VISUAL CONVERSATIONS ON URBAN FUTURES

Understanding participatory processes and artefacts.

Thesis submitted in partial fulfilment of the requirements

for the degree of Doctor of Philosophy (PhD)

June 2017

Serena Pollastri

Lancaster Institute for the Contemporary Arts

Lancaster University

DECLARATION

This is an edited version of the submitted that does not contain any image protected by copyright material.

The work presented in this thesis is my own, and has not been submitted in substantially the same form for the award of a higher degree elsewhere. To the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text.

Chapter 2 contains images and information from the report, Dunn, Nick, Paul Cureton, and Serena Pollastri. 2014. "A Visual History of the Future." Future Cities. UK Government, Office for Science.

Chapter 5 contains images originally published in the report, Urry, John, Javier Caletrio, Thomas Birtchnell, and Serena Pollastri. 2014. "Living in the City." Future Cities. UK Government, Office for Science.

Chapters 6, 7 and 8 reflect on three projects conducted as part of Liveable Cities, a research programme supported by the UK Engineering and Physical Sciences Research Council (EPSRC) under grant number EP/J017698 (Liveable Cities).

Serena Pollastri

ACKNOWLEDGEMENTS

As much as I would like to avoid the cliché, I don't think that this PhD could be described as anything but a journey and an exploration.

Firstly, my thanks go to my supervisors, Rachel Cooper, Nick Dunn, and Chris Boyko, who allowed me to wonder around, but kept me out of the many rabbit holes and reminded me to ultimately look for a path.

I am thankful to my PhD friends, for enriching the journey and for joining me in exciting adventures off the beaten track. And to Claire and Stephen, for the road trips, the music, the food, and the moral and concrete support.

My gratitude also goes to John Urry, who, in the early days of my explorations helped me to shape my research through long discussions and endless train rides. He is dearly missed.

This work would not have been possible without Paul, always by my side, first as a boyfriend, now as husband. Thank you for holding my hand and walking with me, even when I was not quite sure of where we were heading.

Finally, my thanks go to the Liveable Cities research programme and to ImaginationLancaster for their support and generosity.

ABSTRACT

Visualisations of future cities contribute to our social imaginary. They can, and have been used as speculative objects for imagining new possible ways of living as communities (Dunn et al., 2014). However, future cities are usually represented through coherent scenarios that only tell one story (or one version of it), and rarely express the complexity of urban life.

How can the diversity that characterises the city be represented in visions of the future that give voice to different, diverging ways of living and experiencing it? How do these visualisations contribute to inclusive design and research actions aimed at envisioning, prototyping, and reflecting on possible scenarios for liveable cities?

My research focuses on ways of visualising possibilities for life in future cities that include and valorise plurality and agonism (DiSalvo, 2010), rather than present (as usually happens) only one story. For a lack of existing terminology, I am calling this approach "Visual Conversations on Urban Futures" (VCUF).

Although there are no definitions or structured descriptions of VCUF, some prototypes can be found in design, art, and architecture. These examples show the great variety of methods and media that can be adopted in participatory processes of imagining futures cities.

As a designer, I have chosen to adopt an action-research methodology (Kock, 2012; Rust, Mottram, & Till, 2007) to conduct, document, and reflect on a series of design experiments (Eriksen & Bang, 2013) that enhance my understanding of what it means to make pluralism explicit when producing visions of urban futures.

The four main design experiments that I have undertaken are:

- **Living in the city.** A first experiment in visualising future urban scenarios from a collaboratively written text.
- **Envisioning Urban Futures.** Speculative Co-design practices: designing spaces for imaginary explorations and mapping them in an Atlas that makes visions readable and explorable
- **Sharing Cities.** Conducting situated conversations on the relationship between social practices and urban futures: co-creating scenarios of sharing cities.
- **Birmingham Parks Summit.** Visions designed to be unpacked, reworked, and developed into actions.

The main contribution of my research is the proposal of a set of design principles, including a definition of the design space of VCUF. The design space outlined in the dissertation is a framework that can be used both as an analytical lens (to understand existing processes and artefacts of VCUF) as well as a design tool.

Visual Conversations on Urban Futures could offer a significant contribution to the early stages of scenario building processes for possible futures. Manzini and Coad (2015) describe scenarios as "communicative artifacts produced to further the social conversation about what to do". This way of imagining futures is ultimately about building alternatives to the dominant order by "making possible what appear(s) to be impossible" (Lefebvre, 1970, cited in Buckley & Violeau, 2011).

While in times of urgent change seeking clarity and agreement might seem a much preferable route, I argue that articulating divergence is a necessary step to explore truly radical solutions. Stepping back from a solution-oriented approach allows us to visualise

and better understand underlying tensions, and to critically question assumptions about what futures are or should be desirable.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

"D'una città non godi le sette o le settanta meraviglie,

ma la risposta che dà a una tua domanda."

"You take delight not in a city's seven or seventy wonders,

but in the answer it gives to a question of yours."

Italo Calvino (1972), Le Città Invisibili.

FOREWORD

When I moved to Shanghai, China, in February 2010, the city was three months away from the grand opening of the World Expo. The scale of the preparation for the big event was signalled, in almost every street, by the number of construction sites: the government's effort to transform the city into the window of the fast-paced innovation China aspired to. Most of these projects were garnished with billboards and the slogan of the Shanghai Expo: "Better City – Better Life (城市，让生活更美好)".

No effort was spared to instil this aspirational vision into the people of Shanghai–not only citizens, but also expatriates, Chinese and international tourists, migrant workers, and business travellers. A better city was going to be "harmonious" (和谐) : fast yet kind; modern, yet traditional; grey of the glass and steel of new high-rise buildings, but also green of parks and flowerbeds. As the Chinese version of the motto would directly translate: "the city", specifically, this improved version of the city, "will make life even better".

At the same time, much of the local creativity and ways of life that gave the Shanghai its unique character didn't seem to feature within the imagery of the vision, which presented a distilled message of one unifying tradition and a singular future. As such, this vision silenced the complexity of Chinese values, experiences and identities. This clear, harmonious future did not allow contestation[1].

As a new resident, I found myself trying to understand a city that was completely new to me while being caught between two opposite realities: the aspirational message of unifying harmony and progress broadcasted from screens and billboards, and the complexity, messiness, and diversity that existed (and resisted) in every corner of every neighbourhood. While the rhetoric of the harmonious vision seemed at first to resonate in many superficial exchanges, deeper conversations would inevitably start composing much more variegated visions of future, often characterized by a mixture of hope and uneasiness towards the government's plans (some of these issues are explored in Valsecchi, Pollastri, and Lou 2011; Lou, Valsecchi, and Diaz 2013).

Three years later I left Shanghai, and a few months after that I came to Lancaster University. My practice-based PhD was to be conducted as part of Liveable Cities, a five-year programme aimed at developing future visions and guidelines for low-carbon, resource secure UK cities that prioritise individual and societal aspirations and wellbeing.

My Chinese experience came back to mind: what is the value of developing visions of future if these do not capture the diversity and divergence that characterize both the present, and the future? And how to challenge the role of the actors and institutions that develop and impose such visions?

---

[1] Although contestation did take place, particularly online (see Nordin and Richaud 2014).

[2] Because of the geographical and cultural context in which this thesis is developed, this chapter will focus primarily on European and North

This is a thesis about future visions, even when it looks like a thesis providing arguments against the formation of future visions. It is, in fact, a thesis about experimenting with alternative, participatory processes and visualisations of urban futures that embrace messiness rather than purifying it.

Exploring the topic of future urban visions through design experiments means adopting a research approach that draws from personal experience in practice. While any research strategy is arguably informed and shaped by the researcher's epistemology, worldview and personal histories, this is particularly true in practice-based research, which implies a constructivist approach to knowledge.

In my case, my previous experience working in product design first and service design later (before taking interest in visual design), is the reason why this thesis focuses more on *processes of visualisation* rather than on *future visions as artefacts*. Because of its focus on systems, rather than individual products, the core of service design lies in fact in the creation of spaces for interactions, rather than finished products. This is the type of approach that I brought into the PhD. When thinking about future visions, I got more interested in understanding how these come to be, rather than what these look like.

THE TOPIC OF THIS THESIS.

We all experience the city in different ways, and the way we live in the city is what shapes it. In return, the city also shapes the way we live. So, why is it that visions of urban futures only tell one story?

This thesis seeks to answer the following research question (RQ):

How can the diversity that characterises the city be represented in visions of future(s) that give voice to different, sometime conflicting ways of living and experiencing it?

Specifically, this means understanding:

- **(RQ1) What are the processes that can be designed to enable these visions to emerge?**
- **(RQ2) What are the characteristics of the artefacts representing these visions?**
- **(RQ3) Who has already used a similar approach? How was the approach used?**
- **(RQ4) How do these visualisations contribute to inclusive design and research actions aimed at envisioning, prototyping, and reflecting on possible scenarios of liveable cities?**

In my research I use design to explore collaborative ways of visualising urban futures that articulate and celebrate multiple perspectives rather than looking to produce a coherent vision. This means creating spaces for discussion and imagination of possible futures, but also ways of representing these conversations through – for example – maps and atlases, illustrations, and objects. Thus, this approach brings together three design-specific disciplinary areas and traditions: participatory design, speculative design, and visual design.

As part of bringing together the three areas and traditions, I have worked with other local groups, researchers, city councillors, but also students, writers, and other creative types. And from practice with these groups, I developed a series of design principles for this approach, that I call Visual Conversations on Urban Futures. These principles (and

the research presented in this thesis) do not focus on the graphic design details of the visualisations as artefact (e.g. typeface choices, colour schemes, grids and layout etc.), but rather seek to contribute to a better understanding of the visualisation processes.

In Chapter 3 I will define Visual Conversations on Urban Futures as such:

> **Visual Conversations on Urban Futures (VCUF) are visualisations of future scenarios that utilise visual methods and tools to articulate multiple voices discussing possible futures for life in the city.**

This approach is relevant for future-oriented projects like Liveable Cities. When facing pressing challenges we tend to adopt a solution-oriented approach. However, taking a step back to critically question assumptions about what is or should be desirable allows underlying tensions to be visualised and better understood.

OUTLINE OF THE THESIS

This is an edited version of the submitted thesis that does not contain any image protected by copyright material.

The aim of this thesis is to understand the role, the significance, and the characteristics of approaches that enable and document multiple voices in visions of future. In order to achieve this aim, I have combined theoretical and evidence-based research with a substantial amount of practice-based research that allowed me to experiment with the approach and reflect on my experience. The findings from theory and from practice contributed to the definition of a set of principles and a design space that can support the understanding and the design of Visual Conversations on Urban Futures.

This thesis is thus divided into three parts, briefly outlined below.

Part A provides a theoretical framework for the research area that this thesis, and the approach into which this study seeks to position themselves. Part A is divided into four chapters. Chapters 1 and 2 review the last 100 years of discourse on futures and visualisations of urban futures, respectively. In particular, the chapters will highlight a lack of understanding in how participatory approaches can be adopted in both researching and imagining futures and in visualising them. The findings from this review contribute to the description of the Visual Conversations on Urban Futures approach, which is described in Chapter 3. Chapter 4 presents the methodological approach that has been adopted to explore the characteristics of VCUF given the premises set out in Chapter 1 and 2.

Part B describes in detail my personal journey of exploring VCUF through practice. It provides a candid account of the four design experiments that have been conducted for the study. By elaborating on what worked, what did not work, and the possible reasons why or why not, each chapter within Part B will focus on the learning outcomes. The descriptions will also make explicit how reflection on action in each experiment influenced both the way in which subsequent design experiments had been conducted and the understanding of the VCUF approach.

Part C brings together experiential learning from the design experiments presented in Part B with the evidence-based research conducted as part of the theoretical research presented in Part A. Part C is divided into three chapters. Chapter 9 reviews the challenges of conducting processes and designing artefacts of VCUF, and proposes a set of overarching principles for the design of VCUF. Chapter 10 unpacks the design process of VCUF into a design space that can be used both as an analytical and a design tool. Finally, Chapter 11 concludes the thesis by reflecting on the findings of the

research, providing detailed answers to the Research Questions, acknowledging limitations and suggesting possible directions for future research.

Figure 1 summarises the research journey in a map of the thesis.

Figure 1 (in the next page) Map of the research, representing the main contribution of the thesis (outlined in blue) and the exploratory research journey that I undertook to understand the characteristics of the VCUF approach

A MAP OF THE THESIS

This map is a conceptual representation of the research process as presented in this thesis

Key: Descriptions and definitions of the approach are marked in blue. Research activities conducted to understand and explore VCUF are marked in red. Yellow boxes mark Part A, B, and C.

Part A

Chapter 1

A review of current attitutes towards future research reveals the need for ways of capturing the divergence and plurality of multiple futures. Participatory practices of speculative design can contribute by creating "spaces for agonism".

Chapter 2

Visualisations intended as continuum of processes and artefacts can capture diversity and multiplicity when representing urban futures (as shown in a **review of examples**)

RQ:
How can the diversity that characterises the city be represented in visions of future(s) that give voice to different, sometime conflicting ways of living and experiencing it?

Chapter 3

VISUAL CONVERSATIONS ON URBAN FUTURES

- **RQ1** What are the **processes** that can be designed to enable these visions to emerge?
- **RQ2** What are the characteristics of the **artefacts** representing these visions?
- **RQ3** Who has already used a similar approach? How was the approach used?
- **RQ4** How do these visualisations contribute to inclusive design and research actions aimed at envisioning, prototyping, and reflecting on possible scenarios of liveable cities?

Methodology

Chapter 4
Action research through
Design Experiments (DE):

Research **about**, **through**, and **for** design

Part B

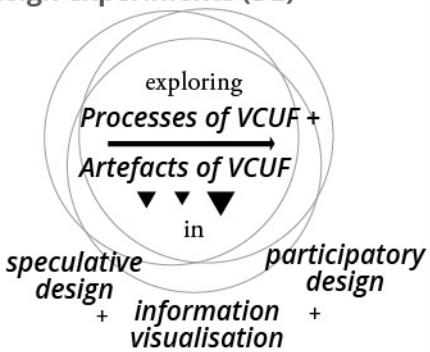
Exploring the approach through design experiments (DE)

Chapter 5
_DE#0: Living in the City

Chapter 6
_DE#1: Envisioning Urban Futures

Chapter 7
_DE#2: Sharing Cities

Chapter 8
_DE#3: Birmingham Parks Summit



Part C

Design Principles for VCUF

Chapter 9
Overarching principles of VCUF:

_**Tensegrity**: conceptual structures to support and facilitate processes of speculative co-design

_Using **modalities** to combine readability and ambiguity in artefacts of VCUF

Chapter 10
Proposing a design space as a framework to guide the analysis and design of VCUF

_**Design space of the process.** Dimensions: model of the proces, artefacts, actors, scale.

_**Design space of the artefacts.** Dimensions: complexity, navigation, engagement, involvement.

design principles for processes of VCUF

design principles for artefacts of VCUF

PART A.

THE THEORETICAL FRAMEWORK

INTRODUCTION: VISUAL + CONVERSATIONS + URBAN + FUTURES

Part A of this thesis provides the theoretical framework that constitutes the broader context of this research. It does so through a review of the literature in two main areas: futures and visualisations of future cities. The review is divided into two chapters:

- **Chapter 1** which describes how "the future" is currently defined and conceptualised, and reviews practices of anticipating, speculating, and designing. It concludes by advocating for a better understanding of ways for dealing with the uncertainty and plurality of multiple futures, through participatory practices of speculative design.
- **Chapter 2** addresses the issue of how to replicate the plurality and divergence that emerges from the participatory processes of speculation described in chapter 1 in artefacts that represent these multiple futures. To do so, the chapter reflects on the essence of what visualisations are. Focussing on the context of visualisations of cities, it then provides an historical account of the role and agency of visualisations of urban futures, and proposes an overview of approaches and methods for bringing together multiple perspectives and capturing them within the vision.

These two chapters elaborate on two different dimensions within the main research question, namely: the processes that enable pluralistic future visions of futures to be

constructed (Chapter 1), and the characteristics of the visualisation artefacts (Chapter 2). The participatory processes and artefacts that the theoretical framework argues for are brought together in **Chapter 3**, which provides a definition of the Visual Conversations on Urban Futures (VCUF) approach.

