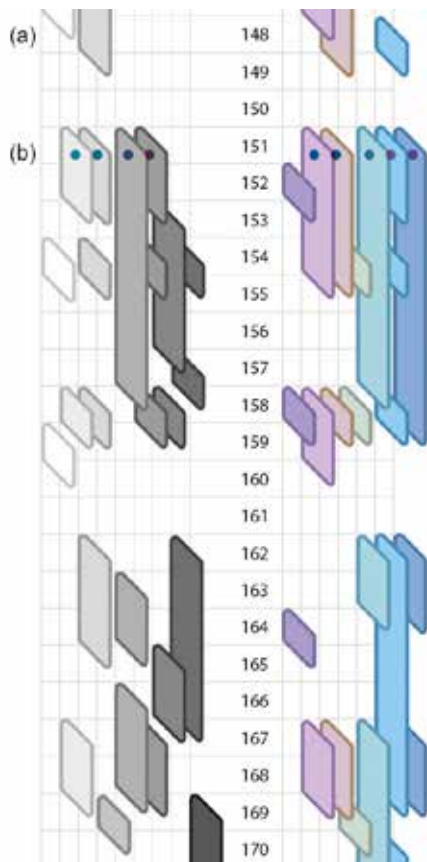
case expert describes some of the tensions that exist inside the company, a co-occurrence of Subject Themes and questions form a second alignment of markers at U120 (Figure 8.13).

1. [113] P5: Yes, so it takes them... essentially their boss has said, OK, the research team has these new things that they think are very important, and we need to integrate this into version...whatever the last version was, let's say, 1.1., or 1.0....or maybe it's 1.5, so it's four versions away. And so the problem is getting that to actually be used, in the actual end product itself.

[114] That's eh, the relationship between the team and the CTO is actually an example of a really good relationship...]

[U120] P5: So there's also the CEO, and in this case there's internal power struggles inside of PEAR. The CTO and the CEO don't have the same views.

Figure 8.14. Snapshot 8: Innovation workshop, Framing.



The conversation continues to touch on all the Subject Themes in play up to U148 (Figure 8.14, a) where, with the inclusion of the seventh Theme, *Health of company*, there is an increase in the frequency and complexity of Subject Theme co-occurrences.

Asked whether the situation between the case *teams* is being manipulated by upper management to further their own ends, the case expert, at first uncertain about how much of the back-story to reveal, describes what comes to be recognised as the keystone idea (for how it was recognised see Section 7.3.6.2 'A link between driving forces and keystone ideas').

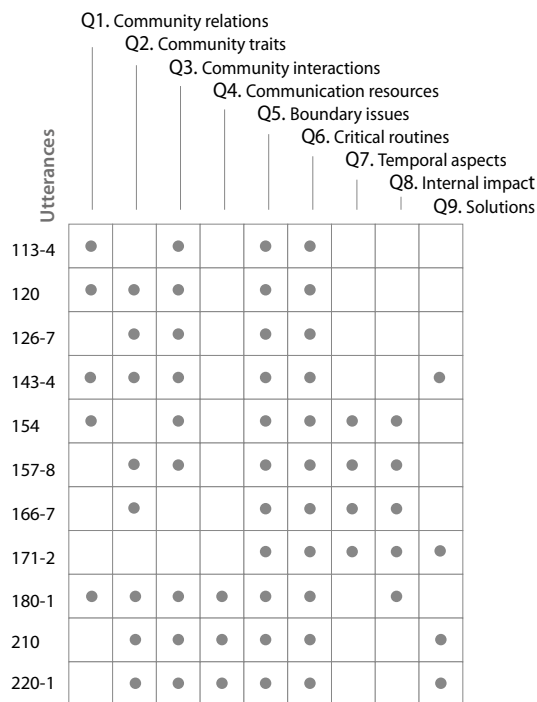
[U151] P5: So I can tell you that the company breaks.

The repetitive multiple alignment of markers that follow this revelation begin at U151 (b) and continue to the end of the orienting episode, giving a very graphic indication of how, through anecdotes, scenarios and various other forms of narrative, participants systematically draw on all the Subject Themes in play to reframe, rethink and refit the story. As they do so, they confirm their understanding of the case, gather more facts where needed, and test their ideas by fielding new propositions.

[U162] MJ: So it seems to me that if I was working in one of those development teams, I too would have some motivation problems.

With connections made between boundaries, stakeholders, and all the events surrounding it held in place by the keystone idea, the Teams were satisfied that they had a sufficiently good grasp of the case to move on.

Table 8.4. Distribution of multiple alignments.



A graph is used to show the distribution of multiple marker alignments that occur throughout the episode (Table 8.4). Marker alignments represent co-occurrences of references made in the conversation to questions or Themes. Where these occur on the data graph is taken as a measure of (a) the Team’s progress in answering all the questions, (b) the breadth of the Team’s understanding of the case story and its ability to assimilate, organise and draw conclusions from the many concepts that come into play, and (c) the usefulness of particular narrative resources at particular times.

Except for two utterances at U140–41 that briefly address Q9 *solution*, the conversation prior to U150 concerns itself entirely with the first six questions. In that section of the transcript there are three loose-alignments and one tight-alignment. After U150, where all nine questions are in play, there are five loose-alignments and two tight-alignments. In all seven instances there is a co-occurrence of five or more questions, with a co-occurrence of seven at U180–81.

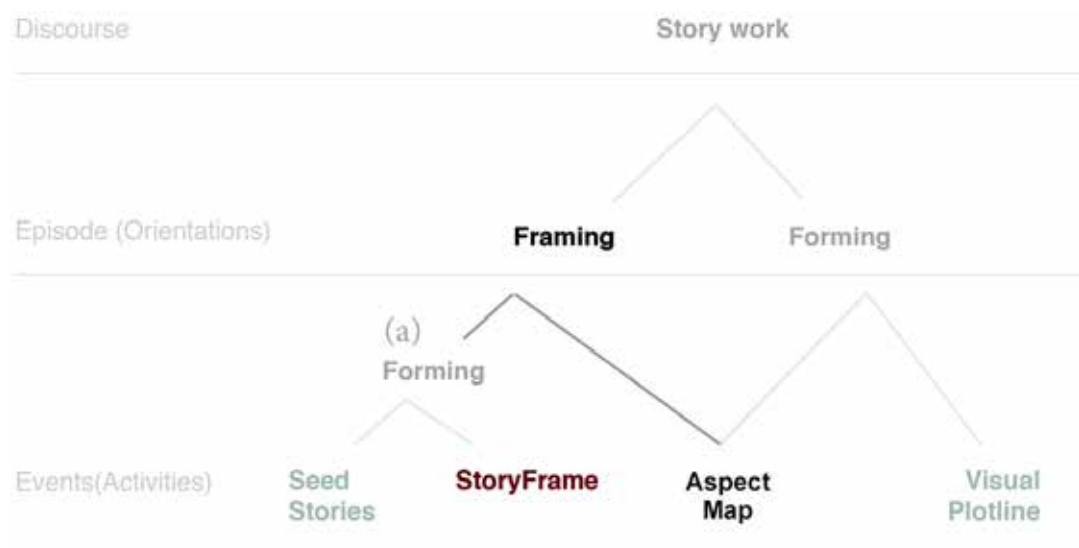
8.2.1.5. Interim summary of insights: Innovation workshop, Framing

Patterns created by the markers on the data chart show that the *directive* function of the questions served to motivate and guide the story work, draw out the case story and develop story-related concepts and Themes. This began in an unexpected way. In response to the first question participants touched, if only lightly, on three other

questions that drew four Themes into the conversation. It wasn't until two questions had been addressed in this way that the group settled into a rhythm of addressing each question thoroughly by systematically exploring individual or pairs of Themes. The ability of participants to expand on concepts or bring disparate concepts related to those Themes into focus through stories and anecdotes grew throughout the episode. Learning how to work together and use story and narrative to consider a wide range of concepts, then, appears to underpin the Teams' ability to recognise and articulate the keystone idea, an event that the visual system of analysis made plain to see. Once recognised, the pattern of Theme co-occurrences that follow recognition of a keystone idea (Table 8.4 Distribution of multiple alignments', bottom three rows) is also of interest, because it reveals how, through repeated rephrasing and reshaping, the ideas' fit with the story and suitability for design is assessed.

8.2.2. Framing: Design fiction

Figure 8.15. Framing episode: Design Fiction formal study.



The episode in the Design Fiction formal study where the conversation oriented towards *Framing* began with Seed stories to prime the activities, moved on to spinning with StoryFrame and concluded with the creation of an Aspect Map (Figure 8.15). At 301 utterances, this episode is longer than the Innovation workshop episode, and, since they addressed different subjects in different ways, the way the data was set up for analysis differs slightly (explained in the following section).

In the Innovation workshop, what was being Framed was a design challenge about which the Teams knew very little. *Framing* was therefore initiated by an explicit

question-asking activity from which concepts about the subject arose and story spinning followed. In contrast, what was being Framed in the Design Fiction formal study was the design story work itself. Thus *Framing* was initiated by story prompts and concepts and questions about the subject arose from engagement in developing the design fiction. In the latter, rather than inquiry-through-questions preceding story work, inquiry-through-stories enabled questions to be fielded and to emerge in the strategic conversation.

As a result of these differences, in the *Framing* episodes, the way questions and Subject Themes have been arranged for comparison on the data graphs differs. However, because of the interrelatedness of questions and Subject Themes, and the fact that they co-evolve, a reasonable argument can be made for being able to make defensible comparisons based on patterns of attention.

8.2.2.1. Plot Themes: Design Fiction, Framing

Whereas in the Innovation workshop the ‘20 Questions’ resource helped to direct investigation of a boundary case (see Table 8.2 ‘Framing episodes’, Column 2), in the Design Fiction formal study acting as agenda, prompt and mnemonic device StoryFrame’s nine Plot Themes performed a similarly *directive* function in facilitating the creation of a future world in which issues of bereavement could be explored.

Figure 8.16. Plot Themes: Design Fiction Framing.



Figure 8.16 shows how Plot Themes have been abbreviated and how each Plot Theme is graphically represented and arranged on the data chart. The same visual and spatial devices of tonal value, shape and position used to graphically represent questions in the Innovation workshop *Framing* episode are applied here to represent Plot Themes.

Table 8.5. Plot Theme abbreviations.










Abbreviation	Marker Symbol	Plot Theme
Lack/Need		There is a lack or need
Recognise		An agent recognises a lack or need.
Threat		Something threatens to prevent, or does prevent, an agent from satisfying the lack or need.
Seek Help		An agent seeks help to satisfy the lack or need.
Received		An agent receives help (from an unexpected source).
Task Set		An agent is required to complete a task or test to either, a) get help, or b) satisfy the lack or need.
Task Complete		An agent completes the task or test.
Need fulfilled		The lack or need is concluded (with either positive or negative results.)
New Order		A 'new order' is established. An agent's status is raised.






Table 8.5 describes the relationship between each abbreviation, marker symbol and Plot Theme.

8.2.2.2. Subject Themes: Design Fiction, Framing

Figure 8.17. Framing Subject Themes: Design Fiction formal study.



Figure 8.17 shows how Subject Themes are graphically represented on the data chart (for how they were developed, see Appendix D4.4 ‘Subject Theme development’).

Subject Themes are grouped according to their relationship with the three most salient research questions posed in the study. For example: Q1 *What would the notion of prolonged digital presence of an absent loved one do to people’s expectations of bereavement?* Was related to Themes of human contact and loneliness (*interaction* ); gift of care, being comforted, and being remembered (*benefit* ); and longevity of loved ones or perpetuity of digital ‘others’(*presence* ). Q2 *What does it mean to put a service in place that captures people’s entire life and then manage that over a long time?* Was related to the persistence of data and technologies (*persistence* ); investment in technologies, services and the future (*investment* ); and ownership of digital identity

and personal data through the consumption of technology (*Ownership*). Finally, with its concern for being concrete and particular about the way in which humans perceive and interact with material things, Q3 *How does VIVIEN manifest itself? Was related to the Subject Theme manifestation*.

8.2.2.3. Distribution of Plot Themes: Design Fiction, Framing

To view the full Design Fiction Framing chart, visit <http://malcolmjones.com/making/DFiction_Framing.html>.

Table 8.6. Plot Theme distribution.

Act	Plot Theme	Section of Orienting Episode										PT Total	Act Total
		1 1-30	2 31-60	3 61-90	4 91-120	5 121-150	6 151-180	7 181-210	8 211-240	9 241-270	10 271-300		
Setup	1. Lack/Need	16	5	5	3	2	6				1	38	87
	2. Lack recognised	5	1	1	2	6	6	2	2	4	2	31	
	3. Threat to resolution			8	3		1	5	1			18	
Confrontation	4. Help sought		1		1	3	5	3	3	5	4	25	156
	5. Help received				6	2	18	22	27	13	7	95	
	6. Task set	2			14	2	5		1	11	1	36	
Resolution	7. Task complete	4				1	2			6	11	24	89
	8. Need fulfilled	2	4	1	2	15	4	2		8	12	50	
	9. New order	1	1		2	2			1		8	15	

Table 8.6 describes the distribution of Plot Themes throughout the episode. As is the case with Dial-a-Plot’s 18 *Plot functions* (see Figure 4.15 ‘The makeup of Dial-a-Plot’), the *three-act structure* is used to group Plot Themes (Table 8.6, Columns 1 and 2 respectively). The orienting episode is divided into 10 section (numbered across the top), each of which accounts for 30 utterances (third row). The number of utterances that refer to or directly address each Plot Theme appear in the centre of the table. The total number of utterances referring to each Plot Theme is given in Column 13 (PT Total), and those assigned to each act are listed in the far right under (Act Total). For a detailed description of the analysis, see Appendix D4.5 ‘Analysis of Plot Theme distribution: Design Fiction *Framing*’. Three things of note resulted from the analysis.

First, at times throughout the conversation the Teams gave concentrated attention to each Plot Theme. Red numbers show where the highest concentrations occur. The amount of attention given over to each Plot Theme varies considerably, ranging from 5 (PT4) to 27 (PT5).

Second, despite the methodical way in which each Plot Theme was addressed, all nine were drawn into the conversation in the first four sections (green table cells). Six enter the conversation in the first section alone. Then, one at a time, each of the remaining Plot Themes enters the conversation in the following three sections.

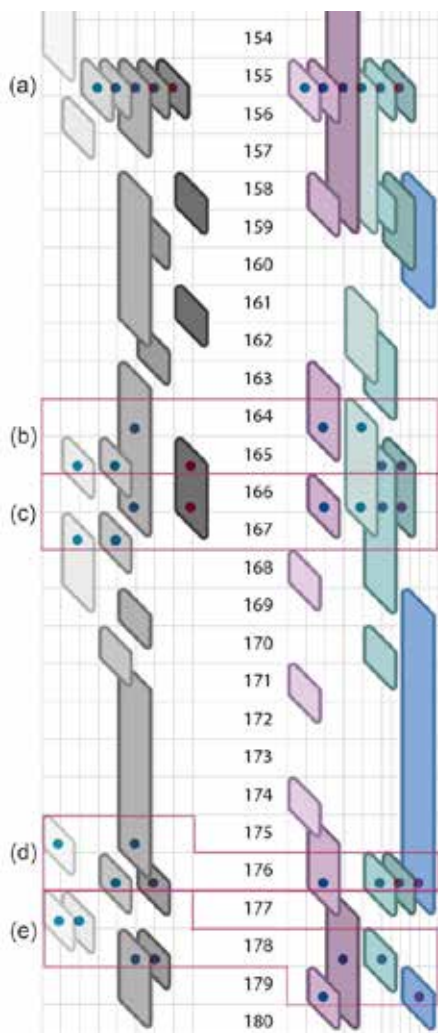
Third, attention given overall to each Plot Theme is heavily weighted towards Plot Theme 5 ('Help received'), which was addressed in 95 utterances (PT Total column). Least attention was given to Plot Theme 3 ('Threat to resolution'). Addressed in only 18 utterances, interestingly the usefulness of this Plot Theme was challenged by P15.

Also of note is the attention paid to each part of the narrative (last column 'Act Total'). Perhaps because participants were given set-up and resolution Seed stories, the confrontation act (Plot Themes 4, 5 and 6) demanded approximately the same level of attention as the set-up and resolution acts combined.

8.2.2.4. Distribution of Subject Themes: Design Fiction, Framing

It is in the handling of Subject Themes that participants come to grips with a subject and a story. As was the case in the Innovation workshop, each of the marker alignments represent storied explanations, scenarios or anecdotes that tend to draw Subject Themes together. Nothing of particular note occurs in the first few sections of the episode as participants address Subject Themes in response to this practitioner-researcher's periodic verbal introduction of Plot Themes.

Figure 8.18. Snapshot 1: Design Fiction Framing.



However, a co-occurrence of Plot Themes and Subject Themes creates a tight-alignment of markers at U155 (Figure 8.18, a). This marks the inception of an idea that comes to resonate more so profoundly as participants orient themselves towards *Forming* a narrative, one which comes to be recognised as the ‘VIVIEN as legal signatory’ keystone idea (described in Section 7.3.6.3 ‘Tracing the emergence of a keystone idea’).

[U155] P19: To some degree I have a certain sense that I need to make the most of what technology is currently offering. It’s almost an investment in the future. But, it’s also a responsibility to continue to maintain it. So, actually, technology, in terms of a wish for technology to facilitate whatever it might be – the care, the longing – but a wish to engage with technology.

The conversation returns to the subject at U164 (b)

[U165] PR9: Iris wants to create some kind of legacy thing, to invest in something for John for the future.

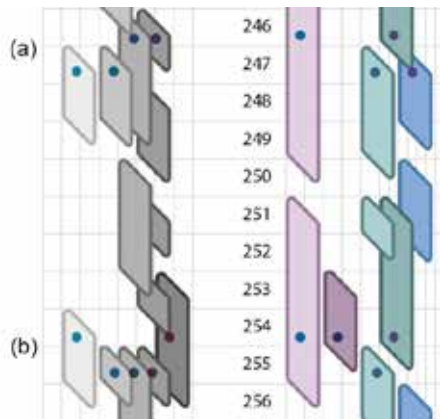
...and again at U176 (d) and U187 (e).

[U176] PR9: And that idea of Iris basically being a consumer in some way, by signing up for this or by pressing this...key, or whatever, is interesting.

[U178] P4: You’re basically buying a future encounter.

A co-occurrence of Plot Themes and Subject Themes form an alignment of markers at U210 when reasons for *investing* in a technology such as VIVIEN lead to questions of trust and need, as well as propositions for motive.

Figure 8.19. Snapshot 2: Design Fiction Framing.



At U254–55 (Figure 8.19, b) there is a co-occurrence of Plot Themes and Subject Themes that questions how such an *investment* might actually be made.

[U255] P4: So, what's this initiation ceremony?

A series of Subject Theme co-occurrences indicate that participants spent time working through all the ideas they'd fielded before turning their attention back to addressing multiple Plot Themes at U284. Here, a new concept is fielded that gives purpose to Iris' investment in the future.

[U284] P4: We're assuming that money is no object [...] but if it is the only thing that you can potentially have [...] then it takes it into a whole different [equation].

[U285] P16: What happens if somebody takes all that?

[U286] PR9: Yeah, I was thinking about that.

[U287] P16: Who owns this?

With the framing of Themes such as investment, legacy and ownership in concrete questions, the seeds of the keystone idea had been planted in the minds of participants. But it would not become fully formed, nor would its importance be recognised, until close to the end of the *Forming* episode.

8.2.2.5. Interim summary of insights: Design Fiction, Framing

In the Design Fiction framing episode, Plot Themes performed a *directive* role as agenda and guide for story work. Mirroring storytelling activities that took place in the Innovation workshop *Framing* episode (see Figures 8.8 and 8.9), when participants engaged in addressing the first two Plot Themes they did so by exploring six Subject Themes, then rapidly and lightly touching on the last four Plot Themes before settling into a more methodical and narrowly focused approach. The analysis raises questions

about the amount of attention paid to Plot Themes (see Table 8.6 ‘Plot Theme distribution’). Whether some Plot Themes are more important to address or more difficult to work with than others is uncertain. The analysis also helps to confirm two things. First, co-occurrences of Themes tend to represent storied explanations that are either convergent or divergent in nature. Second, by tracing Themes back from the point where they form a keystone idea, it is possible to find their source.

8.3. Forming

Orientations categorised under *Forming* are considered to stem from a need to couch contextual information in terms that are familiar and useful for design. *Forming* may be characterised by the use of narrative to make sense of and understand contextual information and to test propositions. For Carroll, orientations of this kind represent ‘interacting intimately with the concrete elements of the situation’ (2000b:45).

Table 8.7. Forming episodes.

Forming episodes					
Study (Activity)	Resources (Directive)	Design Story Subject Themes	Utterance Numbers (Total)	Narrative	Resources (Acquisitive)
Innovation workshop 2 (story spinning)	<ul style="list-style-type: none"> • Dial-a-Plot • Event cards 	<ul style="list-style-type: none"> • Interactions • Stakeholders • Interests • Routines • Boundaries • Motivations • Health of the company 	438–571 (133)	Scenario	Visual Plot-line
Design Fiction workshop (story spinning)	<ul style="list-style-type: none"> • StoryFrame • Aspect Map 	<ul style="list-style-type: none"> • Interactions • Benefit • Presence • Persistence • Investment • Ownership • Manifestation 	319–571 (253)	Design Fiction	Visual Plot-line

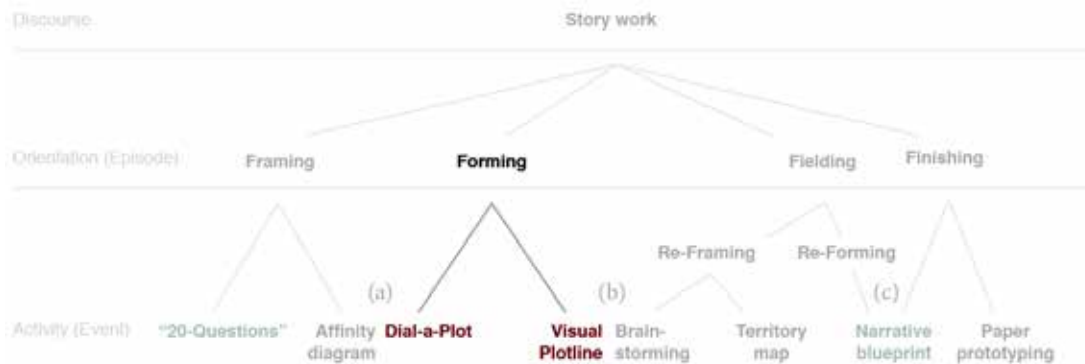
Table 8.7 provides an introduction to the two chosen *Forming* episodes. Each episode (Column 1) is underpinned by narrative resources with *directive* attributes (Column 2), with conversations motivated by Subject Themes (Column 3). Narrative analysis centres around utterances (Column 4) where stories are the desired outcome (Column 5), and these are harvested via *acquisitive* resources (Column 6). The Subject Themes represent a common link between *Forming* episodes and *Framing* episodes.

Note that the *Forming* episode chosen from the Innovation workshop does not begin where the *Framing* episode ends. The two episodes are separated by an Affinity Diagramming activity. The Innovation workshop *Forming* episode consists of 133

utterances, while that of the Design Fiction formal study consists of 253 utterances . The latter does progress numerically from the Design Fiction *Framing* episode.

8.3.1. Forming: Innovation workshop

Figure 8.20. Forming episode: Innovation workshop.



The episode in the workshop where the conversation oriented towards *Forming* began with Dial-a-Plot and Event cards and ended with the framework of a scenario inscribed on a Visual Plot-line (Figure 8.20).

8.3.1.1. Narrative resource use: Innovation workshop, Forming

Table 8.8. Narrative resource pairings.

Three-act structure	Plot Theme Event card	Description	Number of utterances
Set-up	Plot Theme 1	Indication of a lack requires unusual action	35
	Event card 1	A challenge	22
Confrontation	Plot Theme 2	Help received from unexpected source	25
	Event card 2	A reappearance	16
Resolution	Plot Theme 3	Unfounded claims made by dubious agent	34
	Event card 3	An appointment	26
Total			158

Table 8.8 shows how the *three-act structure* (Column 1; see Section 4.3.2 ‘Dial-a-Plot’) helps to guide participant’s pairings of Plot Themes and Event cards during the story-spinning activity (Columns 2 and 3). For example, the first pairing of Plot Themes and Event cards to be addressed in the conversation was the set-up Plot Theme ‘Indication of a lack requires unusual action’ with the Event ‘A challenge’, and the last pairing to be addressed was the resolution Plot Theme ‘Unfounded claims made by dubious agent’ with the Event ‘An appointment’. The number of utterances where each of these Plot Themes or Events were addressed in the conversation are given as a total in the last column, with a grand total below.

Table 8.9. Utterances of the meta-discourse.

The meta-discourse			
Concern	Symbol	Discourse name	Number of utterances
Interpreting the case/story	\	Story Discourse	48
Keeping story work on track	Q	Story Work Discourse	15
Keeping research on track	•	Research Discourse	9
Total			72

In both *Forming* episodes, utterances that attend to matters of narrative development, such as those that address Subject Themes or Plot Theme/Event card pairings, are differentiated from those that attend to other matters. Referred to as aspects of the meta-discourse, these utterances deal with one of three themes (Table 8.9). The first concerns itself with interpretation of the case story (Column 1). It is given the symbol \ (Column 2) and hereafter referred to as Story Discourse (Column 3). The number of utterances that concern themselves with Story Discourse is given in Column 4. The second theme concerns itself with keeping the story work on track. It is given the symbol Q and hereafter referred to as Story Work Discourse. The last theme concerns itself with keeping the research on track. It is given the symbol • and hereafter referred to as Research Discourse. The total number of utterances that focus on the meta-discourse is given as a grand total on the bottom row.

8.3.1.2. Subject Themes: Innovation workshop, Forming

Figure 8.21. Layout of Subject Themes: Innovation workshop, Forming.

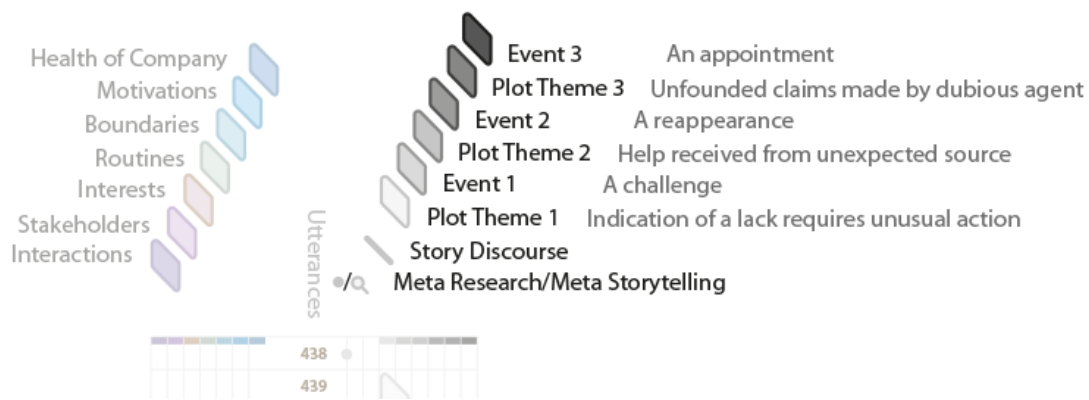


Subject Themes, that in both of the *Framing* episodes were arranged on the right hand side of the utterance numbers, are, in both the *Forming* episodes, arranged on the left (Figure 8.21). It is worth noting that in the Innovation workshop *Forming* episode, the Subject Theme *Health of Company* is not mentioned or implicitly referred to in any utterances and therefore does not appear on the data chart in any marker

features. This is not because the ‘breakup of the company’, which appeared to have a significant impact on the health of the company was of no more interest or importance to the Northumbria Team. On the contrary. The ‘breakup of the company’ had become accepted as a useful exemplar for the kinds of events that might cause boundary issues. Though it appeared to warrant no further discussion, the impact that such an event might have and the kinds of interventions that might be made in such situations could be well explored through the formulation of scenarios and design narratives.

8.3.1.3. Plot Themes and Events: Innovation workshop, Forming.

Figure 8.22. Layout of Plot Themes and Events :Innovation workshop, Forming.



Plot Themes are arranged to the right of the utterances (Figure 8.22). With the addition of codes for utterances not directly concerned with narrative development, analysis of the *Forming* episodes provides a more subtle and nuanced view of story work than the one gained from analysis of the *Framing* episodes. For example, examination of the length of time it took participants to conclude discussion of each Dial-a-Plot/Event pairing illustrates the value of this finer-grained analysis.

It took 103 utterances to draw discussion of the set-up to a close, 28 to draw discussion of the confrontation to a close and a mere 10 to draw discussion of the resolution to a close. However, in the set-up, only 38 percent of utterances focus on *invigorating* the story. 62 percent (64 utterances) are concerned with taking care of story work, i.e., the meta-discourse. With these removed from the calculation it is evident that it took 39 utterances to bring the set-up discussion to a close, only 11 more than it took to draw discussion of the confrontation to a close.

8.3.1.4. What the patterns reveal

What can the patterns created by marker features, such as clusters and chains, tight-scattered and long-sustained, reveal about story work? They may not reveal what

participants are thinking, what they believe or what their motivations are. But, they may reveal something about where, in the conversation, participant attention is being directed. Looking at a sequence of such features provides a glimpse of how participant attention changes over time. For instance, long-sustained or short-constrained features followed by scattered features may suggest that the group’s attention, once focused in a particular area, has spread into others. Is this a case of divergence? If so, then what type of divergence is occurring? Is it a divergence of attention, of conceptual propositions or of the subject under discussion? Attention may have drifted in either an intended or unintended way. Participants may be engaged in a thought experiment intent on exploring a range of ideas or, equally, may be summarising ideas in order to advance the subject of conversation on. Conversely, a sequence where scattered features precede constrained features may suggest convergence. But does the pattern represent a determined effort to explore at length the potential worth of a particular idea or area of interest, a retreat from exploration of ideas that have become exhausted or the creative equivalent of the doldrums?

8.3.1.5. Divergence and convergence: Innovation workshop, Forming

View the full data chart at; <<http://malcolmjones.com/making/InnovForming.html>>

As mentioned, the length of the Innovation workshop *Forming* episode is considerably shorter than that of the Design Fiction *Forming* episode. With this and the desire to study some of the broader patterns of divergence and convergence in mind, this episode was not divided into sections of equal length. Rather, it was divided into periods of divergence or convergence and only the first six periods are included in the analysis.

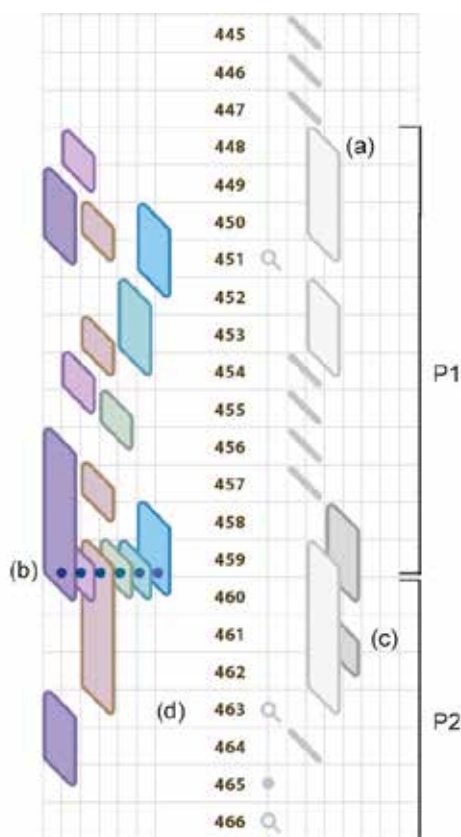
Table 8.10. Divergence and convergence.

Periods of divergence and convergence					
Period	Manifestation (Marker type)	Divergence	Count	Convergence	Count
Pd.1	Tight scattered	U448–459	12		
Pd.2		Short constrained		U460–466	7
Pd.3	Tight/Loose scattered	U467–482	16		
Pd.4		Long sustained		U483–489	7
Pd.5	Loose to Tight scattered	U490–542	53		
Pd.6		Long sustained		U543–557	15
	Total		81		29
	Grand Total		110		


Table 8.10 describes an alternating pattern of divergence and convergence occurring in the first six periods of the Innovation workshop *Forming* episode. In the section that is examined, there are three periods of divergence (Column 1, Pd.1, Pd.3, Pd.5) separated

by three periods of convergence (Pd.2, Pd.4, Pd.6). How they manifest themselves as marker types on the data charts is shown in Column 2. Utterance numbers for periods of divergence are shown in Column 3 with the count shown in Column 4. Utterance numbers for periods of convergence are shown in Column 5 with the count shown in Column 6. The total number of each count shows that more of the conversation is devoted to expanding on what is being discussed (81 utterances) than is devoted to consolidating what is being discussed (29 utterances). Perhaps not a surprising finding in what is inherently a creative activity.

Figure 8.23. Snapshot 1: Innovation workshop, Forming.



Period 1: Divergent (U448–U459)

After some discussion about the resources in play (Story Discourse), at U448 (Figure 8.23, a), with the statement ‘This can say the CTO’, participants address Plot Theme1 , ‘Indication of a lack requires unusual action’, for the first time. Examination of participant utterances suggests that the tight-scattering of Subject Themes that culminate in a tight alignment of markers at U459 (b) represents rapid exploration of ideas that might fit the given Plot Theme. The outcome of a prompt from Event card 1 to weave ‘A challenge’ into the story at U458, it consists of the following utterance made by the case expert as the concepts in play are summarised;

[U485] P5: It would be easy enough to say, you know, that they (*stakeholders*) may be having a difficult time (*boundaries*), and they are working with the development team (*routines*). And so, basically, they are coming together and meeting with everyone (*interactions*) to try to solve some sort of a problem (*motivations*). They all recognise that there is some sort of problem but maybe it’s not, everyone’s really clear on it (*interests*).

Period 2: Convergent (U460–U466)

U460 marks the beginning of a brief period of convergence. First, U460–62 serve to clarify points made in the discussion (c). Then, *protective* of the storytelling process,

at U463 the statement *'We probably need another frame here, that's the invite'* draws attention back to the story plot-line (d). Finally, with the question *'Where is the meeting held?'* (U464), story-spinning gives way to a meta-discourse on Story work.

Period 3: Divergent (U466–U482)

At U466 participants are looking for clarity on the role played by the Visual Plot-line. A discussion ensues and narrative resources help to bring story-spinning back on track.

[U466] P3, pointing to the frames on the paper: What's that?

[U467] MJ: Addo invites the team to this meeting. This is the meeting (referring to the drawn frame). This is where. There's the invite (touching the 'invite' frame)...And this is Addo meeting with his research team, right?

[U468] P5, making a connecting gesture: I think he's getting both teams in the same room so that he could, kind of, get them all on the same page.

[U469] P3: Is that the ideal case? Is that what we want him [Addo] to do or is this the status quo?

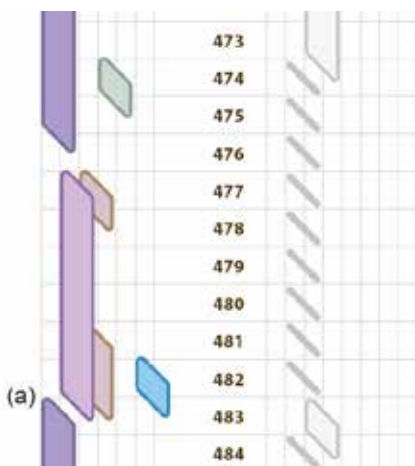
[U470] P5: I don't think he would do that in real life. No.