Part A concludes with a chapter (**Chapter 4**) that describes the methodological approach that has been adopted within the PhD journey to explore the characteristics of VCUF given the premises set out in the theoretical framework.

1 FUTURES + CONVERSATIONS: PROCESSES OF ANTICIPATING, SPECULATING, DESIGNING

Engaging with futures and future-oriented research, means engaging first and foremost with a thick fog of unknown and uncertainty. But it also leads to encounters with infinite ways of either developing tools to try and see within the fog, or imagining what might lie ahead.

This chapter presents these two seemingly alternative ways of looking at the futures. It will describe how the Western field of future studies have developed rational methods to attempt anticipating possible alternative futures, and how speculative approaches have in return raised "what if" questions as a way of exploring hard-to-imagine possibilities. In particular, I will focus on how critical practices of speculative design have proposed, debated, and questioned visions of future worlds through design propositions.

The review will highlight an important research question, to which I will propose an answer in section 1.4.5. How to explicitly incorporate the diversity and multiplicity of experiences found in today's cities in processes of envisioning possible urban futures, as well as the different worldviews that will shape such futures?

1.1 WHAT IS THE FUTURE?

Any definition of "future" is also a statement about the way in which time and human agency through time are understood. Most societies throughout history developed ways of imagining and anticipating individual and social futures (List 2005; Urry 2016). The methods for predicting the future, the characteristics of what is foretold, and the consequences of the predictions, all depend on whether the future is perceived to be: in

the hands of gods or humans; whether it unfolds primarily through linear or circular time and; on systems of believes (Urry 2016; Adam 2010).

In most ancient mythologies, and for most of human history, the future was in the hands of the gods. While humans had control over their actions (and the direct consequences of these actions), individual futures were seen as embedded in a cosmic master plan. Only selected individuals (fortune tellers, prophets, oracles) were believed to be able to receive from the gods messages revealing their plans for individual and collective fate (Adam 2010). For everybody else, the future was "regarded as predestined–an existing landscape that will be revealed as we travel through it" ("Futures—Confidence from Chaos" 1969).

A significant change in the way in which futures are conceptualised has occurred in the last few centuries. In the Western(ised) world[2], futures are not seen anymore solely as determined by immutable destiny, but largely as influence by historical circumstances. Robinson (2003) describes this shift as one from "deterministic" to "probabilistic" futures, and attributes it to the emergence of modern science during the scientific revolution of the 17th century. Other historians have argued that this change in perspective didn't occur in a particular historical moment, but over a longer period (Adam 2010; Le Goff 1982; Hölscher 2014). Some scholars attribute this new way of conceptualising futures to the diffusion of tools for standardising and measuring time (such as clocks and calendars) (Adam 2010; Bell 2002). These tools made it possible to plan and act ahead (mostly in trading). They also decontextualized time (and therefore

[2] *Because of the geographical and cultural context in which this thesis is developed, this chapter will focus primarily on European and North American traditions. Other schools of thoughts will be considered later on in the chapter when relevant.*

futures) from the cycles of stars and season, and therefore from the control of the divine forces regulating the universe (Glennie and Thrift 2009).

The interest in looking ahead into the future didn't end with this shift. On the contrary, as I will explain in section 1.3, gave origin to new fields of inquiry, aimed at speculating or anticipating the future.

In particular, the field of Future Studies emerged as an interdisciplinary attempt to systematize research about possible futures (1.3). It is in this context that some of the most commonly adopted descriptions of the general characteristics of the future have been developed.

1.1.1 Alternative Futures: main concepts and definitions

This section reviews key frameworks and descriptions that influenced the way in which "futures" are currently conceptualised in the Western world. What all of these theories have in common is that they recognise the impossibility of accurate and reliable predictions, and admit the existence of an array of potential alternative futures. Such epistemological position is highly influenced by the theories of complexity and the notion of complex adaptive systems developed in the 1960s (Urry 2016).

In complexity science, complex adaptive systems are systems that are characterized by a large quantity of agents involved in non-linear interactions that generate a large and essentially impossible to predict impact on the structure of the system itself (Lewin 1999). Although originally developed in relation to quantum mechanics, similar patterns of behavior can be identified in a variety of other systems, including organisms, cities, the market, and large scale socio-technical systems (Gell-Mann 1995; Urry 2002, 2016).

The non-linear behaviour of complex systems means that, according to Amara's three laws of the future, the future is not predetermined and not predictable. It also means that that future outcomes can be influenced by our choices in the present (1981). Almost thirty years later, with a similar focus on the unpredictability of the future, Rescher writes that the "three most salient facts about the future are: that it does not (yet) exist, that it unavoidably will, and that we do–and *can*– have very incomplete information about its nature, let alone achieve control of it" (Rescher 1998, 3 italics in the text). Dator points out both that the future is always unpredictable and that "the fundamental unpredictability of the future does *not* mean that we should therefore not concern ourselves about the future and merely trust in luck, god, or fate" (Dator 2002, 108).

Bell defines the future as "what people can shape and design through their purposeful acts. (…) [P]eople try to know not only what is happening, but also what might happen, what could happen, or, under particular conditions what will happen *in the future*." (2002, 3 italics in the text).

Bell's orders of probability of futures (what "might", "could", "will" happen), is in line with a way of classifying alternative futures that is originally attributed to Henchley and later on expanded and represented by Hancock and Bezold first, and Voros later.

Henchley (1978) identified four classes of futures:

- Possible Futures: all the futures that we can imagine might happen, no matter how unlikely based on current scientific knowledge;
- Plausible Futures: all the futures that could happen according to today's current knowledge;
- Probable Futures: the futures that we think are more likely to happen, based on our understanding of how current trends could continue;

- Preferable Futures: the futures that one would like to happen (sometimes called prescriptive futures or normative forecasts (Evans 2010a))

In addition, Voros (2003) includes a fifth class of futures:

- Potential Futures: all of the alternative futures, including those that are beyond the power of imagination.

Finally, Voros also includes in the framework the concept of "wildcards": low probability events with a very high impact and able to produce major change (2003).

Hancock & Bezold (1994) represent Henchley's futures on a cone showing how the degree of indeterminacy grows through time. Voros adapted the diagram to include all of the five classes of futures (Figure 2).

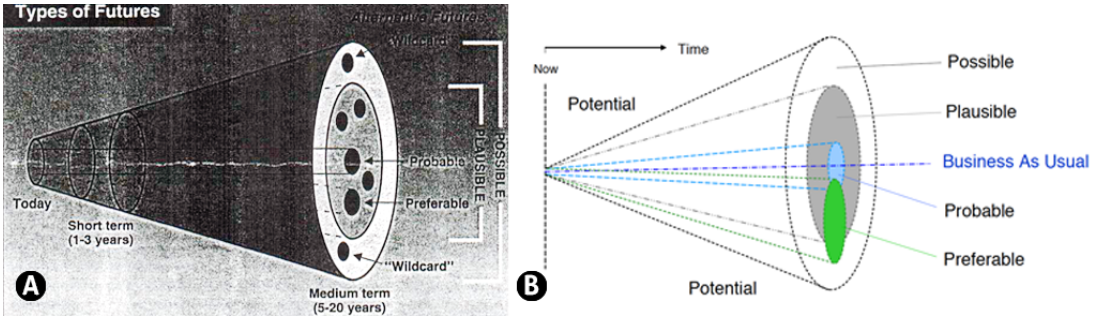


Figure 2 (A) Hancock & Bezold's cone of futures (1994), and (B) Voros' version, which include potential futures (2003)

Glenn (2003; cited in Evans 2010a) summarises the various frameworks that describe futures into a series of philosophical assumptions that he sees as being shared by most futurists:

1. You cannot know the future, but a range of possible futures can be known;
2. The likelihood of a future event or condition can be changed by policy, and policy consequences can be forecasted;

3. Gradations of foreknowledge and probabilities can be made; we can be more certain about the sunrise than about the rise of the stock market;
4. No single method should be trusted; hence, cross referencing methods improves foresight;
5. Humans will have more influence on the future than they did in the past.

The cone of futures has been commonly adopted in the dissemination of future focussed research work, because it provides a clear and (for most audience in sharing the Western conceptualisation of futures) easy to understand description of the multiple possibilities, their degrees of probability, and consequent the uncertainty in attempts of forecasting. However, when used in a literal sense, this metaphor fails to address some of the key complexities of future thinking.

Various authors have highlighted how futures will not be shared and homogeneous, but discrete and diverse. What the cone doesn't capture is the fact that the diversity that characterises the present will also be replicated in the future, and that therefore the cone, and the trajectories within the cone will look very different for different people in different parts of the world (List 2005; van der Heijden 2005; Savransky and Rosengarten 2017). Drawing on the philosophy of Vieira Pinto[3], Gonzatto (2013) goes further, arguing that not only the future, but also the past (and imaginaries of the past) is shaped by what is "at hand" in one's present. In turn, the "handiness" of the present (objects, ideas, possible actions that are available to someone) is shaped by a "socio-historical construction of reality" (Gonzatto et al. 2013, 37).

[3] *Specifically: Consciencia e realidade nacional. (1960) and O Conceito de Tecnologia. (2005). English translation of original texts not available*

The way in which past experiences and imaginaries influence our perceptions of the present and the future is also captured in McLuhan's famous quote: "we look at the present with a rear-view mirror. We march backwards into the future" (McLuhan and Fiore 1967, 74). Sardar (2010, 178), reflecting on the potential and shortcomings of futures in future studies also writes that looking ahead also should involve "being aware of what lies before and beneath the horizon". Furthermore, just like the future, the past is not a homogeneous entity; both in its actualisation and in the way it is thought of (Law and Urry 2004; Coulton, Burnett, and Gradinar 2016). In section 1.4.3 I will further explain how the uncritical use of the "cone" as a visual metaphor within certain approaches to speculative art and design contributed to the lack of diversity in the way futures are envisioned.

Finally, it must be reminded that if futures are conceptualised not as static moments in time, but as emerging and evolving situations (see earlier in this section), then it is important to specify the time scale when discussing or imagining futures. As concrete actions can only be taken in the present (Gonzatto et al. 2013; Urry 2016), scenarios of far or near futures may have different aims and purposes. For examples, three of the four Design Experiments presented in Part B of this thesis look at possible futures that might happen fifty years from now (DE#0, DE#1, DE#2). These scenarios are developed for the purpose of informing discussions and suggesting less-likely alternatives. On the other hand, one of the Design Experiments in this thesis (DE#3) reflects on the outcomes and methods employed in a workshop in which participants developed sets of scenarios 25 years in the future. These scenarios were used to inform concrete strategies and develop a plan of action (see Chapter 6).

This section has presented different ways of conceptualising futures that reflect on one hand on its unpredictable and emergent nature, and on the other on its connection to

choices and actions. In the following section I will elaborate on two different attitudes towards futures: anticipation and speculation.

1.2 ATTITUDES TOWARDS FUTURES

Based on evidence from multidisciplinary literature, in this section I identify two alternative attitudes for looking at futures that have emerged, namely:

- Anticipation: trying to understand how the future might unfold through the systematic use of methods and for a strategic purpose.
- Speculation: imagining what the future might look like if certain conditions (however unlikely) were met, for the purpose of furthering discussions, challenging existing trends and assumptions, or propose radical ideas.

From a disciplinary point of view, these two attitudes are represented by sets of distinct (and in some case epistemologically incompatible) fields, and are investigated through the use of very different methods and approaches. Future Studies is the field that developed as a systematic approach to anticipation. One of its key aims is to research and develop methods for studying alternative futures (1.3). Speculative futures are instead explored mostly through art, design, architecture, and literary fields (1.4). These include science fiction, speculative design, and speculative architecture.

While the two approaches have mostly developed separate and at times incompatible lines of inquiry, several authors suggested that the two ways of looking into the future might have much to learn from each other (see 1.3.2 and also (Bassett, Steinmueller, and Voss 2013; Urry 2016; Urry et al. 2014).

1.3 ANTICIPATING FUTURES, THE WESTERN FIELD OF FUTURE STUDIES

Future studies (or future research) is the study of the future through a systematic and semi-structured approach to considering and anticipating potential futures (Spies 1982; Evans 2010a; Schwartz 1996) through the use of scientific methods and processes (Son 2015). It is an action-oriented approach, aimed at informing perceptions and strategic choices (Amara 1981; Bell 2002) by exploring, creating and testing possible and desirable futures, and then reflect on how policies and actions might change them (Evans 2010a).

While people have always looked at futures (see 1.1 and also Schwartz 1996; List 2005), most scholars regard the Western field of future studies, at least in its modern incarnation, to be born at the end of World War II (Kahn and Wiener 1968; Son 2015; Bundy 1976; Cornish 1977). This section will provide an historical account and an overview of the most influential intellectual positions that shaped the field of future studies. The scope of the review in this thesis is limited to the way in which future studies developed in the West. Many of the core assumptions, concepts, and methods that defined the field date back to the post-war period and very much reflect the political and cultural climate of the Western Bloc during the Cold War (Son 2015). Other important examples of non-Western future studies that will not be covered include Middle-Eastern (Hejazi 2010), Islamic (Zakaria 2010), African (Fox, Rowntree, and Kaskinen 2012), Asian (Inayatullah 2007) (including South Korea (Son 2013)), and Australian (Ramos 2004) perspectives.

Son (2015) divides the history of future studies in three main periods. The first phase, beginning in 1945 to the 1960s, was characterised by the rationalisation of futures: "purposive-rational actions penetrated into the study of futures and futurists [were] encouraged to generate future knowledge through a process of systematic inquiry as a

professional practice" (Son 2015, 123). In the US, the fear of imminent nuclear and security threats lead to the development of a number of methodologies for scientifically exploring alternative scenarios and "what if" questions (Son 2015; Cornish 1977). Methods included game-theory, Delphi Method, modelling, and cross-impact matrices" (Tolon 2012). This was also the period when scenario methods and foresight were developed (1.3.1).

Meanwhile, in France, futurism was highly influenced by intellectual currents. Existentialism, in particular, conceptualised the future as something to be invented or created, rather than something that unfolds. In the 1960s, French futurists inspired a tradition of attempting at transforming society through technology and following a vision (Cornish 1977). These early attempts developed later on into organisations and projects aimed at expanding and strengthening the field of future studies. Notable organisations in Europe included The Futurible Internationales, the World Future Studies Federation, and the Club of Rome, and projects such as Mankind 2000.

Two main events, according to Son's periodization (2015), influenced the second phase of future studies, which lasted until the end of the 1980s. The first one was the publication of "The Limits to Growth" by the Club of Rome in 1972. The book included computer-modelling scenarios for the future of the global economy and environment, and highlighted the fact that unlimited growth could result in worldwide catastrophic outcomes such as malnutrition, resource scarcity, environmental deterioration, and economic collapse (Son 2015). The second event was the oil crisis of 1973. The crisis was largely due to a chain of disruptive events that could not be captured by the traditional "predict-and-control" paradigm, centred around forecasts that were built by projecting future trends (van der Heijden 2005). Royal Dutch/Shell Group was the only oil company that could identify the first signs of the crisis, as these were coherent with one

of the alternative scenarios (1.3.1) that were envisioned by in-house teams of futurists years before the striking of the crisis. The success of Royal Dutch/Shell during the crisis brought the business community to get involved in future thinking and to use scenario methods instead of forecasts to understand alternative futures and paths (Linneman and Klein 1983). At the same time, the pessimistic message of "The Limits of Growth" lead to "the foundation of a series of scenario studies on the survival of mankind" (van Steenbergen 1970).

Finally, the third and still ongoing period of future studies identified by Son corresponds to "the neoliberal view" of the future (2015). The end of the Cold War, the spread of information technology, and neoliberal globalisation have come to prioritise, since the early 90s, neoliberal approaches to the future, through the use foresight techniques both in corporate and national contexts (see for example UK Government Office for Science 2013). Foresight techniques consist of strategic forward-looking analysis of socio-technical systems conducted for the purpose of identifying promising areas of research and development to plan investments (Son 2015).

The over-reliance on foresight as a lens through which to look at the future has been critiqued as problematic by a number of authors (Inayatullah 2010, 1990; Dator 2009). Foresight analysis, like any other method of anticipation, is not value-free, but it does, often get framed as such, leading to the power of dominant groups being reinforced in visions of futures and related strategic planning (Son 2015). Section 1.3.2 elaborates on this point and considers alternative views and approaches.

1.3.1 Scenarios in future studies: exploring alternative futures

This section looks closely at scenario building, as one of the most impactful contributions of the field of future studies. It will describe how scenarios have been

historically used in very different contexts, and how different types of scenarios are currently categorised. In a later section of this chapter (1.4.4) I will discuss the influence that these methods had in the field of design and how they have been adapted for speculative, rather than anticipatory, purposes.

Scenarios are plausible, challenging and relevant stories about how the future might unfold (Hunt et al. 2012), developed to inform strategies or to guide interventions (Börjeson et al. 2006). Originally developed to plan military strategies, their history unfolds along diverging paths.

As anticipated in 1.3, after World War II scenario planning as a method was transferred from the military to the civil world. In the US, in the early days of the Cold War, Herbert Kahn was credited with developing a methodology to provide a comprehensive overview of all the different possible futures that a potential nuclear crisis could bring about. He did so first with RAND Corporation (an American global policy think tank), and later on at the Hudson Institute, the American conservative organisation that he co-funded and that is still in operation. Kahn's scenarios are probabilistic assessments of future, that focus on causal sequences of possible events and on the role of decision making (Kahn and Wiener 1968).

In the US, Scenario planning methods have later on been adopted in the private sector by companies looking for effective tools to support long-term strategies. One of the definitions of scenario in this context, provided by Peter Schwartz in "The art of the Long View" (1996) is: *"*a tool for ordering one's perceptions about alternative future environments in which one's decisions might be played out." One of the first companies to adopt "scenario analysis" as a strategic tool was Royal Dutch/Shell, where Kahn's approach was developed to include human behaviour as one of the non-quantifiable,

critical factors influencing pathways towards the future (van der Heijden 2005). Scenarios have been used at Shell to test initial ideas for projects and interventions against different alternative futures, with the objective of planning for flexibility. This flexibility consisted in the ability of being prepared to rearrange and take the right decisions once the key patterns that identify the emergence of one particular scenarios are detected (van der Heijden 2005). As introduced in 1.3, this approach enabled Shell to identify the first signs of the oil crisis, and to react accordingly.

In the same period, in France, scenarios were adopted to develop public policies and planning strategies. Unlike the North American approach to scenarios (that took a global perspective), French scenarios were mostly narrowly focussed, and with a normative aim (Bradfield et al. 2005).

Scenarios have also been widely used in research on resilience and sustainability, initially as a reaction to the Buntland Commission's 1987 report "Our Common Future".

In 1991, four years after *"*Our Common Future*"* was published, Tellus Institute and Stockholm Environmental Institute, started the Polestar Project (polestar.org). The aim of the project was to develop scientifically-grounded ways to examine long-range socio-ecological prospects, evaluate policy adjustments and their implications. The research resulted in the creation of the PoleStar System, a computer-based tool intended to support the construction of integrated, long-range scenarios primarily based on quantitative data.

In 1995 Tellus Institute and Stockolm Environmental Institute assembled the Global Scenario Group (GSG), an interdisciplinary and international group that creates, evaluates, and refines scenarios of alternative futures for the 21st Century (GSG 1995).

According to the GSG, "a scenario is a story, told in words and numbers, describing the way events might unfold. If constructed with rigor and imagination, scenarios help us to explore where we might be headed, but more, offering guidance on how to act now to direct the flow of events toward a desirable future" (http://www.gsg.org/gsgintro.html)

The first set of scenarios was proposed in 1997, and consisted of three main scenarios and six variants. Other research groups and institutions have developed global scenarios to reflect on alternative futures at different scales. Hunt et al. (2012) collected a set of 160 scenarios produced between 1997 and 211, and identified that four of the six variations of GSG scenarios constitute recurring scenario archetypes that appear in various forms in most of the sets. These are named: Policy reform, Market forces, Fortress World, and New sustainability Paradigm. A full description of each scenario is available at http://www.gsg.org. Hunt and colleagues demonstrate in their review how this set of scenarios highly influenced the way in which futures are portrayed by various groups of academics conducting research in environmental, social, and engineering fields.

1.3.1.1 A characterization of scenarios

As a strategic planning tool, scenarios have been used in many different fields, and for this reason there is very little agreement on methods and even ways of classifying the many existing approaches. Börjeson and others provide a comprehensive characterization of scenario types and techniques based on literature and case studies reviews (2006).

This typology (Figure 3) identifies three distinct main questions that different types of scenarios ask: what will happen? What can happen? How can a specific target be reached?

"Predictive scenarios" respond to the first question ("what will happen?"). Predictive scenarios claim to describe probable futures given existing trends. They are either *forecasts* (elaborating on what is most likely to happen) or *what if* scenarios (answering specific questions on what is most likely to happen in case of specific events in the near-future).

"Explorative Scenarios" deal with possible futures, and the question of "what can happen?" They normally are developed as sets of scenarios, and "explore situations or developments that are regarded as possible to happen, usually from a variety of perspectives" (Börjeson et al. 2006, 727). They can be *External*, i.e. dealing with aspects that are entirely beyond the control of relevant actors (like in the case of the GSG scenarios) or *Strategic*, i.e. incorporating possible interventions "at the hand of the intended scenario users to cope wit the issue at stake" (Börjeson et al. 2006, 728). The scenarios used in the 1970s by Royal Dutch/Shell were strategic scenarios.

Finally, Normative scenarios are those that explore preferable futures, and ask: "how can a specific target be reached?" Normative scenarios suggest either how to reach a particular target when to act within an existing system (*Preserving scenarios*) or how to structurally transform those aspects the prevailing system that prevent us from reaching the desired target (*Transforming scenarios).* Unlike in the other two categories of scenarios in the typology, the actors that are involved in building Normative scenarios adopt an active and generative role in thinking about the future.

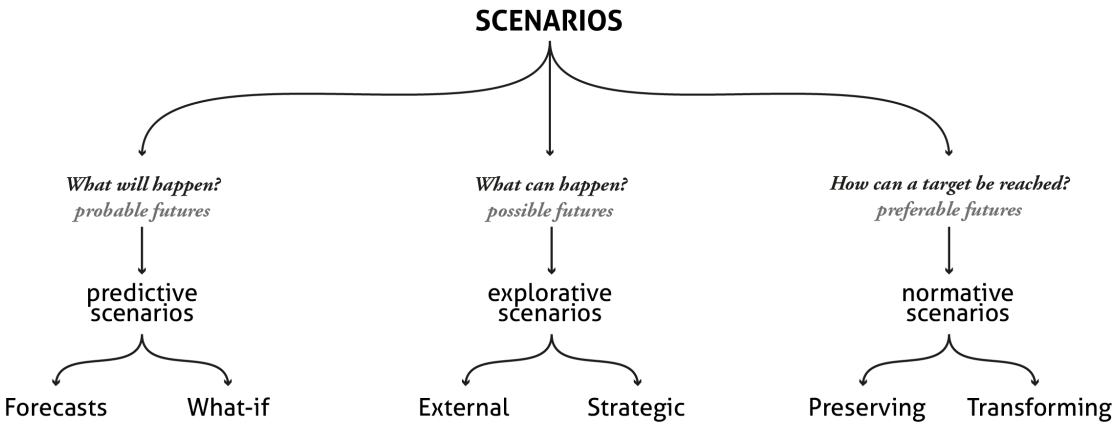


Figure 3 Adapted from Börjeson et al. (2006): Scenario typology with three categories and six types

In this section I presented an overview of scenario-making as a methodology employed in future studies to support strategic decision making through attempts at rational modelling. However, scenarios reveal just as much of the scenario maker as they do of the future they portray. As Dator writes in his review of future studies: "We shape our tools and thereafter our tools shape us" (2007, 2)[4].

Futurist Andrew Curry writes that "one of the problems with much futures analysis is that if it is any good it produces far too much 'variety' for the organisation (or group of organisations) to process it effectively" (2009, 119). Scenarios are therefore to be looked at critically, as processes of learning, framing, synthesis, and negotiation rather than value-free windows to the future (Curry 2009). As it will be further explained in the following section, this also means that the power of dominant groups to influence discourse (Son 2015) should not be discredited.

[4] In reality, although not indicated in Dator's text, this is likely not to be an original statement of the author, This quote is most commonly attributed to Marshal McLuhan, who was citing in turn an article titled "A Schoolman's Guide to Marshall McLuhan" by John M. Culkin (1967).

1.3.2 Critical future research

In the first part of section 1.3 I presented a brief historical overview of the Western field of future studies, and sought to show the various approaches to the study of the future have been entangled with historical events, contextual and situated conditions, as well as political agenda and cultural discourses. For example, as introduced towards the end of the previous section, scenarios (one of the most common methods in future studies) are not value-free or value-neutral. In his historical overview of the field, Son (2015) writes that for every issue there could always be many normative scenarios that reflect the diversity of values and "preferred" futures for different commentators. Yet, for decades futurists have for the most part "ignored the moral orientation of future studies" (Son 2015, 134)

Critical future research emerged within the field of future studies as a response to such lack of transparency in discourse about futures. Adopting techniques from critical discourse analysis (among other methodologies) critical future studies focuses on the social construction of the future and its symbolic functions (Slaughter 2002; 2004), and seeks to understand the role of power structures in "neutralizing certain questions and leaving unproblematic others", to understand "how a particular future has become hegemonic" (Inayatullah 1998, 817).

Generative approaches of critical future studies often draw on other ways of knowing and categories of knowledge from other civilisations to disturb power relations, question assumptions and taken-for-granted categories of knowing and propose alternative, otherwise unimaginable futures (Inayatullah 1998; Son 2015). Inayatullah, in particular, developed the Causal Layered Analysis (CLA) method for building multi-layered future visions by engaging not only with concrete structures, infrastructures, and systems, but

also with deeper layers of meaning, such as world-views, metaphors, and myths (Inayatullah 2013, 1998, 2010).

Critical future studies brings back subjectivity in the way we conceptualise futures, and in doing so, it leave space for imagination and debate. In a sense, it opens the door to speculation as a way of playing with metaphors and meaning, and imagine deeply different and divergent futures (Inayatullah 2013).

1.4 SPECULATING ABOUT FUTURES

According to the Oxford English Dictionary, the most common current use of the term "speculation" indicates 'The conjectural anticipation of something', or 'An act of speculating, or the result of this; a conclusion, opinion, view, or series of these, reached by abstract or hypothetical reasoning' ("Speculation" 2017).

In this thesis, the terms "speculation" and "speculative practices" are used to identify ways of looking at futures that ask and explore (however unlikely) answers to "What if" questions, with the aim of furthering discussions about what the future might look like. Or, as Whitehead puts it: speculative practice offer propositions, i.e. "tales that perhaps might be told about particular actualities" (Whitehead 2010, 26)

Unlike anticipatory practices, speculations are, generally speaking, not concerned with assessing the degree of probability of things and events to come. On the contrary, they welcome radical ideas that challenge expectations and assumptions based on trends on what the future might entail. Savransky and Rosengarten (2017) write that speculative futures are not considered as objects of knowledge, but as "vectors of creative experimentations". Because of this, speculative practices are particularly inclined to the explorations of those events that, against all odds, transform the very order of the possible, the probable, and the plausible.

Despite what the structure of this chapter (divided into two streams) might suggest, speculation and anticipation are not perfectly antithetical, but have historically been in "mutual engagement and even co-constitution" (Bassett, Steinmueller, and Voss 2013). In particular, Basset and others (2013) recognise the role of Science Fiction in influencing nascent technologies and industries (e.g. Gibson's work and Second Life), and how these are framed and presented (e.g. the swiping in *Minority Report*). Science

Fiction also shapes the cultural debate around specialist areas (e.g. *1984* and surveillance) and the way science and technology are publicly understood (e.g. *Jurassic Park*).

Beyond the realm of fiction literature and film, the role of speculation, and in particular of utopia, as a way of imagining real possibilities out of what appear to be impossible and engage critically with the present, has been explored by various authors (particularly in social science and architecture), including Lefebvre (1996, 1991), Levitas (2013), Coleman (2005), Pinder (2013).

The following sections will provide an overview of how futures are explored in design, with a particular focus on speculative practices and their role.

1.4.1 Design and Futures

Design historian and theorist Victor Margolin positions designers, as creators of models, prototypes, and propositions, in a dialectical space between the present and the future (2007). Most types of design embed future thinking in processes that resolve into objects, services, systems, or other types of products to be used in the present. But others engage primarily and explicitly with futures, by creating artefacts (such as visions or prototypes) that materialise, interpret, and reflect on possible social, cultural technological and economic futures (Evans 2010a).

Dunne and Raby divide design into two broad categories: affirmative design and critical design: "the former reinforces how things are now (…) the later rejects how things are now as the only possibility" (Dunne and Raby 2001). These two categories can also be applied to forms of design that explicitly engage with futures:

- **Affirmative speculative design:** future visions as corporate design fictions (Revell 2013) as a form of foresight that explores future trends while simultaneously influencing areas of research, development, and investment.
- **Critical speculative design:** design of future worlds or elements of future worlds as a way of critically question and discuss possible futures and their implications.

These categories respectively mirror the two attitudes towards futures that have been presented in this chapter: anticipation versus speculation.

1.4.2 Design and anticipating futures

The commercial world of technology has a recent history of producing future visions that use images to "make the future present", for the lay public (Kinsley 2010). Large corporations such as Nokia, Microsoft, and Google among others used dedicated websites as well as social media to share their visions of what daily life in the future will look like.

In reality, involving designers, video-makers, and artists to translate research on trends and future scenarios into easy to understand visual stories is not an entirely new practice. One of the earliest examples of this genre is General Post Office (now BT)'s "Vision of Future Communication", a two-minute video produced in 1969 that showed how we will communicate and work remotely in the future. Just like in more recent examples, the video presents technologies that are nascent or not available at the time the video was shot. It also includes some impossible products, such as a display that can impress images on instant film, and that in order to do so would have to emit incredibly high (and dangerous) levels of UV radiations (Figure 2).

Similarly, contemporary corporate future visions create and stage fictional prototypes embodying the future of technology as envisioned by the company through a mix of trend and foresight research and branding (Evans 2010a).

The original version of this thesis includes a figure that shows three photograms from three different corporate future vision videos: Microsoft (2009), Nokia (2011), and Samsung (2015). Despite being produced by three different multinational companies (based, respectively, in the US, Finland, and Korea), these visions depict the future as homogeneous, and in relation to almost identical lifestyles.

While GPO (BT)'s vision of the future includes glitches and frustrations, that characterize daily life, and addresses some of the scepticism and issues that the public might encounter with new technologies, Revell comments that in contemporary corporate future visions "everyone's happy, nothing is broken or smudged. There is infinite Wi-Fi with infinite bandwidth, no batteries run out, no traffic no delays. This is the preferable future bit of the futures cone[5] - at least to some. And it totally lacks in humanity. The people are props for the technology" (2013). Futurist Scott Smith calls these visions "flat pack futures in which everybody has similar values and aspirations (productivity, success, health, beauty), and in which technology can be seamlessly adapted to address anyone's needs.

In some cases, most notably in the case of Philips' Design Probes (Philips 2008), future visions and prototypes of fictional future products are developed as research and design projects in their own right. Their objective is to explore and experiment with possible future technologies, lifestyles, and ways of interacting with everyday objects. They are

[5] *Here Revell refers to Voros' cone, see section 1.1.1*

"industrial design concepts and scenarios that rather than being predictions were designed to stimulate discussion and debate" (Philips 2008).

However, these visions are initiated and disseminated by companies prioritising their economic and strategic interests. So, despite being framed as means for "discussion and debate", they contribute to reinforce and propagate mainstream trends (Fry 2008) and corporate aspirations, without questioning or challenging them.

As a reaction to corporate-led strategies and visions of futures, various forms of speculative design have emerged. Unlike corporate-led future visions, speculative design explicitly challenges and critically discusses, through the means of design, possible futures and their implications.

1.4.3 Speculative design practices

In "Design Futuring"(2008), design philosopher and theorist Tony Fry writes that design, as a directional practice shaping the artificial, has a responsibility towards the future. The impact of design extends beyond the constellation of artefacts that design creates. Fry argues, citing Bordieu, that the way we live is designed by the material world that we designed: a world we were born into and which is the only one we know (2008).