[U471] P3: All right, all right.

[U472] MJ: So this would be an unusual action though, right?

[U473] P5: This *is* an unusual action. Yes!

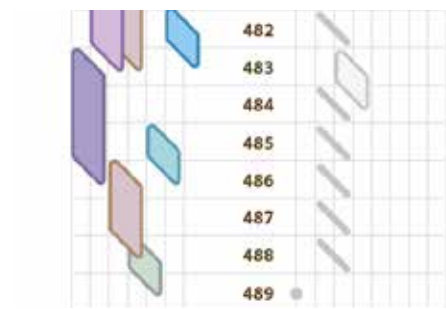
Figure 8.24. Snapshot 2: Innovation workshop, Forming.



The Teams' attention becomes increasingly divergent, until at U483 the declaration *'We've got the beginning of the story'*, which represents the co-occurrence of three Themes, creates a loose-alignment of four markers with U482 (Figure 8.24, a). It's a short recap of what's been discussed, but it plays a vital role by demonstrating that in conceptualising Addo's meeting concepts have not been 'concrete' enough to add anything useful to the Event plot-line.

Period 4: Convergent (U482–U489)

Figure 8.25. Snapshot 3: Innovation workshop, Forming.

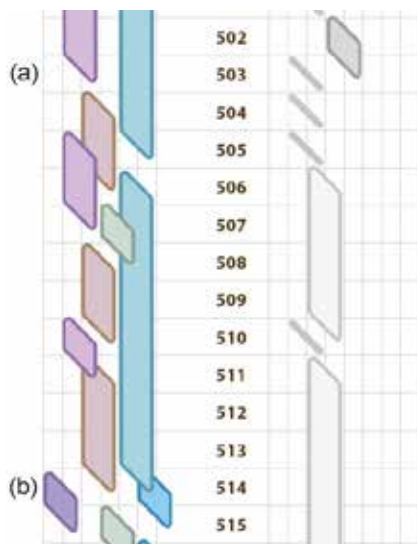


After the small number of Subject Themes under discussion are brought into focus at U482, attention becomes convergent as Story Discourse takes precedence over attention given to Subject Themes (Figure 8.25).

Period 5: Divergent (U489–U542)

Attention to Story Discourse continues as a long period of slowly increasing divergence begins to take hold. It begins at U489 with a brief exchange that brings into question what the Teams are trying to sort out; whether the story that is being depicted is what ‘should be the case’ or ‘what is?’ Significantly, the question is partially answered by referring back to a Plot Theme discussed at U472–73 and the fact that the scenario addresses an *unusual* case. At U495, marked by long-sustained attention given to boundaries where issues of stakeholder relations play a leading role, the Teams re-engage with story spinning and, for the second time, Event 1 prompts the them to integrate ‘a challenge’ into the narrative.

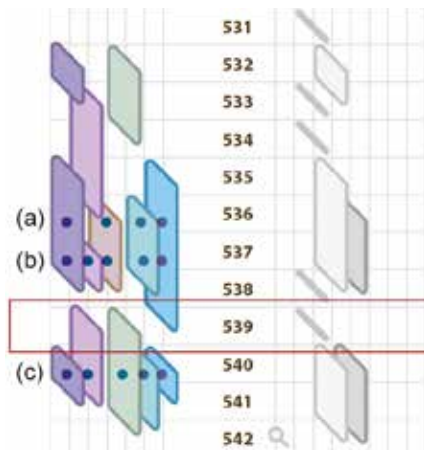
Figure 8.26. Snapshot 4: Innovation workshop, Forming.



At U503 (Figure 8.26, a) an anecdote illustrating the idea that Addo may be viewed by the teams in different ways inspires exploration of a new line of thinking. In the conversation that follows there is a divergence of interest that pauses to gain clarity at U513 with the question ‘Why would [Addo] call a meeting?’. This very concrete probing question intended to solicit ideas results in a loose-alignment of markers with U514 (b). The alignment does not simply represent the drawing together of Subject Themes and ideas.

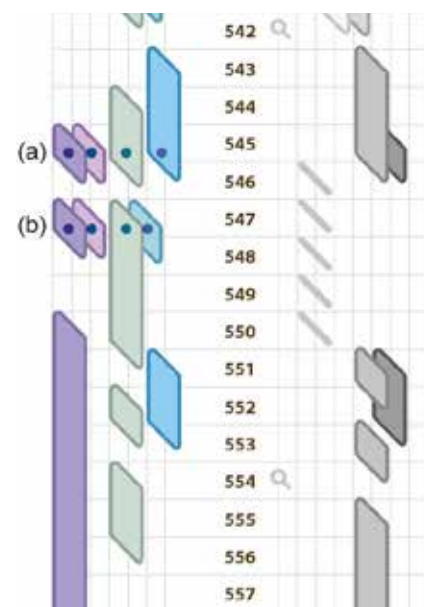
Rather, it represents an abutment or conjoining of conversations concerned with different things. This is similar to what Goldschmidt (2004:85) refers to as a ‘pivot move’, passage between two ‘chunks’ of moves that concern themselves with achieving different aims (ibid:62).

Figure 8.27. Snapshot 5: Innovation workshop, Forming.



As the Teams attempt to finalise a plausible scenario for Addo’s meeting the co-occurrence of Themes and resources increases. The scattering of markers gets progressively tighter until they culminate in a cluster of three tight-alignments (two conjoined). The marker alignment at U536 represents the co-occurrence of four Themes (Figure 8.27, a), and those at U537 (b) and U540 (c) represent five Themes.

Figure 8.28. Snapshot 6: Innovation workshop, Forming.



Period 6: Convergent (U542–U557)

The story set-up had been discussed at great length and the Teams were anxious to move the story along. The pattern of tight-alignments at U545 (Figure 8.28, a) and U547 (b) represent a summation of the Teams’ understanding about the story set-up. It acts as a temporary agreement contingent upon further discussion; an activity that helps them to consolidate their understanding and allow them to move on. From there, attention narrows to focus on the Theme of interactions as the Teams work out the details

of Addo’s returning expert. Though these alignments show a disbursement of Themes, they do not represent a divergence of interests.

8.3.2. Detailed analysis of U540: Innovation workshop, Forming



Here, detailed analysis of a three-way inter-actant engagement was conducted. By looking at different actants, this analysis builds on that of a conceptualisation described in Section 7.3.3 (‘Conceptualisation 3. Resource functions in inter-actant engagements’). Where in Conceptualisation 3, the actants were a narrative resource, a participant and an utterance, in this analysis they are two participants and a narrative resource.


The approach is inspired by Propp's narratological principle of grouping, i.e., recognition of serendipitous coupling of *functions*, and the concept of complementary functions (see Section 7.3.3.4 'Insights from Conceptualisation 3').



What follows is detailed analysis of a short 'conversation' about the Visual Plot-line that took place between a member of the Delft Team and a member of the Northumbria Team. Lasting no more than a few seconds, the conversation concerns itself with a question and answer.

The episode shows, amongst other things, how unused *acquisitive* functions afforded by a resource, such as a piece of paper, can complement a participant's *expressiveness*. And, conversely, how *directive* functions of an inscribed resource can complement a participant's *acquisitiveness*.




8.3.2.1. Setup of the inter-actant engagement.

The tight-alignment of markers at U540 (Figure 8.27c) stems from a participant's answer to a question posed at U539 (Figure 8.27, framed in red). The question touched on two Subject Themes: *Stakeholders*  and *Routines* . The answer came in two parts.

[U539] P7: Are we still talking about these guys and these guys (*Stakeholders* ) [...] working on the same team?

[U540.1] MJ: No. We're not interested in that (*Stakeholders*  and *Routines* ) at the moment.

Implicitly referring to the *acquisitive* function of the Visual Plot-line, the utterance then continues to summarise the Team's understanding of the story.

[U540.2] MJ: We're trying to set up how Addo brings the teams to the meeting (*Interactions* ). He's confronting them with the issue of the missed deadline (*Motivations* ). So that, though, [will reveal] what a lot of the problems are (*Boundaries* ).

It can be argued that during this interaction several different functions could be attributed to the Visual Plot-line. At least four are immediately evident. An *integrative* function may have been attributed to it for the role that it played in helping to bring all the parts of the story together. An *informative* function may have been attributed to it for the role that it played in reminding participants of what had been discussed or agreed. A *protective* function may have been attributed to it for its role in ensuring that the threads of the story were not lost, and an *invigorative* function

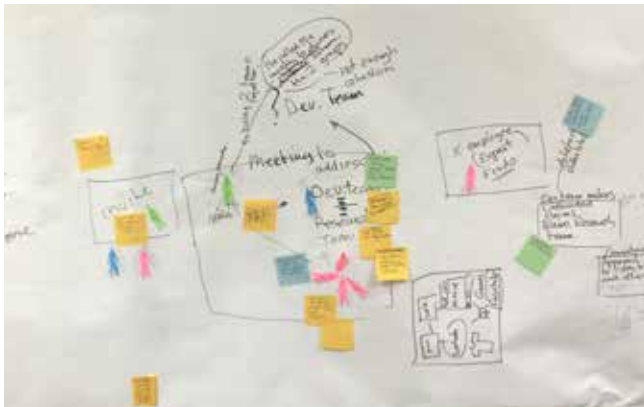
may have been attributed to it for its role in spurring the story on. However, all these attributes represent broad generalisations. Unless they are viewed in the context of very particular and very concrete situations, they say very little about how actants work together successfully or about the value that designers may derive from such interactions.

Table 8.11. Components of narrative.

	Narrative elements	
	(Story) Content	(Discourse) Expression
Form	(FC)	(FE)
Substance	(SC)	(SE)

To gain further insights into the functions that each actant performs in such interactions, interactive episodes are analysed as fine-grained narratives. Here, once again, methods of analysis drew on Chatman's (1980) model of narrative structure to guide interpretation (Table 8.11).

Figure 8.29. Visual Plot-line.



In describing the conversation that took place around the Visual Plot-line (Figure 8.29; for enlargement see Appendix A6.3 'Visual Plot-line: Boundary Object Workshop 2'), actant functions are colour-coded.

Functions attributed to the narrative resource are shown in **purple**.

Functions attributed to the participant are shown in **green**.

Functions attributed to the utterances are shown in **blue**.

The following describes the interaction between actants in five parts.

8.3.2.2. Part 1: Functions of the resource

Part 1 describes the resource and its default functions, i.e., those related to intended purpose (see Appendix Figure C1).

Substance of Expression [SE] is *performative*. In this case, SE concerns qualities of paper, such as weight, stiffness, size, proportion and colour, etc., but also markings inscribed upon it, such as words and graphic symbols, and things attached to it, such as Post-it People and notes. These tangible visual properties of the media are *performative*. **Form of Expression [FE]** is *expressive*. The form visual media takes is that of a poster diagram. What is inscribed on it *expresses* itself.

Substance of Content [SC] is *informative*. The SC *expressed* in the diagram speaks of the sequentiality of events, relationships between stakeholders and the aspiration of goals, etc., *information* that at that particular moment. These qualities were *informative*.

Form of Content [FC] is *directive*. The FC of the Visual Plot-line, i.e., the concrete details of characters and settings, events and existents, were instrumental in *directing* what needed to be resolved.

8.3.2.3. Part 2: Functions of the participant

Part 2 describes functions that come into play when the participant is primed to engage with the as yet 'unused' resource.

The resource presents itself as an object with material properties and less tangible but valuable affordances nonetheless. As is the case with other actants, its Form and Substance of Expression function in a *performative* and *expressive* way. Potentialities for use lie in the resource's content, which has the potential to inform and direct thoughts and actions. But these functions can be attributed to the resource by the participant only if they recognise that they might be useful for resolving a lack or assuaging a need. The participant's engagement goes something like this:

Substance of Expression [SE] is *assimilative*. The designer has an unfulfilled need to spin a story. The need leads them to take reasoned action that is *receptive* to resources that might positively influence the situation. With no function in the W2C set that fits these particular requirements, a new one is proposed. The *assimilative* function acknowledges that something has been received, fully understood and accepted.

Form of Expression [FE] is *acquisitive*. The form taken by the *assimilative* action is one that results from *acquisitiveness*; it is *acquisitive*.

Substance of Content [SC] is *protective*. The substance of the designer's actions, i.e., the content of their reasoning, is *protective* of both the story and the process of story work.

Form of Content [FC] is *integrative*. The form taken by the reasoned action is

integrative. The designer opportunistically takes advantage of the affordances of things at hand, such as the resource, to draw the threads of the story together.

8.3.2.4. Part 3: Complementary pairing of resource-participant functions.

Part 3 seeks to establish complementary pairings between functions attributed to the resource described in Part 1 with those attributed to the participant described in Part 2.

Before moving on to analyse the utterance, the functions of the unused resource are compared with those of the primed participant. Functions attributed to the participant are shown in **green**, whereas those attributed to the resources are shown in **purple**.

Substance of Expression [SE]: The *assimilative* stance taken-up by the participant intent on narrative development is complemented by the *performative* presence of the resource.

Form of Expression [FE]: The *acquisitiveness* of the participant is complemented by the *expressive* properties of the resource's diagrammatic schema.

Substance of Content [SC]: the participant's *assimilation* of the resource's Substance of Content is *protective* of both the conversation and the story. It shows trust in the kind of *informative* action that the resource might afford.

Form of Content [FC]: the participant's desire to draw on or accept input in order to get the job done is *integrative*, making them receptive to accepting the resource's *directive* influence.

8.3.2.5. Part 4: Functions of the utterance U540

Part 4 describes functions that can be attributed to utterance 540.

Substance of Expression [SE] is *performative*. The Substance of Expression is verbal – speech that is *performative*.

Form of Expression [FE] is *expressive*. The *performative* function of speech acts to convey meaning through words. It is *expressive*.

Substance of Content [SC] is *protective*. The Substance of Content acts to keep the story and the telling straight. It is *protective*.

Form of Content [FC] is *integrative*. The content takes the form of a summary intended to bring elements of the story together. It is *integrative*.

8.3.4.6. Part 5: Comparative analysis of functions

For both actants, the function attributed to Substance of Expression is *performative*.

And, although there are differences in the mode of expression, for both actants the functions attributed to Form of Expression is *expressive*. These observations raised questions about whether, in the case of resources and utterances, attribution of the *performative* function to Substance of Expression and the *expressive* function to Form of Expression might be universal. Sufficient self-reflective experiments were conducted to confirm that this is in fact the case. In subsequent analysis, therefore, Substance and Form of Expression may be included where descriptions are helpful, but excluded where they are not.

With regard to Substance of Content, where the resource is *informative* the participant utterance is *protective*. With regard to Form of Content, where the resource is *directive* the participant utterance is *integrative*.

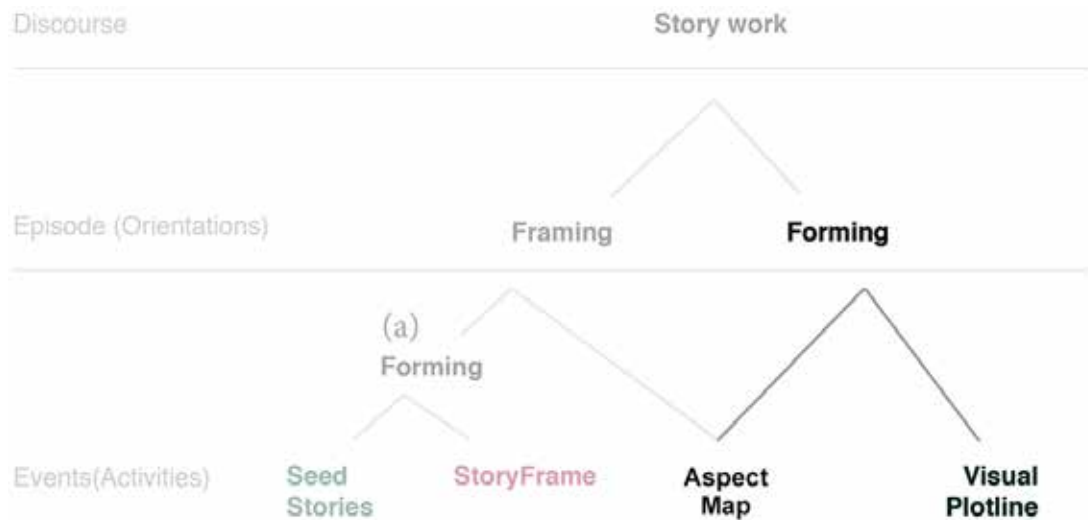
8.3.2.7. Summary of insights

With regard to the role of functions in inter-actant engagement it is now possible to argue that both actants take up *performative* roles in a conversation (see Section 7.3.2 'Resource functions in inter-actant engagements'). The worth of narrative resources may become apparent when, with particular needs and goals in mind, participants turn to resources for help and find that although they may serve their needs by functioning in one way, they may also function in other ways – either expected and wanted or unexpected and unwanted ways. Inter-actant engagement brings about change in both actants. Unlike the narrow range of affordances that tend to be attributed to tools, the range of affordances attributed to resources appears to be broad, open to wide interpretation, and dynamic, i.e., changing through use and over time.

With regards to alignments and pattern features, what the analysis demonstrates in general is that although they may appear to represent similar movements of attention, they may not represent similar actions. Some alignments represent moves to expand on ideas that might be triggered by *invigorative* brainstorming, while others represent moves to consolidate ideas that might stem from a desire to *integrate* and summarise.

8.3.3. Forming: Design Fiction formal study

Figure 8.30. Forming episode: Design Fiction formal study.



Turning to the Design Fiction *Forming* episode, at 253 utterances it is almost twice the length of the Innovation workshop *Forming* episode. The conversation oriented towards *Forming* when participants began to use the *directive* agency of the inscribed Aspect Map to develop a detailed plan of a Design Fiction and ended with the plan inscribed on a Visual Plot-line (Figure 8.30).

With considerably more utterances than that of the Innovation workshop *Forming* episode, the Design Fiction *Forming* episode lends itself to being divided into ten equal sections. To view the full data chart, visit <http://malcolmjones.com/making/DFiction/Forming.html>.

8.3.3.1. Divergence and convergence: Design fiction, Forming

Since all marker features are now familiar, meanings are sought in the interpretation of features and patterns. In this orienting episode there is notable contrast between periods of divergence and convergence. As has been seen repeatedly in the other orienting episodes, progress in addressing topics of conversation builds slowly at first, gathers momentum and becomes increasingly diverse and *integrative* as they draw to a conclusion. In the first 107 utterances (four or more sections) 8 of the 9 Plot Themes are addressed. However, participants make very few conceptual propositions associated with question-related Themes, probably because they are orienting themselves to the situation, to each other, the activity and the story. One quarter of the utterances concern themselves with topics unrelated to design questions, and half do not address

Plot Themes at all. Topics that are discussed at length include questions about whether Iris is dying and why and how she might invest in the VIVIEN service. Where, during these discussions, conceptual propositions are made, attention is only intermittently sustained. There is only one loose-alignment at U409–10 and only two instances of long-sustained attention. At U442 a block of loose-alignments shows participants fielding, discussing and exploring ideas, but the discussion consists of neither *invigorative* brainstorming nor *integrative* summation.

As the conversation progresses, the pattern of convergence and diverse is repeated at ever-shorter intervals, until, in sharp contrast to the slow, narrowly focused beginning, the orienting episode ends with four tight-alignments. Here, participants are engaged in rapid brainstorming where a broader range of concepts are proposed for the last two Plot Themes: ‘need fulfilment’ and ‘new order’.

8.3.3.2. Distribution of attention: Design fiction, Forming

Figure 8.31. Distribution of attention.

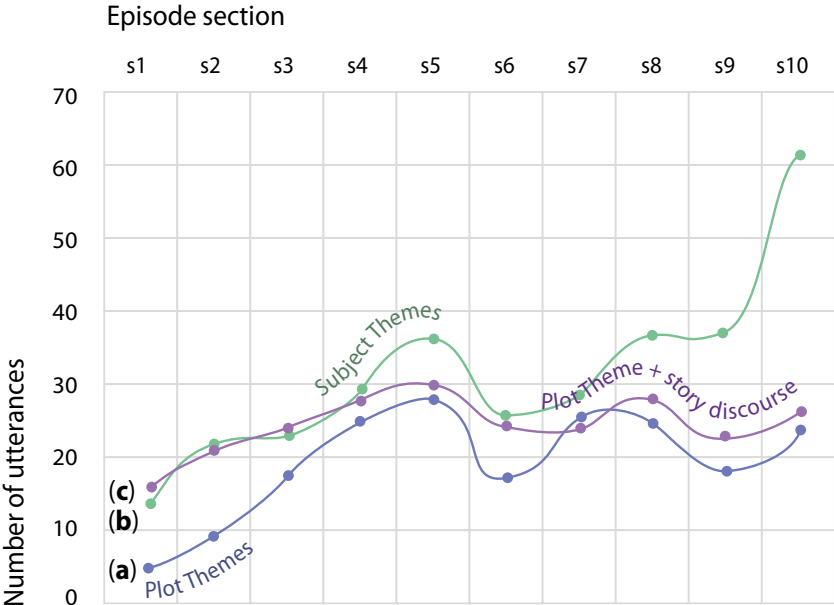


Figure 8.31 shows where participant attention is directed in the conversation (for a table of the numbers, see Appendix D4.6 ‘Design Fiction, forming episode: Distribution of Themes’). On the horizontal axis, numbers across the top refer to episode sections. Each section consists of 25 utterances. The vertical axis displays the number of utterances. Three attention categories are plotted: Plot Themes, Subject Themes and, to get a clear indication of how much of the conversation is concerned with story spinning, Plot Themes plus Story Discourse. A low number of utterances assigned to an attention

category suggests that little attention is being paid to that category, whereas a high number of utterances suggests the opposite. Attention paid to Plot Themes is shown in blue (curve 'a'), attention paid to Subject Themes is shown in green (curve 'b'), and attention paid to Plot Themes plus Story Discourse is shown in purple (curve 'c').

As a general observation it can be said that participants' ability to attend to multiple question-related Subject Themes at the same time increases as participants respond to prompts from *storienteering* resources. Except for two dips in the curve at sections 6 and 8, progress towards addressing Plot Themes and fielding question-related concepts grows steadily, ending in a sharp increase in section 10.

With Plot Themes 1–3 addressed, the story is well set up at section 5. Some agreements have been reached about why Iris 'seeks help' from VIVIEN (Plot Theme 4) and a range of concepts have been fielded regarding the 'task set' for Iris and John (Plot Theme 6). The downward curve in the graph at section 6 suggests that attention to Plot Themes falters as the conversation deals with areas not directly concerned with development of the Design Fiction. Re-examination of research materials confirms this. Plot Themes and details of concepts unattended had left gaps in the logical progression of events depicted on the Visual Plot-line. The story was drifting and story spinning was becoming unproductive. However, the *directive* attributes of StoryFrame's Plot Themes and the Visual Plot-line helped to bring everyone's attention back to completing the order of events in the plot. Near the beginning of section 6 a question draws participant's attention back to Plot Theme 5 ('Help received').

[U449] MJ: Through all this adversity, how does [Iris] finally make the choice [to accept VIVIEN and 'push the button']? Does she go to some backstreet little shop in Tibet?

This example reinforces the need for designers engaged in story work to attend to both content (*What*; events and existents) and expression (*How*; structure and manifestation) to ensure that all the elements of narrative are brought together in an ordered and logical way. What helps in these situations is being 'concrete' and particular in the conceptualisation of events and existents, etc. This meta-discourse about process combined with the narrowing of conceptual focus that followed, explains the lower number of utterances in section 6.

If participant's attention to narrative production is viewed as a combination of attendance to Plot Themes (a concern for content) and attendance to meta-discourse (a

concern for how content is expressed), the numbers are far more consistent across all sections in the episode (curve 'c').

Bearing in mind, the effect on the data of the meta-discourse, it is possible to see that more attention was paid to the order in which Plot Themes were addressed and the breadth and depth of attention paid to question-related concepts began to increase again. At sections 8 and 9 further meta-discussions about the story and how it should be represented on the Visual Plot-line cause attention to Plot Themes to drop off. Attention to Subject Themes, however, simply plateaus then recovers quickly to end on a high of 61 instances.

8.3.3.3. Alignment of Themes: Design fiction, Forming

Table 8.12. Theme alignments.

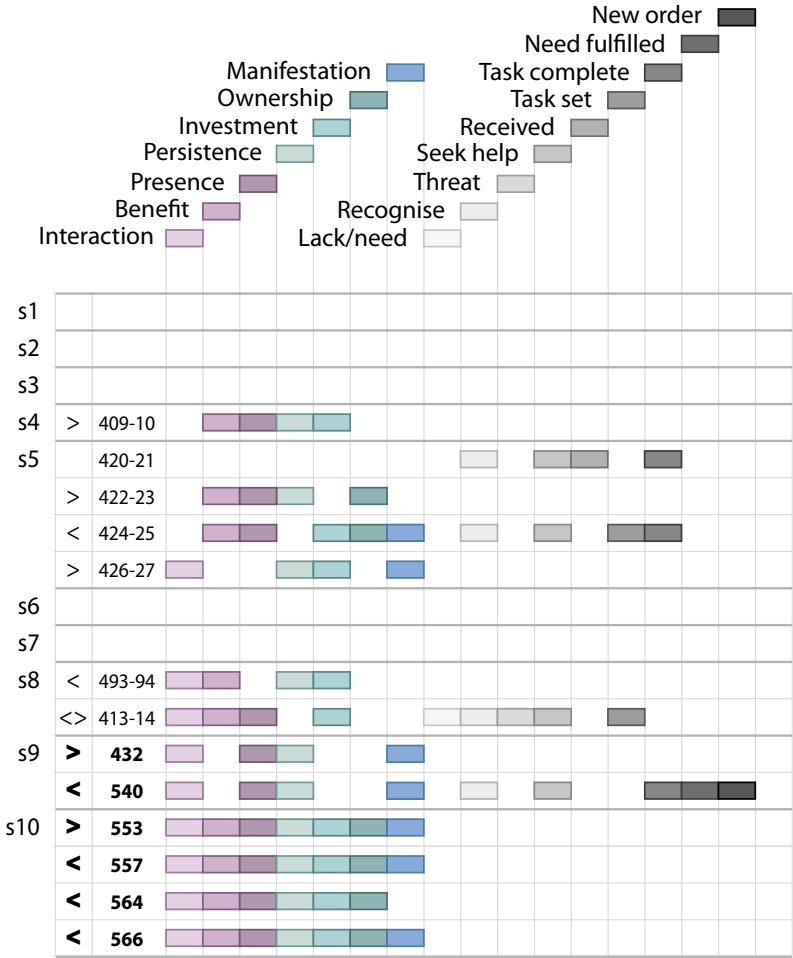


Table 8.12 provides a simplified view of marker alignments that shows the relationship between attention paid to Subject Themes (coloured markers on the left) and that paid to Plot Themes (grey markers on the right). Numbered sections of the episode appear down the left side of the graph. Alignments are categorised according to whether they

are convergent [>] or divergent [<] (Column 1). Utterance numbers are given for each alignment (Column 2). Those set in regular font indicate loose-alignments, while those set in bold font indicate tight-alignments.

8.3.3.4. Co-occurrence of Subject Themes: Design fiction, Forming

Co-occurrence of Subject Themes tends take place when participants are engaged in brainstorming concepts or summarising the story. The frequency with which co-occurrences take place in a section gives an indication of levels of engagement in such activities. By way of illustrating the point, after a typically slow beginning the first alignment of markers indicating a co-occurrence of Subject Themes does not take place until U409-10 in section 4. Then, in section 5, three loose-alignments of markers in quick succession indicate that co-occurrences increase. No marker alignments occur in sections 6 and 7 due to the convergence of attention described in the previous section. Then, as their frequency increases, instances of tight marker alignments become more common and the number of Subject Themes touched on in each alignment increases.

8.3.3.5. Co-occurrence of Plot Themes: Design fiction, Forming

We find the first co-occurrence of Plot Themes in section 5 with a loose-alignment of markers at U420-21, just prior to three conjoined marker alignments that represent the co-occurrence of Subject Themes. The conversation is intent on formulating a scenario that will help consolidate loose threads in the story. It draws Plot Themes 2, 4 and 5 into a coherent narrative. However, the scenario gains much of its meaning by anticipating the consequences of actions. *Protective* of the Visual Plot-line, it alludes to later events that touch on Plot Theme 7 ‘Task complete’. There is little doubt that this scenario, which sets the present in the context of an imagined future, was instrumental in prompting the divergence of conceptual thinking that manifests itself in the series of marker alignments that followed.

Utterances that reveal a co-occurrence of Subject Themes and Plot Themes at U424–25 represent a summary of the story that takes the scenario fielded at U420–21 into account. But, although the Plot Themes that these two co-occurrences of Themes address are almost identical, their purpose is quite different. Where utterances at U420–21 offer creative propositions that represent a divergence of thinking, those at U424–25 seek to consolidate what is understood and thereby represent a convergence of thinking. Further dual co-occurrences of Themes occur at U413–14 and U540. There is evidence of convergent thinking in both.

8.4. Summary

The analysis described in this chapter has sought to gain insights into how designers' ways of knowing evolve through story work. Story work has been viewed as a narrative in which participants first develop then build upon a repertoire of shared questions, concepts, stories and ideas, all of which co-evolve in a strategic conversation with materials. Through the micro analysis of conversation, stories and properties attributed to mediating objects such as narrative resources the analysis has sought to understand how, in lock-step with questions and concepts, stories and ideas emerge in the conversation and either take hold and come to resonate for design or fade away. Motivating the analysis was the goal of tracing the emergence of keystone ideas.

Story-based design activities were found to have particular orientations that could be categorised. Four categories were generalisable across the studies; *Framing*, *Forming*, *Fielding* and *Finishing*. Of these, strategic conversations from two *Framing* episodes and two *Forming* episodes were chosen for detailed protocol analysis. In each conversation a narrative resource serves as a *directive* prompt to invigorate the conversation, and another acquires the outcomes of the conversation by harvesting concepts, ideas and propositions. Through implementation of a coding scheme and a proprietary data visualisation system, questions and Themes referred to in conversation were plotted on the data charts. With the interests of participants thus manifested in visual representations of strategic conversations patterns emerged that show where they lie.

8.4.1. What the analysis reveals

The approach taken to analysis shows, first, how story, narrative and narrative resources function in strategic conversations and, second, how concepts and ideas emerge on account of those functions.

8.4.1.1. Resources mobilise conversations

Story, narrative and narrative resources have been shown to act as guides for strategic conversations and prompts that invigorate design discourse. In this respect they act in much the same way as questions and propositions. The data charts show that there are functional similarities between the way questions support the strategic conversation in *Framing* episodes and the way story and narrative support the strategic conversation in *Forming* episodes. In both, the conversation is not only directed towards achieving a particular goal, it is also mobilised by speech that conforms to a pattern of 'call and response'. Prompts made by either a *directive* story-based resource or a set of questions

initiate a 'call' to action. Each Plot Theme raises questions and each question elicits a response. More often than not, responses initiate new calls that drive the conversation on. From these observations it is possible to conclude that prompts that 'call' out what needs to be discussed perform the important function of motivating conversations. In addition, having the right kinds of prompts that make the right kinds of calls is akin to asking the right kinds of questions – they are essential for having meaningful conversations. In terms of how they support strategic conversations, then, Dial-a-Plot, StoryFrame's Plot Themes and '20 Questions' all perform the function in exactly the same way, they acted as 'call agents' that fuelled the right kind of conversation.

8.4.1.2. Questions themselves as discourse prompts

If a set of targeted questions, such as those posed in the Northumbria Team's investigation of boundary interventions ('20 Questions') can act as prompts to probe for particular information and touch on particular subjects, individual questions fielded in a storytelling discourse may arguably be viewed as discourse prompts.

8.4.1.3. How questions and concepts co-emerge with stories and ideas

Second, the analysis shows how concepts and ideas emerge on account of those call and response functions. As participants become more familiar with the story and the way the resources work, the density and frequency of question and Theme co-occurrences – as indicated by marker alignments – shows that the ability of participants to either draw disparate ideas and loose threads of the narrative together or expand their thinking to consider a broader range of ideas improves. High concentrations of thematic co-occurrences towards the end of conversations confirm the notion that keystone ideas are privileged in that they both address and bring coherence to the greatest number of design-relevant questions and Themes. We have shown the significance of their co-occurrence, suggesting that they may be taken as a measure of progress towards coming to grips with stories and story work. But nowhere is their presence more significant than in showing where keystone ideas emerge in the conversation and how they come to be recognised and accepted.

8.4.1.4. Where, in the strategic conversation, interest lie

The pattern of story work shows that it is not unusual for participants to cast their thinking about during the initial stages, perhaps in order to sketch out in rough the things that are being discussed. With the aid of Discourse prompts, this usually settles down quickly into methodically addressing things.

The features of utterance markers and the patterns that they create say something about the way interests converge and diverge throughout the conversation, but they also correspond to story use. Some times marker alignments represent a searching or exploring of concepts, sometime they represent an effort to consolidate what is known or understood. In both cases, utterances are necessarily complex, touching on many different subjects, concepts or themes. To create a coherent proposition from these, participants draw on the structuring and sense-making capabilities of story and narrative. Thus, marker alignments often represent the use of stories, scenarios, anecdotes and the like.

After keystone ideas have been identified, there is a period in which the story and the work is questioned and verified by rethinking and reframing the narrative around the keystone idea and assessing how well it fits with the story work. The repeated pattern of marker alignments that follow recognition of keystone ideas shows this happening.

Analysis of the *Forming* episodes shows that the importance of the meta-discourse cannot be underestimated. During analysis of the *Forming* episodes three aspects of the meta-discourse were identified: Story Discourse, Story Work Discourse, and Research Discourse. Accounting for these in the analysis that was conducted on the *Forming* episodes led to more accurate assessments of where participant attention was directed. Hence, an assertion can be made that

the way resource-based story work both draws attention to and supports these meta-discourses that concern themselves with what is being done and how it is being done, is one of the ways in which scenarios may be made more worthwhile.

8.4.1.5. Detailed analysis of inter-actant engagement

The approach taken in the analysis shows that actants, whether human or non-human, do not act alone. To act is to interact in relation to or with other actants. We have demonstrated how in fruitful interactions, ones where needs are fulfilled, functions attributed to the performance of one actant are complemented by those attributed to the performance of another.

Extremely detailed analysis of an interaction between two actants, one human and the other a narrative resource, explored how resources function. The outcome suggests that one way of coming to understand the efficacy of narrative resources is to examine and compare functions that can be attributed to human and non-human actants in particular inter-actant engagements. Materials, such as narrative resources, have

significant parts to play in design conversations. It appears to be the case that when they are useful, it is because they are performing particular functions for particular people at particular times. When narrative resources are not useful, however, the reason may be that the functionality they afford does not match that sought by the designer.

Chapter 9. Claims and Further Work

The chapter begins with a summary of the research, followed by a statement of research limitations. The bulk of the chapter is then devoted to describing claims for contributions to knowledge.

A section is devoted to each area in which claims are made. In each section, assertions and claims are subdivided and each is addressed in a separate subsection. Each subsection consists of a contextual summary, a discussion of warranted assertions, and claims that stem from them. Not all warranted assertions lead to claims for contributions to knowledge.

The chapter concludes with a practical 'how-to' guide for design practitioners on how to tell a good story, and thought about future work.