Tony Fry is hardly considered a "speculative designer" per se, as his main concern is how design and politics can produce concrete impact to redirect or respond to the large-scale effects of climate change. But, he argues, it is precisely through critical fictions asking key questions that challenge and potentially radically alter the way the artificial world is materialised that design can bring about major transformations. The crafting of these critical fictions is the subject of speculative design.

The term "speculative design" is used in academia to indicate non-commercial design practices that speculate on future products, services, systems, and worlds through the use of artefacts such as objects or visualisations. The role of these artefacts is to make possible future worlds visible and tangible, so that they can be questioned, discussed, and manipulated (Auger 2013; Dunne and Raby 2014). Unlike future studies or corporate-led future visions, speculative design is not interested in anticipating what products, services, places, and technologies will be like, but in "possible futures and using them as tools to better understand the present and to discuss the kind of future people want, and of course, ones people do not want" (Dunne and Raby 2014, 3).

As an umbrella term, it has come to include approaches such as "critical design", "design fiction", "radical design", "adversarial design", etc. Many of these practices overlap[6], and the terminology that is used by different authors varies in different geographical and cultural contexts (Auger 2013). What all of these practices have in common is that design is used as a vehicle to reflect on the daily experience of "futures", as materialised through socio-technical assemblages (Malpass 2017). In other words, generally speaking speculative design is not concerned with large-scale foresight, but with the future as a personal and lived experience.

Various authors (Malpass 2012; Sparke 2013; Mazé 2007; Kerridge 2015) argue that the roots of critical practices of speculative design can be traced back to the 1960s-1970s Italian avant-garde movement in art, design, and architecture. This movement included a series of critical design practices, including radical design, counter design, anti-design (different names were used by different groups). These movements were a reaction to

[6] For example, Dunne and Raby went from describing their practice as "critical design" to calling it more recently "speculative design", as they felt that the word "critical" was leading to misinterpretation in some contexts (Dunne and Raby 2014).

the rapid emergence of a consumerist culture in Italy in the post-war period, and embodied a dissatisfaction with the role of design solely at the service of mass production and consumption (Malpass 2017). The generation of designers in the Italian avant-garde (including Sottsass, Mendini, Branzi, Navone, and others, many of whom working in groups such as Superstudio or Archizoom) was the first one to explicitly and critically engage with discursive practices (Malpass 2017; Sparke 2013), by creating propositional objects and environments as well as alternative practices of doing design and architecture (Coles and Rossi 2013).

The involvement of Italian avant-garde groups wasn't limited to design practice, but was intended to impact on broader issues of social, cultural, and political discourses. For this reason, the role of magazines (especially Casabella, Domus, Modo) and self-produced publications (such as the Global Tools bulletin and Gruppo Strum's 'fotoromanzi') was essential to disseminate speculative ideas (through collages, sketches, photomontages) and theoretical writings and manifestos (Colomina 2010). These publications and a series of exhibitions and seminars held in museums in Italy and abroad and progressive art galleries resulted in these movements having a profound influence on speculative design practices of their time (such as Archigram and Utopie, see Chapter 2) as well as later ones.

The legacy of the avant-garde is evident in the practice of critical design, a form of speculative design that Dunne and Raby have been developing in the last fifteen years, at the Royal College of Art in London first, and at the New School in New York more recently. According to Dunne and Raby, critical design is "[the use of] speculative design proposals to challenge narrow assumptions, preconceptions and givens about the role products play in everyday life. It is more of an attitude than anything else, a position

rather than a method" (Dunne and Raby 2009; Dunne 1997). Critical design revitalised the field of speculative design, particularly within the discipline of interaction design (Revell 2013). There are many similarities between the critical design approach and the Italian avant-garde, and two main differences: the narrower focus of the debate proposed by critical design, centred on the impact of technology on everyday life (rather than on broader social, cultural, and political aspects), and the aim (or at least the declared ambition) to popularise the debate beyond the boundaries of academia (Kerridge 2015). To do so, critical design build narratives that contextualise disruptive electronic objects in familiar settings, to "encourage complex and meaningful reflections" (Dunne 1997, 102) on the critical and often ethically problematic aspects of technology. Dunne and Raby summarised the differences between affirmative and critical design in the a/b manifesto.

Design fiction is another approach that seeks to "speculate about new ideas through prototypes and storytelling" (Malpass 2017, 54). It is closely related to critical design, but it is usually described as a method, rather than a practice (Malpass 2017).

The term "design fiction" is attributed to Bruce Sterling (2005), who describes it as "the deliberate use of diegetic prototypes to suspend disbelief about change" (2012). Compared to critical design, design fiction is much closer to science fiction, and often adopts the language, tropes, and media of this field, including the use of diegesis. In design fiction, like in science fiction, diegetic prototypes are those objects and technologies that "exist as 'real' objects that function properly and which people actually use" (Kirby 2009, 41) only within the space of the fiction. In his highly influential essay on design fiction, Bleeker describes examples of design fictions as "conversations pieces (…). A design fiction practice creates these conversation pieces, with the conversations being stories about the kinds of experiences and social rituals that might surround the designed object. Design fiction objects are totems through which a larger story can be

told, or imagined or expressed. They are like artefacts from someplace else, telling stories about other worlds" (2009, 6). Lindley and Coulton (2015, 210) extending Sterling's concept of design fiction and define it as "(1) something that creates a story world, (2) has something being prototyped within that story world, (3) does so in order to create a discursive space".

More than in critical design, storytelling is an important aspect of design fiction, and so is the world that the story suggests (Malpass 2017). For this reason design fictions are often constituted by a constellation of artefacts and different media, including text, videos, illustrations, photography, and physical prototypes used in combination to suggest possible worlds and alternative everyday experiences.

Both critical design and design fiction (as well as other types of speculative design) suggest possible near-futures that disrupt mainstream idea of normality but are still close enough to the present to be relatable and therefore debatable (Mitrović 2015; Tonkinwise 2016). They do this by forcing aspects of the future in a context that highly resembles the present (Dunne and Raby 2014).

However, some authors, and in particular Tonkinwise (2016, 2015, 2014), have criticised the lack of variation within the discourse and imagery of speculative design practices, arguing that its white, intellectual, middle class, western-centric perspective stands in the way of truly engaging with meaningful debates about discrete and diverse futures (1.3.2). Both Tonkinwise (2014) and Prado and Oliveira (2015) identify two main problems of speculative and critical design, at least as explored by Dunne and Raby (1997; 2014). Firstly, that it uses the pronoun "we" to describe the whole of humanity while neglecting to acknowledge that visions of the world are not value-neutral, and no two 'cones of futures' (1.1.1) are alike. Tonkinwise points out that in reality there is no singular starting

point in the future cone, and "many of us are in very different 'places' and with very different sets of futures" (Tonkinwise 2014, 174). Similarly, DiSalvo points out elsewhere that speculative design projects that fail to connect to actual practices and contexts are merely spectacles to "arrest us and pique our interest" (DiSalvo 2012b). Secondly, that in speculative design "dreams about the uncanny implications of tricky subjects such as birth, death, social anxiety, are predominantly expressed through the aesthetic of consumerism and still contained within a clear neoliberal framework" (Prado and Olivera 2015). This narrow view of what shapes the future neglects to include in the discussion alternative models that explore how even our core moral, cultural, religious values might change (Prado and Olivera 2015). As part of this criticism, Tonkinwise points out that already "there are strong design communities practicing and researching with models of future that challenge those of [Dunne and Raby]" (2014, 174). Interestingly, many of the criticism of speculative design mirror those that critical future research brings to the field of future studies (see section 1.3.2)

Finally, Prado and Olivera (2015) argue that speculative design practices can still perform a strong political function, as long as they openly acknowledge the diversity of the contexts in which they operate and extend their scope beyond the current economic model to include possible futures that question culture and society. In the following section I will explain how engaging with co-design and participatory design practices can help doing so.

1.4.4 Issues of participation in speculative design practices

The previous section presented a number of speculative practices and methods that approach design as a discipline creating artefacts to critically question and discuss possible futures and their implications. At the same time, a review of examples and the

critical commentaries on some of the most influencing streams of inquiry in speculative design highlighted the inability of such discussion to capture the diversity of futures (and presents) and to question the systems themselves in which artefacts and narratives are contextualised.

Building on both Tonkinwise (2014) and Prado and Oliveira's critiques (2015), I suggest that these shortcomings reflect a more (up until recently) deeply-rooted failure of speculative design to devise the necessary infrastructure for involving participants in a dialogue. The neglect for real dialogue is even suggested in one of the most widely accepted descriptions of speculative design, when Auger writes that "one of the core motivations of this practice is to shift the discussion on technology beyond the fields of experts to a broad popular audience" (Auger 2013, 12). How can there be a dialogue if one of the parts is mere "audience"?

Furthermore, even when participation is actively pursued, this mostly happens downstream, when "products of critical design (critical artefacts) are intended to provoke reflection in their audiences" (Bowen 2010, 2), and rarely upstream, in the early phases of idea generation and design of the artefacts. Bowen describe this choice as deliberate, noting that current approaches to participatory design "can produce solutions relevant to users' existing wants and needs, but could be less effective at producing innovative ideas that answer users' future or latent needs (i.e. needs that users are unaware of, but recognise as being relevant to them once satisfied" (Bowen 2010, 2). Similarly, Evans found that participants in visioning exercises "often struggle to go beyond the bounded thinking of what they understand and know and may require creative techniques to assist in free visioning" (2014, 194).

In the light of this, it is unsurprising that Sanders and Stappers (2008) position critical design[7] in the top-left quadrant ("design-led", "expert mindset"), on the opposite side of participatory design (Figure 4).

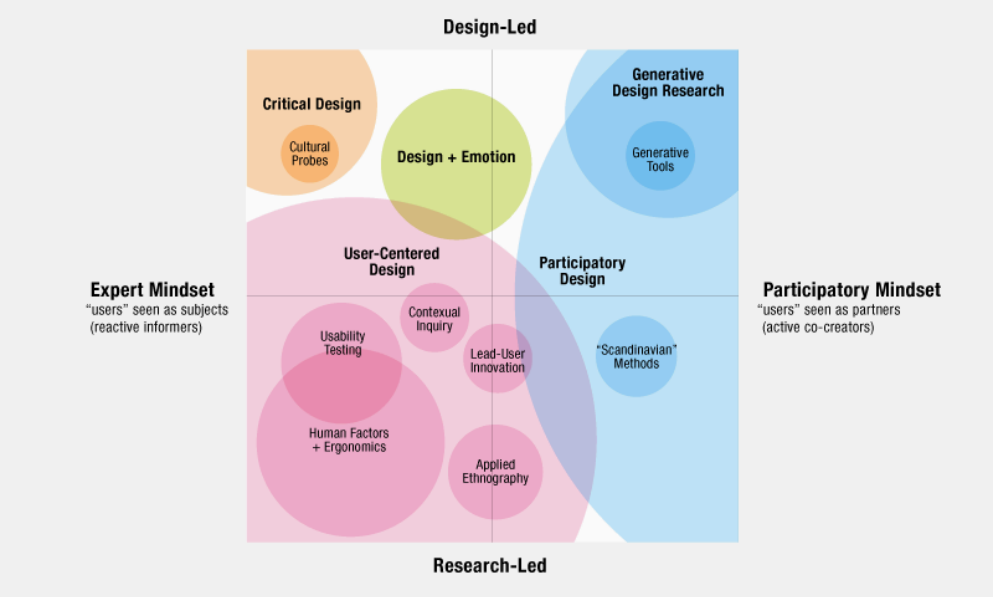


Figure 4. Map of Design Research (Sanders, 2008)

In more recent years (and after Sanders and Stappers' published their map), some synergies between participatory practices and speculative design have started to emerge, most notably (but not exclusively) in the collaboration between the Scandinavian school of participatory design (Pelle Ehn, Liam Bannon and colleagues at Malmö University) and Carl DiSalvo.

The use of participatory techniques in speculative design (and the inclusion of speculative practices in participatory and co-design) can be seen as a response to some of the criticisms of speculative design practices as well as the issues raised by Evans and Bowen (see earlier in this section). The combinations of these two approaches seeks to

[7] *In 2008 design fiction was still a nascent discipline, and "speculative design" was not yet widely used as an umbrella term within the design community.*

answer a key question: how can design create spaces and infrastructures for involving participants in building and debating speculative visions of futures that challenge mainstream assumptions?

1.4.4.1 Speculative design as creating spaces for agonistic pluralism

In a paper presented at the Design Research Society conference, Carl DiSalvo (2010) introduced the design community to the idea that design can be political by creating "spaces for agonism", which are "spaces for revealing and confronting power relations, i.e., it creates spaces of contest. This occurs both in and through the objects and processes of design: the objects and processes of design are both the site and means of agonistic pluralism" (p. 369).

The concept of agonistic pluralism was initially formulated by political theorist Chantal Mouffe, who identifies it as a necessary part of democracy. In "The Democratic Paradox", Mouffe suggests the need, particularly for democratic institutions, to design spaces in which "confrontation is kept open, power relations are always being put into question and no victory can be final" (2000, 15). The value of this confrontation, in fact, is that unlike artificial consensus around middle-of-the-road positions achieved through negotiations, it challenges hegemonies by unveiling their contingency and proposing alternatives (Mouffe 2012).

Mouffe sees great value in artistic and cultural practices, as they can contribute in revitalising democracy by creating agonistic spaces to question the status quo and imagine the otherwise. "According to the agonistic approach, critical art is art that foments dissensus, that makes visible what the dominant consensus tends to obscure and obliterate. It is constituted by a manifold of artistic practices aiming at giving a voice to

all those who are silenced within the framework of the existing hegemony" (Mouffe 2007, 4).

DiSalvo's work in design research and practice draws substantially from Mouffe's theoretical framework, that he has adapted, in particular, to the context of speculative design, as a way of highlighting multiple and conflicting positions about the futures, and bring forward "differences and dissensus" (DiSalvo 2010, 368).

The full version of this thesis includes an image that shows some photos from GrowBot Garden, a project organised by DiSalvo with Laura Fries, Thomas Lodato, Beth Schechter, and Thomas Barnwell at the Georgia Institute of Technology. In this project, groups of designers, artists, farmers, and other food producers were brought together in a series of workshops "to critically think about, discuss, and debate, agricultural technologies for small-scale agriculture" (The Public Design Workshop 2010). In this project (and in others adopting similar methods) participants were involved in a series of activities aimed at envisioning possible futures. The portfolio of ideas and prototypes that constitutes the main outcome of the project presents a pluralistic vision, that explores the complexity and diversity of the future without providing a summary or a solution to potential conflicting ideas.

Two years after introducing the idea of designing "spaces for agonism", DiSalvo expanded on this approach by creating the term "adversarial design". Adversarial design is "a kind of cultural production that does the work of agonism through the conceptualization and making of products and services and our experiences with them" (DiSalvo 2012c). DiSalvo's approach is directly inspired by Mouffe's thoughts on art, in that it focuses on objects and artefacts of communication (mostly data and information visualisation) that unveil and contest the hegemony. To be sure, the case studies

presented in the book are for the most part closer to critical design and design fiction, in that the critique is prioritised over the exploration of multiple alternatives. Elsewhere, however, there seems to be a recent growing interest in design practices that create spaces of agonism as ways to include complex networks of conflicting voices in constructing plural visions for urban future (see for example Huybrechts et al. 2016; Franzato, Poderi, and Del Gaudio 2016). Similar approaches have been adopted, for example, by Laura Forlano and Anijo Mathew who use speculative co-design methods to explore "frictions" within possible futures (2014), and –empirically– by design fiction agency Near Future Laboratory, who developed a Design Fiction Product Design Work Kit to support collaborative practices (2014). Both cases adopt a combination of techniques that are familiar to the field of participatory and co-design, where games, cards, props, and various tools are adopted both to generate creative ideas and explore conflicting view (E. B.-N. Sanders 2000; Simonsen and Robertson 2012), suggesting the potential of integrating co-design and participatory design techniques within processes of speculative future visioning.

1.4.4.2 Working with controversies and multiplicity of futures in participatory and co-design

The previous section suggested that tools and methods from co-design and participatory design could be (and have been) combined with practices of speculative design to create spaces in which groups of participants explore possible futures and their implications.