9.1. Summary of the research

The aim of the research has been to refine solutions to an existing challenge that persists in design story work. Though increasing demands are being placed on the use of story and narrative, confirmation of difficulties encountered by designers comes from both the literature and first-hand observations.

While some activities, such as making transitions from one type of activity to another, have been shown to be conceptually difficult (see Section 7.3.4.4 'Insights on how resources function in discourse'), others, such as orienting to *the right stories* and *getting them right*, are poorly supported by tools, methods or unifying theory.

I have shown that gaps exist in the body of theory and knowledge that underpins scenario research, limiting their usefulness as a foundation for a theory of narrative resource-based story work. To fill such gaps and support theory development, theory has been drawn from sources outside design, such as literary studies and narratology.

Empirical studies have been conducted and observations made of collaborative story work in which some of the difficulties that designers experience with story and narrative were confronted. Design settings were simulated 'in the lab' and story work was supported by development of a suite of narrative resources. The question of whether design is an act of storytelling is posed and supported by a set of canonical units of narrative referred to as Plot Themes. Narrative interpretation methods are used to demonstrate how design work follows a pattern of inquiry and narrative sense-making.

Experiments conducted throughout the research further underpinned resource development and informed theory about how designers work with story, narrative and narrative resources, and how story, narrative and narrative resources work for design.

Concurrent development of approaches to data visualisation and narrative analysis reveal patterns in the way questions, Subject Themes, concepts, ideas and design propositions form and come to resonate in strategic conversations that take place around the creation of stories and narratives. The division of story work into orientations has aided analysis of how designers move from *Framing* to *Forming*, *Forming* to *Fielding* and *Fielding* to *Finishing*.

Progress has been made in the development of theory with a taxonomy of resource functions proposed as an alternative to "types". Thereafter, functions become increasingly important for explaining inter-actant relationships and the dynamic attributes of resources.

9.2. Limitations of the research

9.2.1. Limitation 1: Theorising the work

As theories about story, narrative and narrative resources began to take shape, two other bodies of theory appeared to float on the periphery. Actor network theory and assemblage theory may have been worthy of further investigation, but recognition of their relevance to the research came too late to find out.

Opportunities to explore a broader base of theory that could explain interactions and networks of connections between actants may have been missed when a decision was made part way through the research to expand the scope of inquiry beyond scenarios to story work. The decision was motivated by findings from the literature which gave strong indications that challenges facing design teams placed greater demands on

story and narrative than scenario theory could support. Though the change in direction meant taking on a much larger subject with ill-defined limits, it held greater promise for answering worthwhile research questions, and for making novel discoveries and valuable contributions to knowledge.

9.2.2. Limitation 2: Simulations of work

The approach taken to interrogate story work involved enactments of design work in simulated settings. What can never be recreated 'in the lab' is the designers' own work environment with all of its commercial and professional trimmings. The tensions around project briefs and aims, as well as issues of quality control, deadlines and inter-departmental evaluations of designs, etc. All of these have an impact on the behaviour of designers and the way design activities are carried out. None of the studies were able to observe design work being conducted 'in the wild', for the distributed nature of story work made conducting such studies prohibitive.

This presented a methodological conundrum. Questions arose about the rigour with which the subject of story work was being studied and the value of observations that could be made from simulated settings. If I was instrumental in designing the settings in which story work was going to be conducted and observed, making objective observations would be impossible. Alternatively, if I had no hand in setting up the settings in which story work was going to be conducted, there was a very real likelihood that no story work would be conducted and no observations at all would be possible. The two sides of this conundrum were played-out in the Innovation workshops. In the first workshop, I made no attempt to introduce formal storytelling activities into the proceedings. As a consequence, the storytelling that took place was ill-structured and yielded no useful stories. In contrast, I set up the second workshop with story work at the centre of activities, and as a consequence there was an abundance of stories and opportunities for observation.

A compromise was made that favoured facilitating design research over achieving standards of scientific rigour. It was thought that, though simulated, an abundance of opportunity to engage with and observe design activities that were tightly focussed on story work would serve the aims of the research better than one or two opportunities to observe story work taking place in real design settings.

What has been observed in the studies, therefore, are design practitioners and practitioner-researchers engaged in resolving real-world design research challenges. Arguably, the Delft Team's research question posed a design challenge that was every bit as 'real' as any commercial project. Though no financial rewards were involved, the outcomes were none-the-less valuable. Likewise, in the Design Fiction workshops, the brief to develop a resource-based approach to Design Fiction story-spinning for independent use presented an equally real Design *for* Design challenge.

We are left with the questions of whether it is possible to learn as much from fiction as we can from real-life, and the real possibility that, because fiction can be controlled and bend to particular needs, of the two it may afford the greater opportunity for learning.

9.2.3. Limitation 3: Replicability

In the sciences, replicability is considered to be one of the proofs of good research. If an experiment can be replicated, then outcomes can be either verified or refuted by independent sources. It is one of the checks and balances that ensure that information/knowledge put forward as true, accurate and reliable, is in fact what it claims.

In the interest of exploring the subject of inquiry on an experiential as well as a critical-reflective level, this research has followed a pragmatist philosophy that has sought a middle ground between objectivism and subjectivism, practice and theory, as well as knowledge and action, fact and value (Dewey ct. in McDermid, 2006:4). The outcome is a very personal, subjective view that claims no more than a handful of insights that, depending on who conducts the work, may or may not be replicable.

After the '20 Questions' were found to be so successful in the first Innovation workshop, taking the questions as given P5 used them in a student study. They did not work. The value afforded by the '20 Questions' resource arose from its role as an exemplar, not as a ready-made list of questions. It is the contention of this practitioner-researcher, therefore, that if one follows the theory and philosophy that lies behind the resources and approaches and takes the artefacts and studies as exemplars, rather than tools and methods, further work of this kind may be replicable.

9.3. Claims for original contributions to knowledge

Table 9.1. Claims for contributions to knowledge.

Design practice	
Claim 1	Specialised tool support in the provision of a suite of narrative resources.
Claim 2	Method innovation in the provision of guiding support for independent development of narrative resources.
Design theory	
Claim 3	Revision in the way resources are viewed and theorised.
Claim 4	Advancement of theory supporting a view of design as storytelling.
Research practice	
Claim 5	Two novel, empirically evaluated visualisation techniques that serve as research aids in narrative data analysis.
Claim 6	Furthering methods of analysis.

Claims for original contributions to knowledge are made in the areas of design practice, design theory, and research practice. Six claims are made in all (Table 9.1)..

In a methodology that embraces Research *into*, *through* and *for* Design, beneficiaries of original contributions to knowledge need to be clearly identified, because in some cases more than one type of beneficiary is possible. Beneficiaries are identified at the beginning of each section.

9.3.1. Claims for contributions to design practice

Claims for contributions to knowledge in the area of design practice stem from RfD. Assertions are made with design practitioners in mind as beneficiaries. Two claims are made.

9.3.1.1. Claim 1: A suite of narrative resources

A claim is made for specialised tool support in the provision of *a suite of narrative resources*.

In the course of this research a suite of narrative resources was developed to support the study of design story work. The value of the resources, however, extends beyond their use as ‘tools’ for conducting research. When put directly into the hands of design practitioners, these *storienteering* resources serve as both a toolkit for configuring approaches to different types of story work, and an exemplar to which design practitioners can look when creating their own suite of narrative resources.

9.3.1.1.1. Assertions stemming from empirical observation and participant feedback

Warranted assertions are made for the usefulness and worth of narrative resources on the basis of empirical observation and participant feedback during a series of studies that had distinct research and participant objectives. Each study enabled observation of designers engaged in solving real-world problems with prototype narrative resources. Each study also afforded feedback on designers' experiences with narrative resources.

Example 1: The Pilot study provided the opportunity to observe designers 'in the field'. For the first time, novel narrative resources were combined with Scenario Planning methods (see Section 5.5.2 'Reflections on the Pilot study'). As a result, greater emphasis was placed on finding *the right story* and structuring it in such a way that it served the intended purpose (*getting it right*). Use of narrative resources, such as storyboards, Event Map and Visual Plot-line, supported multi-modal expression, i.e., working with images, graphics and texts.

Positive feedback was received about Proverb Randomizer, session documents and Event Map. For example, by considering ways to integrate the proverb 'A stitch in time saves nine' into their story, P1 and P2 were able to envisage actions and happenings that differed from those inspired by other resources. The proverb called for the consequences of envisaged actions and happenings to be made explicit. By doing so, P1 and P2 were prompted to interpret the story with metaphors that referred to how they themselves might prepare for future problems.

P1. [it was akin to] putting the tent pegs in place.

P2. You don't keep climbing a rock face without putting the pitons in place.

Working through the scenario while being prompted by narrative resources helped to anchor vague concepts in concrete questions. Interjecting a proverb;

P2. ...makes it more credible, and that is what we are trying to do when we are thinking things through. Because here we say 'Ah, alarm bells! What is that? What alarm bells?'

Example 2: During the Innovation workshops designers and design practitioner-researchers were observed working collaboratively to address a difficult design-related question (Chapter 5). A resource-based approach that configured selected narrative resources with traditional tools and methods provided both a shared vocabulary

for talking about designs, and 'middle ground' for discussions. The multiplicity of perspectives afforded by narrative resources as well as resource/method configurations enabled the Teams to acquire the quality and breadth of privileged views needed to form a complete picture of the boundary case and propose interventions that might help to address it. For P7, Dial-a-Plot enabled the Teams to 'play faster' and thus conduct a more worthwhile conversation.

9.3.1.1.2. Did narrative resources help design teams get the story straight?

It is the contention of this practitioner-researcher that the Northumbria Team did get the story straight. The aim of the workshop was to reify an approach to boundary interventions that could stand as an exemplar for theory development. There were disagreements and, as Turner, Turner and McCaul (2001) have pointed out, 'many voices'. Some spoke for research, some for design, and yet others spoke for story work, theory and practice. But, because narrative resources allowed the Teams to focus as much on getting the *story work right* as they did on getting *the right story* and the right design, the goal was reached (argued in Section 8.4.1.4 'Where, in the strategic conversation, interest lie').

Within two hours of starting the second workshop, the '20 Questions' resource enabled the Teams to draw out a case story and identify a keystone idea that could resonated for design. It took a further 10 hours to understand how the story could inform the development of prototype designs. In that time, with the support of Dial-a-Plot, Event cards and a complementary repertoire of methods, narrative resources and Narrative Fugitives such as Visual Plot-line and Narrative Blueprint, the story was rethought, reframed and refitted. With every orienting activity the Teams were able to gain a new perspective and move closer to completing their goal of knowing enough about the case and about how they could design for it to underpin design proposals. Throughout, the story did not change. It was still about two managers with dysfunctional *teams*. What changed was the narrative. With each retelling the narrative became richer, fuller, more nuanced and refined as it drew closer to being what was needed for design. The journey of the story's transition from a statement of case facts at the beginning of Day 1 to design propositions at the end of Day 2 is in itself a story (story work). A story of assuaging a lack; but also a story that unfolds as the Teams moved from doubt to warranted assertibility.

Example 3: In the Design fiction workshops, designers and design practitioner-researchers were observed spinning fictional ‘worlds’ from Seed stories with the aid of specialised narrative resources. Priming resources were seen to ‘get your brain visualizing’ (P13) where narrative resources helped designers reconcile the abstract with the concrete (PR9). In answer to a questionnaire (see Appendix C11 ‘Design Fiction Formal Study: Questionnaire feedback’), StoryFrame was ‘helpful for getting started’, Visual Plot-line ‘was a great way of bringing the group together’ (P17), and the Aspect Map was thought to be a ‘good log’ (P16) or ‘useful repository’.

9.3.1.1.3. Assertions stemming from qualitative analysis

Qualitative analysis of story work has demonstrated the usefulness of narrative resources, both at the level of collaborative discourse (Section 7.3.3 ‘How resources function in discourse’) and at the level of inter-actant engagement and utterances (Section 7.3.2 ‘Resource functions in inter-actant engagements’).

A programme of mixed-methods qualitative analysis has shown that at the level of collaborative discourse StoryFrame and the combination of Dial-a-Plot and Event cards guide narrative development by getting story work going and keeping it focused and fruitful. Comparisons made between two *framing* episodes revealed that despite differences in the type of design work and in the participants and resources acting to direct story work, similarities were evident in the take-up, use and efficacy of narrative resources (Section 8.2.2.5 ‘Interim summary of insights: Design Fiction Framing’).

Detailed analysis of strategic conversations at the level of individual events and utterances shows how directive resources, such as Dial-a-Plot and StoryFrame, support the acquisition of skills in narrative sense-making. As designers become familiar with the approach, the resources in play and the story being told, their ability to draw more than four or five seemingly complex and disparate concepts or themes together into a coherent idea improves. Through the use of novel data visualisation methods, these skills and their dependence on narrative resources can be seen at the level of speech in tight multiple alignments of marker patterns that represent co-occurrences of questions and Plot Themes or Plot Themes and Subject Themes. In the course of addressing all questions or Plot Themes, concepts and ideas of sufficient resonance begin to emerge, increasing opportunities for identification of keystone ideas and participants’ readiness to *form* coherent narratives.

9.3.1.1.4. Assertions stemming from experiments and studies

Support in making transitions

Insights from the studies help to build a case for where, in story work, narrative resources are most needed and, therefore, most useful (see Section 7.3.4.4 ‘ Insights on how resources function in discourse’). In routine work, activities tend to follow a prescribed pattern, and moving from one activity to another presents few challenges. In creative work where the order of activities tend to be less structured next moves are typically contingent upon last moves, the outcomes of which are not always self-evident. Making good choices that help to move work forward is challenging for design because important methodological as well as deliberative decisions must be made, and until they are made much may hang in the balance. Several transitional periods such as these occurred in the studies. In some of these cases, narrative resources helped participants to reorient activities and keep design work on track (for example, see 7.3.5 ‘How narrative resources support story work’). Having explored some of the characteristics of inter-actant engagements, and, in particular, how the affordances of resources complement the needs of those who seek help, there is good reason to claim that one of the primary roles that narrative resources are well-suited to perform is as support in making transitions from one type of activity to another.

9.3.1.2. Claim 2: Support for independent development of narrative resources

A claim is made for method innovation in the provision of *guiding support for independent development of narrative resources*.

The primary value of narrative resources is considered to arise not from the resources themselves, i.e., the artefacts, but from the investment that designers make in adapting existing narrative resources or the attention they pay to creating their own, for, this is where thinking narratively about design work begins.

On the basis of this proposition, warranted assertions are made for the value of guiding support for practitioners’ independent development and use of narrative resources. Guidance is underpinned by empirically tested theory about story work that, it is claimed, is manifested in a suite of *storienteering* resources and approaches.

Research of this kind rarely considers issues of dissemination or delivers anything other than ‘page stuff’, i.e., written documents. In contrast, this research has embraced proto-dissemination and thereby delivered prototype narrative resources directly into the hands of design practitioners. A campaign consisting of direct mailings and access

to a website with worksheets and downloadable resource exemplars aims to give ongoing guidance to design practitioners on how to develop new approaches to story work through adaptation and creation of narrative resources for independent use. With it, a robust verbal/visual language and vocabulary dedicated to supporting a discourse on resource-supported story work has been developed that not only talks about how story, narrative and narrative resources can help improve story work, but allows beneficiaries to try them and take part in their ongoing development. The following provides additional guidance to design practitioners by summarising insights from the research on how to tell a good story.

9.3.1.2.1. Insights from Chapter 5

- Come to know the purpose of the story by asking the right questions.
- Be concrete. Get down to the details.
- Look for conflicts or confrontations and motivations.
- Identify the story's keystone idea (find it through telling, by diligence in looking for universal connectivity – the coherent big idea).
- Use a canonical framework to guide story spinning. Dial-a-Plot helps with new stories. StoryFrame helps with a wide range of spinning and evaluation activities.
- Draw on simple, tangible, non-intrusive resources (props) to invigorate ideas and prompt actions.
- Understand where human lack is and how it differs from the worldly 'problem'.
- Abandon all preconceptions about the way the story should be expressed (let the story unfold like a budding flower).

9.3.1.2.2. Insights from Chapter 6

- Story spinning consists of a series of retellings.
- Test the story in different media (multi-modal language or separate language tellings), and different tenses.
- Progress in a rhythm of deliberative and reflective moves.
- Accept that during storytelling there will be doubts and episodes of apparent inaction.
- During such episodes rethink, reframe and refit everything; introspective viewpoints, methods of working, contextual information, the story, the design.

9.3.1.2.3. Insights from Chapter 8

- Story spinning is a narrative activity that concerns itself with both content (the story being told) and expression (the way it is told). Teams have to learn more than just what the story is; they have to learn how it can be told.
- Story and narrative are inseparable. In design work the story has traditionally been the goal of story spinning. Yet questions about the way it should be told (the narrative) can challenge a design team's working methods. Such questions should not be dismissed. Rather they should be embraced.
- Though mediated by strategic conversations, stories are the product of the imaginings of those who engage as both tellers and listeners. Allow the imaginings. Before launching into uncharted waters, invite an expert on-board.

9.3.2. Contributions to design theory

Contributions to design theory stem from *RiD*. Assertions are made with design methodologists and academics in mind. Two claims for original contributions to knowledge in the area of design theory are made that advance understanding and theorisation of design work.

9.3.2.1. Claim 3: Revision in the way resources are viewed and theorised

A claim is made for *revision in the way resources are viewed and theorised*.

This claim stems, in part, from proposed amendments to the content of Cockton's Working to Choose (W2C) framework (2012a), and, in part, from the assertion that functions hold the key to understanding how narrative resources work for designers.

9.3.2.1.1. Amendments to the content of the W2C framework

Assertions made that advance theorisation of design resources have led to amendments to the W2C framework (Cockton, 2012a). The assertions include; classification of resources by function rather than "type" (1), and a social-constructivist view of functions that views them as neither intrinsic, persistent nor predetermined, but rather situated, changeable and determined by use (2).

Assertion 1: Classification of resources by function

The discovery of previously unrecognised functions that may be attributed to resources (see Appendix C4.1 'The makeup of Resources') led primary investigators engaged in the TwinTide initiative to revise their stance on resource categorisation. Critical reflection on the origins of the TwinTide classification system coupled with

self-reflective experiments conducted on design resources led to the conclusion that resources have multiple dynamic functions (Section 7.3.1.1 “Types” questioned’). The insight moved TwinTide positions away from;

an object modelling approach for understanding re-usable design(ed) resources, with its attributes and entities [towards] different views as different windows onto a design resource.

(Cockton, 2013, personal email communication, 3 April).

Assertion 2: The situatedness of functions

Functions are not viewed as intrinsic properties of resources. Rather they are viewed as attributes of particular actants realised by particular people in particular situations. In this respect they act in much the same way as ‘signs’ (see Peirce’ semiotics, for example Atkin, 2010). When viewed as situated in the lived experience, functions are an agency exhibited by an actant, or an affordance that one actant derives from another. Conceptualisations such as these expand views on functions to embrace them as situated attributions. In this case, situatedness is a decidedly narrative rather than paradigmatic concept. For, to understand it one has to accept that there is a setting in which an actant is observed, the presence in that setting of an observer, and the observer’s subjective actions in the occurrence of an event that brings observer and actant into contact with each other.

9.3.2.1.2. Functions hold the key to understanding how narrative resources work

This research has sought to understand how narrative resources work, both at the mirco-level of inter-actant engagements (see Section 7.3.2 ‘Resource functions in inter-actant engagements’), which may be characterised as ‘very small units of activity’ (Goldschmidt, 2014:22), and at the macro-level of collaborative discourse typified by design activities (Section 7.3.3 ‘How resources function in discourse’).

Self-reflective experiments have shown that when story work itself is viewed as a story in which human and non-human actants play equal parts, functions that can be attribute to resources may also be attributed to utterances (see Section 7.3.3.4 ‘Insights from conceptualisation 3’ and Section 8.3.2 ‘Detailed analysis of U540’). The approach, which drew Design theory and the W2C framework into a union with Propp’s (1968) functions and Chatman’s (1980) model of narrative, led to the conceptualisation of *complementary functions* and *function reciprocity* (see Section 7.3.3.4 ‘Insights from Conceptualisation 3’). The outcome of these design experiments has led to

the conjecture that in design settings, functions that can be described by Cockton's meta-principles of design (2009a) are put into practice with every thought and every utterance, where they are primed to form couplings with complementary functions afforded by resources that are ready at hand. Thus, for this researcher and perhaps for others, the route to understanding resources and to theorising their efficacy and use begins with an examination of functions.

Warranted assertions that are made with regard to functions stem from insight about their complementarity and reciprocity.

9.3.2.2. Claim 4: Advancement of theory supporting a view of design as storytelling.

In Chapter 5, narrative interpretation of empirical studies explored the degree to which Erickson's (1996) claim for 'design as storytelling' could be upheld in the case of two Innovation workshops. Progress toward gaining a comprehensive understanding of the challenges involved in the case came only after storytelling was given a central role to play in the activities. In Chapter 8, detailed analysis of the same events shows how storytelling supports all the core creative and deliberative activities undertaken by designers, from the consolidation and contextualisation of information to making sense of what and how to design and the testing of propositions. Can such findings claim to make scenarios more worthwhile?

Scenario theory was found to be wanting (Chapter 2) and scenario-based design practices ill-suited to the kinds of storytelling challenges facing designers today (for example, Design fictions). What this research claims to have achieved by way of making scenarios, and storytelling in general, more worthwhile is the provision of a different way of look at storytelling in design, a different way of approaching difficult challenges, using materials in a different way and consequently being able to think in ways that set no limits on the size or type of stories that designers can bring to bear on their work.

Erickson's claim goes further than scenario-based designs' claim for the value of story and narrative in design work, for it suggests that design *is* storytelling (Lupton, 2017), i.e., that design has a fundamental orientation towards story and narrative. Though design may not always be wholeheartedly oriented towards story and narrative, it is probably at its best when it is.

As a result of conducting the studies in this research, a case has been made for design story work as an activity that draws together complementary ways of making, doing

and thinking. The outcomes strongly suggest that creative design work concerns itself as much with the creation of a robust and common narrative that encompasses both the designing and the designs, as it does with the resolution of problems or challenges. By way of demonstrating how these two previously disparate theoretical perspectives on design work complement each other and how one can succeed where the other fails, the following observation is offered.

9.3.2.2.1. Identification of a lack helps to clarify the design problem

With few exceptions, activities in the first Innovation workshop took up a problem-solving perspective (Section 5.4.5.1 'Innovation workshop 1'). As a consequence, the Teams failed to create a scenario that represented a boundary object case story. However, the second Innovation workshop saw story, narrative and narrative resources take a leading role. When, during post hoc analysis of the workshops a second reading of the text took up a *design as storytelling* perspective, it was realised that the shortfalls of the first workshop were never viewed by the Teams as a 'lack' or 'need'. They were only viewed as an ill-defined problem with no immediate solution. Had the Teams framed their challenge in terms of lack/resolution, rather than problem/solution, they may have been able to draw out a case story and create a scenario much sooner.

The complementary pairing of 'lack' and 'resolution' in story work can be viewed as questioning whether something is missing that must be found or whether something that is wrong must be set right. These questions are not the same as those that would be asked in a problem/solution approach to design. Where problem/solution approaches have an objectivist view of the world being 'out there', lack/resolution approaches take a subjective, humanist view of the world as experienced through loss and pain to reconciliation and triumph. It is this human, experiential connection that stories bring to design work that makes them resonate so strongly for designers.

During analysis of the workshop, it was attempts to find meaning and narrative coherence in the design work that drew attention to the Team's need to identify a lack rather than a problem. What the Team lacked was a complete case story. But this was never recognised and its fulfilment was never articulated as a design goal. As a consequence of not recognising the lack, neither it nor its assuagement were sought, no discussion of it entered the conversation and it was, therefore, not achieved until story and narrative were given explicit roles to play in the second workshop. Only then could design's lacks and needs be addressed in a creative, narrative and storied way.

What is significant about this finding is that the real problem facing the Northumbria Team was not one that was 'out there' somewhere beyond their comprehension or experience. But one to do with coming to recognise an unidentified lack in the narrative that they were both enacting *through* design and engaged in developing *for* design. This narrative view of design, frames problems in such a way that, once recognised, both they and their resolution give the appearance of being familiar and self-evident.

And so it is possible to assert with some confidence that it is not enough for designers to look at a problem as if it were something outside their ability to comprehend through narrative – something 'out there', an objective to be reached, an unruly force to be tamed. When they are telling stories about or around the problem they must also be able to articulate the human lack or need. For, from a narrative perspective, the lack is the referent for the problem, and it is through recognition of the referential connection between lack and problem that meanings appear to arise.

Such insights have theoretical implications for design. On one hand they challenge the long-standing belief that design is predominantly a problem-solving activity, and on the other they support emerging views of design in which the design team's role is increasingly one of sense-making and mediation through what Goodman (1978) refers to as "worldmaking".

As designers work, they name things, assign meaning to things and give order to things. By doing so, designers build a 'world' in which they are able to experience and thereby become familiar with the things that confront them. Schön's description of a student's conversation illustrates the point.

Clara named the 5ft displacement, 'and made it a thing'. She's 'not only discovering but constructing the reality of a design situation.

(Schön, 1992:8–9).

There is a growing awareness of the role of story and narrative in design, for story and narrative provide the means to draw into a coherent whole the form, structure and content of design situations which allow designers to conceptualise things and thereby field propositions for change. The stories designers tell help them to conceptualise possible 'worlds', and the 'worlds' designers conceptualise enable them to reshape the 'real world'. Where scenarios may depict only a small part of such worlds, Design Fictions have the potential to depict far more. As analysis in Chapter 8 suggests, one way of assessing the worth of such storied worlds may be to consider the number of

narrative threads that run through them, as well as the richness of information and experience presented in the many focalisations and interpretations that they afford. Their efficacy, on the other hand, may be judged by how well they support design work.

9.3.2.2.2. Worlds in question

In Innovation workshop 2, the 'world' that the Teams set about to create with Dial-a-Plot and Visual Plot-line were questioned. Was the Northumbria Team creating a story about a world that represented the current state of affairs with its problems and lacks, or a world that represented the preferred state of affairs where problems and lacks had been resolved?

Though the story was no more 'real' than the one proposed by P3 as story spinning began (see Section 5.4.6.4 'Plot Theme 4: Help is sought'; for the story, see Appendix B7 'P3's scenario'), the activity itself provided a productive forum for strategic and creative thinking through which understandings could be arrived at and propositions could be made. The story may not have represented the exact problem, but it enabled the Northumbria Team to build a world in which real needs that arise from such problems could be framed and plausible ways of assuaging those needs could be substantiated.

9.3.3. Contributions to research practice

Contributions to research practice stem from RtD. Assertions are made and contributions claimed with those engaged in the research community in mind as beneficiaries. Two claims are made.

9.3.3.1. Claim 5: Two novel visualisation techniques

A claim is made for two novel, empirically evaluated visualisation techniques that serve as research aids in narrative data analysis.

9.3.3.1.1. Storyboard transcription

The first research aid, 'storyboard transcription', creates static visual overviews of entire video episodes that include utterances, gestures and annotations. Expressed in this way, story content is far richer than text yet far easier to handle, search, tag and analyse than video recordings. Development of a pre-printed sticker system has rendered the technique more accessible to those with little or no artistic training (see Section 7.2.2 'Research aid 2: Storyboard transcription'). The following comments were made in response to the combined freehand/sticker technique's used in a live panel discussion that took place at DIS 2012 (Sep 6, Culture lab, Newcastle Upon Tyne).

Very impressive capture of our discussions! ...[D]oing this from video would... allow for comments and expressions to be marshalled with more time to construct a narrative.

(Bill Gaver).

I am especially intrigued in the use of white space to indicate a variety of things, not just pauses, highlights, changes of topic, and an ambiguous combination of those.

(Pieter Jan Stappers).

I especially enjoy the hand-waving bits!

(Kristina Höök).

9.3.3.1.2. Graphical notation system

Exemplified in Resource Journeys (see Section 7.2.1.2 'Resource Journeys'), the second research aid consists of a graphical notation system developed for use in planning and analysing human/non-human interactions. The current library of graphics is suitable for further resource-based research. It also stands as an exemplar in adaptations of the system to other research uses that involve narrative analysis of interactions.

9.3.3.2. Claim 6: Furthering methods of analysis

A claim is made for *furthering methods of analysis*.

One aspect of practice that has characterised this research is my interest in Design *for* Design. Narrative resources have been developed in part to conduct studies in story work, in part as offerings to design practice. Other resources have been developed specifically for research (previous section). Though many of these resources exist as tangible, often paper-based objects, other, non-tangible resources exist that are nonetheless useful or valuable. Though ethereal and lacking in physical form, they warrant recognition as contributions to knowledge.

Such *resources for research* extend beyond material 'tools' and 'methods' to provide sources of knowledge, guidance and inspiration. For example, adaptations made to Chatman's (1980) model of narrative provide guidance for those engaged in studying design story work, and data charts have proven to be a useful visualisation technique for narrative analysis. Resources such as these, combined with new knowledge about story work that underpins independent development of narrative resources, support novel methodological approaches to research in the area of design story work. Of particular worth are the methods of protocol analysis that, I claim, extend Goldschmidt's (2014) linkography work beyond the realm of sketching and ideation,

into the broader realm of story work. Where Goldschmidt's work has focused on sketching and the development of design concepts, this research has sought to explore links, on one level between designers and the resources they draw on to create designs, and on another between the conversations, stories and narratives that stand as some of design's primary resources. This multi-perspective view of how such diverse things as people, objects, stories, language and perceptions coalesce into design experiences moves design story and narrative research onto a broader and far more challenging plain that is, consequently, that much more interesting and potentially worthwhile.

9.4. Further work

Starting with the general and moving to the particular. More robust theory about how designers and design objects contribute to the strategic conversations that go on around story work and how such inter-actant engagements can be understood through concepts such as assemblages or networks may help advance the body of knowledge on how story, narrative and narrative resources work for designers.

With approaches, narrative resources, theory and methods of analysis now in place to support *Framing* and *Forming* episodes in design story work, the opportunity exists to focus attention more firmly on the study and comparative analysis of *Fielding* and *Finishing* episodes. This may either reinforce or raise doubts about the approaches that have been taken, but will nonetheless be *informative* and may lead to a more complete picture of story work. It seems that with more time devoted to thematic analysis, protocol analysis and narrative analysis of the kind of data that storyboard transcriptions, resource journeys and data charts have been able to provide, far more insights might be drawn from further work. The highly detailed micro-analysis that has been conducted on function complementarity (see 7.3.4 'How resources function in discourse'), as well as the proposal that has been made for a three-part relationship between resources and goals (see 7.3.4 'How resources function in discourse') raise questions about functions, their attribution and their usefulness in theorising about narrative resources.

The cognitive dimension of narrative resources is another area worthy of further investigation. Nowhere is this more intriguing than in the way Narrative fugitives, such as Visual Plot-line and Narrative Blueprint, perform different functions for different people at different times. Has it to do with their low 'viscosity'? Viscosity is a term used by Cockton et al., (2012b:1281) to refer to 'resistance to change or a measure of

how much work is needed to achieve a change'. It is appropriated here to mean the ease, openness and flexibility afforded by Narrative fugitives that seems to stem from functions properties, qualities and attributes of both the resource and the designer which keep the relationships that govern inter-actant engagements in a constant state of flux. The way these resources work is hard to pin down. But that resistance to being fixed is precisely the quality that makes them so useful for making design moves.

Finally, had this researcher had better web skills, the storienteering website could have been adapted to solicit feedback on user stories. Though too late for making a contribution to this research, such a modification would be a good first step to further work on the development of storienteering resources.

9.5. Afterthoughts

In Chapter 2, Bruner's two distinct yet complementary modes of thought, narrative thinking and paradigmatic thinking, were introduced. In Chapter 3 it was proposed that one of the defining characteristics of design work might be the way in which it brings both modes of thinking into productive harmony. In Chapter 5, the proposition was put to the test by analysing design work conducted in the second Innovation workshop from perspectives that complement Bruner's two modes of thinking; design as problem-solving and design as storytelling. Elsewhere (Section 6.3.4.4. 'Response to the Design fiction workshop 2') the research has established the efficacy and worth of taking up multiple perspectives. I have shown how, when designers take up a different perspective, they are able to make moves. For example, in the case of scenarios and design fictions, it is not just the substance of the perspectives themselves that are important to design work but the fact that another perspective can be taken up from which current perspectives can be viewed.

As a result of taking up multiple perspectives, design teams are able to find creative openings. Movement involves suspension, a drawing away from current thinking. It affords opportunities for discovery and change in the form of openings for new ideas or refinements to existing ones. Such movements may represent the means by which designers are able to be inventive and most creatively productive. When design teams engage in story work, they do so for many reasons. But one of them, it can be argued, is to take advantage of the abundance of opportunities for mindful suspension that strategic conversations so amply afford.

Listen to any conversation and you find a great deal of just this sort of storytelling. But also you will hear sudden leaps and changes as one idea triggers another apparently remote from it. Anecdotes, recollections of previous events, momentous occasions, amusing incidents, unusual occurrences, any of these and many more will come into the minds of the conversationalists as they talk.

(Lawson, 2004:92).

Engagement in strategic conversations around stories helps individual designers make sense. In addition, mindful suspensions that discourse affords provide openings for sense to be questioned and either affirmed or undone so that individual sense can be made anew and 'common' sense found.

In the Innovation workshops, Northumbria Team members were faced with coming to grips with a novel challenge, that of creating a boundary intervention. They could not visit the challenging situation on which they would base their proposals, for it occurred at another time in another place. The challenging situation, therefore, had to be brought to them. In order to grasp the context and extent of the challenges posed in that absent situation, they were obliged to abstract and reconstruct it from what was available to them, in this case an expert with first-hand knowledge of the case. To manifest the challenging situation in ways that the Team could grasp, some procedural adjustment and fitting took place that brought the characteristics of the challenging situation and that of design work into alignment.

When the Teams reflected on what was learned from the workshops there was a sense in which the Northumbria Team felt that they had actually visited the site of the boundary issues and there enacted their design proposition. By all that can be considered to be acts of design work, the challenging situation was enacted. Design work literally took on patterns of activities that reflected those that one might have expected to find in the challenging situation itself. Laurel (1991:7) has suggested that the human-computer interface 'becomes the arena for the performance of the task'. Here it is suggested that activities engaged in by designers while designing for challenging situations resemble those engaged by actors in the challenging situations themselves.

Based on this conjecture, an argument can be made that critical observation of design work does not just reveal a discourse about resolving a challenge. Rather, the structure and characteristics of design activities and events, the particularities of design

situations, the expressions and interactions of designers – in short, the narrative of the design investigation as a whole – comes to depict the situation in which the challenges arise. What is depicted is not the challenging situation itself, but the challenging situation as that particular design team in those particular circumstances has come to know it.

Arguments might be made that although clear physical distinctions may exist between a design team and their beneficiaries, during design work no clear distinction can be discerned between challenge setting or challenge resolution. From this perspective, it is not so much *what* design can achieve that is of either interest or value, but *how* design achieves what it sets out to achieve. This line of thinking suggests that the designers' willingness to not merely empathise with those for whom they design, but through narrative abstraction immerse themselves in the challenges they face as if they were their own, may be a distinguishing characteristic of story work and, more broadly, design work.

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Appendix A: Studies and Experiments

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A1. Text transposition experiments

A series of critical reflective experiments explored approaches to the transposition of scenarios from written text to visual narrative. The same scenario ‘Taxi required’ is used in each experiment (for a synopsis of the story, see Appendix B1. ‘Taxi required’).

‘Taxi Required’ was written by a group of researchers at Northumbria University working with stakeholders on a project for the Assisted Living Innovation Platform (ALIP). It was used in focus group sessions to gain consensus for design directions in a technology-driven network service.

Elizabeth is an elderly pensioner living on her own. She uses a combination of technological devices and software programmes to make contact with friends in order to meet-up, buy weekly groceries and share taxi fare home.

A1.1. Experiment 1: Matching pictographs to keywords and phrases

(2011.03)

Figure A1: Matching keywords and pictographs

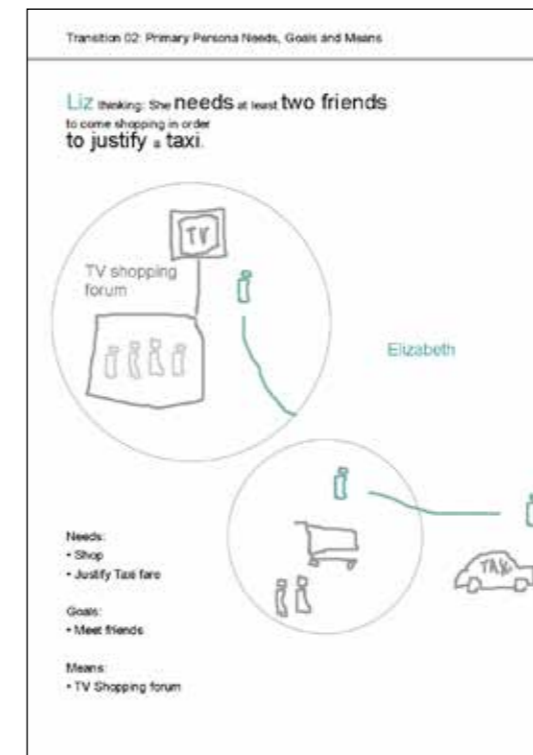


The first experiment considered an approach to text transposition that was developed in professional practice. Following the lead of film directors, animators and editorial illustrators, designers in scenario-based design often begin with a textual scenario. When creative practitioners review these documents, it is not unusual for them to begin responding to the text by making notes in the margins. This was the starting point for the experiments.

In the left column a textual scenario is double-spaced and divided into scenes. Keywords and phrases are highlighted in the scenario. The highlighted text indicates significant events or propositions that establish the value of the story. In the right column the keywords and phrases are represented by pictographs, some of which are iconic and others indexical or symbolic.

A1.2. Experiment 2: Needs, goals and means

Figure A2. Highlighting needs, goals and means

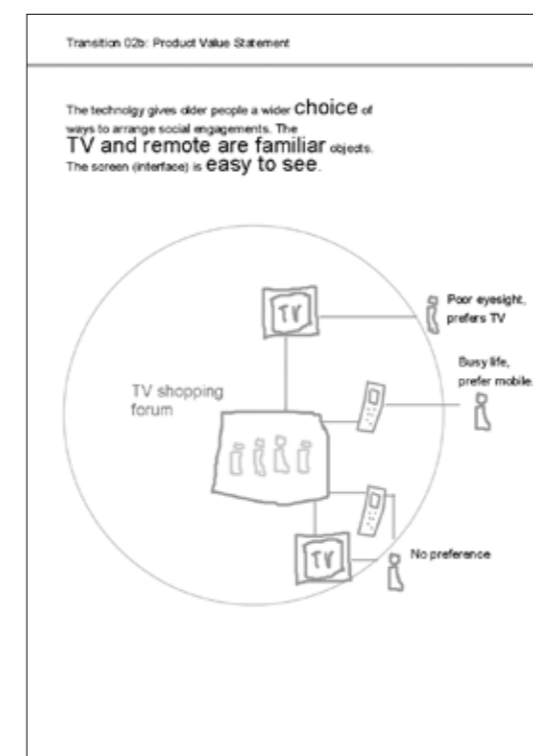


The second experiment explored ways to visually control the focalisation of scenarios, i.e., where the focus is placed. In this case the focus of attention was human goals. The agent, Liz, has a goal. She wants to meet up with some friends. The goal is driven by a need to do some shopping and to get a taxi ride home. However, the goal cannot be achieved unless Liz has the tools and resources to achieve it – here provided by the technology.

The story unfolds in two scenes represented graphically by circles. Liz, the protagonist, travels between the scenes, from her home to the shopping centre, then back by taxi.

A1.3. Experiment 3: Product value statement

Figure A3. Product value statement

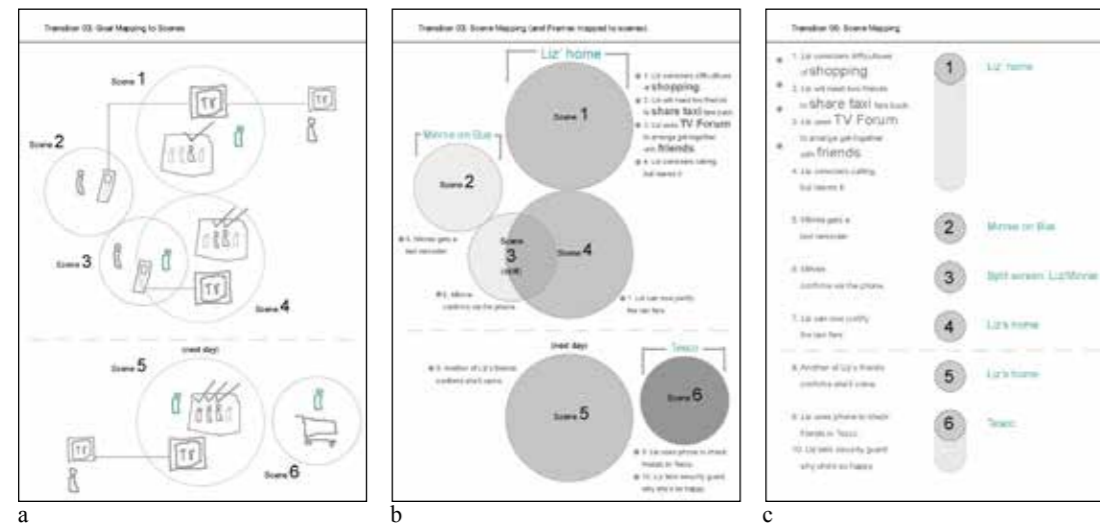


The third experiment focused on product values. The product network is the focus of attention (in the circle) and Liz's interactions with it occur in different places.

A1.4. Experiments 4, 5 and 6: Goal mapping to scenes

The last three experiments in the series explore designs for a notation system that enables visual mapping between scenes and frames.

Figure A4. Goal mapping to scenes.

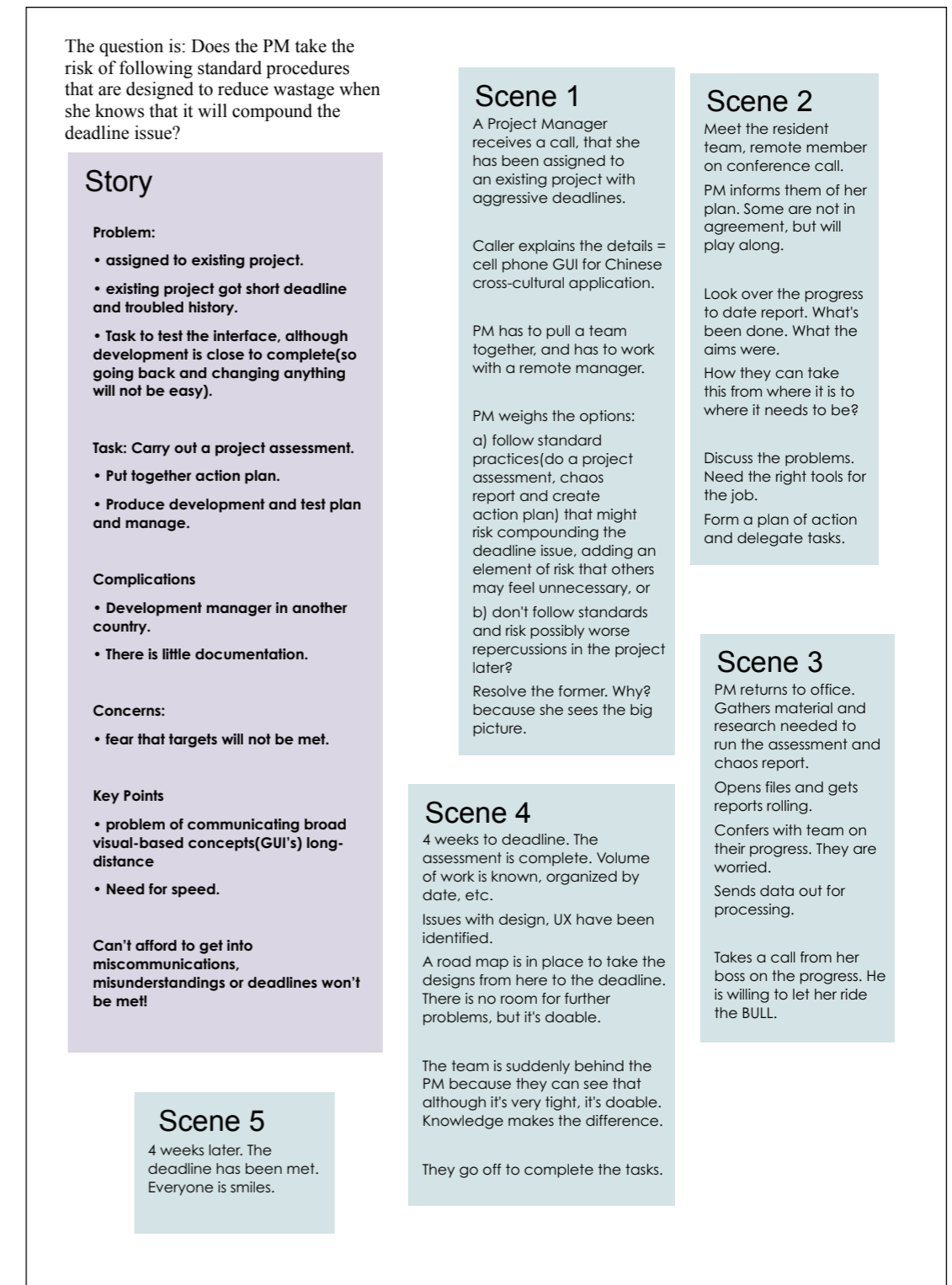


Using the same notation system, Figure A4 maps goals to scenes (a), reinforces the depiction of scenes and maps them to brief descriptions of each frame (b), and suggests an alternative arrangement (c).

A1.5. Text transposition; story to script

This systematic approach to text transposition was used successfully in practice and in some of the research experiments. The story or scenario is broken down into individual actions and events. These are arranged in a long panel on the left-hand side of the page. One-by-one scenes are developed to match and elaborate on each of the actions and events.

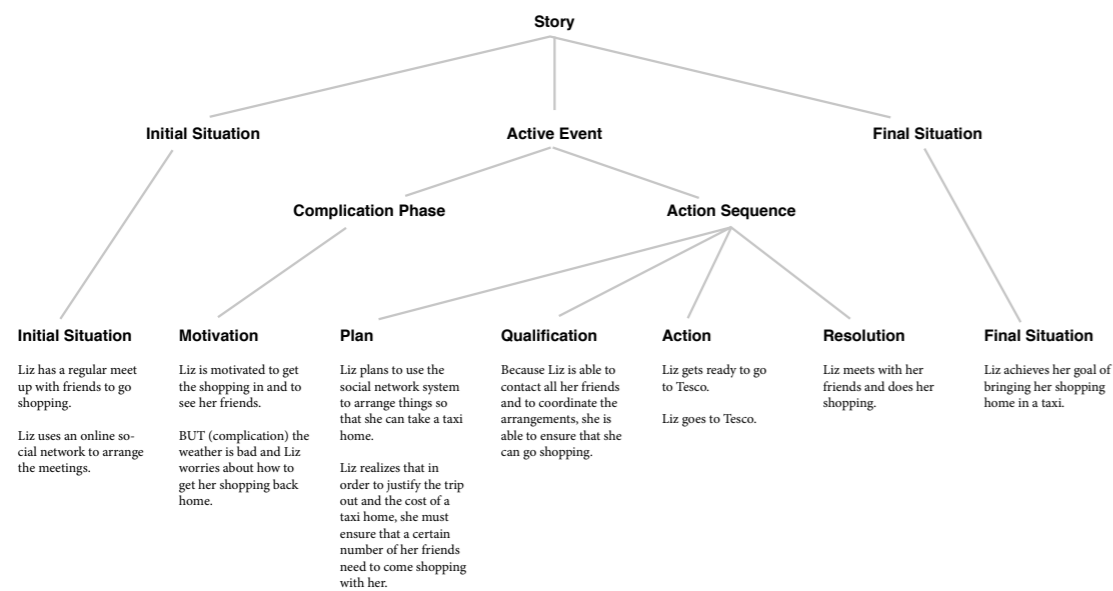
Figure A5. Example of text transposition



A2. Scenario Breakdown

A branching tree diagram used to model stories acts as a framework for breaking down the narrative components of scenarios.

Figure A6. Pemberton's grammatical structure of stories.



Branching tree diagrams are used extensively in science. One need only recall the ubiquitous maps that depict the evolution of species. Pemberton's schema for the grammatical structure of a 'simple story' (Figure A6; 1984:87 in Wilcock, 2005:12) uses a branching tree diagram to show the substructure of the 'active event'. Story time, 'the duration of the purported events of the narrative' (Chatman, 1980:62), is framed by a 'initial situation' and a 'final situation'. Bracketed by a beginning and end, the story content (diegesis) unfolds through a sequence of five phases; motivation, plan, qualification, action and resolution.

The experiment considered whether Pemberton's (1989:219) division of story content might provide a starting point for either structuring or analysing scenarios. The 'Taxi Required' scenario (see Appendix B1. 'Taxi required') was analysed to see if the five phases could be identified. Then the text was edited and arranged according to Pemberton's grammatical structure on a branching tree diagram.

"This study was interesting, but did not lead to any inspirations for resources...it didn't actually help me understand the storytelling process or the story itself any better.'
(memo 9, 08.10.2011)

Though the exercise didn't suggest any immediate uses for narrative development, during the analysis stage of research the model proved to be useful for describing episodes of story work (see Section 8.1.3 'Describing the episodes').

A2. Are scenarios narratives?

(2012.03.05)

A2.1. Experiment 1: Assessment of narrative content

Figure A7. Assessment of narrative content, example 2.

Title: Vivian's contextual scenario		
Narrative	Instance	Text
Actor 1	*** Vivian	1. While getting ready in the morning, Vivian uses her phone to check her e-mail. It has a large enough screen and quick connection time so that it's more convenient than booting up a computer as she rushes to make her daughter, Alice, a sandwich for school.
Actor 1 beliefs	* Heterosexual. * Care of family. * Care of work.	
Actor 1 feelings		2. Vivian sees an e-mail from her newest client, Frank, who wants to see a house this afternoon. The device has his contact info, so now she can call him with a simple action right from the e-mail.
Actor 2	* Alice. * Frank. * Husband.	
Actor 2 beliefs		3. While on the phone with Frank, Vivian switches to speaker phone so she can look at the screen while talking. She looks at her appointments to see when she's free. When she creates a new appointment, the phone automatically makes it an appointment with Frank, because it knows with whom she is talking. She quickly enters the address of the property into the appointment as she finishes her conversation.
Actor 2 feelings	* Nice husband message.	
Event 1	**** Focus on appointment.	
Event 2	* Getting Alice to school. * Getting to the office. * Getting to the appointment.	4. After sending Alice off to school, Vivian heads into the real-estate office to gather some papers for another appointment. Her phone has already updated her Outlook appointments, so the rest of the office knows where she'll be in the afternoon.
Scene setting	* Home. * Office. * Vacant property.	5. The day goes by quickly, and she's running a bit late. As she heads towards the property she'll be showing Frank, the phone alerts her that her appointment is in 15 minutes. When she flips open the phone, it shows not only the appointment, but a list of all documents related to Frank, including e-mails, memos, phone messages, and call logs to Frank's number. Vivian presses the call button, and the phone automatically connects to Frank because it knows her appointment with him is soon. She lets him know she'll be there in 20 minutes.
Situation/Action	* Managing appointments.	
Object focus	***** Technology	
Temporal element	** Vivian's routines with family and job.	6. Vivian knows the address of the property but is a bit unsure exactly where it is. She pulls over and taps the address she put into the appointment. The phone downloads directions along with a thumbnail map showing her location relative to the destination.
		7. Vivian gets to the property on time and starts showing it to Frank. She hears the phone ring from her purse. Normally while she is in an appointment, the phone will automatically transfer directly to voice-mail, but Alice has a code she can press to get through. The phone knows it's Alice calling, and uses a distinctive ring tone.
		8. Vivian takes the call -Alice missed the bus and needs a pickup. Vivian calls her husband to see if he can do it. She gets his voice-mail; he must be out of service range. She tells him she's with a client and asks if he can get Alice. Five minutes later the phone makes a brief tone Vivian recognizes as her husband's; she sees he's sent her an instant message: "I'll get Alice; good luck on the deal!"

A2.2. Experiment 2: Comparative analysis; narrative, chronicle or annal?

The second experiment was a refinement of the first. It sought to establish whether texts were narrative according to criteria proposed by White (1980) and Pentland (1999) for the difference between narratives, chronicles and annals.

The first text, 'Vivian's context scenario,' is considered to be a narrative. It has sufficient elements of narrative. For instance, it has a clear beginning which sets up the conflict over making all the day's appointments. It has a clear ending that resolves the appointment conflicting with picking up Alice from school. Although it reveals nothing of the main character's feelings, traits or personal characteristics, it does reveal some basic beliefs in, for instance, a heterosexual relationship, family values (making Alice's breakfast, getting her to school, etc.) and work ethic.

Figure A8. Comparative analysis, example 2.

Vivian's Context Scenario		
Evidence of Narrative	Instances	Text
Main actor	VIVIEN (3)	<p>1. While getting ready in the morning, VIVIEN uses her phone to check her e-mail. It has a large enough screen and quick connection time so that it's more convenient than booting up a computer as she rushes to make her daughter, Alice, a sandwich for school.</p> <p>2. VIVIEN sees an e-mail from her newest client, Frank, who wants to see a house this afternoon. The device has his contact info, so now she can call him with a simple action right from the e-mail.</p> <p>3. While on the phone with Frank, VIVIEN switches to speaker phone so she can look at the screen while talking. She looks at her appointments to see when she's free. When she creates a new appointment, the phone automatically makes it an appointment with Frank, because it knows with whom she is talking. She quickly enters the address of the property into the appointment as she finishes her conversation.</p> <p>4. After sending Alice off to school, VIVIEN heads into the real-estate office to gather some papers for another appointment. Her phone has already updated her Outlook appointments, so the rest of the office knows where she'll be in the afternoon.</p> <p>5. The day goes by quickly, and she's running a bit late. As she heads towards the property she'll be showing Frank, the phone alerts her that her appointment is in 15 minutes. When she flips open the phone, it shows not only the appointment, but a list of all documents related to Frank, including e-mails, memos, phone messages, and call logs to Frank's number. VIVIEN presses the call button, and the phone automatically connects to Frank because it knows her appointment with him is soon. She lets him know she'll be there in 20 minutes.</p> <p>6. VIVIEN knows the address of the property but is a bit unsure exactly where it is. She pulls over and taps the address she put into the appointment. The phone downloads directions along with a thumbnail map showing her location relative to the destination.</p> <p>7. VIVIEN gets to the property on time and starts showing it to Frank. She hears the phone ring from her purse. Normally while she is in an appointment, the phone will automatically transfer directly to voice-mail, but Alice has a code she can press to get through. The phone knows it's Alice calling, and uses a distinctive ring tone.</p> <p>8. VIVIEN takes the call -Alice missed the bus and needs a pickup. VIVIEN calls her husband to see if he can do it. She gets his voice-mail; he must be out of service range. She tells him she's with a client and asks if he can get Alice. Five minutes later the phone makes a brief tone VIVIEN recognizes as her husband's; she sees he's sent her an instant message: "I'll get Alice; good luck on the deal!"</p>
Main actor - feelings	None	
Main actor - Beliefs	Heterosexual, etc.	
Main actor - traits and values	Care of family. Care of work (2).	
Secondary actor	Alice, Frank, Husband (3)	
Secondary actor - feelings	Nice husband message	
Secondary actor - beliefs, traits/values		
Main event	Focus on the appointment (5).	
Secondary events	Getting Alice to school, getting to the office, getting to the appointment (3).	
Scenes/settings	Home, office, vacant property (3).	
Situation/Actions	Managing appointments	
Objects of focus	Technology (9)	
Temporal element	Vivian's routines with family and job (2).	
Evidence of Annal	Instances	
No plot	Negative. There is a clear plot-line.	
No identification of author	Affirmative	
No date of authorship	Affirmative	
No author rationale	Affirmative	
No opinion of the author	Affirmative	
No beginning or end	Negative. There is no introduction, but there is a clear setup and resolution.	
No claim to be factual or fictional	Affirmative	
Is eminently rational	Affirmative	

A3. Mandler & Johnson's (1977) Story Grammar

(adapted by Wilcock, 2005:9/10)

Fable → Story AND Moral

Story → Setting AND Event Structure

Setting → State*(AND Event*) | Event*

State* → State((AND State)*)

Event* → Event ((AND | THEN | CAUSE) Event*)(AND State*)

Event Structure → Episode ((THEN Episode)*)

Episode → Beginning CAUSE Development CAUSE Ending

Beginning → Event* | Episode

Development → Simple Reaction CAUSE Action | Complex Reaction CAUSE Goal-Path
 Simple Reaction → Internal Event (CAUSE Internal Event)*
 Action → Event
 Complex Reaction → Simple Reaction CAUSE Goal
 Goal → Internal State
 Goal Path → Attempt CAUSE Outcome | Goal Path (CAUSE Goal Path)*
 Attempt → Event*
 Outcome → Event *| Episode
 Ending → Event*(AND Emphasis)| Emphasis | Episode
 Emphasis → State

A4. Card set experiments

A4.1 Card set experiment 1

(2012.04.10)

The story

Shit-Stirrer: "You'll never make it Edgar."
 Apologist: "Sorry?"
 Shit-Stirrer: "I said, you'll never make it".
 Apologist: "I wish I could stay, but I must go."
 Shit-Stirrer, stirring a stick in the sand: "Must you? Seems to me
 that you want to go!"
 Apologist: "No. I'm sorry if I gave you that impression."
 Shit-Stirrer: "Bugger off then. I don't need you any how."
 Apologist: "You've made that very clear.
 At least we agree on something!"
 Edgar walks out into the heat of the sun. His bare feet sink deep into the
 soft sand. All he can see in every direction is sand, sand, sand.
 Shit-Stirrer: "You'll never make it you stupid bastard."
 "You stupid bastard...you stupid bastard! ! ! !"

Analysis of the scenario and the methods used in telling it revealed that the card set lacked prompts for technologies, designs or design situations. The scenario was an interesting short story with a clear purpose, but one that still needed to be directed toward design needs. It was later recognised that the *Purpose* 'dimension' drew out the keystone idea.

A4.2 Card set experiment 2

(2012.04.24)

Further research and reflection on ways to approach the design of card sets drew on the concept of layers. The concept was probably influenced by concurrent development of Plot Themes which were being adapted to fit design story work, as well as widely accepted theories about the way elements of story and narrative can be conceptualised as layers (Pemberton, 1984:87 in Wilcock, 2005:12 after Chatman, 1980).

A two-layered setup was envisaged; one layer concerned with the structuring of stories and another concerned with fleshing out narrative content and expression. The former supported by Plot Themes, the latter by storytelling card sets.

Cards in play

Plot Theme: Your actor takes unusual measures to resolve a problem or to achieve a goal.

1 Location Card: 'In a dream'

1 Actor Card: The cocky bastard (Plus a 'protagonist')

3 Event Cards:

- A disappointment
- A conflict
- The arrival of something unexpected

The story

Fred is *disappointed* (Event 1) with the new game. It isn't as challenging or fun as he thought it would be. He had bragged to his best friend about getting it. They had played it together. Now Fred is really sad and embarrassed. Fred's friend is a really *cocky bastard* (Actor 1). Fred is afraid that his friend will never forgive him for this. Fred thinks that maybe he should go somewhere far away and try to forget the whole thing. Maybe he can find a way to *change what had happened* (take unusual measures to solve a problem). He'd seen that kind of thing in movies where people go back in time and change stuff. Or maybe he could just phone the store where he bought the game and complain. Yes! That's what his friend, the cocky bastard, would do isn't it! But Fred's not cocky. *Should he phone the store or shouldn't he?* (Event 2: Conflict) The store owners may be really horrible to him, which would make things even worse. He resolves to do it... tomorrow. That night, Fred has a *dream* (Location). Fred dreams that when he phones the game store they are really nice. The store owner is so glad that Fred has been kind enough to call them and inform them that the game they sold him is lousy, that they are going to send him ten brand new games that nobody has ever played before. Fred invites his friend over to play the new games. Ring. Ring. His friend is at the front door now, ringing the bell. Fred wakes up from his dream because the door bell is really ringing down stairs. Fred runs to the door. It's the postman. *The postman has a large unexpected parcel...* for Fred (Event 3; The arrival of something unexpected). Two hours later, Fred and his reinstated best friend are deeply immersed in playing the coolest games ever, ones that nobody else has ever played!

In this experiment the purpose card proved to be redundant because the Plot Theme provided a goal: 'Your actor takes unusual measures to resolve a problem or to achieve a goal'. This

discovery led to the concept that properties such as purposes and character traits might be deliberately crafted into the phrasing of Plot Themes. The aforementioned episode was rephrased to read ‘Unusual measures are taken to resolve a problem or to achieve a goal’, thus making it more widely applicable to situations rather than actors, and emphasising the importance of purpose in scenario content.

A4.3 Card set experiment 4

(2012.04.25)

Annotated story authoring

Event 1: Meeting. *It’s an upper management meeting (of a UK hardware manufacturer) being held to discuss a controversy over the introduction of a future product. A DECISION has been taken to (expand the company’s business into the software market UNUSUAL ACTION and) develop a new business management tool. But, a competitor has just announced a similar move (DOUBT is CAST).*

Event 2: There is a conflict over whether to go ahead as planned.

The story describes the ‘introduction of a future product’, but this does not seem to be a particularly unusual thing for a company to do, and the Plot Theme asks for an ‘unusual action’. Can this be a hardware manufacturer venturing out into the software market? I add a note next to the ‘meeting’ to suggest that it is a meeting of the upper management of a ‘UK hardware manufacturer’, and that the business management tool is a software tool. I wonder if these concrete elements might be the kinds of things that individual game players, as users, might add themselves, i.e., this would orient the story to their particular circumstances.

This is about building ‘constants’ into the content side of the story and ‘variables’ into the expression side of discourse.

(Memo, July 2-16)

I deal two actor cards; The analyst, and The Prima donna designer.

It’s not hard to see how there could be some conflict between these two actors in the meeting. I’m also interested in seeing whether some of the other resources can help here. I use the Proverb Randomizer to adapt the story to fit a randomly chosen proverb, the figure stencil to visualise scenes in a more concrete way, and a ‘location’ card to help situate the story.

With these elements in play, a new version of the story is spun.

There is disagreement between the analyst and the designer over whether the project can and should go forward, and, necessity being the mother of invention, a seriously creative solution is called for. The designer may take the line that he can provide assurances that the design team will come up with something superior to the competitors, and, in fact, view the news about the competitor as an opportunity, since it shows that the idea is both timely and achievable; it confirms that they made the right decision (Confidence. Decisiveness).

Alternative scenario

The opportunity card could also be played first, as in;

The story opens with the analyst pointing out the opportunity for the company to branch out into business management software.

The random selection of a different proverb, such as ‘the proof is in the pudding’, would change some of the story’s characteristics. We might have the rest of the meeting members override an unresolved conflict between the analyst and the designer by, as it were, throwing their hands up in the air and resolving to go ahead with the project in order to prove the point one way or the other. Or, they may decide to hold back their product to see what their competitor has, giving them the opportunity to learn from and improve on it (Cautiousness). What’s happening here with the story composition is that, with these things in play, on the table, as it were, it is not hard to see many different permutations that circle around these story characteristics.

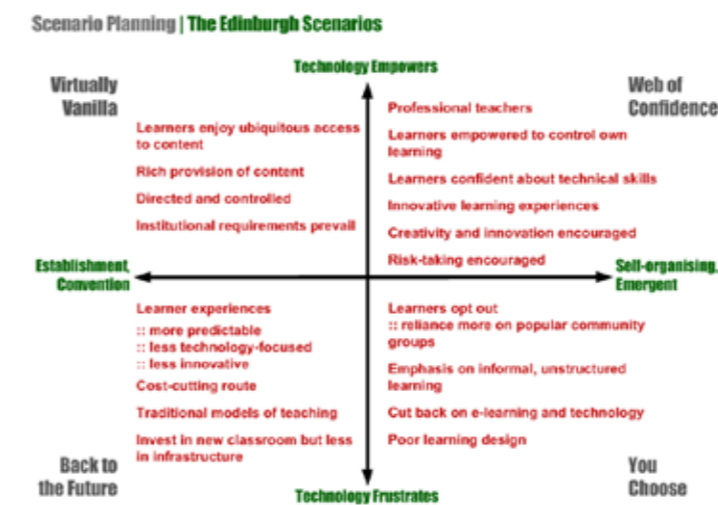
A5. Pilot study

A5.1. Preparation for the Pilot study

(2012.07.06)

A series of critical reflective experiments were conducted in preparation for the Pilot study. The approach to the study included two seminars that focused on Strategic Planning and Scenario Planning. It wasn’t clear how these management strategies might lead into the creative activities associated with Storiencing. The experiments were conducted in order to find out.

Figure A9. The ‘Edinburgh’ scenarios

















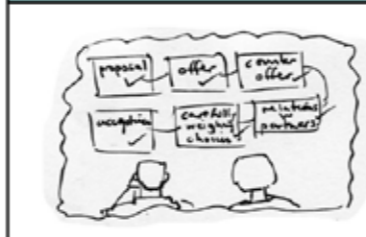


Each experiment began with scenario-related factors drawn for a matrix called the ‘Edinburgh Scenarios’ (jiscInfoNet, 2013:8). Several scenarios were developed using the design storytelling card sets and the Proverb Randomizer. The method used in Card set experiment 3 acted as a starting point.

One of the insights from these experiments, was that the Proverb Randomizer prompted critical analysis of the scenario. In attempts to apply a proverb to a scenario, the scenario’s structural integrity and logic is questioned. For the scenarios, see Appendix B7.

A5.3. Pilot study: Final storyboard

Figure A11. The Holy grail storyboard

ADQ "Holy Grail" Scenario

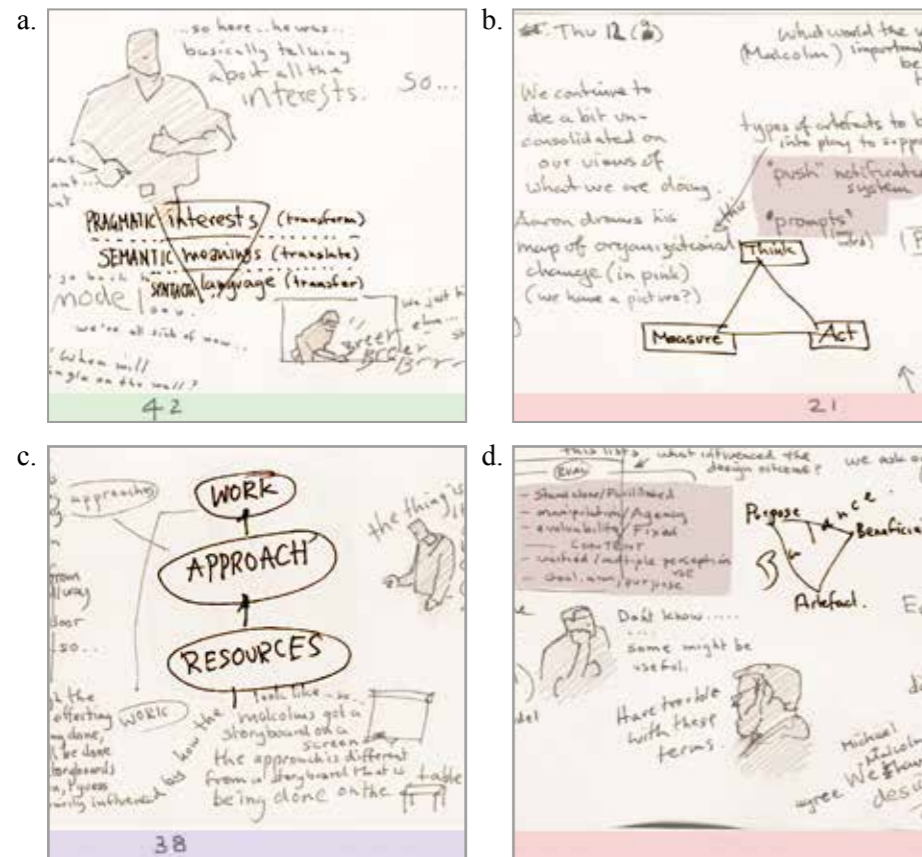
<p>01 The year is 2016. Design is considered essential... but, tough times persist in the NE of England.</p> 	<p>02 We drop in on a meeting of the NHS, NE regional procurement committee...</p> 	<p>03 Over at ADQ, a small local design agency, a meeting has been called with a partner company,</p> 	<p>04 Asier, ADQ cofounder and senior designer, has a suggestion for how they might proceed.</p> 	<p>05 The next morning, Mel and Asier meet at Starbucks for an informal chat.</p> 	<p>06 Privately, they have some serious doubts.</p> 	
	<p>Chair <input type="checkbox"/> It seems to come down to Y-Co, the bigger agency, or ADQ, the one with the most imaginative approach. James, I think we'd all value your recommendation.</p> <p>James <input type="checkbox"/> ADQ have the personnel and an impressive track record with the NHS. I recommend we offer them the contract with conditions that cover some of the reservations we have.</p>	<p>Mel <input type="checkbox"/> Asier and I called this meeting to discuss whether we should accept the contract offer from the NHS. Jill, can we count on X-Tec to deliver on their part of the work?</p> <p>Jill <input type="checkbox"/> As you know, we've taken on another contract, so as it stands we'd be hard pressed to maintain our partnership with you on this.</p>	<p>Asier <input type="checkbox"/> We can't afford to pass up this offer from the NHS. Maybe one way we can deliver on the contract is for X-Tec to honour their commitment to us by acting as consultants and subcontracting some of the work.</p> <p>Jill <input type="checkbox"/> Give me a couple of days to look into that.</p>	<p>Asier <input type="checkbox"/> So, given the situation with X-Tec where do you think we stand with this NHS contract? We need to reply to it by end of day Monday.</p> <p>Mel <input type="checkbox"/> There's more risk than we'd hoped for. Jill seems to feel that X-Tec can handle it on top of their other work, but I don't know, I have all kinds of alarm bells going off over this.</p>	<p>Mel <input type="checkbox"/> Should we pull out now I wonder? But maybe this is our BIG break?</p> <p>Asier <input type="checkbox"/> This contract will mean that we have all our eggs in one basket..... that's not good!</p>	
<p>07 Two days later, with time on the contract offer running out, Jill calls Asier.</p> 	<p>08 Saturday, 17:30. Asier has just completed a one-hundred mile bike ride.....</p> 	<p>09 Meanwhile....Mel is on the home stretch after a ninety-minute jog....</p> 	<p>10 Monday morning, Mel and Asier are confident that accepting the contract offer is the right thing to do.</p> 	<p>11 6 weeks later, X-Tec are working late, testing systems on site at St. James Stadium</p> 	<p>12 Mel takes Asier aside.</p> 	
	<p>Jill <input type="checkbox"/> We've discussed the situation over here Asier, I've made some calls and, in short, we can commit to everything in the proposal.</p> <p>Jill <input type="checkbox"/> Flying by the seat of our pants.. but, fingers crossed, we'll make it work.</p>	<p>Asier <input type="checkbox"/> I'm going to call Mel and suggest that we go for the NHS contract.</p>	<p>Mel <input type="checkbox"/> I think we should go for it!</p>	<p>Mel <input type="checkbox"/> Hi Jill! We've decided to accept the NHS offer and we're looking forward to working with X-Tec to bring about the designs that we've all worked so hard on.</p> <p>Jill <input type="checkbox"/> That's great Mel.</p>	<p>Asier <input type="checkbox"/> Can we get the graphics up on the monitor yet Jill?</p> <p>Jill <input type="checkbox"/> No. We're still having trouble getting real-time feed between mobile phones, the spectator dongles and the stadium's LED monitor. The system worked fine in the lab!</p>	<p>Mel <input type="checkbox"/> I'm confident that we'll get the technical stuff working, but we all need to see how spectators will interact with the system.</p> <p>Asier <input type="checkbox"/> I agree. I think we should go the extra mile on this and provide NHS with a live demonstration before we submit the next progress report.</p>
<p>13 Auditors at the NHS have raised concerns over ADQ's latest progress report...</p> 	<p>14 The next day...</p> 	<p>15 Asier and Mel recall how carefully they planned everything so far...</p> 	<p>16 ..and how at moments like this, it all pays off.</p> 	<p>17 The video did the trick. Weeks later, after the first full-scale demo of ADQ's designs...</p> 		
<p>James <input type="checkbox"/> Mel, I'd like to meet up with Asier and yourself to discuss ADQ's last progress report.</p> <p>Mel <input type="checkbox"/> Certainly James.</p>	<p>James <input type="checkbox"/> According to your last report, the onsite demonstration is behind schedule. Our auditors are asking for some assurances.</p>	<p>Asier + Mel <input type="checkbox"/> We're in love with this work now, and have to see it through.</p>	<p>Mel <input type="checkbox"/> James. We'd like to show you a short video of a small-scale demonstration that we set up in a pub during the derby game last week.</p>	<p>James <input type="checkbox"/> Congratulations everybody. If this was anything to go by, the campaign's going to be a terrific boost to our public profile and to health in the NE.</p> <p>Asier <input type="checkbox"/> ...and may be the beginning of a beautiful relationship?</p>		

A6. Innovation Workshop 2

(2012.11.26-27 Northumbria University, Newcastle, UK.)