Participatory design is the direct involvement of users and stakeholders in the design of products, services, and system they use (Simonsen and Robertson 2012; Kensing and Blomberg 1998). Co-design is a particular type of participatory design, and it is currently used to indicate an approach to design whereby designers and people not trained in design work together in collective creative processes throughout the whole design

journey (Elizabeth B.-N. Sanders and Stappers 2008). In reality, terms and methods are often used interchangeably in co-design and participatory design, especially because participatory design has a longer history and (at least for now) more established theoretic and philosophical groundings.

Participatory and co-design practices have been developed and adopted in many contexts. The characteristics of the communities and places in which these approaches are implemented determine the challenges, opportunities, and ultimately the details of each research or practical project in this field. For this reason, a comprehensive review of the literature in participatory and co-design is well beyond the scope of this thesis. This section will focus in particular on how participatory design (and later on co-design) embraces conflicting views and agonism, especially in the context of speculative futures.

Participatory design has its roots in the Scandinavian social and political movements of the 1960s and 1970s, when people started demanding more inclusion in processes of decision making (Robertson and Simonsen 2012). What is common to all the different approaches and sub-fields of participatory design is the belief that all the stakeholders that might be affected by a design intervention should be able to have a say in it. Consequently, an essential task for participatory design as a discipline is to develop tools for capturing and understanding not only explicitly articulated information from experts and technicians, but also forms of tacit or experiential knowledge (Bjögvinsson, Ehn, and Hillgren 2012). As a result, identifying, mapping, and dealing with controversies and conflicting ideas is at the core of participatory design (Bannon and Ehn 2012).

As part of its methodology, participatory design has often been borrowing techniques from various disciplines, such as system theories or ethnography, and adapted them to support the dialogue between competing interests of the many stakeholders involved in

design process. Examples include Checkland's "soft system analysis" approach, that Bannon and Ehn (2012) identify as an early attempt to work with "narrative design tools" (such as scenarios or storyboarding), or Marianella Sclavi's "tools for active listening" (Sclavi 2002).

While many narratives of design projects tend to emphasize the development of concepts and the implementation of solutions within a team of experts, participatory design explores ways to creatively work with existing controversies and divergent ideas. The overarching concern of participatory design is "the need for providing means for people to be able to be involved, the need for respect for different voices, the engagement of modes other than the technical or verbal, the concern with improvisation and ongoing evaluation throughout the design process, etc." (Bannon and Ehn 2012, 41).

The review of the literature suggests that a co-design approach rooted in the participatory design tradition of articulating and working with divergence and controversies can support the design of diverse and radical visions of future. And in return, Bannon and Ehn highlight "the relevance of [speculative design] to people in Participatory Design is that it provides ideas and inspiration for challenging some of the taken-for-granted positions we adopt in relation to our society" (Bannon and Ehn 2012, 48)

For example, in 2012 the challenge of participatory design for "making futures" starting from controversies was tackled through a workshop that was organized as part of the Participatory Design Conference 2012 (Roskilde, Denmark). The aim of the workshop was to "collaboratively envision and plan for locally grounded particular futures" by involving "an assembly of local (often marginalised) participatory initiatives of future-making practices" (Topgaard 2012). Participants to the workshop were invited to present

an example of a local future "being made" (social innovation projects, new collaborations in public interventions…). In the first part of the workshop, the examples were explored individually, as "islands". During the day, the "archipelago of futures" was then mapped by drawing connections and search for collaboration and controversies between examples.

While being a one-off project developed in the context of an a academic event, the Travel Guide to the Future is an interesting example showing how future visions can be created starting from an explicit plurality of visions participating in the conversation. One of the objectives of this experiment in visioning was to understand how maps and visual tools could be used not only to explore controversies, but also as a design tool to explore possible futures. This aspect will be further elaborated in Chapter 2 of this thesis.

1.4.5 Co-designing scenarios for participatory speculations

In this final section of the chapter, I will describe Design Orienting Scenarios (DOS) as on one particular method for envisioning futures in a participatory way. By that, I do not mean to imply the superiority of DOS over other methods for building and discussing speculative future worlds, and indeed, DOS might not always be a suitable method. However, the ability of scenarios to capture multiple dimensions in a common space makes this method particularly appropriate for speculations on urban futures, which is (as it will be further elucidated in chapter 2) the main context of this thesis.

Evans defines scenarios in the design field as "descriptive visions of the future communicated through a narrative structure outlining how certain dynamics of change occur over time" (Evans 2014, 195). In this sense, the scenarios used in design are often similar to the normative scenarios in section 1.3.1.1.

Manzini and Jegou developed Design Orienting Scenarios (DOS) as a participatory method to envisage and communicate compelling stories about possible sustainable futures that disrupt current practices and systems (Jegou 2010). DOS are communicative artefacts produced both as a result and to further social conversations about possible futures that could be attainable if certain conditions were fulfilled (Jegou and Manzini 2004; Manzini and Coad 2015). They describe ideas that are "realistic enough to make us question our own lifestyles, but still sufficiently open-ended for us to adapt them to our own lives" (Jegou 2008). Unlike other types of normative scenarios, that usually include a phase of backcasting (Quist and Vergragt 2006; Börjeson et al. 2006), DOS welcome speculative future-focussed ideas that could not be realised with today's knowledge and technologies (see examples on www.strategicdesignscenarios.net/sustainable-lifestyles-2050). Dunne and Raby also described how speculative futures can "take the form of scenarios, often starting with a what-if question" (2014, 3).

In order to communicate a vision, DOS are often rendered as visual narratives, through photomontages, videos, illustrations. Because they are meant to further discussions, scenarios adopt "techniques of storyboard and video sketches [to] combine the proposals' considerable 'ability to stimulate', with their necessary 'flexibility of representation', that is, the need for them to be modified easily in response to suggestions" (Jegou 2010).

Finally, promising elements of the presents (in particular alternative ways of livings and countercultures) and memories of the past are deliberately brought into the scenarios. In their latest account of DOS, Manzini and Coad (2015, 132) remind us that 'by building on the fact that society is a laboratory of new ways of being and doing, [scenarios] use selected clusters of existing cases as raw materials from which to realize larger visions'.

1.5 SUMMARY

This chapter set out to understand the theoretical frameworks and the characteristics of processes for envisioning alternative futures in two seemingly antithetical attitudes, namely: anticipating and speculating. In doing so, it highlighted, for both attitudes, the importance of critically understanding the actors, agendas and concerns, power structures, values, and cultural and political contexts that engender such visions.

The dominant way of conceptualising futures, at least in the Western world, sees them as, more than ever before, highly influenced by human action, yet it still highly unpredictable and emergent in nature. The idea of "the future" has been, in current thinking, replaced by a wide range of alternative futures. These are often classified, as "potential", "possible", "probable", and "preferable" futures (1.1).

The Western field of future studies is primarily concerned with developing rational methods to anticipate how wide ranges of futures might unfold (1.3). The most prominent of such methods is scenario planning: a way of using statistical analysis and probabilistic modelling to develop alternative views of how the future might unfold (1.3.1). However, despite the focus on rationality held by futurists, the field has been criticised for failing to recognise "the moral orientation of future studies" (Son 2015). Critical future studies emerged as an alternative way of thinking anticipatorily about futures by foregrounding and unpacking values, metaphors, and worldviews (1.3.2).

In the following section of chapter 1 (1.4), I described how worldviews and metaphors are explored in speculations, as processes of asking "what if" questions and imagining what often appear as impossible. This section is particularly focussed on how design engages with futures, through the development of affirmative or critical visions. Critical visions, in particular, are the subject of approaches and methods such as radical design,

speculative design, critical design, design fictions, and adversarial design (1.4.3). Their intent is to critically question and discuss possible futures and their implications. At the same time, some commentators highlighted how many examples of critical speculative design fail to capture the diversity of futures (and present) and to question the systems themselves in which narratives and artefacts are contextualised (by replicating neoliberal paradigms of consumption).

Thinking about futures necessarily involves dealing with uncertainty and plurality: alternative futures will stem from non-linear combinations of social and technological processes (Urry 2016), with multiple "futures" coexisting at any time. In 1.4.4 I highlighted the value that participatory practices offer in discussing, and co-creating visions of futures. While decisions about future directions are often framed in rational and analytical ways, participatory speculations draw on everyday experiences, values, and conflicts to inform research and strategies. The co-design of Design Orienting Scenarios (DOS) can be used as a method for participatory visioning that extend the speculation to a variety of actors and practices, and engage directly with conflicts and divergence in processes of imagining future worlds. Rather than coherent worldviews, these scenarios can be framed as spaces for agonism (DiSalvo 2010).

This chapter leaves one important question still open. How to replicate the plurality and divergence that emerges from processes of participatory speculations in artefacts that capture these polyphonic visions of futures? Chapter 2 will address this research question, with a particular focus on the topic of urban futures.

2 VISUALISATIONS + CITIES: PROCESSES AND ARTEFACTS OF REPRESENTATING THE MULTIPLICITIES OF URBAN EXPERIENCE

Of all the topics that have been imagined in speculative practices, the city is perhaps the one with the longest and richest history (Bruno 2007; Urry 2016; Urry et al. 2014; Hall 1988). This is because cities are often described as the nexus for economy, enlightenment, democracy and freedom (Dunn, Cureton, and Pollastri 2014). Thus, imaginary future cities are often depicted as a way to talk about, by extension, imaginary future worlds.

Because of their materiality and spatiality they can be best described through visual language, which, unlike other types of languages, allows to see both form and content simultaneously (Dondis 1973). Because of their complexity, they require visualisation techniques that can make their tangible and intangible, static and dynamic aspects readable and understandable. Thus, visualising the city –and its futures in particular– means not only reflecting on various aspects of what constitute urbanism and urban life, but also experimenting with representation techniques to make this complexity visible and tangible. Section 2.2 (and more extensively (Dunn, Cureton, and Pollastri 2014)) gives an account of the great variety of media, techniques, and methods that have been employed to do so. The patterns and paradigms that emerged from this review show the cultural significance of visualisations, and that technical choices are not neutral, but linked with the purpose of the visualisation and its cultural role. Visualisations of future cities are in fact both expressions of future desires and comments on present conditions (Cook 2012).

However, while much has been written on ways of visualising perceptions, emotions and oppression through collaborative actions of mapping (2.1.1), how to capture individual

and collective fears and aspirations in pluralistic visions of future cities is a much less explored topic. Specifically, very little literature has focussed on the technical aspects of these types of participatory visualisations processes, except for subject-specific studies (for example Colomina 2010; Buckley and Violeau 2011).

The main purpose of this chapter is to address the aforementioned literature gap, and reflect on the roles and the agency of visualisations of future cities. In particular, Section 2.2.1 presents an account of methods for including pluralism and participation in visualisations of future cities by using different genres of visualisations (including games, 'little magazines', interactive displays, etc.).

But before delving into the review of examples, this chapter will take a step back and clarify the theoretical framework adopted in this thesis when discussing "visualisations".

2.1 VISUALISATIONS

In the first year of the PhD, I had the opportunity to compile a few entries for The Bloomsbury Encyclopaedia of Design (Edwards 2015). This included the entry for "visualisation":

"A visualisation is an artefact (or sometimes just a mental image) that translates information, which by itself is not directly observable, into a visual representation that facilitates the understanding of such information. This is done through the use of visual language, a type of language that is able to describe data or ideas that are complex and/or have a non-linear structure. Unlike written text, visual language allows the reader to "see content and form simultaneously" (Dondis 1973, 106).

As cognitive tools, visualisations present working ideas and concepts for personal use or to facilitate a discussion among peers or with external stakeholders. This is, for example,

the case of visualisation for science, or design sketches and design visualisations. The subject of the visualisation, in this case, is an abstract, conceptual idea that is part of a process of creation of new knowledge. As such, these visualisations are partial and often ambiguous images (Goldschmidt 1991) that function as visual notes (Crowe and Laseau 1986) enabling the generation, interpretation, and manipulation of information through spatial representation (Dahl, Chattopadhyay, and Gorn 2001).

As communication devices, visualisations are used to present multidimensional datasets or phenomena to an audience. The information displayed can be qualitative or quantitative, or a mix of the two. These types of visualisations are central to disciplines such as Information Graphics, Information Visualisation, and Data Journalism. Their purpose is to tell a story or communicate a concern (through the use of illustrations, diagrams, maps, or other visual devices), or, particularly when displayed on interactive supports, to provide the user with a set of tools to explore the issue.[8]"

Writing a definition of the term "visualisation" proved to be more challenging than initially anticipated. Visualisations are (and have historically been) used in many different fields –not only design and architecture, but also, for example, in science and technical disciplines (Eisenstein 1982; Latour 1988; Cross 1999). Here, drawings, diagrams, and models function as "optical devices" (Eisenstein 1982): instruments that visualise phenomena that are immaterial or too big, too small, or too complex to be perceived. In all cases, the aim of visualisations is "to map phenomena into representations whose scale is comparable with the scale of human perception and cognition" (Kosara 2007).

[8] *Contributors to the Encyclopaedia were asked to keep in-line references to a minimum. The literature that informed the definition included: (Dondis 1973; Cross 1999; Schenk 2007; Goldschmidt 1991; Cairo 2013; Valsecchi et al. 2010; Lima 2011; Tufte 2006). The full-length entry is included in Appendix X.*

Thus, visualisations are usually not truthful representations of perceptible reality (as it will be further explained in 2.1.1), but records of how the author (or authors) sees something (Crowe and Laseau 1986; Berger 1972; Dörk et al. 2013). Furthermore, as utterances in social communication processes, visualisations are also shaped by their materiality, the purpose (or purposes) of all the actors involved in producing and them, and specific social and cultural structures (Hodge and Kress 1988; Kress and Van Leeuwen 2006). Authors writing in the field of social semiotics also argue that in visualisations "meaning" is not intrinsic, but constructed by the characteristics of the artefacts as well as by the social, cultural, environmental circumstances in which these are received (Jewitt 2011).

For this reason, visualisations are conceptualised in this thesis as a continuum of processes and artefacts. This has implications not only for the way in which visualisations are seen and analysed, but also in terms of design possibilities. An example of what it means to think of visualisations as part of processes of visualising can be seen in the work of data artist Jer Thorp. "Any good visualization process is iterative", Thorp writes, "[a]nd if we allow ourselves to think more about the value of the branching points of that process than we do a single result, we leave ourselves open to many more possibilities" (2013). As a result of this approach, Thorp's portfolio of visualisations includes sculptures, diagrams, interactive programs, and live performances, all based on quantitative datasets .

This section has so far introduced the concept of visualisation, which I described as a continuum of processes and artefacts aimed at communicating what cannot be directly perceived and understood, because it is too big, too small, or too complex. Visualising (particularly through the use of diagrams) also involves revealing hidden patterns and weak links between elements of a system (Scagnetti et al. 2007).

In the next part of this initial section, I will comment on the role of visualisations in representing the city, focussing in particular on processes that enable the capture of those aspects that usually escape conventional plans and topographic maps.

2.1.1 Visualising the (experienced, emotional, resisting, subjective) city

Cities have always been visualized in ways that capture far more than their topographical features, even when the cartographic map is the medium of choice. A considerable amount of literature has been published on maps and their relation to the territory they describe. Cosgrove (2004) argues that "urban space and cartographic space are inseparable", as it is first of all through their visualisations that cities are created (Corner 1999), experience, and communicated. Maps can in fact be better seen as territorial narrations (Farinelli 2003): artefacts with strong storytelling abilities (Peter Turchi 2004).

This narrative dimension is particularly evident in ancient maps, where the semantic aspects of the representation are more important than the territorial description itself. For example, medieval maps of Jerusalem were often derived from the description of the city that Christian mapmakers found in the scriptures. They were maps of the imaginations: geographically inaccurate, but with a strong symbolic value (Farrauto and Ciuccarelli 2010). Other visualisations of cities prioritise the narrative to the symbolic aspect, such as XVIII Century's maps that included landscape views and vignettes showing the history of the city portrayed (Bruno 2007). Even contemporary maps that are produced for pragmatic purposes (such as maps of transport or tourist maps) distort urban geography when translating spatial information into a visual message.