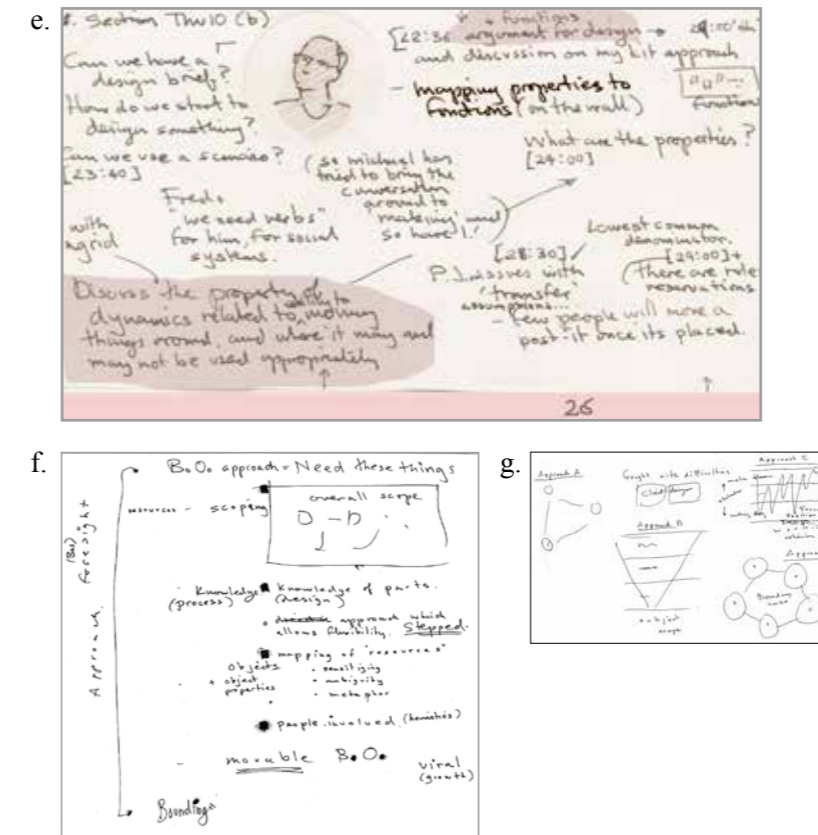
A6.1. Theoretical models

Figure A12. Theoretical models: Innovation workshop 2



Theoretical models played a key role in the Team's strategic conversations. The Delft Team put forward and used in their explanations, Carlile's 3T model (2002:17; Figure A15a) and Hussain's model of organisational change (Figure A15b). While the Northumbria Team put forward and used Cockton's Working to Choose framework (2012a; Figure A15c) and Design Arenas (Cockton, 2017: 751–755; Figure A15d).

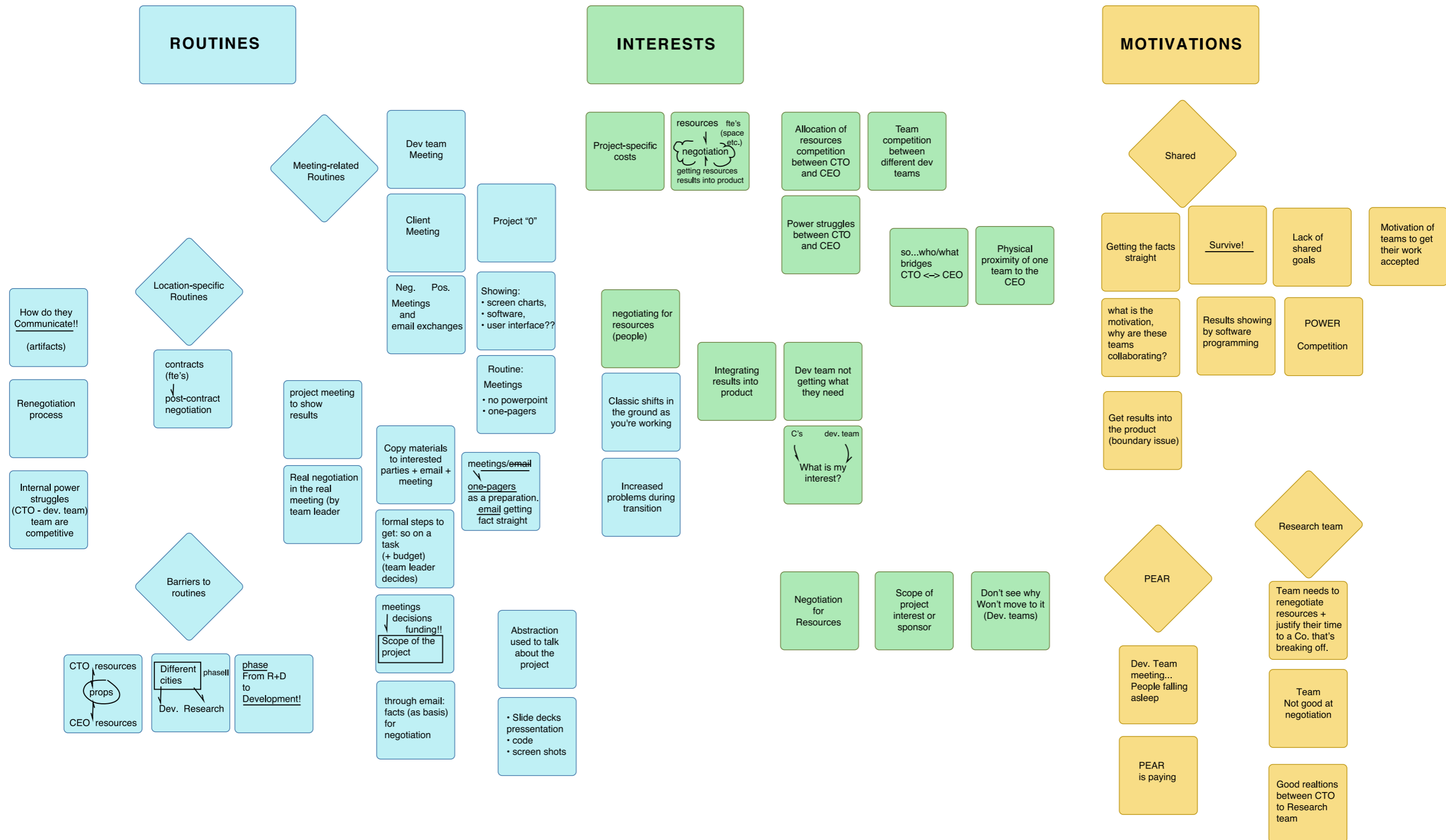
Figure A13. Consolidating theoretical models



During a discussion about properties and functions (Figure A16e) an idea was put forward that connections might be made between models related to boundary object theory and those related to design theory. This did not materialise, but a short list of things that needed to be considered when creating for a boundary approach did (Figure A16f), and this marked the beginning of what later emerged as a more robust framework on the last day of Boundary Object Workshop 2 (Figure A16g).

A6.2. Affinity diagram

Figure A14. Theoretical models: Innovation workshop 2

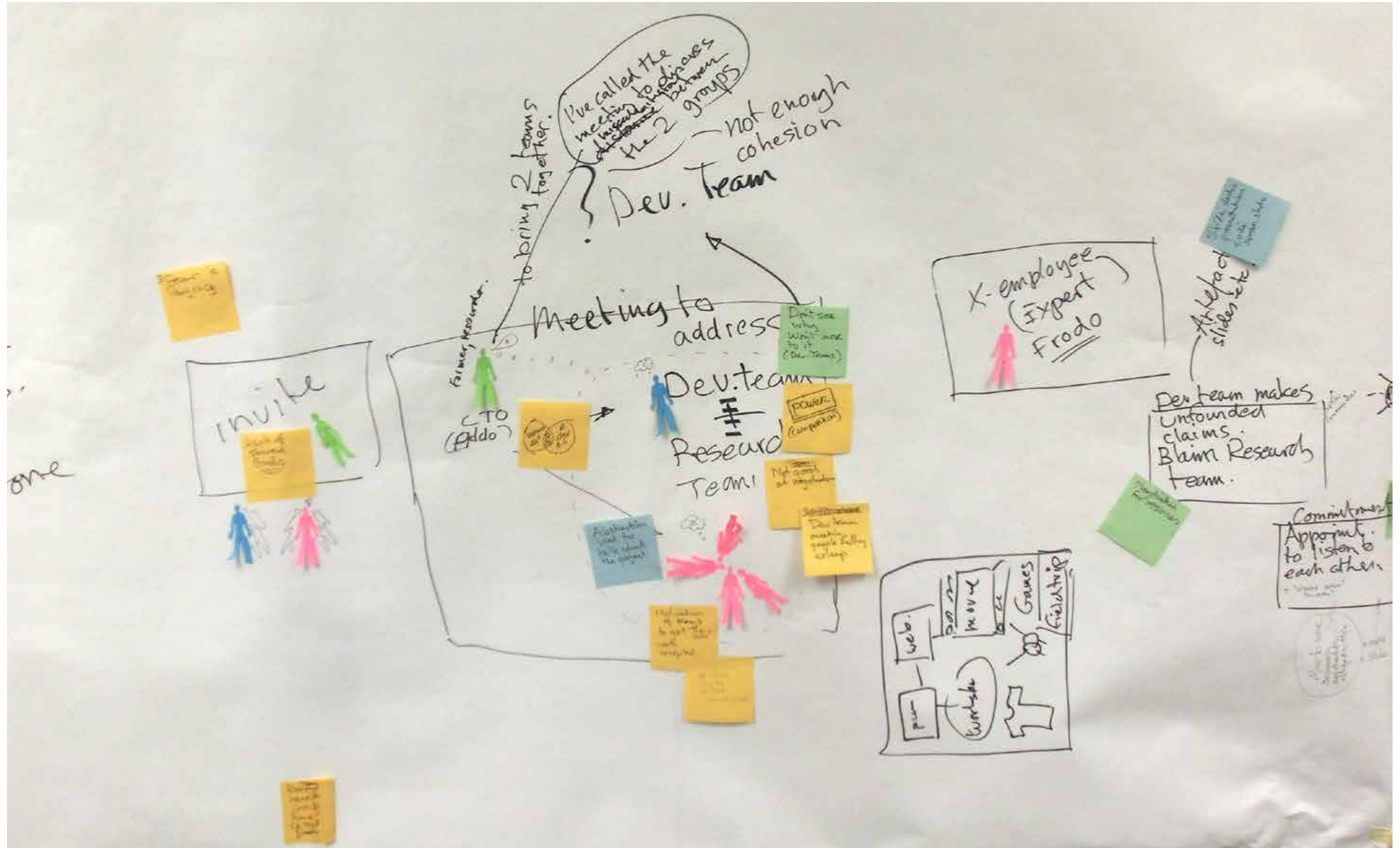


Affinity diagram showing 'routines', 'interests' and 'motivations' arranged in themes. The theme *routines* was divided into those that were meeting-related, those that were location-specific, and those which had experienced imposed barriers. The theme *interests*

was divided into those that sought power and control, those that sought autonomy, those that sought to be protective, and those concerned with competition. *Motivations* were grouped according to whether they were shared or specific to either Pear or the research team.

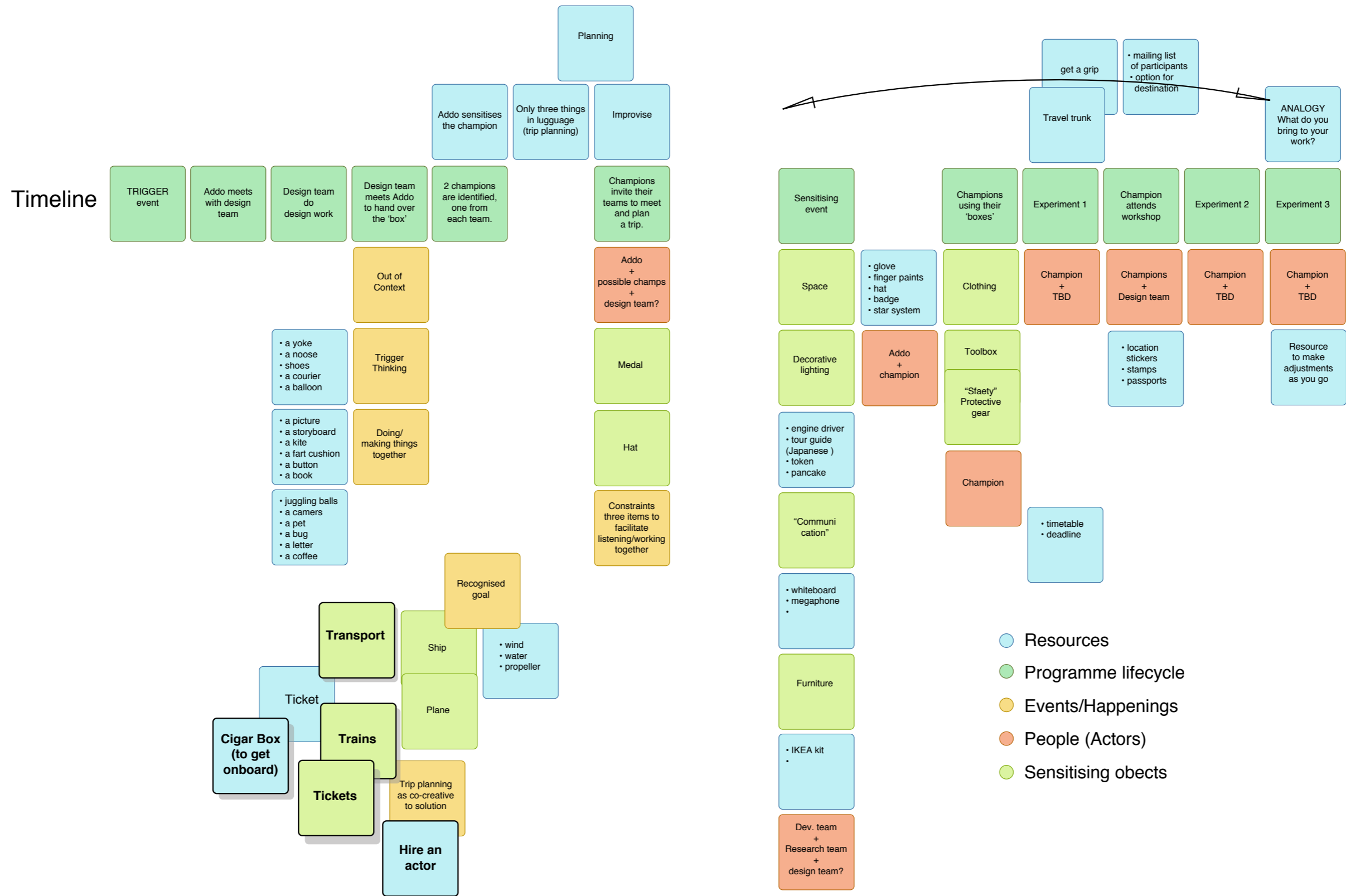
A6.3. Visual Plot-line: Boundary Object Workshop 2

Figure A15. Visual Plot-line



A6.4. Narrative 'blueprint'

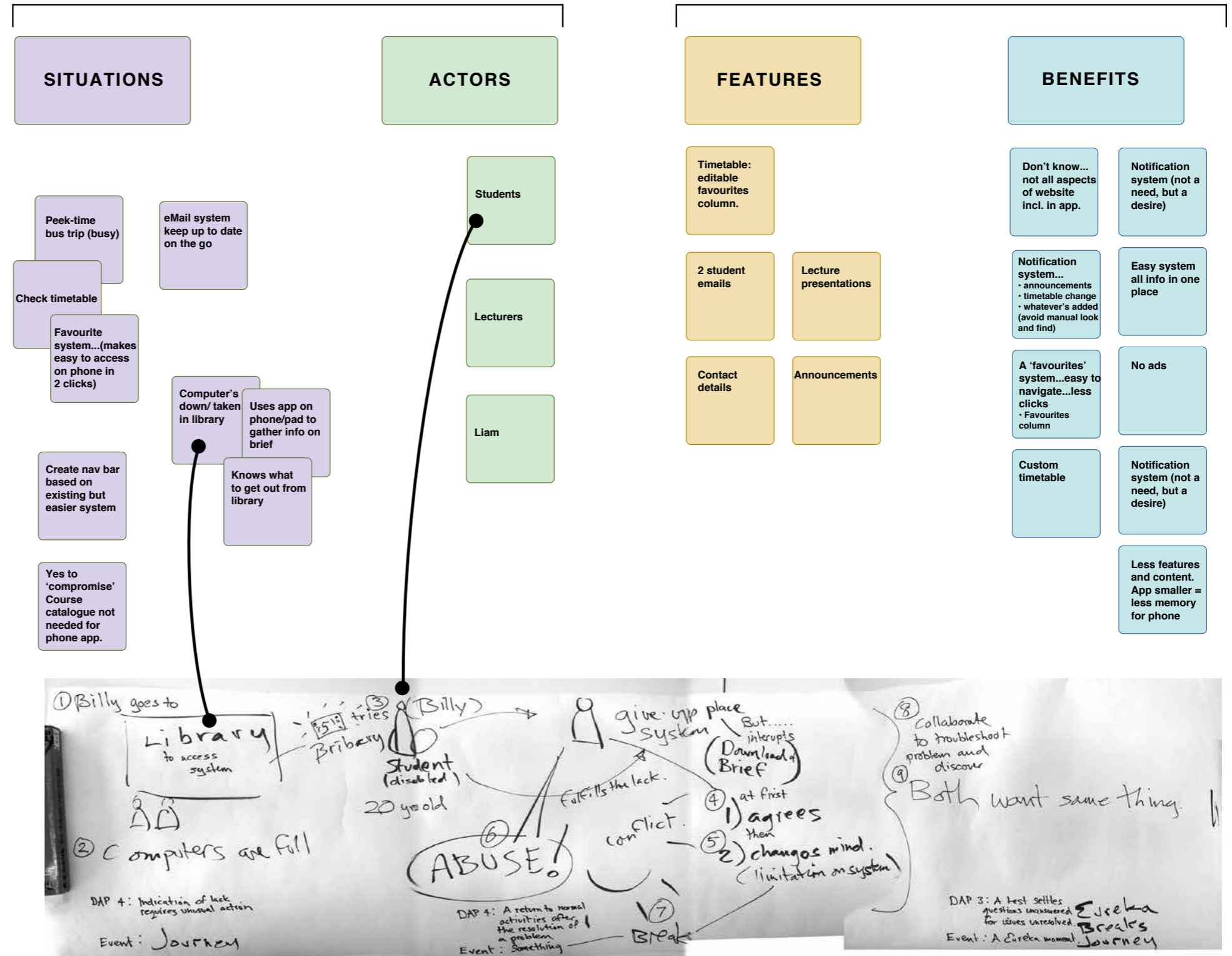
Figure A16. Narrative Blueprint



A7. Storioteering in Interaction Design

(2013.03-04)

Figure A17. Linking contextual themes to narrative events.



A8. Design worker personas

Figure A18. Database tool used to grade adopters of storioteering resources.

Job Type	Category	Evidence of use	Score	Take-up Probability scale
Interaction	Designer	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	11.0	5 Very High
User Experience	Designer	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	10.9	5 Very High
Human Factors	Engineer	<input type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	10.1	5 Very High
User	Researcher	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	10.1	5 Very High
Product	Manager	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	9.0	5 Very High
User Interface (Design)	Director	<input type="radio"/> Personas <input type="radio"/> Scenarios <input checked="" type="radio"/> Use cases	8.2	5 Very High
Usability (or information)	Architect	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	8.1	5 Very High
Program	Manager	<input checked="" type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	8.1	5 Very High
Senior Software Systems	Engineer	<input type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input checked="" type="radio"/> Use cases	6.8	4 High
Product Development	Manager	<input type="radio"/> Personas <input checked="" type="radio"/> Scenarios <input type="radio"/> Use cases	6.8	4 High
Applications	Engineer	<input type="radio"/> Personas <input type="radio"/> Scenarios <input checked="" type="radio"/> Use cases	6.6	3 Moderate
Product Design	Manager	<input type="radio"/> Personas <input type="radio"/> Scenarios <input type="radio"/> Use cases	6.2	3 Moderate
Research and Development	Manager	<input type="radio"/> Personas <input type="radio"/> Scenarios <input type="radio"/> Use cases	6.0	3 Moderate
Systems Analyst	Manager	<input type="radio"/> Personas <input type="radio"/> Scenarios <input type="radio"/> Use cases	5.6	3 Moderate
Marketing	Coordinator	<input type="radio"/> Personas <input type="radio"/> Scenarios <input type="radio"/> Use cases	5.4	3 Moderate

A9. Independent Use: Design Fiction Pilot study 1

A9.1. Use of StoryFrame to author a Seed Story

Figure A19. StoryFrame in use

Plot Theme	Narrative
F01: There is a lack or need	Freeman is having great difficulties at school and with his family.
F02: An agent recognises a lack or need.	Tien recognises Freeman's problem when he accidentally discovers one of Freeman's virtual programmes.
F03: Something threatens to or does prevent an agent from satisfying the lack or need.	Either a) Freeman doesn't know how to resolve these problems in the real world, he lacks skills, experience and guidance, or b) Tien is prevented from helping Freeman because he too doesn't know what to do.
F04: An agent seeks help to satisfy the lack or need.	Either a) Freeman turns to the VR gaming world as a means to understand what he can do, or b) Tien decides he must get help from (his parents? Teacher? Virtual friend?).
F05: An agent receives help (from an unexpected source).	Either, a) Freeman gets help from the teacher or Tien's dad, via Tien, or b) Tien gets help from his dad, who is much more empathetic than expected or a friend of teacher or an online gamer?
F06: An agent is required to complete a task or test to either, a) get the help, or b) satisfy the lack or need.	For Tien to help Freeman, he must go 'out of character' to be serious.
F07: An agent completes the task or test.	Tien overcomes his fear of being mature about the problem and playing a role he has tended to avoid.
F08: The lack or need is concluded with either positive or negative results.	Freeman receives some of the help he needs, but he too must take affirmative action to effect changes in his situation and in his own behaviour.
F09: A 'new order' is established. An agent's status is raised.	Both Tien and Freeman grow up a little.

Development of the 'Approaching Adulthood' design fiction using canonical Plot Themes. This approach was used in order to establish a well structured narrative.

A9.2. Seed Story: Pilot study 1

Figure A20. Approaching Adulthood seed story.

The Design Fiction

The year is 2062. Trades have been reduced to a small group of highly specialised individuals who troubleshoot extreme problems remotely using VR simulations. Tien, 16, wants to be like his Dad, an “A”-Grade plumber. He is lucky to have his own account on his Dad’s simulation system. He uses it for both recreation and school work. Tien only attends “real” school part-time. His best pal, Freeman is not so lucky. His Dad’s a lowly civil servant, so he has to attend school full-time. Freeman spends a lot of his free time over at Tien’s house, playing and doing homework using Tien’s account.

Tien finishes his video-geography lesson and logs into his personal account on the simulator system. There is a small flash and hesitation on start-up that Tien hasn’t noticed before. He reaches into the terminal to check out what might be causing the anomaly. Tien finds a rogue programme that has been inexpertly hidden on his account. His buddy, Freeman, is pretty much the only other user and this looks like his work. Tien tries a few standard approaches to hack into the program, and finally hits on the right one. He runs the programme.

Tien practically falls over when he sees what’s in the programme. Freeman has created a world that looks eerily like their neighbourhood, their school, their homes and their parents and families. But all the routines are wrong. People are programmed to act in aggressive ways. In this program there are weapons and people are using them. The event sequences break all the rules when it comes to gaming ethics.

“Wow! All this stuff was banned aeons ago. What’s Freeman up to?”

Then Tien sees himself in the simulation, and he doesn’t like what he sees.

“That is just totally illegal!”

That evening Freeman comes over to Tien’s house as usual to use Tien’s system for a homework assignment. When they finish their homework, Tien suggests they get out of the house and go to the GameMall, maybe meet up with some friends. When they get there, Freeman doesn’t want to go in. He heads off home leaving Tien wondering.

“Whatever’s eating him, clearly he’s working through some pretty heavy problems. I really need to find a way to help Freeman out without confronting him directly, which would cause him more pain and even embarrassment”

The next day, under the pretext of having a history assignment to complete, Tien poses a hypothetical question to his Dad about what people in the early 21st century did when they found someone abusing the online gaming rules. Tien’s dad suggests that he runs some simulated case studies, which he will send him links to. His mum thinks he’s up to something, but she’s not sure what.

After supper, Tien runs some of the cases that his dad sent him. He learns how online gaming programmes changed from being purely recreational to being educational and how more recently they’ve been used in medical diagnostics and remote therapy. He finds a programme that claims to treat youth anger. It gives him an idea.

Tien plants an intelligent script in Freeman’s programme that he hopes will help Freeman to work out his problems in a less violent way.

A few weeks later, Freeman and Tien visit the GamesMall and Freeman enjoys himself for the first time in ages playing with some kids from school that previously he would not go near. A short time later, Tien notices that Freeman deleted his programme.

“Way to go Freeman! Back in the real world”

Three years later, Tien and Freeman both graduate with honours and find work as remote engineers.

A9.3. Information Sheet: Pilot Study 1

Figure A21. What is Design Fiction?

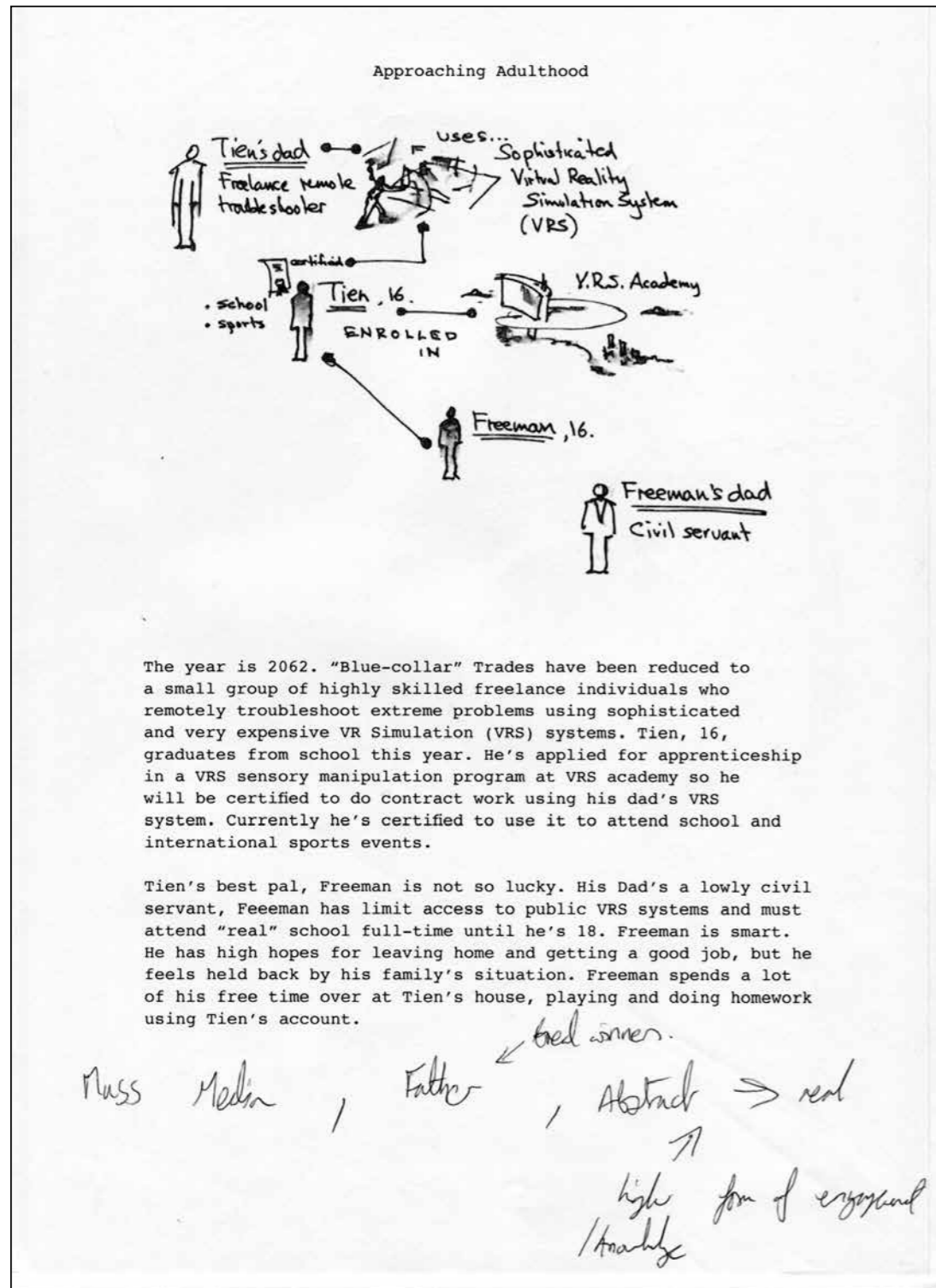
The collage illustrates the concept of Design Fiction through various examples:

- Science Fiction:** A scene from the movie *The Minority Report* showing a futuristic city with the text "science fiction" and "The year 2054".
- Technical Drawing:** A detailed technical drawing of a "COMMUNICATOR STANDARD FIELD EQUIPMENT ITEM" with specifications and a circuit diagram.
- Hand-drawn Diagram:** A hand-drawn diagram titled "design fiction" with handwritten notes and a small image of a glowing orb.
- References:** A reference to "Franz Joseph, 1975, Star Trek Star Fleet Technical Manual" with a URL.

A10. Design Fiction Pilot Study 2

A10.1. The backstory

Figure A22. Illustrated backstory: Approaching adulthood.



Appendix B: Scenarios and Stories

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B1. 'Taxi Required'

Elizabeth likes to meet people when she is out shopping. Elizabeth does not drive. She likes her independence and is happy to use public transport rather than relying on people to take her places. While she is happy to take the bus to the shops, she is often tired at the end of a shopping trip and finds it easier to get a taxi back with her shopping bags. However this can be a bit expensive.

So using her TV, Elizabeth looks up her shopping buddies on the shopping forum she has set up. She sends a message to her shopping buddies saying she would like to go to Tesco's on Wednesday afternoon and asking who would like to go at the same time, meet for a coffee in the cafe and share a taxi, when she has finished shopping. It will probably be about 2.00 o'clock. She gets a text message back to her mobile phone from her best friend saying she will join her and share the taxi back. Her friend prefers the phone to the TV as she is always out and about. It's great how she can send a message one way and get an answer back another way, it all depends on the preferences you have set up on the system.

When Elizabeth gets to Tesco's, she checks to see if any friends are in the shop on her GPS enabled phone. This shows her that two of her shopping buddies are already in the shop. Elizabeth knows they will get an alert to say she is in the area and begins her shopping looking forward to her coffee and a natter when she has finished.

B2. Sharon's visit to the science fiction club meeting

In Rosson and Carroll, 2003:13.

Sharon is a busy third-year psychology student at Virginia Tech. Even though she has a biology exam tomorrow morning, she has been looking forward to her science fiction club meeting for several days, so she decides to go and stay up late to study when she gets back. She remembers that they were planning to talk about Asimov's Robots and Empire, and she has a new theory about the timeline for first detection of the Zeroth Law.

The meeting is scheduled for 7pm at their usual room in the town library. But she is late getting back from dinner with her room-mate, so she misses her regular bus and arrives 15 minutes late. The meeting is already underway; she notes that they have a relatively small group tonight, but is happy to see Bill and Sara, who are the real experts on Asimov. She is even more delighted to see that these two are already having a heated discussion about the Zeroth Law. But she cannot immediately tell what points have been made, so she sits back a while to catch the drift of the conversation. At a break, Bill greets her and asks her what she thinks about Faucian's insight. She replies that she isn't sure about how central he is to the plot, but that she has a new theory about the timeline. They promise to hear her proposal in a few minutes, then resume the argument.

B3. 'Edinburgh' Scenarios

What follows is a series of scenarios that were authored during experiments in preparation for the Pilot study.

Teacher scenario 1a.

There's a meeting between two teachers in Burnley. They are relaxed. All their work is nicely under control (in sharp contrast to current teaching conditions) because a large burden has been taken from their shoulders by the emergence over the past few years of powerful web-based environments for learning and teaching.

The discussion represents a journey in time as they reminisce about the 'bad old days' when they were overworked, over-stressed, and far less effective teachers.

The conversation begins with a discussion of a student's work, and the confidence she is showing in her technical skills. The teachers have been working for a more open and supportive environment for students where they are encouraged to take risks and be creative. They both agree that would have never happened a decade ago. Back then, students did not take control of their own learning. One of the teachers announces that he is transferring to the Hong Kong office (parting company), the central location for the Global University.