In the last century, the symbolic and narrative aspects of representations of cities have been used as an explicit resource to capture the subjectivity of the relationship between the city and its inhabitants. Authors from various disciplines (including social science, art,

architecture and planning, geography) reflected on how the city shapes our actions and emotions, and how our actions and emotions shape the way we interact with the city (e.g. Simmel 1903; Chombart de Lauwe 1957; Lynch 1960; Jacobs 1961). These texts (and the maps they included) directly or indirectly inspired new ways of representing the city that highlight and celebrate the plurality of experiences. In most cases, this involved rethinking not only how cities are visualised, but also the processes of visualisations.

Dada in the 1920s, and later on the Lettrists and Situationists (1950s-1960s) developed practices of walking aimlessly in the city ("excursions" for Dada, "derive" for the Situationists), while recording their impressions through visual essay. The Situationists in particular, translated these visual essays into maps, such as Ralph Rumney's *Psychogeographic Map of Venice* or Guy Debord's *The Naked City* (both 1957). The relevance of these maps for their time is that they represented "an attempt to disrupt existing representations and convey different visions of the city" (Pinder 1996). The purpose of these activities (or "situations", to use the group's terminology) was two-fold: to study the effect geographical environment had on the emotions and behaviour of individuals (a practice that Debord named "psychogeography") and to research hypothesis for possible urban transformations (Debord 1981).

This approach to urban mapping shifted the focus from the artefact to the experiential process of exploring the city, capturing feelings and perceptions, and using these as the subjects of the representation. The legacy of this approach is evident in contemporary examples of sensory mapping, such as Kate McLean's *SmellMaps* (2013, ongoing) or Christian Nold's *Biomapping* (2004, ongoing). Unlike most Situationist maps, in these two examples the subjective experience of the city is not an isolated and personal one, but part of a collaborative experience, involving groups of participants other than the map-maker (Nold 2009; McLean 2016).

Collaborative efforts are a fairly common theme in many contemporary examples of representations of cities, particularly when the aim is to subvert traditional practices to provide space for alternative voices and experiences. Tactical cartography like the *Routes of Least Surveillance* (in Bhagat and Mogel 2008) and the collaborative maps developed in workshops organised by Iconoclasistas are examples of visualisations of cities that communicate, through the map, urban features of oppression that would otherwise remain invisible. Iconclasistas in particular, are less interested in the production of the map than they are in the creation of spaces and adaptable tools to enable processes of collective visualisations (Iconoclasistas 2013)[9].

The brief overview of examples presented in this section demonstrates that representations of cities can be thought of as processes that capture the plurality and subjectivity of the urban experience. As artefacts, these visualisations can be read as "macroscopes" (De Rosnay 1979) , i.e. metaphorical tools "to observe what is at once too great, too slow, and too complex for our eyes" (p.6). In particular, maps and diagrams that emerge from collaborative representation processes can become negotiation and decision-making tools, that enable common and shared understanding in multi-actors context (Ciuccarelli, Ricci, and Valsecchi 2008).

The way in which information is handled in these examples, in fact, reflects a recently emerged interdisciplinary interest in processes of exploring complexity, controversies, and multiple perspectives. In these contexts, finding ways to visually capture heterogeneous information and their relations is key. In a keynote lecture at the meeting

[9] Most examples of these maps have explicit or indirect implications beyond the visualisation process itself. Psychogeographic maps were developed as part of a broader avant-garde attempt of rethinking urbanism and society (Pinder 1996; Dunn and Brook 2011); radical maps (including the projects of Iconoclasistas) have a clear political message, and embed a call for action (Bhagat and Mogel 2008). As this thesis is about pluralistic visions of urban futures, a systematic analysis of these aspects is beyond the scope of what this chapter can cover.

of the Design History Society, Latour raised the following question to designers "where are the visualization tools that allow the contradictory and controversial nature of matters of concern to be represented?" (2008, 13)

In the last decade, the role of visual representations in observing and describing the social debate around controversial techno-scientific, as well as political issues, has been explored by Latour and colleagues at SciencePo (as well as other institutions[10]) through an extensive inquiry into tools for the cartography of controversies (Venturini 2009; Venturini et al. 2015).

Mapping complexity and controversies can allow us to identify spaces for design interventions, and show the forces that can facilitate (or hinder) them (Scagnetti et al. 2007). This is particularly relevant in urban contexts, which are characterised by a complexity of issues, spaces, infrastructures, and networks of actors. In this sense, visualisation of cities can have a generative effect, particularly if they do not limit themselves to representing the appearance of the urban environment, but also how material and immaterial elements function, flow, and interact (Corner 1999).

Collaboratively designed maps and visualisations can support the design of interventions that respond to the conditions of the present. However, truly radical solutions usually require thinking beyond the immediate experience (Fry 2008), in an effort to imagine what future cities (and our experience within them) might be like.

---

[10] The MACOSPOL (MApping Controversies in Science and POLitics) research network was active between 2009 and 2014 (www.mappingcontroversies.net). In particular, research on mapping controversies in architecture has been conducted at Manchester School of Architecture (Yaneva 2012). Visualisation tools and methods for controversy mapping have been developed and applied by researchers at Density Design, the information visualisation research unit at Politecnico di Milano (www.densitydesign.org).

In the next sections I will examine the role of visualisations of urban futures, focussing on how these visions both materialise concerns of the present and propose ideas that shape or influence the future. The themes explored in this section will then be resumed in section 2.2.1, in which I will reflect on how multiple perspectives can be mapped in visions of urban futures.

2.2 VISUALISING URBAN FUTURES

This section is based on the key findings from an evidence-based analysis of the last one hundred years of visual futures conducted in 2014. The study culminated with the publication of the report *A Visual History of the Future*, authored by Prof. Nick Dunn, Dr. Paul Cureton, and myself. The report was commissioned by the UK Government Office for Science, as part of the Foresight project. The full text can be accessed online at https://www.gov.uk/government/publications/future-cities-a-visual-history-of-the-future.

Figure 5 ***A Taxonomy for visualisation of future cities*****. Part of N. Dunn, P. Cureton, S. Pollastri (2014)** ***A Visual History of the Future*****. A large-scale version of the visualisation is included in Appendix A .**

In the introduction to this chapter, I suggested how visions of future cities and visions of future worlds often seem to be connected in a synecdoche, a figure of speech in which

the part (the city) is a signifier for the whole (the world)[11]. When seen as "theaters of social action" (Mumford 1937) cities are not only defined by buildings and infrastructure, but also by the material and immaterial flows generated by the activities that take place in the urban environment, as well as the personal experience of its inhabitants (as discussed in the previous section). For this reason, cities have long been subjects of imaginative projections and aspirations for better futures (Hall 1988).

In 1953, Ivan Chtcheglov, a young activist whose political theories influenced the Situationists, wrote in the *Formulary for New Urbanism*: 'architecture is the simplest means of articulating time and space, of modulating reality, of engendering dreams' (Knabb 2007, 7). In a similar way, Thomson argues that visions of urban futures contribute to our social imaginary, i.e. 'the creative and symbolic dimension of the social world, the dimension through which human beings create their ways of living together and their ways of representing their collective life' (1984, 6).

It is for this reason that the depiction of future and imaginary cities has been a recurring theme in works of fiction across different media, particularly in films, in which the story, the built environment, and the lived experience of urban conditions are woven together through the movement of the camera (Dunn 2013; Schwarzer 2004). The cinematographic city is never simply an inert stylistic prop, but performs an integral part in the story, significantly contributing to the portrayal of civilisation (Halper and Muzzio 2007). Notable future cities of films include: the automated and hierarchical city of Metropolis; the underground, muffled, and sensory-depriving environments of *THX-*

[11] It must be noted, however, that a city-focused mindset can have problematic effects when transferred to strategies, planning, or design actions, if prioritizing the city means disregarding rural communities and non-urbanised areas. I previously wrote about this in the context of rural-urban China in, for example, Valsecchi, Pollastri, and Lou (2011) "Design Harvests: a network of social collaborative innovation hubs". Other authors have been addressing similar issues (see for example Zask 2016; Lobao 1996; Singelmann 1996).

1138; and *Blade Runner*'s Los Angeles: an ill-fitting melting-pot of people and technologies in which progress and decay coexist (Halper and Muzzio 2007; Bruno 1987).

by Fritz Lang); *THX-1138* (1971 directed by George Lucas); *Blade Runner* (1982, directed by Ridley Scott).

And perhaps, the most telling example is *Things to Come*, in which the city changes its architectural features following the tales of capitalism, destruction, and utopian order that characterise the three main stages of the narrative.

In images of future cities (including the cinematographic ones), the use of visual language makes it possible to show things that could not be explained otherwise (Cook 2012). It is not just cinematographic cities that engender the ideals that the filmmaker seeks to convey, but all visualisations of cities carry deeper meanings and wider information about culture and society, beyond their architectural characteristics (Allen 1999; Brooker 2002). Images of the future are products of the cultural context in which they are created, and are loaded with hopes, dreams, and critiques (Cook 2008). At the same time, they can have a significant influence on the culture in which they are disseminated (Cook 2012). For this reason, an historical review of past future visions can reveal societal concerns and changes of attitudes throughout time, as well as how such visions have shaped the present.

The report *A Visual History of the Future* culminated in a timeline in which we identified six paradigms that somehow reflect the dominant discourses on futures as these are materialised in future visions (with a focus on the UK).

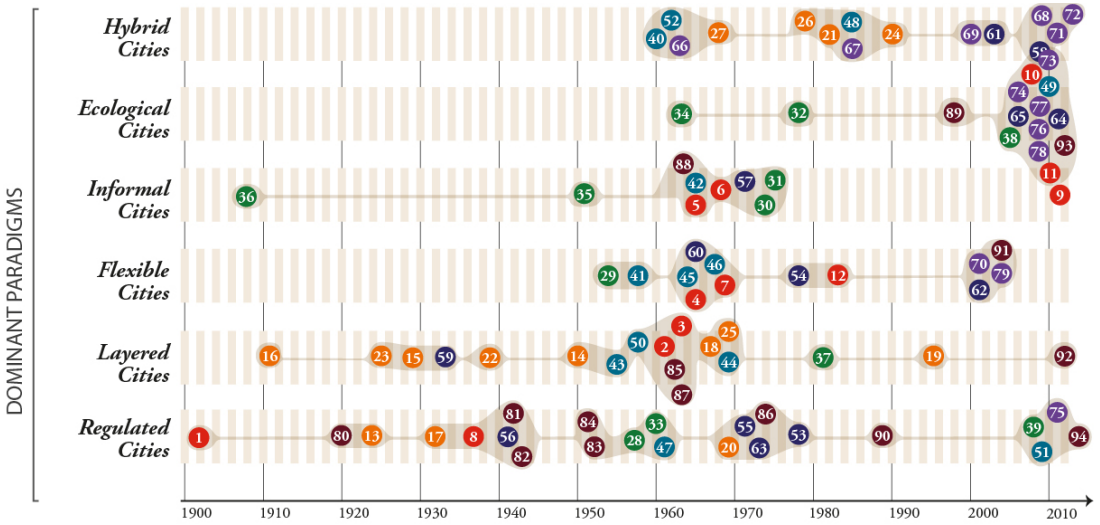


Figure 6 Dominant Visual Paradigms of Future Cities from the timeline in Dunn, Cureton, Pollastri (2014) ***A Visual History of the Future*** **(adapted). The timeline maps the 98 examples of future visions collected in the report throughout time and across six dominant paradigms ('Hybrid Cities', 'Ecological Cities', 'Informal Cities', 'Flexible Cities', 'Layered Cities', and 'Regulated Cities').**

The six paradigms are described in the report as follows:

1. "**Regulated Cities** - urban visions that integrate aspects of rural/country/green living.
2. **Layered Cities** – portrayals that have explicit multiple but fixed levels typically associated with different mobilities.
3. **Flexible Cities** - urban depictions that allow for plug-in and changes but still fixed in some manner to context.
4. **Informal Cities** – present visions that suggest much more itinerant and temporary situations and include walking, nomadic, and non-permanent cities.
5. **Ecological Cities** - illustrations of cities that demonstrate explicit ecological concerns, renewable energies, and low or zero carbon ambitions.

6. **Hybrid Cities** - urban visions that deliberately explore the blurring between physical place and digital space, including augmented reality and 'smart' cities."

   (Dunn, Cureton, and Pollastri 2014, 127–28)

While the names and details of these paradigms might be open to some level of discussion, as there are no established and discrete "movements" for future city visions (Thomsen 1994), the timeline can nevertheless be used as a framework to relate visions of urban futures to their wider context.

For example, the proliferation of flexible, informal, layered cities in the UK between the 1960s and 1970s can be understood as an expression of the cultural and political debates taking place both in the UK and in Europe. In this period, magazines, exhibitions, and events connected radical groups of architects, designers, artists, and sociologists across Europe (Colomina 2010; Coles and Rossi 2013). Socio-political debates on technology, capitalism and consumerist society, and broader geo-political issues encouraged new ways of rethinking the city. Many visions of cities developed in this period sought to break away from tradition, and embraced the possibilities offered by new technologies and new ways of living (in line with contemporary approaches to future-thinking described in 1.3, particularly in French existentialism). These future cities are "free-form architectural visions without constraint, projecting visions dismembered from their present conditions" (Dunn, Cureton, and Pollastri 2014, 48). As such, and also because of their highly conceptual nature, they required new visual languages, beyond the traditional repertoire of the architect. These include photomontages, diagrams, collage, cartoon, performance, and temporary structures.

Partly influenced by radical design collectives associated with the Italian Avant-Garde (including Superstudio, Archizoom, Global Tools), groups such as Archigram (UK), UTOPIE (France), or Ant Farm (USA) moved away from purely commercial practices, to embrace critical ways of doing and researching architecture (1.4.3).

The work of Archigram explores the fluidity of adaptable and reconfigurable urban structures that mimic the complexity of human relations in urban areas (for example in the work of Peter Cook and in Ron Herron's Walking City). Both UTOPIE (particularly Jean-Paul Jungmann) and Ant Farm experimented with temporary floating or inflatable structures designed for nomadic lifestyles (Awan, Schneider, and Till 2011; Buckley and Violeau 2011; Sadler 2005). To an extent, these critical (and often playful and irreverent) visions were a response to the failed modernist utopias that were the dominant approach to planning in Europe in the first half of the century.

In the same period, in North America, the political tensions of the Cold War and the related fears of nuclear strikes, influenced visions of underground cities. These included Oscar Newman's *Nuke Proof Manhattan* (1969), an urban future in which nuclear warheads are used to clear an underground space in which to rebuild Manhattan, to keep it safe from a potential nuclear attack. Bubbles and domes were also used in response to emerging environmental concerns, as ways of creating micro-climates (like in Hans-Rucker-Co's *Palmtree Island*) or to shelter city dwellers from air pollution and the elements (see for example Buckminster Fuller's *Dome Over Manhattan*). All of these visions are critical responses to both the futurists' scenarios and the mainstream political discourse that these generated (1.4). These improbable urban visions question rationalistic strategies by pointing out risks, paradoxes, and latent dystopias, and by providing radical alternatives to seemingly inevitable trajectories (Levitas 2013; Pinder 2013; Coleman 2005).

But visions of futures do have an agency, beyond that of promoting debate and problematizing other visions. Indeed, an historical reading of visualisations helps to recognise how existing (or once-existing, now failed and dismantled) urban forms carry within them the material evidence of antecedent future visions.

In the first half of the 20th century, urban forms and infrastructures were rethought in future visions to accommodate cars and take full advantage of the freedom and independence offered by private vehicles. Hénard's *Cities of the Future (*1911) and Le Corbusier's *Ville Radieuse* (1924) both propose the rigorous zoning of residential towers organised in grids of green spaces that are connected by roads meant to be travelled by cars. Some of these visions were later translated into actual neighbourhood plans, or had a significant influence on planning strategy. This is most notably the case of Bel Geddes' *Futurama*, a model of a future city presented to participants at the General Motors exhibit during the World Fair in New York in 1939. This vision of a city shaped by road infrastructures and skyscraper technologies was taken as a model for the way in which US cities were planned in the following years (Albrecht 2012). These visions offered a response to a particular idea of innovation and future that seemed promising to their initiators. But they also constituted the "modernist utopia" later on critiqued by the Avant-Garde as well as elsewhere (most notably by Jacobs 1961).