Teacher scenario 1b

There's a meeting between two teachers in Burnley. They are relaxed. All their work is nicely under control (in sharp contrast to current teaching conditions) because a large burden has been taken from their shoulders by the emergence over the past few years of powerful web-based environments for learning and teaching.

The discussion represents a journey in time as they reminisce about the 'bad old days' when they were overworked, over-stressed, and far less effective teachers.

Teacher 1. *Sighs over his energy drink... 'We used to spend hours just teaching them how to use applications, find files and print out their work. All that's in the past'.*

Teacher 2. *Casually watching a wall-sized screen that visually displays his cohort of students learning activities 'Your right on that...hmm looks like those protocols you just loaded onto the system to encourage student creativity and risk taking are starting to have an effect already. 'Technical confidence' just spiked into record territory!'.*

Teacher 1. *Immodestly... 'Just a little app I've been messing about with in my spare time. We wouldn't want students losing interest in taking control of their own learning would we?'.*

Teacher 2. *'Right again. BTW, I'll be moving on to the Hong Kong office in the morning. They're short some TechnoTutors, and I have some skills in VR-based learning'.*

Teacher 1. *'Oh, right. Well, good luck with that. What was your name again?'*

Teacher Scenario 2: Back to the future

It's raining very hard. A male teacher is riding in a cab. Student assignments are strewn all over his lap and seat. He's on two phone calls at the same time, on his way home from school through a very high density downtown city street, let's say Toronto. Traffic is moving slowly. Many horns, sirens, bustle of cars and people on the sidewalk.

On one phone the teacher is talking to his wife who is wondering why he's late for their weekly visit to the garden plot that they keep. On the other is a parent trying to make a case for her child to be enrolled in the very popular course in home maintenance.

The teacher's wife tells him that they don't even have enough vegetables for tonight's supper. He gets into a very terse argument with her, claiming that there isn't enough

of anything, including hours in the day (time passes too quickly). He promises that he will be home in time to bring in the veggies (inserted after drawing the proverb). She hangs up. He turns his attention to the parent on the other line. Just as he's about to launch into a well-rehearsed speech about how, although there is plenty of physical classroom space to take more students into the course, there simply aren't enough electric kettles, sockets and thermostats to go around. Two things happen simultaneously; his cell phone battery dies, cutting off the call to the parent, and the traffic lights up ahead abruptly malfunction, causing a multi-car collision. The street is instantly transformed into a parking lot as people start abandoning their cars. Our teacher gets out of the cab, throws his arms up in the air and cusses the cutbacks.

B4. 'Holy Grail' Story

Once Upon a Tyne, ADQ, a two-person design studio founded by Mel and Asier in a home office in Whitley Bay is facing a defining moment in their plans to maintain a steady flow of business and modest growth. The studio has weathered some tough times by establishing good working relationships with individuals and groups who have complementary skills and expertise that they can draw-on when necessary, and by being selective in the size and kind of work they take on. The economy in the NE has been in a state of slow decline for almost a decade. Everyone has adjusted to a new reality. In this environment, along with science and technology, design is increasingly seen as an essential ingredient in initiatives that aim to improve quality of life. 'Accountability' is the buzz word of the day. Design work is being contracted but there are high levels of client concern over the quality and value of work. Small design agencies face intense competition for work and, due to the increased complexity of design work and the culture of accountability, risks of contract failure are high.

ADQ is in negotiations over a proposal for a contract to design an NHS public health awareness campaign that targets players and spectators at sports events. It's a bold government initiative that aims to communicate health, fitness and dietary information on a person-to-person basis via multiple interactive media. At ADQ, 'warning bells' go off over the conditions of the contract. This may be caused by:

- a) a low cap on the client budget,
- b) an unrealistic deadline,
- c) a vaguely outlined brief, i.e., uncertainty over requirements and scope,
- d) ADQ's concern over whether there is a good match between the work and their areas of expertise.
- e) ADQ's doubt about the capacity of their network of associates to handle the work.

For ADQ, it appears to be a high-risk venture. The contract becomes a point of contention since it would require ADQ to dedicate all their resources to it, putting at risk their ability to service clients in other sectors (publishing, university). The contract would also break with the companies strategic plan to grow in small and steady steps. An argument is put forward that the contract would push them more firmly in the direction of being health design experts, and, if successful, establish them as being able to deliver large-scale, turnkey design solutions. It would also inject a considerable amount of capital into the business that would help them bridge gaps in the near-future workflow.

In light of the uncertainties still plaguing the economy in general and the health of the NE in particular, ADQ resolves to take on the work. A few weeks into the contract the client begins to express doubts about the practicality of the designs and the ability of ADQ to implement them. By now, ADQ has a lot at stake in the work. They have a high level of dependency on outsourced competencies and they increasingly see this work as a test case for whether they and their associates can handle this type of work and take more on in the future.

ADQ has proposed some innovative concepts. The client requires incremental proof as concepts take shape. They are also looking for proof of ADQ's ability to deliver a complete turnkey solution. ADQ allowed for such an eventuality in the terms of the contract and so are prepared to 'go the extra mile' and prototype or user test some of their most novel designs in a bid to put these doubts to rest. ADQ has also fallen in love with the design concepts and now want to see them through. The care that they took in planning the work and balancing their resources allows them to do this.

B5. Boundary Object Workshop 1: illustrated transcript

Michael

Michael talks to the observations that the team made about boundary objects.

Handwritten notes:
 EVAL
 STAND ALONE / FACILITATED
 MANIPULATION / AGENCY
 EVOLVABILITY / FIXED / CONTEXT
 UNIFIED / MULTIPLE PERCEPTION USE
 GOAL / AIN
 PURPOSE

“What we are actually after and what we are looking at... we started to set out where the interlaces are, what are the common approaches, what worked, what didn't work. We talked about...these objects, be it digital object, be it tangible objects...there are some that stand-alone...and work for themselves, but in most cases as we heard from Lilian, talking about the videos and how they evolved into something... they need to be facilitated, then what you hinted at Jan, apparently these objects have a certain agency to them, they are never just there...being unused and working by themselves. But they always act in a certain process and they might change the process or alter the process but they do something to the way how things are done in the approach...and...the type of the object, the artefact changes that process. Of course.. we thought that some objects evolve into something, like err...we didn't get to that point but, like there was this sketch in your research where people pick that sketch up but kind of...no nnnn.. that was the scenario report,

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where they kind of picked it up and kind of talked it into a scenario. They further the scenario, whereas others seem to be fixed, they don't change, they don't evolve over time. Whereas others kind of change how they are, what they look like, what they do to people and how they are perceived. And of course, I think this is something that you hinted at, we realised that there is

Handwritten note: “...a sketching point for...”
 always a context in which these objects act or are perceived, and apparently the context is quite important in how things are done, and how they operate.”

“And there's an attribute to these objects, we think, that, they can either be multiple or unified, which means that different people perceive one object differently, which will be a multiple perception, if that's an expression that's understandable, or there's something that very unified, so everybody, more or less, understands the same thing.

And its the same thing with use, so can be used in different ways, can be used in different ways, it can be used in one way, it can be understood in one way...and of course...and this is actually something that we realised quite late, of course these things have a purpose, and that brought us to that side over here, and these boundary objects have a goal, they have a purpose, they are trying to achieve something, and I think this is what the starting point is for design, the way we get into the state where we actually want to design something actively.”

Aaron

Handwritten note: “we realised that...”
 Then we realised that everything that we'd already talked about was all about evaluation, in fact all the literature always has a post hoc analysis, an evaluation of the boundary object.

But what we really want to know is, **can you design one?** how do you design one? What are the principles of designing one?

Michael

I believe, one can design one. But then we just realised that within the discussion of just half an hour or so. And basically I think that now we know this is a design situation. We've got artefacts involved, we've got stakeholders involved, we've got purpose involved and of course we've got evaluation involved and we're getting to the point where



20:30 now we just need to get to it and do things and not just theorise about it. So we try to understand what people did when they were actually faced with the problem of

having to design a boundary object, eh, or a resource, whatever you might call it...so of course sometimes there was a problem statement, sometimes there were... just the purpose where people would say we have to do something about that, where a problem was not that obvious, then people apparently started to assess the current situation, there were some assumption views of this future object which is going to be build and cause some assumption about stakeholders but basically this is representing a complex design situation. And this is as far as we got.

P.J.

My impression is that this becomes even more theoretical, just as you want to step away from theory. Let me challenge this by saying I don't believe anyone ever has the aim of designing a boundary object. They may have the aim of creating artefacts to support, ehrr, probably them getting their message across to parties they have to work with who have different background.

Lilian

“That's exactly what we meant with the workshop. No one ever did that.”

Fredo

“What?”

Lilian

“Designing a boundary object on purpose.”

Michael

Handwritten note: “...think it like...”
 “No! I think people do it all the time.”

Lilian

“They do it all the time, but they're just not aware.”

Michael

“They're just not classifying it as designing a boundary

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object.”

Fredo

“No because they don't know...to do it...all the time”

Malcolm

“So the question is, can you know.. whether..you can design a successful boundary object?”

Fredo

“So boundary objects is.. is picking on sensii...is related to intentionality. So what is the intentionality of bringing some kind of message from “a” to “b”? Some kind of element from “a” to “b” and then...hey, this is not working and we need something in between.”

Stella

“Do you mean the intention or the “intentionality?”

Fredo

“Yeh..” [comment trails off]

P.J.

“What do we mean by ‘designing’ a boundary object?” I can understand people **creating** a boundary object, like...when I invite you to my home I will **create** a meal.

I think the word is very heavy... to put into this purpose.”

Fredo

“But, created on purpose, that's maybe...”

Malcolm

“Purposefully created”

P.J.

“Created on purpose. I think that is probably what you might mean, but, if you say designing a boundary object, that recalls to me the suggestion that you're going to make programs of environments of what things such as boundary objects should be..in general.”

Ingrid

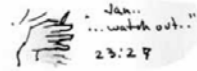
Yeh. But we discussed this level, like, somebody can construct it if you have the right ingredients. Can you really, well create it? Design it by yourself? What do you do maybe if your an experience designer?

We discussed this at various levels.”



P.J.

“OK. But I would watch out with the word “design” as the activity because it already means so many confusing things.”



Fredo

“Unless you take a broad understanding of it. By the way, if you do design the meal as a boundary object you put too much pepper in it and see what happens... ehioewadooo... Well, that was the purpose, I wanted to facilitate something. And that’s exactly what I think that boundary objects do, they facilitate some kind of arousal. And knowing what kind of arousal you’re looking for... makes, if you... it’s a process of creating or designing..”

Malcolm

“Conscription devices”

Fredo

“Yes.”

Stella

“I think that’s a good question. Do they facilitate an arousal or do they facilitate something else? Do they facilitate an understanding? Which is a more complex thing.”

Fredo

“So either you want to create an understanding on the other side...”

Michael

“...or an arousal.”

Fredo

“Yeh, yeh. So it brings it back to intervention literature

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where, where, you could see if you would depend(?) an ongoing process, where you do something in between to get sort of behaviour after the intervention. That could be understanding, that could be a routine way of working, whatever..right? That’s how I look upon it.”

P.J.

“And it’s not necessarily problematic. I think there are many things which we could regard as boundary objects which work very well: our shared diaries; our system of getting to this meeting all of us; maybe the indicator lights on the cars that are red. We have a shared understanding if I turn on the lights, that I’m going to turn right. Would you call that

a boundary object? Well yeh, but that’s shared meaning in general but that’s not an object made for the purpose of globalizing communication within the design process.”

Ingrid

“Yeh but also it’s not really – it’s a shared understanding – but it’s not really ‘creating’ a shared understanding.”

Stella

“It just appears to share.”

Malcolm

“It facilitates a shared understanding.”

Stella

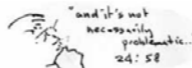
“Well it appears to facilitate a shared understanding that’s already there.”

Ingrid

“You’re not learning from each other, you’re just... sharing something.”

P.J.

“Is the learning a necessary thing of things being the boundary object, or is that learning maybe something which is important in the context where..that we’re going to study? And we’re saying that we’re not going to study all occurrences that can be made by you and them(?)”



Ingrid

“If you want to cross a boundary and you want to have shared understanding then..it’s most likely then....”

Stella

“So there’s a difference between routine interactions, like the indicator on the light, that’s a routine interaction, and somebody is taught to drive cars, so they learn to function in this routineor they don’t learn to drive a car, they still learn it...this routine...that’s very dangerous, he he he... So they also participate in this routine, but there’s a difference between this routine understandings and the learnings, the new understandings. And there’s difference..there’s very much being studied by different people...”

Aaron

“You might want to draw it..you seem to be drawing with your hands.”



Stella

“Yeh, I always draw but that (the wall) is a bit too confronting. So, there’s people studying routines here, for example in their practices. But I’m much more interested in the situation of perception in situated action, so where you have the opportunity for learning where you have the uncertainty and you have to do something with it..I think there’s certainly a difference. If you exclude the routine things you have only made one decision I would say.”

Lilian

“But we’re not excluding”

P.J.



“Is a project proposal a routine thing? I think that’s clearly a boundary object. It needs to be looked at and understood by all parties; by the sponsoring party, by their bookkeeper, by the content party, by the legal people, and it is a step into further development..and probably teaches a number of people that are involved what better was the plan... So there we have something which is probably an accepted format... which serve some people better than others.”



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Malcolm



“Is a book a boundary object, because it’s situated between an author and a reader? Is literature a boundary object? Is language a boundary object? I mean, where do

we end?”

Fredo

“Yeh, that’s the problem.”

Lilian

“what’s the boundary you’re talking about?”

Malcolm

“Hm. Well....”

P.J.

“I think for a project proposal, it’s quite clear what the boundary is because it’s the stakeholder’s signatures that will end up on the proposal.”

Malcolm

“And with a book it’s between a body of authors and a body of readers...”

Lilian

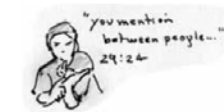
“But the writer and the reader don’t have to...”

Malcolm

“Still, it acts to connect those two communities, with a shared understanding. So what’s the definition of a boundary object? What’s **our** definition of a boundary object?”

Stella

“Meas peripheral.., and.. Can somebody explain to me what a boundary is? Because, is it...you mention between people, you mention between places, you mention between (something else?).”



Lilian

“Yeh. Most of the time we’re talking about social

4

B6. War of the Ghosts

One night two young men from Egulac went down to the river to hunt seals and while they were there it became foggy and calm. Then they heard war-cries, and they thought: "Maybe this is a war-party". They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles, and saw one canoe coming up to them. There were five men in the canoe, and they said:

"What do you think? We wish to take you along. We are going up the river to make war on the people."

One of the young men said, "I have no arrows."

"Arrows are in the canoe," they said.

"I will not go along. I might be killed. My relatives do not know where I have gone. But you," he said, turning to the other, "may go with them."

So one of the young men went, but the other returned home.

And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water and they began to fight, and many were killed. But presently the young man heard one of the warriors say, "Quick, let us go home: that Indian has been hit." Now he thought: "Oh, they are ghosts." He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac and the young man went ashore to his house and made a fire. And he told everybody and said: "Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick."

He told it all, and then he became quiet. When the sun rose he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried.

*He was dead.
(Bartlett, 1932)*

B7. P3's Scenario

Addo recognises that there is a lack of coordinated effort between the development team and the research team and decides to try a different approach to resolve it ('An indication of a lack requires unusual action'). Members of the development team are in a meeting with Addo. Addo is trying to convince them to accept the value of a new offering from the research team. Five members of the development team are already asleep. On Addo's cue, a member of the research team, dressed like Frodo from Lord of the Rings, sweeps into the room with the research team's package ('Help is received from an unexpected source to attain something desired'). The package features a Lego kit. The developer that is still awake is immediately suspicious of Frodo's claims for the value of the Lego kit ('Unfounded claims are made by an agent of dubious reputation'). But then, when all the other developers wake up and declare their admiration for the Lord of the Rings, they say 'If Frodo is going to present that to me, then I think we should pursue it'. This is the story'.

B8. VIVIEN II: The Design Fiction

VIVIEN II

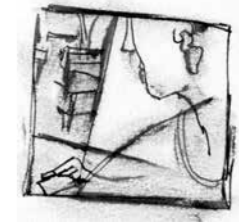
The year is 2040.

Caring for the aged has become big business. There have been considerable advancements in medicine, drugs, and assistive technologies. Genetic profiling is a routine procedure at the age of fifty. Some forms of euthanasia are now legal, but only in some countries. VEATec, an India-based corporation with treatment centres in Tibet, offers a package of highly personalized Inference Extraction Services called VIVIEN (Virtual Information Vault and Inference Extraction Network). It has carved out a niche market by offering a bereavement package with both identity preservation and virtual after-presence (also known as VEA or 'Virtual Ever After'). But, there is growing opposition to these types of services because they operate through loopholes in international law and cater to the needs of a privileged few at a time when the needs of the many are being threatened. Lobby groups and public protests are starting to sway public opinion against them and could threaten to close them down.

SCENE 1

20:36 Sunday, April 1. Interior VEATec cryogenics treatment centre 3, Tibet. Sterile brightly lit corridors.

Clients choose when and how they wish to make the transformation to virtual ever after. Iris, dressed in futuristic clubbing clothes, inserts a white card into a slot in one of the pedestals placed at intervals down the corridor. An otherwise invisible door slides open revealing the interior of a sombre medieval church with dark oak pews and flickering candle lit aisles.



Iris. Nnnnnnaa...that's not quite right!

Iris walks down the corridor to the next pedestal. A door opens onto a wild, strobe-lit party with crowds of people dancing to loud, throbbing music.

Iris (thinking). This is more like it! Just what the doctor ordered...a good place to get distracted. The transformation portal could be offered anywhere at any time. Might as well enjoy the wait...and who knows...perhaps a chance encounter?

Iris makes her way to the bar and orders an exotic highball. After the fourth drink she is feeling pretty mellow. A well-dressed man, considerably younger than Iris, initiates a conversation. After a few minutes he asks Iris if she would like to dance.

VIVIEN: REQUEST SIGNATURE

Well-dressed man. Will you take my hand Iris?

Iris cocks an eye at the man. She had not told him her name. She hesitates for a moment, then presses her hand into his.

VIVIEN: IDENTITY CONFIRMED. CASE 35077954. IRIS CHICHLOWSKI. UK citizen. 57.

Iris. There. I suppose it's done.

VIVIEN: ALLOCATE SERVER SPACE. BEGIN DATA COMPILATION

Iris comforts herself with the thought that she has done all she can for John. Now it's time to take control of her own future.

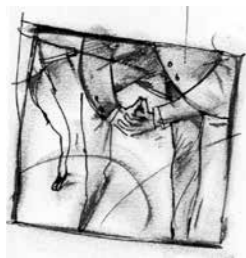
VIVIEN: INITIATE CARE

SCENE 2

Six months earlier.

14:50, Tuesday, October 4, 2039. Interior of John and Iris' home, immersive communications room. John and Iris seated before hologram of their (remote) medical doctor. As the doctor speaks, Iris and John can interact with data displayed on the walls and furniture.

Doctor: Here are the results of your genetic profiles. Your profile, John, shows that you have a predisposition to early onset Alzheimer's disease. But, you appear to be experiencing no symptoms, so we can be optimistic there.



For you, Iris, the results, I'm afraid, are more worrying. They show that what we thought was a mild case of osteoarthritis, the soreness you've been feeling in your hips and knees (x-rays of these appear on the wall), is in fact rheumatoid arthritis. It is progressing surprisingly quickly.

Iris. Thank you doctor. Pause interview.

The interactive systems freeze.

John. Iris! What does this mean?

In her position as senior immunologist at the Weathermore Institute of Molecular Medicine, Iris is well aware of the condition and of how, in her family, it has caused severe debilitation and premature death. She tended her mother through the final agonising stages of rheumatoid arthritis. She is also well aware of John's dependency on her. If he does contract Alzheimer's disease his dependency will grow.

John and Iris have a long and serious discussion about their future. Periodically they consult their personal assistant, which connects them to medical, financial, legal and social records. They receive live advice from their doctor, investment advisor and lawyer as well as family members and friends.

Their doctor offers some hope. A new drug treatment program is undergoing medical trials and may soon be licensed. At £10,000/month though, it's an expensive long-shot. They are about to give up hope when they receive a call from a long-time friend and colleague of Iris', Jasmine Gharra. She confides that, although they are illegal in the UK, she and her husband used an Inference Extraction Service (IES) to help them cope when he became ill and finally passed away. This option appears to offer Iris the hope of a life beyond pain, disease and death, a better chance for a cure and a way for her to continue making an intellectual contribution to the field of immunology. Iris and John compare a number of Inference Extraction Services and weigh their options.

Iris. VEATec's 'VIVIEN' package may offer us the best chance to get the kind of future we hope for.

John. They claim to get the best results when you are in good health. With this package

your intellectual after-presence would be a considerable asset to them. They would look after you and the royalties it generates for us would reduce the cost of the program. Your *Virtual Ever After* presence would act on your behalf...

Iris....to make sure that you get the best possible care.

John. If by a miracle there is a cure, there's some money left over, I'm still alive and, oh yes, I haven't lost all my marbles, we may yet finish the extension on the house and live out our lives in something like peaceful retirement.

long silence.....

John....on reflection, I think I prefer the new drug option.

Iris (visibly wilting). It's settled then, we'll go with VIVIEN.

Scene 3

13:30 Friday, March 30. London Heathrow Airport, passenger departure lounge.

John gives Iris one last hug and waves to her as she enters the security gate. The doors close behind Iris and she suddenly feels very much alone. On the flight she begins to have doubts about what she is about to do.

Scene 4

15:20 Saturday, March 31. Lhasa Gonggar Airport, Tibet.

Passengers arrive at the airport on special flights. As they exit the airport building a crowd of protesters with placards is waiting. A huge floating billboard showing a close up of a doctor holding a pill

proclaims "Why buy months when you can buy eternity?". Protesters are grappling with the billboard control panel to pull it down while others wave placards, shout slogans and try to prevent visitors from boarding buses. Iris is forcefully jostled. But, she has overcome all her doubts and takes this opportunity to give as good as she gets. She slaps a bearded 'lefty' in the mouth and a free-for-all brawl breaks out. Iris manages to get on the bus. The doors close and with the crowd rocking the bus from side to side and pelting it with rocks it leaves the airport.

Scene 5

2 years later. John has struggled to live with IRIS, the Virtual Ever After echo of the real Iris. After Iris left, John found that being able to have her presence on his personal assistant, which runs the household systems and accompanies him when he travels, was both a comfort and a help. Now it reminds him of everything that has changed. He has taken to turning it off.

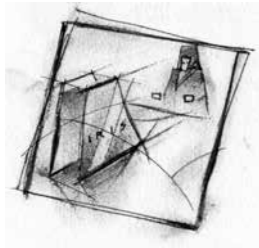


For a while, John is also comforted by reflections of iris' presence during quiet moments, such as at night when he reaches for her pillow, or on Sunday afternoons when he takes a stroll that they both enjoyed. But now the reflections have turned to shadows that bring with them an even deeper sense of loss, and more frequently, regret.

John and Iris never had children. Iris's career took precedence, even over his own. Thanks to the wonders of modern science, which has achieved separation of the intellect from an otherwise cryogenically

preserved body, John occasionally sees Iris' work cited in international news items or special reports on the critical state of world epidemics and the science of immunology.

John is lonely. But, at the same time, he is feeling a new sense of independence. He has kept IRIS and the Inference Extraction Service secret from everyone, including family members. But now he would like to bequeath some of his personal memories, along with those shared with Iris, to his nieces and nephews, and particularly his godson, Hercule, to whom he has become attached. The problem is, every time he starts to write or dictate his thoughts on the matter, or to speak with someone about setting it up, the personal assistant claims to encounter a system malfunction. John becomes suspicious of IRIS.



SCENE 6

7 years after Iris' transformation. John has learned to avoid evoking IRIS during moments of reflection. He no longer grieves for the loss of Iris. Rather, his need of IRIS has been to assist his failing memory and to act as a co-signatory in their joint legal and financial affairs. These are primarily concerned with preserving the VIVIEN account. John has given up trying to bequeath anything to his nieces, nephews and godson.



When Jasmine Gharra becomes a regular visitor and their friendship turns to intimacy, for the first time in many years John feels wanted for who he really is. But communications between them break down irreparably over a series of inexplicable typos, bogus appointments and other personal assistant system errors.

The value of Iris' professional intellect and experience on the open market has grown considerably due to increased threats of global epidemics and needs for advanced immunisation programs. VEATec own usage rights to Iris' intellectual capacity (although they pay a royalty to her heirs and estate). They are at liberty to exploit the opportunity by allocating more power and bandwidth to Iris' intellectual feed. With every increase her ability to influence IRIS, her virtual ever after, grows.

SCENE 7

10 years after Iris' transformation. John has been diagnosed with early onset Alzheimer's disease. IRIS is instrumental in helping to arrange their finances and set up a program of care that includes providing power of attorney should John lose his mental faculties.

Small epidemics break out in isolated regions of the third-world. They don't yet threaten the developed world, but funding is increased to support contingency measures, including immunisation plans. Protests against unlawful euthanasia become more militant.

SCENE 8

13 years after Iris' transformation. A small band of militant protestors manage to infiltrate VEATec's high security cryogenic systems. They are apprehended, but an unknown amount of damage has been done.

John now has a permanent caregiver. His long-term memory has deteriorated and he's prone to wild mood swings and sudden bursts of aggression. He spends hours simply staring blankly at a flickering screen.

The caregiver is unsympathetic.

VIVIEN/Iris: REQUEST SIGNATURE

IRIS. It won't be much longer now John. I will stay with you to the end.

The caregiver produces a legal document and guides John's hand to sign it.



VIVIEN/Iris: IDENTITY CONFIRMED. INITIATE PROTOCOL CASE:35077954 ALPHA ALPHA.

John starts to shake and lose control.

John. IIRISSSSS...goddamit....Why why why why why...

The Caregiver gives him an injection and he slumps back into silent numbness.

SCENE 9

Meanwhile, at VEATec Tibetan treatment centre, Iris begins to

recover consciousness. Attending nurses and doctors, gowned and with masked faces, assist her as she comes round and tries to sit up. Iris goes into convulsions and she is restrained and given an injection.

SCENE 10

A few hours later. Darkened room. Iris sitting in a wheelchair in front of a mirrored dresser. A towel over her head.

Iris. So, my plan worked. John is pleasantly gaga. IRIS has all the burden of looking after him until he croaks (which can't be too long now). While I, I am thirteen years younger than I would have otherwise been and the soon-to-be only heir to our little estate. I can start a new life anywhere I feel like and with whomever I choose. I fooled them all with that faked DNA sample and rheumatoid arthritis condition.

Painfully Iris leans closer to the mirror. Slowly she pulls back the towel.

Iris. Let's see just how well preserved I am.....
AAAAAAAAAHHHHHHHHHHHHH!!!!!!!

SCENE 11

Somewhere deep inside VEATec HQ in a plush executive consulting room, twelve smartly dressed executives sit around a large table.

Head of IT. The security breach must have damaged the cryogenic systems control units in treatment centre 3. Looks like it threw the polarity of the units completely into reverse. We're also getting weird readouts from the Virtual Information Vault. Some, if not all, of the *Ever Afters* may be down.

Chief medical consultant.

For clients stored in treatment centre 3 the results are catastrophic. There's widespread tissue damage and skeletal malformation. They are alive, but most are in critical condition and may never come off life support.

Legal advisor. There will be law suits. We'll have to make some sizable settlements. When word of this gets out our stock will be in the toilet.

SCENE 12

02:46, December 14, 2056. Palliative care resident bedroom, interior.

A soft knock on the door.

John is asleep. Oxygen gauges flicker and the heart monitor shows increased activity. John stirs a little on his pillow.

Another soft knock on the door.

John. Is that you Iris?

The door slowly slides open.

John. Iris?

Iris. Hello John.

John. Iris? Is that really you?

Iris. Yes John. It's really me. How are you?

Silence.

John hears Iris move over to the bed. He feels the air in the room move, then a slight pressure on the bed covers near his hand.

There is a long silence. John has lost his sight and can now barely move.

John. You're not THAT IRIS are you?

Iris. No John. It's really me.

John feels something like a hand cupped in his.

Iris. I am really here and I will stay with you.

Appendix C: Analysis

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C1. Mixed-methods used throughout the research

Table C1. Mixed methods

	Study title	Rationale/Aims	Research Objective	Type of data	Type of analysis
1	Critical-reflective studies and experiments.				
	Are scenarios narratives?	Test the claim that scenarios are narratives. Existing narrative theory is applied to a corpus.	Qualitative - Narrative Properties. (literal reading of texts).	Qualitative (codes) Quantitative (Numeric values) of narrative elements.	Qualitative - content analysis
	Do scenarios constitute a narrative genre?	To discover whether scenarios can be classed a narrative genre.	Test hypothesis that scenarios have a unique set of Plot Themes. Quantitative - average of functions (Formalist literal reading)	Qualitative	Quantitative - number of scenarios that conform to the same set of functions.
	Transposition studies	To explore ways to incrementally transpose textual scenarios into storyboards.	Qualitative - How transposition can be achieved. (Formalist/narratological. Literal reading, Interpretive)	Qualitative	Qualitative
	Card studies	To interrogate the adaptation of storytelling card sets for design.	Qualitative - To see if new designs work	Qualitative	Qualitative
2	'3-Narratives'	To test the efficacy of novel narrative resources.	Qualitative	Qualitative	Quantitative - number of students who excelled. Qualitative - Quality of work
3	Pilot study	To observe and reflect on the scenario authorship cycle end-to-end.	Qualitative - Answer the question, Do resource help?	Qualitative	Qualitative (Reflexive reading of text)
4	Innovation workshops	To test the usefulness and efficacy of resource-based design approaches in a 'real world' setting.	Qualitative - Is it possible to create for a boundary intervention.	Qualitative	Qualitative (Reflexive reading of text) Quantitative measure of attention.
6	Diffusion of innovation Study	Promote the use of storienteering resources.	Measure interest/takeup.	Quantitative (Number of hits and downloads)	
7	Design Fiction workshops	Interrogate independent use of narrative resources.	Qualitative - Adaptation of resources	Qualitative	Qualitative (Reflexive reading of text) Quantitative - measure of attention.

C2. Adaptation of Once Upon a Time Cards

A table was used to systematically translate terms and phrases from the original cards to those considered appropriate for design settings (see; Appendix A4 'Card set experiments'). The table enables comparisons to be made between terms and phrases listed in adjacent columns.

Table C2. Transformation of card set terminology.

'Once Upon s Time'	Design Story Work
Her sorrow came to an end and her joy began..	Disappointment is replaced by satisfaction
She never let it out of her sight again	From then on, it was kept in plain sight
And in the course of time they became king and queen	In due course, it was found that they work well together
So they escaped their captors and fled home..So the spell was broken and they were free	And it made everything possible
He picked up his weapon and went on his way.	Pick up and move on
And the kingdom rejoiced at the end of the tyrant's reign.	Everyone is relieved to see an end to it
So they returned it to its original owner	Rightful ownership is reestablished
So the village was restored to prosperity	Something broken is restored
So the evil-doers were thrown down the well.	The problem is 'put to rest'
And so the prophecy had been fulfilled.	It turned out as anticipated
But no matter how hard they searched they were never able to find it again.	A thing once found, cannot be found again
So she revealed her true identity and they were married.	Its true purpose becomes apparent
So the rightful ruler was placed once more on the throne.	A rightful position is regained.
And never as long as she lived could it be removed	The effect is permanent
It fit perfectly	A perfect fit
And to this day no one knows where she ran to	No-one knows where it has gone
And the king was delighted with such an unusual gift	An unusual thing is well received
So he told her he was the prince and they lived happily ever after.	A thing's true nature becomes apparent, making everything OK
She always wore it to help remind her	A memento is kept close by
Everything was restored to its former glory	Everything is put back the way it was
They looked after it until she was old enough.	A thing is taken into care until its owner can retrieve it
He saw the error of his ways and repented.	An error is acknowledged
So the Queen gave them the prize as she had promised.	A promise is kept
So they promised never to fight again.	A disagreement is resolved
With the rival dead they could get married at last.	A problem is resolved, stability returns.
And the parents were reunited with their long-lost child.	People are reunited after a long separation
So they changed places and everything was back to normal.	Positions are reversed and everything returns to the way it was
But it had vanished as mysteriously as it had appeared	A thing disappears as mysteriously as it appeared
So it was transformed into human form.	So it reverted to the way it was
Which is how the kingdom got its name.	Which is how it got its name
And when they died they passed it on to their children	Something is passed on to a successor.
And (s)he was reunited with his family	Reunion with a community
But she still visited them from time to time.	Occasionally, it is revisited
'Once Upon s Time'	Design Story Work
And the flames rose higher and the evil place was destroyed.	The cause of the problem is eliminated
As dawn broke they could see it was perfect.	Once it was brought out into the open, everything looked OK
And there they sit to this very day.	It is still there to this day
So the king relented and the two were married.	Removal of the impediment restores things
And he listened to his mother's advice from then on.	A lesson is learned the hard way
His dedication had broken the spell.	In the end, hard work solved the problem
So the riddle was finally answered.	The conundrum was finally resolved

Table C3. Conversion of characters

The hero	agent	Protagonist. An agent who's worthiness is recognized in the community which features most prominently in the scenario, i.e., the scenario is sympathetic to or from the perspective of.
False hero	false agent	an agent who's worthiness may be recognized in a community other than that which features most prominently in the scenario, but who's worthiness is questionable, suspect or refuted in the community which features most prominently in the scenario.
Villain	opponent	Antagonist. A disruptive agent. An opponent or adversary.
Princess	agent of desire	Typically desired by the agent or by the agent's community, on who's behalf the agent acts.

Table C4. Translation of events.

QUAT Event	Design Story Work
A Death	A termination
An Object Breaks	A breakdown
Transformation	Transformation
Journey	Journey
A Rescue	A Rescue
People Meet	A meeting
Escape	Escape
Someone is Hurt	Someone is Hurt
People part Company	A parting of Company
Time Passes	Time Passes
A Trap	A Trap
A Fight	A Conflict
A Chase	A Chase
Two People Fall in Love	Fall in Love
Something is Revealed	Something is Revealed
An Argument	An Argument

C3. Adaptation of Propp's functions

Because it afforded 32 rather than 31 functions, this work was conducted with a list of functions adapted from Propp's (1968) original by (Wilcock, 2005:7-8).

Table C5. Method used to adapt Propp's functions.

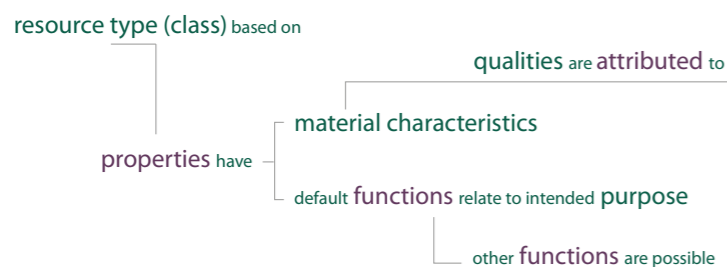
1/ Member of family absents self from home	An agent of a community departs from the norm
2/ An interdiction is addressed to the hero:	Agent becomes challenged by constraints
3/ The Interdiction is violated:	Agent questions the constraint
4/ Villain makes an attempt at reconnaissance:	Alternatives are proffered by an opponent
5/ Villain receives information about his victim:	Opponent gathers information
6/ Villain attempts trickery:	Opponent behaves unpredictably
(7/ Victim deceived:) Mistake corrected June 2016*	An agent is deceived or misdirected
7/ Member of family lacks or desires something:	An agent of a community lacks or desires something
8/ Hero approached about lack:	Lack or desire made evident to a agent
9/ Seeker decides on counteraction:	Agent decides on a counteraction
10/ Hero leaves home:	Agent embarks on a task
11/ Hero tested:	Agent is tested
12/ prepares for magical agent:	Agent draws on resources to ensure a good outcome
13/ Hero responds to test of donor:	Agent responds to test of provisioning agent
14/ Hero acquires the use of a magical agent:	Agent is given assistance to meet the challenge
15/ Hero transferred to the whereabouts of an object of search:	Agent goes to where something searched for can be found
16/ Hero and villain in direct combat:	Confrontation between agent and opponent
17/ Hero branded:	Agent's worthiness is brought into question
18/ Villain defeated:	Opponent relinquishes position
19/ Initial lack liquidated:	Lack or desire fulfilled
20/ Hero returns: Hero pursued:	Agent returns to prior activities, but some aspect of the problem persists
21/ Rescue of hero from pursuit:	Agent receives assistance in solving a persistent problem
22/ The hero, unrecognised, arrives home or in other country:	Events effect change in the agent which changes the way the agent is recognized
23/ False hero presents unfounded claims:	An agent claiming worthiness presents unfounded claims
24/ A difficult task is proposed to the hero:	Agent is set a difficult task
26/ Villain harms family:	Opponent disrupts order in agent's community
27/ Task resolved:	Task is resolved, aims are achieved
28/ Hero recognized:	Agent regains reputation of worthiness
29/ False hero or villain is exposed:	False agent or opponent is exposed
30/ Hero given new appearance:	Agent takes on new persona
31/ Villain punished:	Influence of the opponent ceases
32/ Hero marries and ascends throne:	Agent is vindicated and/or receives elevated status

C4. Resource theory

C4.1. The makeup of resources

Resource ‘types’ are determined by differences in their constitutive properties. Properties have two distinct elements that interest us; material characteristics to which qualities are attributed by ‘some body,’ and functions that properties perform for those who attribute particular qualities to those material characteristics. The particular circumstances in which qualities and functions are attributed determine whether those properties to which the qualities and functions are attributed are viewed as intrinsic, permanent and of the essence of the object (Aristotle) or transient and impermanent. Here, quality attribution is linked to the way in which an object and its properties are assumed to function according to particular design purposes. Objects and their properties can have resident material characteristics and anticipated functions that are related to an intended purpose. But, because other purposes are afforded by the attribution of other qualities and other functions, an object’s material characteristics can also acquire other functions.

Figure C1. The makeup of resources.



For example, the properties of paper, ink and wash may be broken down and combined to evoke aesthetic qualities. In our view, appreciation of aesthetic qualities are culturally and historically determined and therefore attributed rather than intrinsic. Other qualities, such as those appreciated through direct tactile experience with the paper, ink and wash may suggest that material characteristics of properties such as thinness, flexibility, whiteness, lightness, shapeliness, etc., are intrinsic. Each of an object’s property has its function(s) and an object as a whole has its function(s). In our view, functions are ascribed by some body in the circumstances in which an object acts. For instance paper may function as the substrate for an image, yet, as was the case with some of Picasso’s earliest sketches, at a later date the same paper may function as kindling to stave off starvation. For others in other circumstances, paper may function as a ‘mobile’ device with ‘immutable’ attributes (Latour, 1986:7). In these cases, qualities associated with the properties of paper change very little, but functions either assigned (given) or attributed (viewed as belonging) to them may be many and varied.

C4.2. How resource functions won-out over ‘resource types’

A database was set up to help organise and retrieve information about design resources, including those identified in the TwinTide initiative and narrative resources under development. The Pilot study stood as a point of reference for thinking about how resources were used in practice.

Figure C2. Database tool used to interrogate resource attributes.



Over five days, repeated attempts were made to assign types to each resource based on the evaluation of four criteria:

- 1) the resource’s intended effect on those who took part in the recent study,
- 2) the function it performed within the overall approach,
- 3) the functions it might perform for each of four different beneficiaries, and
- 4) the role it might play in Scenario Based Design work.

At first, assessment and assignment of types appeared to be straightforward. However, the experiment was repeated over a number of days after which it became apparent that unequivocal assignment of a type to a resource was impossible. Impossible because each resource has the potential for acting in different ways in different situations.

‘These potentialities arise from the function of particular properties of the resource and are present in varying degrees’

(Memo 2012.11.24).

For Krippendorff, Tahkokallio and Vihma (1994:4), ‘[m]eanings are not fixed (intrinsic) correlates of form (as assumed by a semiotics that favors statements like “X stands for Y,” or “X is a sign of Y”). They emerge, are maintained, or retired in conversational/cultural contexts and shift with them in time’.

C5. Example of function tagging

Below is an example (utterances 1 – 18) of how utterances made in the ‘20 Questions’ activity (Innovation workshop 2) were assessed and tagged according to the functions they performed as narrative resources.

Key to function attribution:

Functions attributed to utterances are shown in [purple].

Functions attributed to resources are shown in [green].

Functions attributed to other aspects of the conversation are shown in [blue]

Questions begin to be asked.

Resource: A copy of ‘20 Questions’ on a laptop is [Directive].

[1] MJ: What is the formal, working relationship of the communities in question?

[Inquisitive]

[2] P5: The formal part is contractual.

[Informative+]

This answers the question, but P5 goes on to elaborate on what it means in this case to have a contractual relationship. He draws on episodic memory to describe, very briefly, three things that impact this relationship; the investment in personnel hours that Pear is making, the cost of that investment, and the ‘routine’ that governs how things are worked out. These background details perform several functions; they elaborate the perfunctory response, adding weight to it being a useful and correct piece of information; and at the same time provide an additional level of granularity to the stories contextual fabric. They are in fact a cognitive or knowledge resource that serve the needs of the moment with their informative and invigorate functions.

[3] P5: Pear pays for, in this case 2.5 FTE (Full Time Equivalents).

[Informative]

[4] P5: We have a basic billing rate of what an FTP costs, not going to talk about the details but lets say it’s more than 100k.

[Informative]

[5] P5: They’ve gone through a process or a routine called Project “O”.

[Informative±]

[6] MJ: What does that routine involve?

[Inquisitive]

[7] P5: In this case it’s a three or four way negotiation.

[Informative]

P5 gets up to draw Mode is [Performative]

Resources: Flip chart \wedge . Media is [Acquisitive] Diagram is [Communicative]

[8] P5: And this is where I’m probably going to have to use the thing (diagram) again.

[Protective]

[9] P5: Obviously there’s the team...

[Informative]

\wedge Points (already shown on the drawing)

[10] P5: ...then there’s the team leader...

[Informative]

\wedge \wedge Draws a team leader. This appears to trigger a reflection for P5 that what he is drawing is not a complete picture. The [Expressive] action of drawing this out has an ‘invigorative’ outcome. It gives rise to reflections that bring other ideas to the surface that may help him to explain what he means and for others in the discourse to get a

clear picture. Media is [Acquisitive]

[11] P5: And there’s also someone here, so ‘research’, ‘program’, ‘management’.

[Informative]

\wedge \wedge P5 sketches in the three parties (in red: the space drawn in red ink just speaks about the team’s resources and the negotiation phase which is pre-project “O”. The black ink is ‘project’ space). [mode: Expressive][content: Informative, Directive] [media = Acquisitive]

[12] P5: These people are clearly on one side.

[Protective]

\wedge \wedge Draws red line around group [Performative]

[13] P5: This person (Addo) is paying for it.

[Invigorative]

This statement suffices to make the point about who is on which side of the boundary, but P5 goes on to elaborate. It’s a statement that speaks of responsibility, touches on the traits of one of the main actants in the story, so it’s ‘wetter’ than some of the other statements in this utterance. Hence it is assigned ‘Invigorative’ function rather than just ‘Information’ function.

[14] P5: All the budgetary allocation decisions have to go through Research Program Management (MRP).

[Informative±]

[15] P5: There’s a small role that the manager plays,

[Directive]

\wedge \wedge Draws small circle with “M” [Expressive]

[16] P5: So we can include him in this.

[Protective]

[17] P5: And they have to agree to the decisions and especially once the FTEs are set, then she’s the one who works with the team leader to say,

[Informative]

Resource: Scenarion is [Performative]

[18] P5: OK this person will do the half FTE, this person will do the half FTE, this person will do whatever...

[Performative]

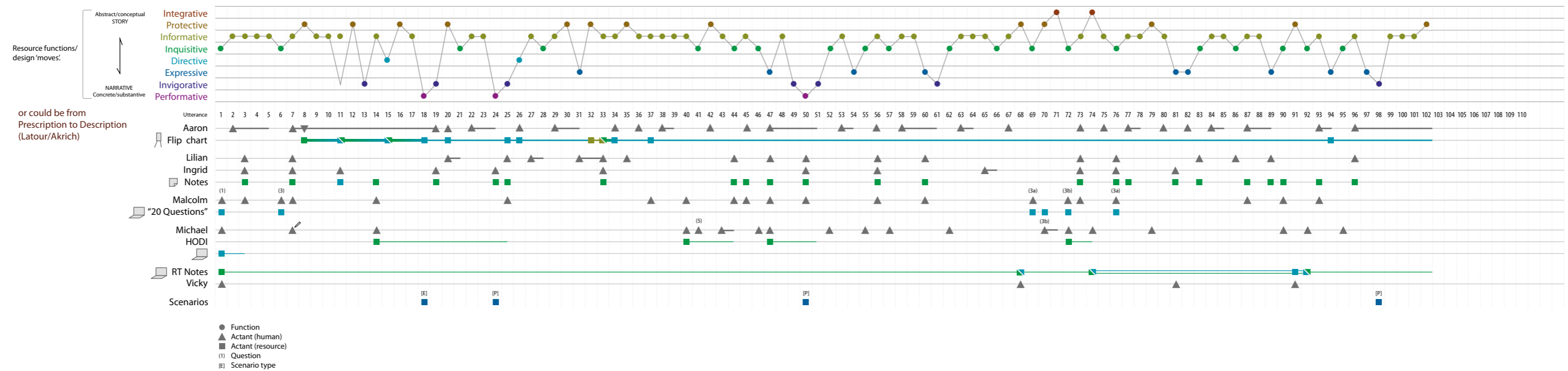
[19] P5: So it’s her decision, she has the final call on who gets to be allocated to what project, because she has to manage people’s time and the like.

[Invigorative]

P5 sits down. So, again, this sentence speaks to the traits of a story actant.

C6. Function attribution in story work

Figure C3. Scatter plot diagram



C6.1. Ordering of Resource functions

Table C6. Resource functions

	'Basic' vocabulary	Meaning	Everyday	Technical
8	Integrative	Pulls stuff together	Linking	Co-ordination
7	Protective	Keeps things right	Caring	Correction
6	Informative	Puts stuff in	Telling	Education
5	Inquisitive	Finds stuff out	Sourcing	Investigation
4	Directive	Systematically guides...	Steering	Instruction
3	Expressive	Gets stuff out	Recording	Registration
2	Invigorative	Spurs things on	Energising	Acceleration
1	Performative	Spreads stuff out	Sharing	Presentation

Decisions made about the ordering of design functions were guided by notions of complementarity and contrast. What function may have complimentary or opposite meanings? Cockton's W2C functions were taken as thematic representations of design work. First, the characteristics of their properties were reflected upon critically by reading and comparing published definitions (Table x). The functions were then cast in a particular order by comparing properties attributed to them with those attributed to Bruner's (1985) complementary modes of logico-scientific (or paradigmatic), and narrative thinking.

Taking the line between the directive and acquisitive function as a midpoint, functions above were considered to have increasing tendencies toward the paradigmatic mode, while those below were considered to have increasing tendencies toward the narrative mode.

C7. Thematic analysis of Boundary Object Workshop 1

A novel storyboard transcription technique was used to analyse, code and theme the video-recordings.

C7.1. Transcription Method

The work of transcribing the video-recording to storyboards began with unstructured sketching on A3 size sheets of paper, but quickly became more structured and systematised. A3 sheets were dividing into three horizontal strips. Each sketched strip represents approximately two-minutes of video. The first ones took approximately thirty-minutes each to create. Short-cuts were needed if the technique was going to be practical. A number of different rendering and layout options were tried, including two-column A4 portrait and very long horizontal layouts, vignetting whole or partial actions and gestures, and stickers depicting key actors and gestures.

C7.2. Coding system


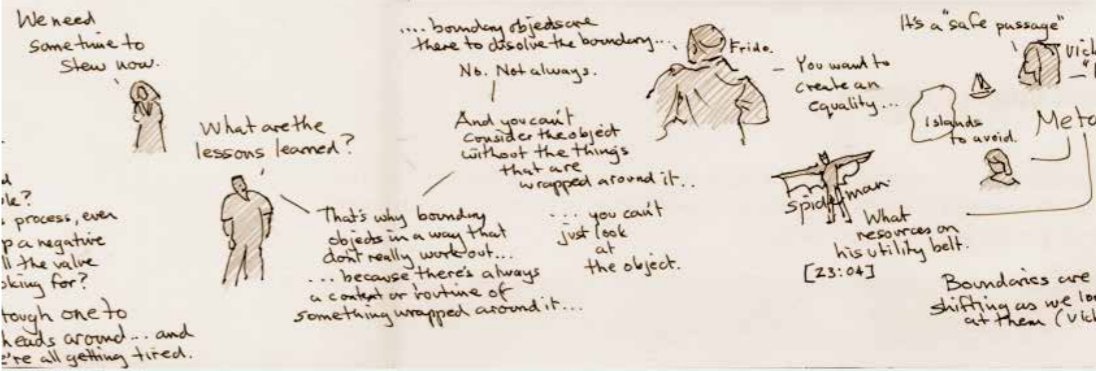
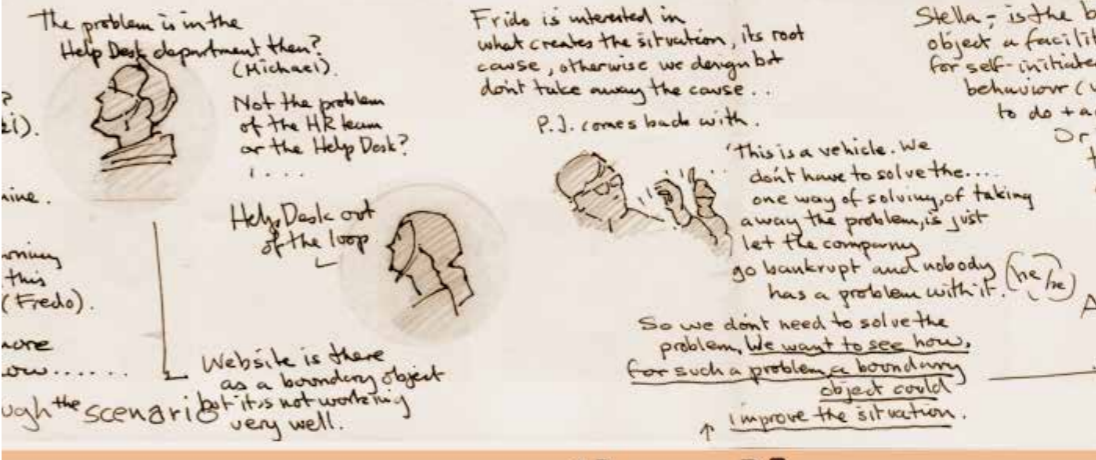
A description is given of the coding system that was used to analyse the storyboard data. The description consists of selected examples of utterances that show where, in the conversation, attention was paid to one of two themes;

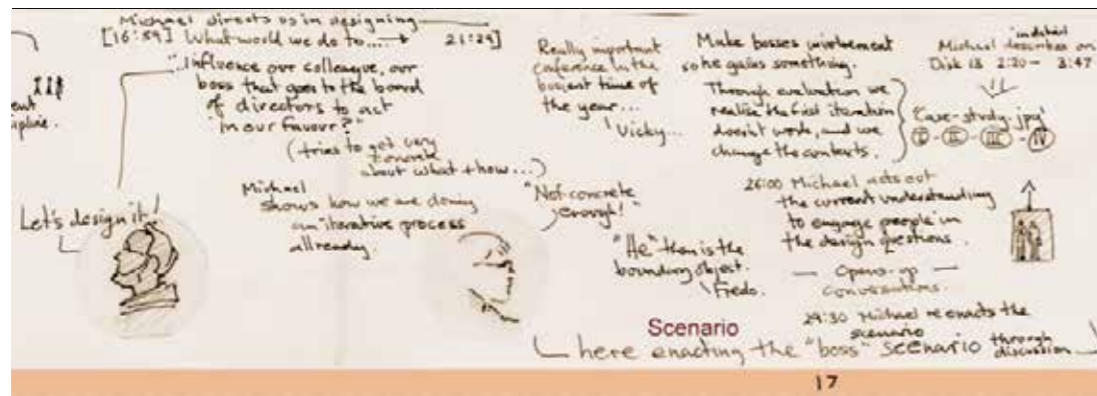
Theme 1: Things to remember when designing are indicated by the code T1, T2, T3, etc.

Theme 2: Properties of boundary objects are indicated by the code P1, P2, P3, etc.

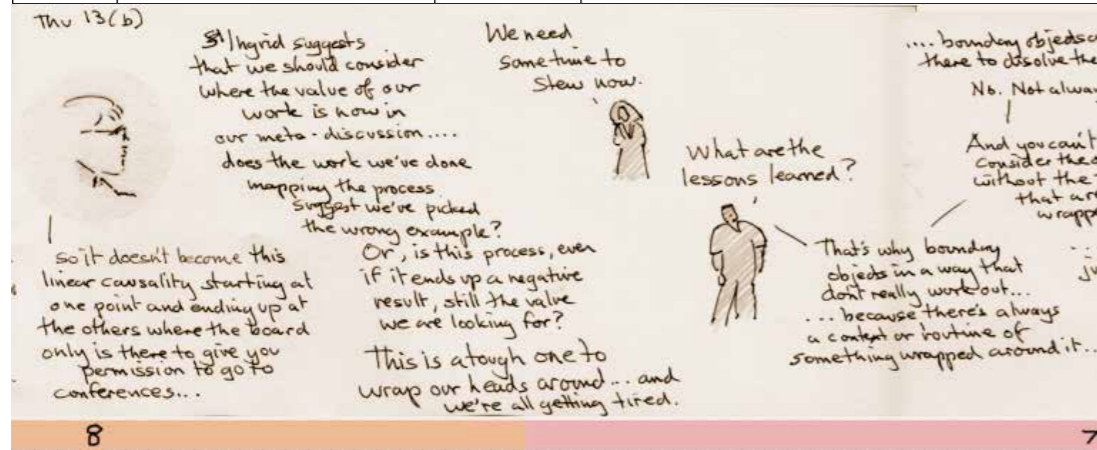
- Sections of the 12.7 metre long storyboard illustrate where utterances were made (the complete storyboard is available at: <malcolmjones.com/making/Innov1_part1.html> and <malcolmjones.com/making/Innov1_part2.html>).
- Topics of conversation are indicated by a band of colour running along the bottom of the storyboard. For example; green = boundary cases, emerald = boundary research, mauve = resources and W2C theory, red = scenario development, and orange = design work.
- Where utterances follow a common theme, they are assigned a common number with a unique letter, thus; T1a, T1b, T1c, etc.
- Bracketed (numbers) correspond to the numbering system used on the bottom of the storyboard to refer to utterances that appear above. The spread of numbers in a theme suggests its persistence in the conversation over time.
- How insights from these utterances informed design work in Boundary Object Workshop 2 are set in italics (Column 4).

Table C7. Method of coding

Theme 1: Things to remember when designing			
Code	Concepts	Position	How the utterance informed workshop 2
			
T1	Begin by asking questions	(24)	<i>An observation made by several participants at different times. Was instrumental in prompting the development of the '20 Questions' resource.</i>
			
T2a	Can't consider the object without considering all the contexts	(7)	<i>May have contributed to the scope of questions asked of the case expert.</i>
			
T2b	Look to root causes, not just surface effects	(23)	<i>May have been instrumental in motivating the question-asker to dig deeply into the case story to find 'root causes'.</i>



T3a	Scenario-Based approaches help, but they must be concrete	(17, 24)	Supported choices to make story work central to the approach.
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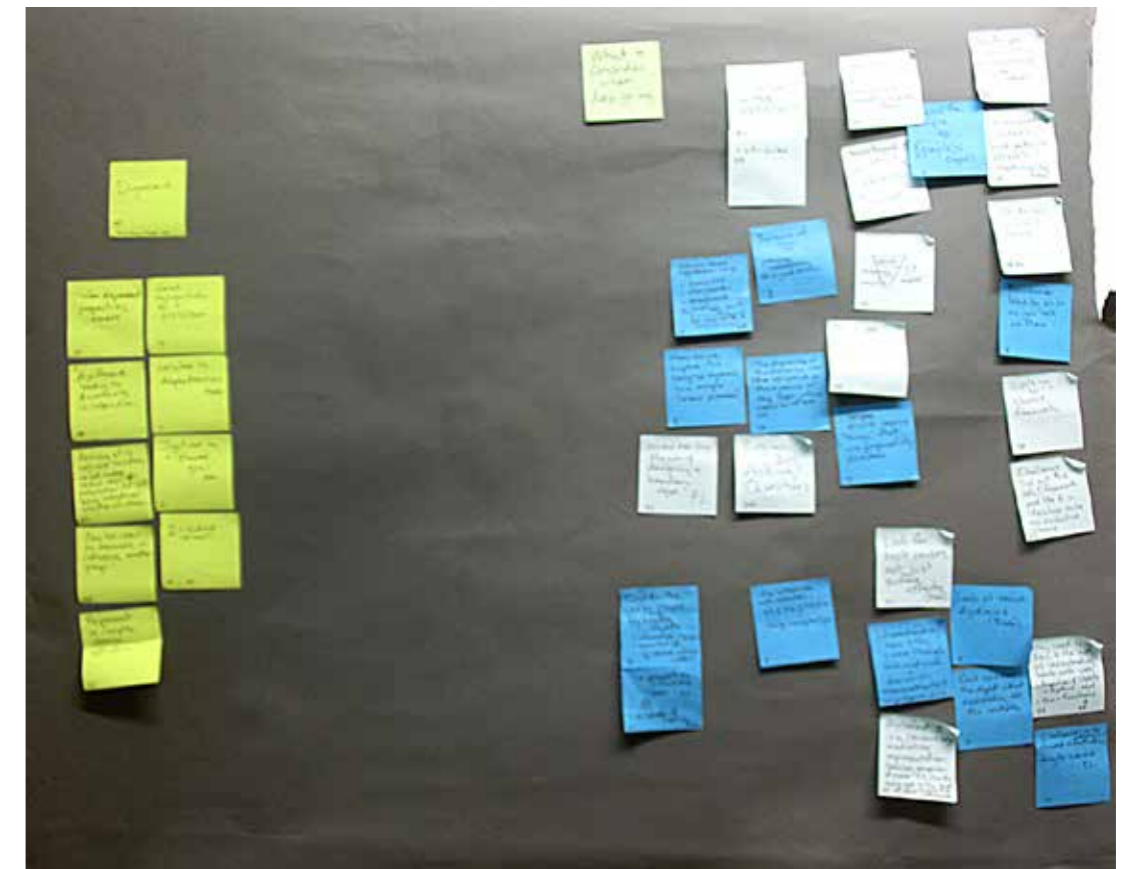
T3b	How do we capture this complex dynamic in a simple scenario?	(8)	Informed choice and configuration of resources to draw out a finely grained and complete story.
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Theme 2: Properties of boundary objects			
P1a	Typified by a shared goal	(9)	
P1b	Joint recognition of a problem	(10)	
P2a	Related to dependencies	(11)	
P2b	Interdependent properties – elements	(14)	
P2c	Cases are dynamic	(47)	Underpinned the theoretical framework for boundary interventions.

C7.3. Outcomes

In all, 39 concepts were identified. They were inscribed on Post-It Notes and taken to Innovation Workshop 2.

Figure C4. Notes from the analysis posted on a wall.



In the second workshop, the Post-it notes were arranged on a wall (Figure C4) and used to inform design activities.

C8. Charting the future of digital bereavement

Themes, such as *lived experience*, *technology* and *data*, that were used to give greater context to the ‘future world’ Aspect Map had their origins in PESTLE trends analysis of issues related to digital bereavement.

Table C8. Example of PESTLE trend analysis.

PESTLE Trends/ Key Driving Forces	Themes	Questions/Issues	Predetermined elements	Critical Uncertainties
Social	Lived Experience (focus on elderly)	<ul style="list-style-type: none"> • Changing values. • Changing paradigms • Machine morality (Allen, C.) • Traditional seat of social power held by elderly. • Knowledge transfer - maintaining kith and kin memory. 	<ul style="list-style-type: none"> • Increased population (9B in 2050) • Changing demographic - more elderly • Need to make sense (1) 	<ul style="list-style-type: none"> • Increase in palliative care services or change of focus from palliative care to technology-assisted self-care? • Changes in attitude toward aging?
	Terminal illness, death and bereavement	<ul style="list-style-type: none"> • Euthanasia, right to die 'as you please' (4). • Who has a stake in relieving the grief of bereavement? 	<ul style="list-style-type: none"> • More instances, leading to more supportive resources. • More distributed (2) in wider networks • More individual choice/control. 	<ul style="list-style-type: none"> • Rights of the dying • Rights of the deceased • Rights of the bereaved vs. the dead's rights of privacy. • A priori conscious management by individuals of personal and family data archives, or negate responsibility and leave to heirs?
Technological	Technology		<ul style="list-style-type: none"> • Influence of new methods and material • (2) Evolution of personal devices and networks • Increasingly intelligent • Increasingly accessible • Increasingly embedded • Increasingly small • Less rigid construction, more organic 	
	Data	<ul style="list-style-type: none"> • What do people do with old data? • How do people value it? • How is it handled by systems and providers? • Who owns it? • Who controls it's use? <p>Old media never die, it's the devices to access them that become extinct.</p>	<ul style="list-style-type: none"> • Increased volume (1) leading to increased use by individuals and organizations, resulting in; • Increased dependence in all areas (PESTLE). 	<ul style="list-style-type: none"> • Longevity (decay) • Increased vulnerability to theft, attack, corruption, loss.
Legal			<ul style="list-style-type: none"> • (3, 4) Lag on resolving more/ethical issues raised by rapid advancements in science, technology, medicine. • Lag on updating outmoded laws regarding ownership, copyrights, etc., off balanced by rise in Creative Commons-type alternatives. 	
Economic			<ul style="list-style-type: none"> • Changing centres of economic growth (west->east) leading to changes in global prosperity and power bases. 	
Political			<ul style="list-style-type: none"> • Focus on issues of aging, retirement, pensions, health. 	<ul style="list-style-type: none"> • Increased role of government leading to stability, or • Increased prosperity and volatility (Shell).
Environmental			<ul style="list-style-type: none"> • Changes in world climate and regional weather constrain quality of life. 	<ul style="list-style-type: none"> • Effects of global warming on health.

C9. Question composition

Questions were crafted to help the Northumbria Team understand WHAT to design for, WHO to design for and HOW to approach the design work. Composition of the questions drew on theoretical models from design theory, boundary object theory and scenario theory.

C9.1. Addressing the WHAT and WHO of design

For design theory, Cockton's Design Arenas (2017: 751–755) helped to draw attention to questions of design purpose, beneficiaries, artefacts and evaluation (see; Appendix A14.2 'Theoretical models' image d). By understanding what, in the boundary object case, might constitute purpose, beneficiaries, artefacts and evaluation, the Team could begin to grasp the purpose of their own design work, its potential beneficiaries, artefacts and methods of evaluation. Artefacts are also an important consideration in the study of boundary object cases (Houssian, 2011). These and two other topics from boundary object theory orient the composition of questions toward WHAT and WHO to design for; routines and actors.

C9.2. Addressing the HOW of design

Since the design work was to be approached through story and narrative (the HOW), boundary object theory's routines and actors were thought to be of particular importance, because they relate so closely to the repertoire of elements used in the composition of scenarios and stories. For instance, in his characterisation of scenario elements, Carroll (2000:47) draws on Propp's (1958) elements of story, such as settings, events that make up the plot, as well as agents and their actions, goals and objectives.

The same auto-generative experimentation technique that had been used to test designs for narrative resources were used here to evaluate whether the questions would work as intended.

C10. Design Fiction Formal Study: Questionnaire feedback

Table C9. Feedback from the questionnaire.

How did you find this experience of collaborative storytelling?	
P17	It was very positive, I enjoyed the collaborative element a lot, despite occasionally getting frustrated and not getting heard! It made me think about technology in a much more open way than I normally do (Concentrating on what is possible now).
P15	Interesting. Revealing.
P4	Interesting, slow start (I wanted to make full stories first!) but interesting results. Perhaps this is needed though for an interesting story?
P18	Confusing – I never did understand the purpose with respect to design. Fun, though!
P16	Great found it most stimulating
P19	Interesting how the course of the story became modified, and the various contributors to the story happily allowed modifications to their conversation.
Can you describe the way in which any of the storytelling resources prompted you to make a contribution to the group discussion?	
P17	The function sheet was really helpful for getting started. I didn't connect with the 'futureworld' but I suspect it would be more useful for reflecting later. The was a great way of bringing the group together.
P15	Checked [StoryFrame], seed story, plus whiteboard props (MJ's) plus whiteboard (Sarah's). Also respond to direction from MJ, AD, SM. And local knowledge of individuals.
P4	It helped in investigating less technotopian/happy situations and more invented and complex ones.
P18	The scenario [vignettes] – I kept referring to it so I could find ambiguities and room for imagination.
P16	Seed story stimulated ideas. [StoryFrame] was a good starting point. Future world was a good log to remind us of – [Visual Plotline] helpful to see what was missing and prompted suggestions
P19	'Futureworld' resource (whiteboard) provided a useful depository for all original ideas floated. The seed story on paper was good as it allowed me to reread, check and gestate(?) to develop ideas.
Can you describe anything about the use of the storytelling resources that, for you, did not help engagement in storytelling?	
P17	Again, the future world thing I felt too hierarchical while in creative mode but would be really helpful later when reflecting.
P15	Some [Plot Themes] were distractions most of the time [explicitly did not like the 'something hinders' function]
P4	I wish in the earlier functions part it was more communal (rather than writing separately and telling at table.
P18	
P16	They all seemed useful in different ways
P19	Original pieces of A3 paper - information sheets as this was better visually pitched.
How far do you think the design fictions we've created touch on interesting research questions about digital bereavement?	
P17	I was not particularly aware of the issues of — bereavement before coming here, so I was new to it but we covered a really broad range of subjects.
P15	Virtual agency, trust, longevity
P4	I think it investigated v. interesting ideas in the last section (we started in standard (?) and eventually --on)
P18	Needs – it may help identify needs
P16	They definitely raised interesting legal and ethical issues . I am not sure that they raise technological or HCI type issues. This is not to say that they couldn't.
P19	Valuable questions that I connected with are the legacy of self, identity and its communication through the portal of technology . How this could be used in the future (by what agents); with what —agendas and how they can be used? Trust . Interpretation in future contexts.
If you were going to present this design fiction to research participants (members of the public) in workshop context, what further work do you think it needs?	
P17	I think it would be good to present it as a forking path style fiction, to help understand how people would react to the future dilemmas.
P15	I would create interactive hypermedia to present the many options generated for [StoryFrame's Plot Themes].

P4	Easier ways to get through the table at the start (big sheet on the table?)
P18	Where it's going not contributing to designing something.
P16	I think there needs to be some way of showing how the participants arrive at the final story.
P19	'actor' to become agent. All the rest was good.

C10.1. Reflections on the feedback

Comments from P17 and P15 add weight to comments made by P12 in pilot study1 and P14 in pilot study2, that there may be opportunities for either mapping or presenting the various story pathways that arise in the ideation/brainstorming sessions. This may seem like a logical thing to want to do, but I'm cautious about adopting it because of the potential effect it may have on the storytelling process. Certainly in the very early ideation stage, such as those we've been investigating via the studies, it would add far too many layers of possibility at a time when the most pressing need is to get one agreed story on the table, a task that is difficult enough as it is. The approach may be useful at a later stage, once there is an agreed story on the table and different options need to be explored. Issues that arise include; who creates the story pathways? This would be far too complex and detailed work to do collaboratively around a table. What form would it take? What levels of story granularity are appropriate to raise the right kinds of questions and support the right kinds of discussions in particular research situations?

C11. Analysis of the Design Fiction Formal Study

Table C10. Concepts found to be present in the discourse.

Code	Concepts	Description	Examples
C1	Mortality • Presence	The illness or disease, link between diagnosis and genetic profiling.	
C2	Motivations • Care • Fear of decay • Loneliness	Iris' motivation (contrast love and care with personal gain)	FS02.2 - Iris' desire for control of what happens in the future
C3	Trust in people	Issues of trust (related to the use of VIVIEN or to alternate courses of action)	• FS16.1 - Iris doesn't trust people not to rip John off. • FS16.2 - John doesn't trust in his own capacity to not get ripped of, especially as he gets older.
C4	Bereavement	Timed intervention.	
C5	Commitment and Choice	The consequences of pressing the button. Physical travel associated with commitment to 'press the button'.	
C7	Roles and characteristics	Which Iris? Which John? Their hopes, faith, fears, and relations with each other.	
C8	Investment	Iris' investment in the future (from the vignettes). Why anyone would invest in VIVIEN.	
C9	Technology	What is VIVIEN?	
C9.1	Gift of care Persistence Longevity	How the service and technology works. VIVIEN's capacity to augment memory. Memorialising vs. virtual presence (mortality).	FS15.7 - VIVIEN helps remind John of the conditions set in place for when he dies
C9.2	Manifestation	How it manifests itself.	The keystone idea answers this.
C9.3	Remembrance Perpetuity	What motivates its use.	
C9.4	Interaction	How John and Iris engage with it.	• FS15.3 VIVIEN as a 'digital avatar facilitator'. • The role of Iris/VIVIEN after Iris dies • FS15.2 - Iris' status is raised to someone who can sign for ever (or until the end of the agreed contract period).
C10	Values Investment	The cost of treatment, the potential for loss.	
C11	Legal Ownership	Ownership, power of attorney, joint consent, legal affairs, difficulties when one loses mental faculties or dies, motivation to count digital others as legal people.	• FS15.4 - V Iris is an incorporated entity. • FS15.4 Iris is there for John's healthcare power-of-attorney • FS15.6 - John has consent for euthanasia
C13	Story Points	focus on story structure as related to events, happenings, functions, etc.	
C14	Process Points	focus on the research or storytelling process.	

Table C11. Coding gestures

Code	Gesture
G1	Pointing
G2	Standing
G3	Waving hands
G4	Sitting back
G5	Leaning forward
G6	Touching the head
G7	Sighing

Table C12. Coding dialogue acts.

Code	Utterance type
F1	Raising or posing questions
F2	Addressing questions and ideas, reinforcing, adding to.
F3	Abandoning questions
F4	Offering ideas and information
F5	Challenging ideas, building on those of others, modifying.
F6p	Telling anecdotes, making comparisons; from personal experience.
F6c	Telling anecdotes, making comparisons; from cultural references.
F7	Confirming understandings, making sense
F8	Recapping
F9	Using humour
F10	Agreeing
F11	Observing
F12	Making conjectures
F13	Taking care of the story
F14	Using deductive reasoning

During tagging the dialogue listed in Table C12 were reduced to coded themes (Table C13).