Failing to acknowledge the agency of visualisations means failing to recognise their historical influence, as well as the ways in which tropes are re-proposed over time, often uncritically. In the UK, the *Garden City* vision has been perhaps the most enduring vision of urban form, one that is usually presented as the solution to the most stereotypical issues of the city (i.e. overpopulation, air pollution, cramped housing, lack of nature, congestion, filth). The first (and most influential example) of this type of vision is arguably Ebenezer Howard's *Garden Cities* (1898, reissued in 1902). As a radical

alternative to overcrowded Victorian British cities Howard proposed a vision of a hybrid town that combined aspects of urban and country life. The legacy of Howard's Garden City can arguably be seen in the planning of most New Town cities, i.e. urban conglomerates built to relieve larger cities of their problems of overpopulation, slums, and sprawl, including Letchworth Garden City and Welwyn Garden City, both founded by Howard. Despite the undisputable merits in improving the quality of life for their post-war inhabitants (Grindrod 2013), the *Garden City* model has been unsuccessful in fostering sustainability, as its low-density grid (featuring large plots) has been proven to lead to higher car-dependency (Campaign for Better Transport 2014; Urry et al. Forthcoming). Yet, because the imaginary that the name suggests is more powerful than the built reality, visions of garden cities are still widely popular (Jacob and Vanstiphout 2014). Currently, 17 new garden villages are being planned in the UK, as part of a national effort to provide homes and facilities to a growing population (Department for Communities and Local Government and Barwell 2017).

Finally, the timeline shows the large number of examples of future visions developed in the last two decades that belong to the "Hybrid Cities" and "Ecological Cities" paradigms. Examples of radical visions of urban futures that combine new technologies and nature include Terreform 1 (a research team promoting community involvement through practices of "urbaneering") and *Soak City*, a semi-vegetated vision of underwater London by CRAB Studio (2004). The latter, in particular, also belongs to a recent, and much less optimistic, tradition of envisioning responses to the destructive impact that the effects of climate change will have on cities (see also Bild Architecture's *Saturated City* (2010), or Clouds Architecture's *Aqualta* (2009)).

Environmental concerns and technological possibilities are often articulated in combination within the Smart City discourse. These contemporary city visions offer a

positive outlook on what can be achieved through the creative employment of new materials and techniques and the extensive use of data to combine "bits and bricks" in digitally-enabled cities (Ratti and Haw 2012). Examples include Balmori's masterplan for Sejong, Korea (in which the city functions as an ecosystem) and Foster & partners plan for Masdar Development in Abu Dhabi (that aims to be the first carbon-neutral settlement). But the over-reliance on software that characterise Smart Cities also stimulated the proliferation of corporate-led aspirational visions of future by companies (such as Microsoft, Siemens, and Cisco) that are involved in the development and implementation of IT solutions for city management.

The connection to context-specific social and cultural issues and the place-making messages that future visions articulate often gets lost in most of the recent visions of "smart cities": generic, ahistorical, professedly apolitical spaces whose identity is defined by information technologies that could be adapted in any context (Greenfield 2013; Hollands 2008).

Despite their innocuous appearance, corporate visions of smart cities do have an agency. They present the future from the point of view of IT solutions. And in doing so, they justify the role of corporations in defining strategies for urban futures, by promoting "a conception of urban management that is a technocratic fiction: one where data and software seem to suffice and where, as a consequence, knowledge, interpretation and specific thematic expertise appear as superfluous" (Söderström, Paasche, and Klauser 2014, 308).

In Chapter 1, I presented an overview of the way in which futures have been conceptualised and researched in the last century in the Western(ised) world, including critical positions towards rationalistic approaches to anticipation and non-inclusive

speculative actions. The artefacts that constitute visions of future cities are to be considered as part of larger processes of anticipating, speculating, or simply engaging in conversations about what the future could, might, or will be like. In this sense, just like critical approaches to future studies highlighted the role of subjectivity, metaphors, and values (1.3.2), and speculative design practices have challenged taken-for-granted pathways to the future (1.4), visualisations of urban futures can play a critical role in debating possible futures.

This was extensively shown in *A Visual History of the Future,* which demonstrated both the cultural relevance and the concrete impact that the examined visions had over the last 100 years. The taxonomy in Figure 5 can be seen as a snapshot of a conversation between numerous and heterogeneous ways of imagining the future, all embedding (often contradicting) specific hopes, dreams, and concerns. However, just like any speculative visions of future (1.4.3), images of future cities are developed from the point of view of who creates them. The problem is, however, that cities do not emerge from one individual experience, but are shaped by their complexity and diversity. Without discounting the value of urban visions described so far, this inherent characteristic of all cities calls for ways to replicate this pluralism in the way in which visions are designed (i.e. as a process) and represented (i.e. within the artefact). This particular approach to visions of urban futures is the subject of the next section.

2.2.1 Visualising plurality in the future city

In section 2.1.1, I described processes of representing the hidden, subjective, and personal city, and reflected on the generative role that the artefacts produced as a result might have. This is particularly so when individual experiences are brought together in

visualisations that allow the "contradictory and controversial nature" of the city to emerge (Latour 2008).

In chapter 1(1.4.4) I explained the importance of creating spaces for participation and agonism when discussing and co-creating visions of futures. Due to the nature of cities, and the social, political, and cultural values that visions of urban future engender, it is valuable and relevant to explore methods to bring the plurality and multiplicity of experiences in these visions. However, thus far there has been no detailed investigation on how to do so.

To be sure, this does not imply that examples of pluralistic visualisations of urban futures do not feature in practice and literature. As part of my inquiry into this subject, I have been collecting such examples in an online archive (https://subjectivefutures.wordpress.com/). This archive shows an incredible and unexpected variety of ingenious methods adopted in different historical moments to visualise multiple voices debating possible urban futures.

The archive is still growing, and is somewhat serendipitous in its nature. The visualisations collected so far cannot claim to be sufficient to constitute a systematic review, but provide initial evidence of what the approach might entail. Without implying continuity or the existence of an established line of inquiry, this section provides an account of the last century of visualisations of urban futures bringing together multiple perspectives.

2.2.1.1 One Hundred years of multiple voices designing visions of urban futures. A selection of examples

In 1919, Bruno Taut initiated a secret correspondence project known as *The Chrystal Chain* (in German: "Die Gläserne Kette"). Inspired by Nietzschean philosophy and by

the new building techniques anticipated in the industrial revolution, Taut saw in architecture the means for creating "Utopia", intended as a moment in time that would be characterised by "harmony and unity" (Whyte 1985; Stuart 1999). In "The Chrystal Chain" project, Taut selected and invited a group of German expressionist architects to collaboratively work on developing "symbolic forms and preparatory fantasies" (Whyte 1985) to envisage the material manifestations of the "Gesamtkunstwerk" (total work of art) that Utopia would be.

For one year, the group of participants sent annotated sketches to each other to exchange ideas on possible utopian futures (Whyte, 1985). The letters were sent anonymously (with authors using a pen-name in place of signatures[12]), and participants were asked to contribute to others' visions of futures through comments, reviews, and further ideas. In his invitation letter, sent on November 24th 1919, Bruno Taut (Glas) sets strict rules of the correspondence: "Quite informally and according to inclination, each of us will draw or write down at regular intervals those of his ideas that he wants to share with our circle, and will then send a copy to each member. In this way an exchange of ideas, questions, answers, and criticism will be established." (Taut, 1919, p.1)

In the introduction to its curated collection of letters from the Crystal Chain, Whyte notes: "Although the correspondence produced few tangible results other than the letters and drawings on which it was based, it provided an important forum for debate during a period of transition. It served to distance the radical architects from the norms and expectations of the architectural establishment, and in doing so it made them more

[12] This is the list of architects that took part in the correspondence (pseudonyms in brackets): Bruno Taut (Glas), Willhelm Brückmnann (Berzback 7), Hermann Finsterlin (Prometh), Paul Gösch (Tancred), Jakobus Göttel (Stellarius), Walter Gropius (Maß), Wenzel Hablick (W.H.), Hans Hansen (Antischmitz), Carl Krayl (Anfang), Wassili Luckhardt (Zacken), Hans Luckhardt (Angkor), Hans Scharoun (Hannes), Max Taut (no name).

amenable to the new ideas that were soon to come from Russia, Holland, and France" (1985, 12). In an era in which the available means of communication didn't support the effortless group communications available now, Taut designed a system that enabled a group conversation beyond the Berlin clique, by involving architects working in various parts of Germany. This conversation was conducted through the integrated use of textual and visual language on the material support of letters that make ideas "mobile, immutable, presentable, readable and combinable" (Latour, 1998).

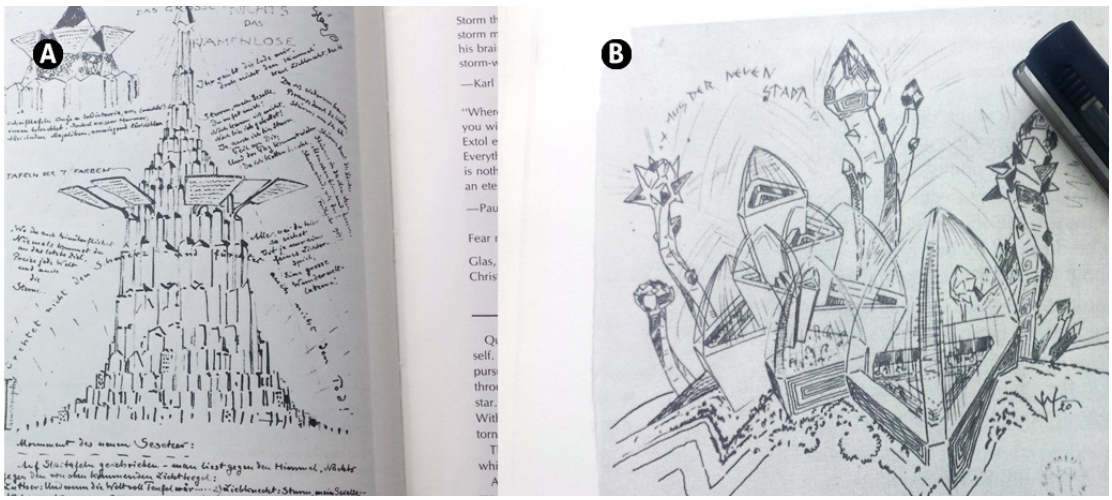


Figure 7 Two letters from the *Glass Chain* correspondence project (pictures from Ianin Boyt Whyte's book *The Crystal Chain*). (A) Bruno Taut, unsigned letter. (B) Wenzel Hablik (1920) *Villas: From the City*.

Allowing for heterogeneous modes of expression (written text, illustrations, photos, etc.) is a common feature of many examples of processes of collaborative visioning, particularly when exploring differences in subjective futures is prioritised over constructing a visually coherent vision. In these processes, striking a balance between allowing for individual expression and constructing a format to bring multiple voices together is a primary concern[13].

[13] *This point will be further addressed in Part C, 9.1, in which I will combine evidence from the literature with findings from my own experience in research through design.*

Both Archigram (UK) in the 1960s, and few years later Utopie (France) chose the fluid layouts of self-published magazines to collect, combine, and disseminate visions of future cities produced by individual members of each group or (particularly in the case of Archigram) emergent from informal conversations.

Both in Utopie and Archigram, the characteristics of the printed media were explored in an experimental way by playing with the layout, compositions, and techniques. Collages, drawings and text coexist on almost all the pages, and provide a visual narration of the ideas presented. Just like the cities they present, their visualisations are made of bits and pieces from different styles and sources; they are cut and pasted and assembled in fluid layouts.

Archigram's collages drew their aesthetic from the pop-art movement as well as the Situationists. Their style was intended to "show an architecture appropriate to our period of time. It was an exciting period full of experimentation, bright colours, casual sex; it was the spirit of that period". In Archigram's visions of the city, architecture was "perhaps merely a backdrop to what is going on" (Webb 2011).

The collage technique was also extensively employed by Utopie, using it to juxtapose conflicting images. Utopie's thoughts on contemporary and future urban life were (self) published in the magazine *Utopie: Sociologie de l'Urbain* (1967-1978). The magazine is a material evidence of an ongoing dialogue within a group of architects and social scientists that deliberately put ideological and iconographic differences in the foreground (Buckley and Violeau 2011).

The layout of the magazine was designed to visually reproduce this dialogue, with its fights, overlaps, and critiques. In particular, the "colonne critique" (critical column) was a visual device consisting of a large page margin containing texts and images that

contradicted or problematized the content from the central column. The column was always written or illustrated by somebody other than who produced the visions within the main spread. Jean Aubert, one of the founders of the group interviewed by Beatriz Colomina (2010, 197), finds the value of the column in the way "it produced fights, overlaps, critiques, everything you can imagine" (Figure 8).

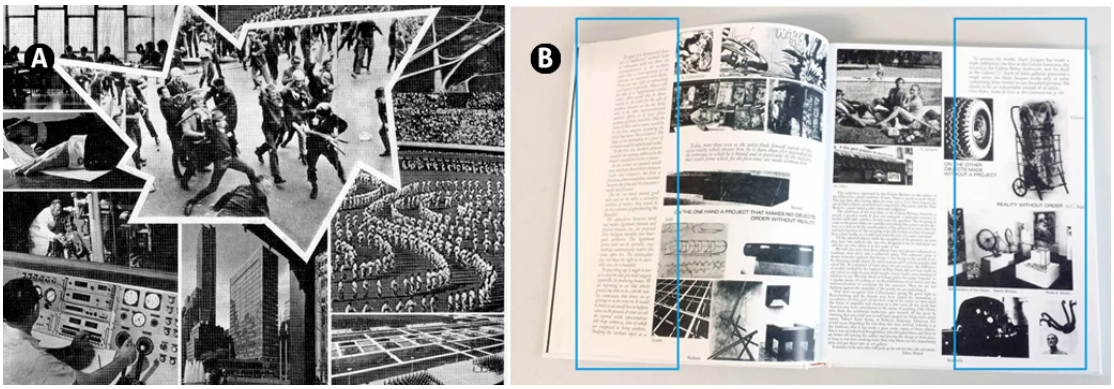


Figure 8 Pages from the first issue of *Utopie, Sociologie de l'Urbaine*, Utopie (1967). (A) a collage, (B) two pages showing the layout consisting of a central spread and the "colonne critique" (marked in blue)

A common frustration that members of Utopie encountered was their inability to move beyond the critique of the present and think constructively about the future. As Fredric Jameson once wrote: it is easier to imagine the end of the world than a radically different society (2003). Games have been found to help address this issue. Critical play, in particular, (Flanagan, 2013) can be adopted as a process to speculate about alternative futures. In the experience of play participants are able to forget the present, suspend disbelieve, and accept the rules and space of action defined in the game by voluntarily participating in the "magic circle" (Huizinga 1938; Csikszentmilhalyi et al. 1982; Salen and Zimmerman 2004). Games have often been used as platforms to enable debates around possible futures, particularly in urban settings (Salinas, Coulton, and Dunn 2016).

The World Game, invented by Buckminster Fuller in 1960 is one of the earliest and perhaps the most famous example of a role-play serious game in which players cooperate

in developing strategies to solve real-world challenges. Intended to be a tool for decision-making, Buckminster Fuller designed the gaming experience to make it accessible to everybody, beyond the political elite. Players would sit around a giant world map (the Dymaxion map) and discuss creative solutions to anticipate and solve issues of overpopulation and distribution of resources. Because of its difficult implementation, the *World Game* never went beyond the concept phase of its design. Nevertheless, it provided an inspiration for methods of participatory future scenario making through play. These include educational role-play games (such as *OS Earth*, (http://www.osearth.com/)) speculative board games (such as *SYMTACTICS*, (Hartmann 2014)), massive multiplayer games (e.g *World Without Oil*, (worldwithoutoil.org)) and generative games to solve complex urban problems (e.g. *Play in the City*, (https://www.playthecity.nl/)).

An emergent line of inquiry on the role of games as "laboratory for cities" is currently being explored, amongst others, in the Games for Cities research programme (www.gamesforcities.com). While most examples of city games focus on near-future strategic challenges, playing can be adopted as an approach to critically examine the present and speculate about the future. When designed for such purpose, speculative games should pay particular attention to enable participants to play according to their multiple values and worldview (1.3.2) and avoid prescriptive frameworks or reductionist portrayals of complex issues (Coulton, Burnett, and Gradinar 2016).

As interactive artefacts that unfold through time, games are characterised by a particular representational mode, that Bogost calls "procedurality" (2010). This means that capturing the visions that emerges from the play might often be problematic.