Table C13. Determination of themes for dialogue acts.

Theme	Instances
Questioning or postulating	F1, F2, F3, F11,
Generating options	F4, F2, F11, F12
Keeping grounded	F6, F7, F8, F9, F13
Taking care of story or process	F7, F8, F10, F13

C12. Analysis of questions

Figure C5. Question analysis and ranking method.

The figure shows five examples of question analysis cards. Each card has a header with 'Type of utterance' and 'Concept', a sub-header with 'Panel code', 'Incident description', and 'Discourse functions', a main text area for the question, a ranking score in a blue box, and fields for 'Utterance' and 'Author'.

- Card 1:** Type of utterance: Story question; Concept: C9.1 - How VIVIEN works; Panel code: 14; Incident description: 8; Discourse functions: F1 - Raise (design relevant) questions; Question: What's the legal status of (virtual) Iris?; Ranking: 10; Utterance: 556.
- Card 2:** Type of utterance: Research question; Concept: C9 - VIVIEN; Panel code: 01; Incident description: 1; Discourse functions: F1 - Raise (design relevant) questions; Question: Is it possible to have some kind of service that can actually offer "products" like that to people? (U240); Ranking: 09; Utterance: [blurred]; Author: [blurred].
- Card 3:** Type of utterance: Research question; Concept: C9.2 - How VIVIEN manifests; Panel code: 01; Incident description: 6; Discourse functions: F1 - Raise (design relevant) questions; Question: How does VIVIEN manifest itself? (U258); Ranking: 09; Utterance: [blurred]; Author: [blurred].
- Card 4:** Type of utterance: Story question; Concept: C9.4 - How J+I engage; Panel code: 13; Incident description: 7; Discourse functions: F1 - Raise (design relevant) questions; Question: There could be something in there, whether it's John that, kind of, gets in touch with VIVIEN or visa versa. Because, what would that be?; Ranking: 09; Utterance: 541.
- Card 5:** Type of utterance: Story question; Concept: C9.1 - How VIVIEN works; Panel code: 15; Incident description: 3; Discourse functions: F1 - Raise (design relevant) questions; Question: Is the legal requirement the main reason for having VIVIEN?; Ranking: 09; Utterance: [blurred]; Author: [blurred].

Author names have been blurred.

C13. Rules applied in coding resources

1. An inscribable resource, when being inscribed, is assigned an *acquisitive* function,
2. When it ‘speaks back’ it is assigned a *directive* function. It continues to function in a *directive* manner as long as it is neither challenged or used for other purposes by someone other than the person who inscribed it.
3. However, if someone else explicitly uses the inscription as a resource to support generation of their own views (pointing to it or otherwise making explicit reference to it other than as a point of clarity to confirm understanding), the inscription is assigned an *informative* function because it is informing the other person’s view.

C14. Storyboard Transcription

Standard procedure in narrative analysis of video-recorded proceedings is to transcribe the video as a written text. Once rendered, the resulting ‘data’ can be coded and analysed. It is a stepped process that involves subjective translation or interpretation at each step. Storyboarding directly from the video performs these steps ‘in the moment’. Storyboards are themselves a coding system, encoding aspects of a story in the form of imagery, storyline and dialogue.

‘More fundamentally, investigators like Franck (1989) and Bergmann (1985) have pointed to the fact that transcription not only leaves things out but actually does a special kind of violence to the spoken word. It fixates what is essentially fluid and ephemeral. It holds talk up for repeated inspection, the very impossibility of which is central to the lived experience. Some practitioners argue that everything should be transcribed because even if, say, pauses or overlaps are not germane to the current analysis, some other researcher might want to use the same materials for checking findings or for novel analytic purposes.’ (Jordan and Henderson, 1995:48)

Jordan and Henderson (ibid) go on to say that Jefferson’s ‘conventions’ are inadequate too, and there is no perfect solution.

Appendix D: Chapter notes

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D1. Notes on Chapter 2

Figure D1. CREWS Table

TABLE 2 SCENARIO CHARACTERISTICS																
Scenario Facet		Project														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Form	Narrative text	F	M	F	M	M	M	M	F	M	—	—	—	F	—	M
	Structured text	F	F	M	F	F	F	F	F	F	M	—	F	F	—	F
	Diagrammatic notations	—	—	M	F	—	M	F	F	—	F	F	F	F	—	—
	Images	F	F	M	M	M	M	—	M	M	—	—	—	M	—	—
	Animations or simulations	—	—	—	—	—	—	—	—	F	—	F	—	—	F	—
	Typical size (pages)	1-3	1-2	2-8	3-8	10-20	3-20	5-20	/	/	1-2	3-10	1	10-200	*	10-50
	System context	M	M	M	M	—	—	—	F	F	—	—	—	F	—	F
Content	System interaction	F	F	F	F	F	F	F	F	F	—	M	F	F	F	F
	Internal system	—	—	M	—	—	—	—	M	F	F	F	—	F	—	—
Purpose and usage	Concretization of abstract models	F	M	F	F	F	F	F	F	F	—	—	F	M	M	F
	Scenarios instead of abstract models	—	—	—	F	F	—	—	—	—	—	—	—	—	—	—
	Interdisciplinary development	F	M	F	F	F	F	F	F	F	—	—	F	F	F	F
	Scenario use with prototypes	F	F	F	F	M	M	—	—	M	—	—	F	F	F	—
	Complexity reduction	F	F	F	F	F	F	M	F	M	M	f	F	F	F	F
	Agreement and consistency	F	F	F	F	F	F	F	F	F	F	M	F	F	F	M
	Scenario use with glossaries	—	—	F	M	M	—	M	—	—	—	—	—	—	—	—
	Reflection on static models	F	F	F	F	F	F	F	F	—	—	—	F	F	F	F
Life cycle and management	Partial views	M	M	F	F	F	F	M	F	F	F	F	M	F	—	M
	Distributed scenario development	M	—	F	F	F	M	M	F	F	M	—	—	F	F	M
	Review	F	F	F	F	F	F	F	M	M	M	M	M	F	—	F
	Traceability issues	F	M	F	F	F	M	M	F	F	M	M	M	F	M	M
	Basis for test cases	M	—	M	M	M	M	M	—	M	M	M	M	M	M	M
	Evolution	F	M	F	F	F	F	F	M	F	M	F	F	F	M	F

* 80% of the screens of the end product

“F” = Frequent use, “M” = Moderate use

D2. Notes on Chapter 3

D2.1. Ontological categories

In Mason (2002:15).

My choices highlighted.

people, social actors, humans
 bodies, subjects, objects
 minds, psyches
 rationality, emotion, thought
 feeling, memory, senses
 consciousness,
 subconsciousness, instincts
understandings, interpretations
motivations, ideas, perceptions
 attitudes, beliefs, views
 identities, essence, being
 selves, individuals, subject
 positions
 others, collectivities
representations, cultural or social
 constructions
 experiences, accounts
 stories, narratives, biographies
 evolution, development,
 progress
 texts, discourses
words, codes, communications
languages
 actions, reactions, behaviours
 events

interactions, situations, social
 relations
 social or cultural practices
 social processes
 rules, morality, belief systems
material cultures, objects,
 things
 time
 institutions, structures, the
 ‘material’, markets
 cultures, societies, groups
 producers, consumers
 nature, genes, humans, animals
 empirical patterns, regularities,
 order, organization,
 connectedness
 empirical haphazardness
 spontaneity, disorder,
 disorganization, chaos and
 disconnectedness
underlying mechanisms
 one objective reality, multiple
 realities or versions.

D3. Notes on Chapter 4

D3.1. Challenges in planning the field studies

Several questions arose during the process of planning field studies (the immediate study, but the same and these questions led to serious doubts about whether a practical method could be found that would enable the research questions, as posed, to be interrogated. Questions arose in four distinct but interdependent areas.

D3.1.1. On what aspects of storytelling with scenarios should the studies focus?

Stories emerge and coalesce through a process that involves different types of conversations that take place over a considerable amount of time, often with the input of multiple stakeholders in multiple locations. As a phenomenon that is often socially, cognitively, geographically and temporally distributed, the act of storytelling in a design setting on this scale would not be easy to study. Even a constrained view of storytelling in a scenario-based design setting that focused only on the authorship and refinement of scenarios from initial concept to written drafts to storyboards presents considerable challenges. For example, people with different skill sets are involved in different stages of scenario development. Members of a design team who have a particular role and skill set may be involved in strategic conversations that lead to the development of scenarios. But these may not be the same team members as those who, because of a very different role and skill set, become involved in transposing a scenario into a storyboard for a focus group, a fact borne out by the observations of this researcher and findings from the literature. Could the studies interrogate the entire scenario life-cycle, including scenario authorship and storyboard refinements? If it was impractical to observe and study all the activities involved in the scenario life-cycle as one case, then which particular aspects of scenario development would be possible and practical to study?

D3.1.2. Who would participate in the studies?

With these questions in mind, others arose over who would make the best candidates for study participants. Would it be possible to find a design team in a medium-to-large enterprise or organisation with experience in scenario-based design who, with sufficient regularity to present opportunities for studies, engage in the activities of scenario authorship, refinement and adaptation to naturalistic storyboards? The participant group would need to be receptive to trying out new, untested methods alongside their own. This may have an unpredictable effects upon their work. They would also need to be confident that when they exposed their working methods to external scrutiny, details of their new projects would not be disclosed. It was considered that a combination of conflicting approaches to design work, competing commitments to projects and security issues that centre on the protection of intellectual property may deter many potentially good candidates from taking part in studies. Would any commercial design team be willing to take part in a series of studies of this nature? If not, then who?

D3.1.3. How choices effect validation of the research

Questions also arose over which pairing of study focus and participant group would best validate the research, support the (generalisability?) of claims, and facilitate the production of reliable data (Mason, 2002). “scientific criteriology”, such as validity, generalisability, and reliability, may be widely shunned in qualitative research, but the ideas behind the principles may still be useful (ibid :38-39).

No one would argue that research should be relevant, meaningful and valuable, whether by scientific or other methods. If researchers can show that they are “observing, identifying and

measuring” what they say they are, then the research is valid (ibid 39). In this case, proof that particular aspects of design story work have been observed relies not just on how the studies are conducted or on the appropriateness of methods, but on how well the studies can focus on aspects of storytelling that reveal new insights about design work, the usefulness of supportive resources in doing so, and our choice of participants. For, some storytelling settings will reveal more insights than others, and some participant groups will be viewed as being a more reliable sources of design story work through scenarios than others.

D3.1.4. Other confounding variables

Finally, doubts arose over the impact of constraints that other factors that govern the design of studies might impose on the choice of study focus and participant group. For instance, the expertise of this researcher and the availability of resources that may be needed to conduct the studies were seen as constraint factors.

D3.1.5. Overcoming the impasse

These questions and areas of doubt represented a considerable impasse to the commencement of studies. Weighing often conflicting interests and trade-offs became a circular activity until it was realised that some of the principles of Scenario Planning might be used to overcome the impasse.

D3.1.6. Scenario Planning

Scenario Planning is a strategic planning method that offers a systematic approach to dealing with uncertainties (Yoe, 2004:3-1). The method was adopted here as a learning device to make informed choices about study design. The method enabled variable factors effecting key questions and doubts to be weighed against fixed constraints, making it possible to envision a number of alternative outcomes. Questions were treated as critical uncertainties, while constraint factors were treated as predetermined elements.

Scenario 1

Scenario 1 considered studies that focused on storytelling in Strategic Management settings with business and design managers as participant groups. This scenario was a good fit with this researcher’s entrepreneurial experience, but whether observations of storytelling in strategic management settings would be (generalisable?) to design settings was questionable.

Scenario 2

Scenario 2 considered studies that focused on storytelling in interaction or experience design settings with design teams taking part as participant groups. This scenario would present opportunities for high quality research. However this researcher’s lack of contacts with these types of teams in the UK and lack of experience working with them in such settings threw doubt on whether a suitable design team and setting could be found and, if they could, whether reliable observations could be made of storytelling activities.

Scenario 3

Scenario 3 considered studies that focused on high-technology research and development (R&D) with an R&D team acting as participant group. This scenario was a better fit with this researcher’s experience in working with R&D teams, and studies conducted in an enterprise or institutional research setting would underpin validation of research quality. That experience, however, was gained in Canada, not in the UK. Through university colleagues, proposals for studies were made to contacts working at Philips Research, Eindhoven, and Microsoft Research, Cambridge. Nothing came of these proposals and time was passing.

D3.1.7. Dual insights

Little could be done to change the way that predetermined elements constrained choices. However, speculation about how critical uncertainties could be changed led to two significant insights that broke the impasse. The first insight emerged with regard to the question of which aspects of storytelling with scenarios could and should the studies focus on. This question could begin to be answered if the problem solving strategy of abstraction (Alexander, 1973:92, Simon, 1996:16) were employed (this instantly shifts the problem more into the realm of theory than ‘real life’ – out of that of proper social inquiry which seeks to draw directly from the source of human social activities in situ. People and actions are still real, but the context is artificial. But for me, that is not a problem because my primary focus is to develop tools not to study designers. Note that Action Research tends to ‘eschew abstraction from observation (Vettingwolff), though I think grounded theory somewhat depends on it!). It was speculated that selected activities of design story work could be simulated in settings outside those of medium to large commercial enterprises or institutions. Once abstracted, taken out of the ‘real world’ settings in which designers tell stories, the storytelling life-cycle could be broken down, reduced or distilled to focus only on those aspects of storytelling that represent persistent challenges to designers. What was sought by taking this narrow focus on storytelling episodes was ‘deep, rich observational data’ rather than ‘hard, generalizable’ . . . data” (Sieber, 1973: 1335 in Burke Johnson & Onwuegbuzie, 2004:14). If warranted, some degree of theoretical generalisation of outcomes based on the data may be achieved by other means, perhaps through diversity of settings on which studies focus.

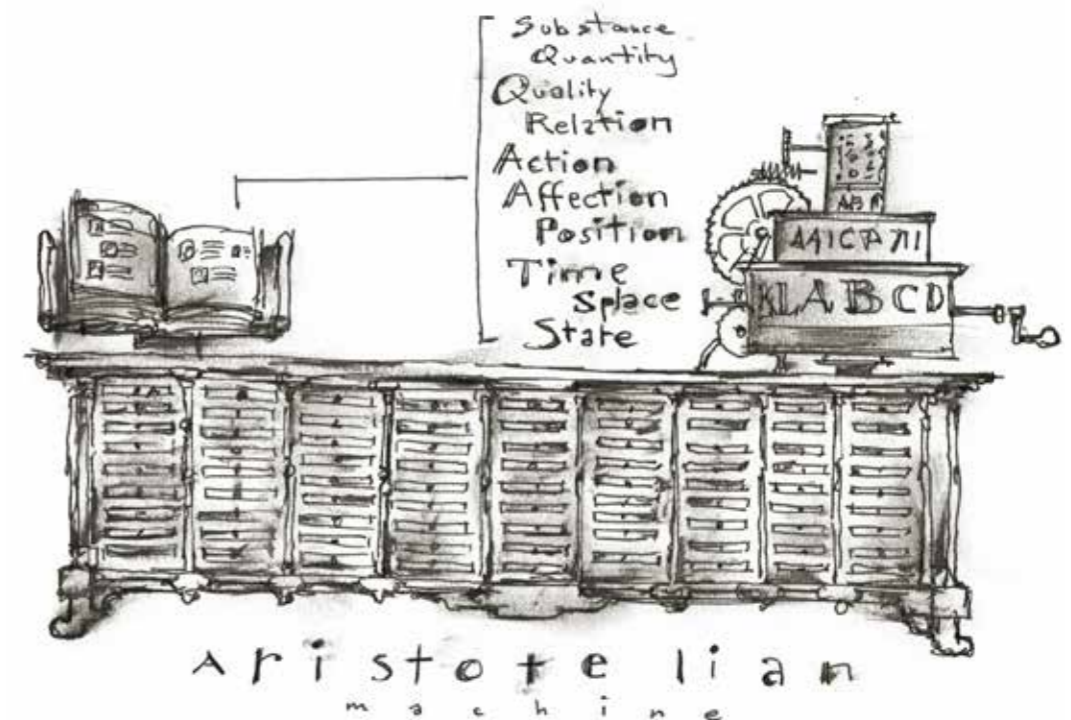
This provoked a second insight that was based on the now certain knowledge that research quality would depend more on being able to establish a trusting relationship with willing participants who anticipated receiving some kind of benefit from taking part in the studies than it would on finding participants who unequivocally represented research beneficiaries. (for how those who are studied make as much use of those who conduct studies than the other way round, see Lloyd 2000:359). Moving the field studies off-site, away from large enterprises or organisations, and breaking the storytelling life-cycle down into more compact storytelling episodes provided scope for finding suitable participant groups, ones that would both appreciate the benefits of taking part in such studies and be able to commit sufficient time to doing them.

D3.1.8. Identification of Participant Groups

Two participant groups were identified as being available and receptive to taking part in studies and highly motivated to tell stories in order to consider their near future options. The first group were ‘early career designers’ who have graduated from an institution of higher education but not yet engaged in full-time employment. The second were ‘design prospectors’, designers who have been employed in the field of design for some time who are either making a career change to become independent design entrepreneurs or changing the focus of their career to favour a different design discipline.

D3.2 Aristotelian Machine

Figure D2. Visualisation of the Aristotelian machine.



D4. Notes on Chapter 8

D4.1. Defining orientations

In this research the term ‘orientation’ is used to refer to activities with distinct roles to play in story work. Determination of orientations began with the assignment of dominant activities, i.e., activities undertaken in those events that most closely align with the design team’s immediate aims or goals (to Frame, to Form, etc.), and function, i.e., the purpose served by an event in relation to other events and to design work as a whole.

First, we make the general observation that any given event may serve one or more purpose or goal, which can make choice and assignment of orientation difficult. But it is in asking these kinds of questions that we learn more about the roles played by events in design work.

For example, Narrative Blueprint (c) served as a means to consolidate understandings and re-frame or reform them in a different way (the resource acted *integratively* and *acquisitively*). However, the activity took place in an episode where the dominant goal was to field propositions. Though re-framing and reforming was taking place, it was doing so with the pressing need to find the design proposition most worthy of being taken to a finished state via paper prototyping. The hope held out for engaging in the activity was that it would show the merits in some ideas and the faults in others, and thus help the Teams make an informed choice (it also acted expressively). On this basis, the event was assigned to a position where it straddles *Fielding* and *Finishing*.

Our analysis will show that at the level of dialogue different orientations are present to varying degrees throughout strategic conversations, but that at any given time some orientations dominate the team’s agenda more than others.

Second, with this view of the discourse we gain a further perspective on the two impasses or moments of doubt that were explained at length in Chapter 5. In the model above we see, bridging adjacent orientations, two ‘inflection points’ that mark points of significant change. The first occurs between Affinity Diagram and Dial-a-Plot (a), the second, between Visual Plot-line and the brainstorming session (b). There is almost no doubt that these occurred because the Teams were uncertain about how to work with novel resources; in the first instance, how to move from familiar methods to novel resources, and in the second instance how to move-on after using novel resources. The inflection points are so pronounced because they make up the whole of, and therefore bracket, the Teams’ orientation to *Forming*. More will be discussed in the outcomes.

D4.1.1. Categorisation of orientations

Categorisation of orientations was achieved through a synthesis of information drawn from the literature and early attempts made by this researcher to categorise stages of design storytelling and resource functions.

Table D1. Categorisation of orientations.

Plot Theme	Deweyan Inquiry	Nielsen’s Scenario Purposes (1995)	Schön (1983)	Story Work orientations
Lack or Need	A doubtful situation			
Recognise Lack or Need	Institution of Problem	Provide context	Framing (p.68)	Framing
Impediment to Lack or Need				
Help sought to overcome impediment	Determination of Problem	Structure Thinking	Exploration + Move Testing (p.147)	Forming
Help offered to overcome impediment	Reasoning			
Task requirement	Experimentation	Test	Hypothesis Testing (p.147)	Fielding
Task completion				
Lack or Need resolved	Warranted Assertability	Communicate		Finishing
New order				

First, Plot Themes (Table D1, Column 1) were matched to Dewey’s six points of inquiry (Column 2). To these were added two trusted taxonomies. The first taxonomy was adapted from one of Nielsen’s (in Carroll, 1995:79) three dimensions of the ‘taxonomy of scenarios’, *purpose* (Column 3). The second taxonomy reflected aspects of design work identified by Schön (1983) that are widely accepted and represent interpretations of Dewey’s pragmatist stance on inquiry (Column 4; see thesis Section 3.2.1.1. Arguments for taking up a critical neo-pragmatist approach’).

D4.1.2. Confirmation of orientation categories

Table D2. Choosing the best episodes to analyse.

Set	Study	FRAMING	FORMING	FIELDING	FINISHING
Set 1	Pilot study session 1	YES			
	Pilot study session 2	YES			
	Pilot study session 3		YES		
	Pilot study session 4			YES	
Set 2	Innovation wkshp 1	YES	YES		
	Innovation wkshp 2	YES (a)	YES (b)	YES	YES
(Propositions)	IXD Student Study	YES	YES		
Set 3	D.Fiction pilot 1			YES	
	D.Fiction pilot 2		YES	YES	
	D.Fiction F. Study	YES (c)	YES (d)		

A review of the empirical studies showed that activities undertaken in each study could be categorised in a consistent way according to these tentative definitions of proposed orientations (Table D2). This review also enabled determinations to be made about which episodes were most suitable for analysis.

Innovation Workshop 2 was found to be the only study where the scope of activities encompassed all four orientations. It, therefore, represented a complete cycle of design story work. With this finding it was possible to make reasoned assessments of the scope of activities undertaken in all the other studies.

For example in Set 2; Innovation workshop 2, the Design Team’s acquisition of contextual information from the ‘20-Questions’ activity represents a clearly defined orientation toward *Framing* (a), and their move to story spinning with Dial-a-Plot and Event Cards represents a clearly defined orientation toward *Forming* (b). Similarly, in set 3, at the beginning of the Design Fiction formal study conversations prompted by StoryFrame around the Aspect Map represent an orientation toward *Framing* (c), and the Teams reoriented themselves toward the development of narrative around the Visual Plot-line there is a well-defined move toward *Forming* (d).

Although this analysis concerns itself primarily with the four episodes (a), (b), (c), (d), there is reason to be confident that with some adjustments to categories, etc., methods proposed here to analyse orientations to *Framing* and *Forming* may be equally effective in analysing *Fielding* and *Finishing*.

D4.1.3. Definition of orientation categories

Orientation activities that relate to *Fielding* are considered to stem from generative aspects of design work where designs are conceptualised and propositions put forward. They may be characterised by the use of story and narrative as a mode of expression.

Orientation activities that relate to *Finishing* are concerned with refinement of resolutions and execution of designs. It would not be unreasonable to assume that as understandings are gained in the course of *Framing*, *Forming* and *Fielding*, the likelihood of being able to orient towards *Finishing* increase.

D4.2. Reduction of the '20 Questions'

Table D3. Reduction of '20 Questions'.

'20 Questions'	Reduction to 9 Questions	Representing phrase
1. What is the formal, working relationship of the communities in question?	1. What is the formal, working relationship of the communities in question?	1 Community relationships
2. How are the communities distinct, what defines their differences? 6. What are the common and what are the distinct interests of the parties?	2. How are the communities distinct, what defines their differences?	2 Common traits/interests
3. What are the routines that relate most closely to the boundary issue? 4. How do these fit into the rest of the work flow?	3. What are the routines that relate most closely to the boundary issue?	3 Critical routines
5. How do these communities "talk to each other"? (Language and discourse conventions) 7. What interactions do they have with each other? (formal and informal) 9. How do each community regard the other? With respect, grudging acceptance, etc. is there a difference of 'rank' or importance? 12. What are the semantics of the 'problem' discussions or interactions? How do each community form meanings around them?	4. How do these communities "talk to each other"? • What interactions do they have with each other? • How do each community regard the other?	4 Community interactions
8. What do they use to support communication and understandings in these discussions and interactions?	5. What do they use to support communication and understandings in these discussions and interactions?	5 Communication resources
10. What might some of the communication difficulties be over? (perhaps in general, but also where closely associated with the boundary case) Language, type of information, form of information, personalities or differences in rank, etc? 11. Can a specific boundary crossing issue between these communities be identified? 17. What attempts have already been made to cross the boundary?	6. What might some of the communication difficulties be over? • Can a specific boundary crossing issue between these communities be identified?	6 Boundary issues
13. How long has the boundary crossing problem been around?	7. How long has the boundary crossing problem been around?	7 Temporal aspects
15. How does the problem effect the community? 16. What might the effect of a successful boundary crossing in this problem area be? On people's jobs, on how things get done, etc.	9. How does the problem effect the community?	8 Internal impact
14. What solutions have been attempted in the past? How did it work/not work, and why?	8. What solutions have been attempted in the past? How did it work/not work, and why?	9 Solution

Reduction of the 17 questions was achieved by finding common themes. For example, Questions 2 and 6 concern themselves with what makes the communities distinct. They are rephrased in the question 'How are the communities distinct, what defines their differences?' This phrase is represented in the data charts by the short phrase 'common traits/interests'. Likewise, Questions 3 and 4 concern themselves with the role of routines in boundary cases.

They are rephrased in the question 'What are the routines that relate most closely to the boundary issue?' This phrase is represented in the data charts by the short phrase 'Critical routines'.

D4.3. Determination of Subject Themes

First, we must ask ourselves what constitutes a 'Subject Theme'. Second, we must reduce the number of Subject Themes to a manageable number without sacrificing resonance or meaning.

Three of the seven Themes used in the analysis were determined in advance of the Case Expert interview, and, in the form of Post-It notes, were an outcome of it (see Thesis Section 5.4.4.2.2. 'Orientation 2: Questioning').

The following describes the procedure taken to determine the other four Subject Themes.

In our analysis of story work in Innovation Workshop 2 (Chapter 5), taxonomies derived from Propp's (1968) *functions* and Deweyan Inquiry had proven to be both useful and fruitful for understanding how, in practice, designers work with story, narrative and narrative resources. In our theoretical interrogation of how story, narrative and narrative resources work for designers a taxonomy or framework of a different kind was thought to be needed.

Table D4. Determination of Subject Themes.

Themes	Utterances		Reading		Subject Themes	
	Critical Uncertainties	Predetermined Elements	1	2		
1	Recognised boundaries	[20 - 38, 70 - 75]	redefined [172 - 184]	45	70	Boundaries
2	Contexts for boundaries (routines; Project "O", Meetings, etc.)	[12, 39-40, 76-78]				
3	Discussion of boundary objects	[104 - 107, 158]				
4	Methods of communication	[41 - 69]		76	82	Interactions
5	Negotiations	[79 - 92]				
6	Disempowerment	[93 - 103]				
7	Dysfunction	[108 - 109, 110 - 113]	confirmed by [183, 188]			
8	Geographically separated teams	[126 - 127, 142 - 145]				
9	Teams not attempting to resolve their issues		[140 - 141]			
10	Breakup exacerbates communication problem		[157 - 159]			
11	Addo's efforts to inform are ineffective		[209]			
12	dev. team is ill-informed		[210]			
13	CEO does not communicate with dev. team		[218]			
14	Working relationship is contractual	[1 - 7]		18	71	
15	Addo pays for Project "O"	[13]				
16	Good CTO <-> Research team	[119 - 120]				
17	Competition between teams		[146 - 148]			
18	Conflict between CTO and CEO		[160]			
19	Differences in managerial vision/ politics		[151], [152.1] confirmed at [181] style [160]			
20	The company breakup	[151]	confirmed at [168]	4	17	Health of company
21	Evidence of disruption from the breakup	[154]	reinforced at [187]			

The utterances were critically analysed to identify individual or groups of consecutive utterances that, within the diegesis of the story, addressed, touched-on or stemmed from trends that were either critical uncertainties or pre-determined elements. These were then grouped into themes. For example the first theme, 'recognised boundaries' enters the conversation early, between U20-38, and again between U70 and U75 and is viewed as a critical uncertainty. But later in the conversation, between U172 and U184, it returns as a pre-determined element. Confident that the list of themes represented acknowledgement in the conversation of underlying PESTLE trends, they were grouped to form four broad Subject Themes; 'boundaries', 'interactions', 'stakeholders', and 'health of the company'.

D4.3.1. Methodological insights

Two methodological insights arose from this exercise.

1. The roles of some themes do not change; from a design perspective they are viewed as either critical uncertainties (green) or predetermined elements (blue). But the role of other themes do change (black). For example, theme 7, dysfunction in Addo's research team, was first viewed in the conversation as a critical uncertainty. No one was sure whether it contributed to the boundary issues or not or whether it was a short-term issue or a persistent one. But further discussion removed those uncertainties and from that point on team dysfunction was considered to be a persistent factor contributing to issues surrounding the boundary. Themes apparently act in much the same way as narrative resources in that different functions may be attributed to them at different times, suggesting that they may be good reason to consider them to be just that [themes as narrative resources].

A themed utterance that changes from a critical uncertainty to a predetermined element is one that addresses a concept from which doubt has been removed and for which there is now confidence.

2. As refinements were made to the graphical display of data, interpretations became more detailed and nuanced, resulting in a different count (columns 4 and 5). The higher numbers in the second reading may represent a more critical reading or the text or a relaxing of criteria in making assessments. The numbers are not as important as the presence of the trends.

D4.4. Subject Themes development

Table D5. Subject Theme development.

		Questions						
		Question 1. What would the notion of prolonged digital presence of an absent loved-one do to people's expectations of bereavement?	Question 2. What does it mean to put a service in place that captures people's entire life and then manage that over a long time?	Question 3. How does VIVIEN manifest itself?				
Themes		Subject Themes						
Seed Story	Aspect Map	Interaction	Benefit	Presence	Persistence	Investment	Ownership	Manifestation
	Perspective							
Contact	Contact							
Investment	Investment							
Persistence	Persistence							
	Longevity							
	Loneliness							
	Decay							
Care	Gift of care							
		Technology						
Presence	Presence							
Preservation	Record							
	Consume							
	Keep with technology							
		Data						
	Record everything							
	Ownership							
		Lived Experience						
Remembrance	Perpetuity							
	One or two-way?							
	Once off or continual?							

Table D5 shows how Themes drawn from the Seed Stories (Column 1) and those inscribed on the Aspect Map (Column 2) were categorised to create seven Subject Themes (Columns 3-9) which align with and thereby represent the three research questions posed during the workshop (Top).

Themes acquired by the FutureWorld Aspect Map were, in part, influenced by research aims discussed during the workshop introduction. In turn, the directive function of Themes inscribed on the FutureWorld Aspect Map influenced the formulation of research questions during the strategic conversation. Twenty-five questions were posed during the workshop. Twenty-two were story-related and three were research related (for how these were simplified, see Appendix C19).

D4.5. Analysis of Plot Theme distribution

D4.5.1. Distribution of Plot Themes

In the first section, six of the nine Plot Theme were touched-on. Attention is first drawn to setup Plot Theme 1. At U14 Plot Theme 2 draws a little attention. Then, if only briefly, at U22 the conversation shifts dramatically from the two set-up Plot Themes (a), to consider one confrontation Plot Theme (PT6) and three resolution Plot Themes; 7, 8, 9 (b). In the following three sections, Plot Themes 3, 4 and 5 enter the conversation. However, of these entry-points, only those related to Plot Themes 1 and 8 correspond to the highest concentration of attention (red numbers).

D4.5.2. Where attention is concentrated

The highest concentration of interest for each Plot Theme is determined by the first instance of the highest number. For example, the highest concentration of interest in Plot Theme 2 occurs in Sections 5 and 6. The number in Section 5 is highlighted because it occurs first. Places in the conversation where interest in each Plot Theme is concentrated weaves two parallel courses across the graph from top left to bottom right (grey lines joining red numbers).

The attention cast ahead to resolution Plot Themes while addressing set-up Plot Themes mentioned above, was not an isolated incident. Though much of the conversation in sections 2 and 3 is concerned with process-level or procedural matters that are not indicated on the graph, in the few brief instances where participants turn their attention to story development, they consider set-up Plot Themes with resolution Plot Themes in mind. In Section 2 attention is drawn to Plot Themes 4, 8 and 9, while in Section 3 attention is drawn to Plot Themes 3 and 8.

At U83, the conversation turns more determinedly toward the story, and in section 4 comes to focus almost exclusively on two confrontation Plot Themes, 5 and 6, with the latter acquiring its highest concentration of interest in the episode. In section 5 markers scatter, suggesting a divergence of attention. The highest concentration of attention paid to Plot Themes 2 and 8 occurs in Section 5, where, as in Section 4, almost all other Plot Themes receive some attention.

This divergence of attention continues into Section 6 resulting in the highest concentration of alignments in the orienting episode (4; next section). This is followed in sections 7 and 8 by a long, sustained debate almost entirely dedicated to discussing Plot Theme 5, help received. With twenty-seven utterances making reference to Plot Theme 5, Section 8 is where it receives the highest concentration of interest. From there, in Sections 9 and 10, with some of the set-up Plot Themes still in focus, attention moves quickly and decisively toward addressing resolution Plot Themes 7, 8 and 9.

D4.5.3. Total number of utterances that make reference to each Plot Theme

At 95 hits, Plot Theme 5, *help received*, either attracted or demanded by far the most attention; almost twice that of Plot Theme 8, *need fulfilled*. Plot Theme 9 received the least attention. However, it may have been sufficiently addressed by Plot Theme 8, which concerns itself with closely related events. Looking at the distribution across the 9 Plot Themes as well as the 3 Acts, the numbers suggest that the conversation followed what is known as a 'dramatic arc' where action begins to rise during Act 1 (set-up), becomes more concentrated in Act 2 (confrontation) and rises to a climax. Whereupon, action falls-off as Act 3 presents a resolution.

D4.6. Distribution of Themes

Table D6. Distribution of Plot Themes.

Act	Plot Theme	Episode Section										Total
		1	2	3	4	5	6	7	8	9	10	
1. Setup	PT1. Lack/Need	1	9	5	1				4		2	22
	PT2. Lack recognised	4		2	3	3			8	2		22
	PT3. Threat to resolution			8		2		7		1		18
2. Confrontation	PT4. Help sought				5	3	2		2	2	1	15
	PT5. Help received					1	9		2	2	1	15
	PT6. Task set				14	15	5	12	5	2	2	55
3. Resolution	PT7. Task complete			2	2	2	1	6	3	5		21
	PT8. Need fulfilled					2				2	7	11
	PT9. New order									2	9	11
Plot Theme total		5	9	17	25	28	17	25	24	18	22	190
Story Discourse		12	13	8	3	2	7	1	3	6	4	59
Grand Total		17	22	25	28	30	24	26	27	24	26	249

Table D7. Distribution of Subject Themes.

Question	Subject Theme	Episode Section										Total
		1	2	3	4	5	6	7	8	9	10	
Q.1	ST1. Interaction	4	7	9		13	8	14	9	10	11	85
	ST2. Benefit	2	5	4	4	2			5		12	34
	ST3. Presence	7	10	4	8	3	3	2	18	11	15	81
Q.2	ST4. Persistence				1	4		4	2	8	4	23
	ST5. Investment			2	16	5	8	4	2		4	41
	ST6. Ownership					7	1	2		4	10	24
Q.3	ST7. Manifestation			3		2	4	1		4	5	19
Subject Theme Total		13	22	22	29	36	24	27	36	37	61	307