In 2009, Wired Italy commissioned DensityDesign, the information visualisation research lab at the Design Department of Politecnico di Milano to visualise the outcomes of the game *Superstruct* for an upcoming article on possible futures.

Superstruct was an alternate reality game designed by Jane McGonical at the Institute For The Future. The aim of the game was to recreate the conditions of cooperation and deep engagement of popular online games to tackle real-world challenges of the next century. In the fictional world of *Superstruct*, participants were presented with five global issues ("Super-Threats"): "generation exile"(mass migration), "quarantine" (pandemics), "power struggle" (shortage of resources), and "ravenous" (food crisis). By joining the community and participating in collaborative missions, players attempted to tackle one or more of the five challenges (http://archive.superstructgame.net/).

The Institute For The Future documented the outcomes of the game in a report that the team at DensityDesign translated into a semantic map of themes and ideas. This map was then visually arranged and overlaid to an allegorical illustration that helps developing a consistent narrative out of divergent ideas (Graffieti et al. 2011)[14].

More broadly, game dynamics have been widely adopted in the design field as part of processes of bringing together heterogeneous groups of stakeholders in co-designing scenarios of possible futures (Brandt 2006; Hannula and Irmann 2016). For example, London-based urban design and research office Chora, founded by Raoul Bunschoten, have developed a participatory methodology for exploring futures of complex urban and regional situations (Bunschoten 2005). Within this methodology, "scenario games" are used to test initial prototypes by simulating future contexts and conditions that the

[14] This map has inspired some of my practical work (5.2), as well as the understanding of some of the design principles, as described in 9.2 (Part C).

prototype might address (Chora 2009). Awan, Schneider, and Till find the board games designed by Chora to be "notable for the wide variety of people that Chora manage to gather together to play the games, groups of people that have overlapping and conflicting interests: residents, policy-makers, government officials, local businesses and industrialists amongst others. Here the game functions as both a platform for testing ideas and situations whilst also being a mediator, bringing together these disparate yet linked groups" (2011). Significantly, Chora also developed a comprehensive set of symbols and a bespoke graphic language to document the information gathered through the game and compare and manipulate the material.

Communication technologies have also been used to enable remote conversations, particularly through interactive platforms that users can contribute to by submitting comments or ideas. *Imaginable Guidelines*, for example, is an "open-platform collaboration tool" to involve citizens, municipalities, and advocacy groups in creatively rethinking their neighbourhoods. Although the project is based in Istanbul, users from around the world can submit design ideas for the cards that are used in idea-generation games. The use of cards as a generative tool is not new in the field of co-design (see for example (Hannula and Irmann 2016)); the particularity of this project is that cards are not used to help reach consensus around a few agreed concepts, but to extend the conversation by generating more, often divergent, ideas for "imaginable" guidelines.

According to the organisers "[t]he aim here is to display the variety of the aspects and their interdependency on each other. They could be used like a game to create the bigger picture, build scenarios for discussion and brainstorming, turn complicated problems into clear strategy and highlight the interdisciplinary nature of public space design" (http://hey.imaginableguidelines.org 2014).

The archive of examples that I have been building as part of my research also include a number of other examples that have not been mentioned in this section, but that show the variety of genres, tools and methodologies that can be adopted to bring multiple perspectives in visions of urban futures. In addition to those listed here, these include exhibitions, graphic documentation, urban design competitions, objects, and digital tools (see subjectivefutures.wordpress.org). This diversity highlights the importance of thinking of visions as both processes and artefacts, to expand the range of possibilities of what a visualisation may consist (as anticipated in 2.1).

2.3 SUMMARY

This chapter sought to address the research question I posed at the end of Chapter 1: how to replicate the plurality and divergence that emerges from processes of participatory speculations in artefacts that capture these polyphonic visions of futures?

To do so, I started with a definition of visualisations that conceptualises them as a continuum of processes and artefacts (2.1). Adopting this definition means, when looking at visualisations, to consider the whole communication process that artefacts emerge from. This has significant implications for the way in which visualisations are seen and analysed. But also in terms of design possibilities, it encourages experimentation with new methods and techniques.

Section 2.1.1 focussed on visualisations of cities, and showed how visualisation processes can help to capture those aspects of the city that would remain otherwise hidden in traditional maps and plans. In particular, visualisations that focus on individual or collective experiences (particularly if produced through collaborative processes) can allow the controversies and complexity of the city to emerge. Such processes not only lead to a better understanding of the city, but can also have a generative effect, as they

help to identify spaces for design interventions, and show the forces that can facilitate (or hinder) them (Scagnetti et al. 2007).

However, truly radical solutions usually require thinking beyond the immediate experience (Fry 2008), in an effort to imagine what future cities (and our experience within them) might be like. For this reason, in this chapter I set out to explore how processes of envisioning complexities and controversies have been employed when the subjects of the visualisations are urban futures (rather than urban presents).

To do so, in 2.2, I firstly described the role and agency of visualisations of urban futures. In this section I presented an overview of the last century of visualisations of future cities, reflecting on how these artefacts are influenced by (and bring evidence of) the cultural context in which they have been created while at the same time have an influence on the way urban futures unfold. Visualisations of future cities are in fact both expressions of future desires and comments on present conditions (Cook 2012).

Finally, section 2.2.1 presents the findings from an ongoing research activity of collecting examples of visualisations of urban futures that bring together multiple perspectives and capture, within the vision, the plurality and multiplicity that characterise the city. The heterogeneity of examples presented in this section show how developing such visions requires exploring participatory processes (through methods such as games, workshops, letter exchanges, conversations) as well as visualisation techniques (such as collages, diagrams, annotated illustrations) that can capture and make visible multiple perspectives.

3 CONCLUSIONS TO THE THEORETICAL FRAMEWORK: THE VISUAL CONVERSATIONS ON URBAN FUTURES APPROACH

3.1 SUMMARY OF THE PREVIOUS TWO CHAPTERS

The first two chapters of this thesis sought to provide an overview of how futures and visualisations of future cities have been conceptualised and approached so far in a variety of fields. In particular, this review was concerned with understanding whether and how the issue of values, subjectivity, and multiplicity of experiences of futures (and particularly urban futures) have been addressed in speculative processes and visualisations.

This review of how futures have been researched and imagined highlighted the relevance of critically understanding values, cultural and political contexts, agendas and concerns that contribute to engendering visions of futures. On one hand this highlights the importance of being critical when examining the outcomes scenarios, foresight, and visioning activities. On the other hand it calls for ways to rethink the way futures are researched and imagined to include multiple perspectives and experiences within the process. For example, this can be done by adopting participatory approaches to speculative design practices, for co-designing with multiple actors visions of futures as "spaces for agonism" (DiSalvo 2010).

It is not only processes of anticipation and speculation of futures that need to be rethought as conversations. Visualisations of urban futures have long been used to document future desires and present concerns, and have a significant role in shaping our imaginary of the future as well as the future itself (Cook 2012; Dunn, Cureton, and Pollastri 2014). Visions of futures (and urban futures in particular) that are developed as

conversations require graphic means to capture and communicate their inherent pluralism.

This thesis is an exploration of an approach, that I call Visual Conversations on Urban Futures (VCUF), which is concerned with both participatory processes and artefacts. Based on the evidence from the literature, I will propose in the next section an extended definition of such approach.

3.2 WHAT ARE VCUF?

Visual Conversations on Urban Futures (VCUF) are visualisations of future scenarios that utilise visual methods and tools to articulate multiple voices discussing possible futures for life in the city. Within this approach, design can play a significant role both in facilitating participatory processes that enable speculative conversations and in documenting the complexity of such conversations in visual artefacts.

Latour's actors-network theory inspired the development of a growing number of methods of mapping controversies of unfolding events and current matters of concern (Venturini, 2009; Venturini, Ricci, Mauri, Kimbell, & Meunier, 2015), but there is no established equivalent for mapping controversies and pluralism in imaginary futures. Talking about futures is always problematic: opinions count as much as facts, the boundaries of the spectrum of possibilities blur, and ideologies might substitute logic in driving choices (see Chapter 1). Furthermore, when urban life is the subject matter, very different experiences can coexist in the same space (as subjective or psychogeographic maps show). It is therefore challenging to design visualisations that can act as "macroscopes"(De Rosnay 1979) that delve into complexity and represent it in ways that make it legible, understandable, and usable.

But although there are no definitions or structured descriptions of Visual Conversations on Urban Futures, prototypes can be found in design, art, and architecture (see Chapter 2, section 2.2.1). These examples show the great variety of methods and media that have been adopted in participatory processes of imagining futures cities.

4 ACTION { RESEARCH [THROUGH (DESIGN EXPERIMENTS)] }; A METHODOLOGICAL APPROACH

Chapter 1 and 2 of part A introduced the research area that this thesis addresses, and concluded with proposing a definition of an approach (VCUF) to address the research questions.

This chapter describes how I explored the approach in my PhD. It explains the methodology, the context, and the research plan of the study, with the aim of providing a rationale for the approach.

4.1 RESEARCH QUESTION

Doctoral research in art and design often starts with a general area of interest. A meaningful research question requires time to develop, and needs to be reshaped several times throughout the undertaking of the inquiry (Gray 2004). In PhD studies in which practice is the main vehicle for the investigation, both the findings and the contingencies of the design work contribute to the defining and redefining of research questions and propositions (Eriksen and Bang 2013; Saikaly 2005).

In this research project, desk research, practice and reflection have been conducted iteratively, and often ran in parallel. All of the research activities contributed to the development of the research question, which emerged from reflecting on theory as well as on practice. In particular, the overview of the research plan (Section 4.3) will illustrate how a project that was not initially planned as part of the study became instrumental for focussing the area of inquiry.

This is to say that the research question was not set at the beginning of the PhD, but emerged as the result of a series of conceptual, evidence-based, as well as practical explorations in the area of Future Visions (from a visual design perspective), and the knowledge gaps that emerged in the process.

In this study I ask:

(RQ) How can the diversity that characterises the city be represented in visions of future(s)that give voice to different, diverging ways of living and experiencing the city?

The main research question was then divided into second-level questions:

- **(RQ1)** What are the processes that can be designed to enable these visions to emerge?
- **(RQ2)** What are the characteristics of these artefacts?
- **(RQ3)** Who has already used a similar approach? How was the approach used?
- **(RQ4)** How do these visualisations contribute to inclusive design and research actions aimed at envisioning, prototyping and reflecting on possible scenarios of liveable cities?

The following sections show how a combination of different research activities contributed to a better understanding of these issues.

4.2 RESEARCH APPROACH

The research question presented in the section above is essentially a question in design methodology, as what I set out to investigate is not *what* might urban futures look like, but *how* we might envision them.

Design is a discipline that has practice at its core (Cross 2001; Swann 2002). Any research project seeking to bring a contribution to design must also somehow engage directly with practice. Design, in fact, belongs to a "third area of human knowledge" (Archer 1979; Buchanan 2001; Saikaly 2005), distinct from the science and humanities, and characterised by being "concerned with the making and doing aspects of human activities" (Archer 1979, 18). For this reason, various scholars have, in the last few decades, debated the nature of design research, and argued for designerly modes of inquiry. Fatina Saikaly's paper: "Approaches to design research: Towards the designerly way" (2005), provides a review of the most relevant positions on the matter, as well as of the way in which complementary or alternative modes of inquiry have been adopted in design research (and particularly in PhD studies).

In the paper, Saikaly shows that while some scholars have opted for adapting scientific or humanities methodologies to design research, others have sought to develop original approaches in which design practice is both "site and medium" for design research (2005). Here, I argue that, while a science or humanities research approach can be adopted for studying theoretical or historical issues in design, inquiries into methodological matters arguably call for the direct engagement of the researcher with practice.

In a review for the UK Art and Humanities Research Council (AHRC), Rust, Mottram and Till (2007, 11) describe practice-based[15] research in art, design, and architecture, as: "research in which the professional and/or creative practices of art, design or architecture play an instrumental part in an inquiry".

It is important to notice at this point, how this definition not only introduces practice as an integral part of the research process, but also implies that heterogeneous research strategies can be used in combination with practice. In her review, Saikaly (2005) distinguishes a "practice-centred approach", in which design projects and artefacts themselves constitute a form of research from a "practice-based approach", in which research through design (Frayling 1993) is conducted alongside other types of research strategies. The advantage of this second approach to research is that it allows the construction of theory that can be extended beyond the situated context of practice. As it will be further explained in Section 4.4.2 of this chapter, this is particularly important in the context of this work, as the programme that funded the PhD largely determined the context in which to conduct the design activities included in this study. For this reason, it became evident, early on in the PhD journey that the research question was to be investigated through different research modes: through, about, and for design.

In the next sections I will explain how adopting distinct stances and methodologies can generate different types of knowledge that together contribute to the construction of generalised theory.

---

[15] The term used by Rust, Mottram and Till is actually "practice-led" research, but AHRC and the authors of the review seem to use "practice-based" research interchangeably. This is demonstrated by the references that are cited in the paper (most of which adopt the term 'practice-based') as well as by other writings from the same authors (e.g. Rust and Wilson 2001). In the paragraph I will use the term "practice-based" for clarity and consistency with the terminology used elsewhere in the thesis and by most of the references cited here.

4.2.1 Research for, through, and about design

While the importance of the role of practice in design research is widely recognised, the epistemological inquiry into the characteristics of design research, and in particular the role of practice in relation to it, is still rich for ongoing discussion. Systematic and quite comprehensive reviews of the theoretical positions that emerged throughout the years have been compiled by, for example, Grand and Jonas (2012) and Frankel and Racine (2010).

Taking the complexity of the matter into account, in this section I will propose a model of research that represents the epistemological position of this work, and the way in which various modes of inquiry have been used in different moments and for various purposes. While I do believe that its validity could be extended beyond the scope of this thesis, this model is in no way intended as 'the' representation of what design research "is" or "needs to be".

In the previous section, I highlighted the role of practice in the methodological inquiry. In this section I will explain how different modes of research intervene in the study to connect the space of practice with the broader research area, and how knowledge is generated through these connections and flows. In doing so, I will refer to the three modes of research "*for", "through",* and *"about* " Design proposed by Christopher Frayling (1993) and initially coined by Archer in the 1970s while teaching at the Royal College of Art. The three modes of research can be closely mapped on the three categories of clinical, applied, and basic research in the taxonomy proposed by Buchanan (2001), which reflects the type of categories often used by many funding bodies (Frankel and Racine 2010).

Research for design (clinical research) is research conducted to enable design. Research about (or "into") design (basic research) is research into the discipline of designing (including, for example the history of design) or into the creativity of designers (how designers think). Research through design (applied research) is when design practice is used to address an issue that is broader of or outside the design space, to which it seeks to provide a theory of explanation (Frankel and Racine 2010; Frayling 1993, 2015).

Glanville (1997, cited in Jonas 2012; and in Rodgers and Yee 2014) elaborates on the three categories above by mapping four different positions of the inquirer in relation to the area of design and its perspective (see Figure 9).

Glanville's map of research is built on the outline of an "inquiry system" that contains a "design system". The design system includes all the design activities that are conducted as part of the study, while the inquiry system encompasses the knowledge that is generated through practice. If taken to include the portfolio of design activities Glanville designs system could be intended as Gaver's "design space" (Gaver 2011, 2012), which is the space that is constructed by the designer exploring a particular area of concern through a multiple design actions and ideas. Each individual design project occupies a point in the design space[16]. Together, Glanville's design system and inquiry system coincide with Eriksen and Bang's "design research program", which is the space of practice and reflection from practice that is situated within the broader area of inquiry (2013).

[16] To avoid confusion, from this point onwards I will use Glanville's "design system" rather than Gaver's "design space" to identify the area defined by the portfolio of design activities in this research, as the term "design space" will be used later on in this thesis in a different context.

For Glanville, in the case of research *for* design, the researcher is situated outside the design/inquiring system, and looks "outward" to the broader research area, in order to produce theoretical knowledge that can be applied in design and design practice. In research *about* design, the researcher investigates the design and inquiry system from the outside. In research *through* design, the researcher is situated within the design/inquiry system, reflecting on practice to develop knowledge that contributes to the area of inquiry. Glanville also proposes an additional, "inaccessible" (Jonas 2012) category: Research *as* design, in which the artefact itself is a research output.

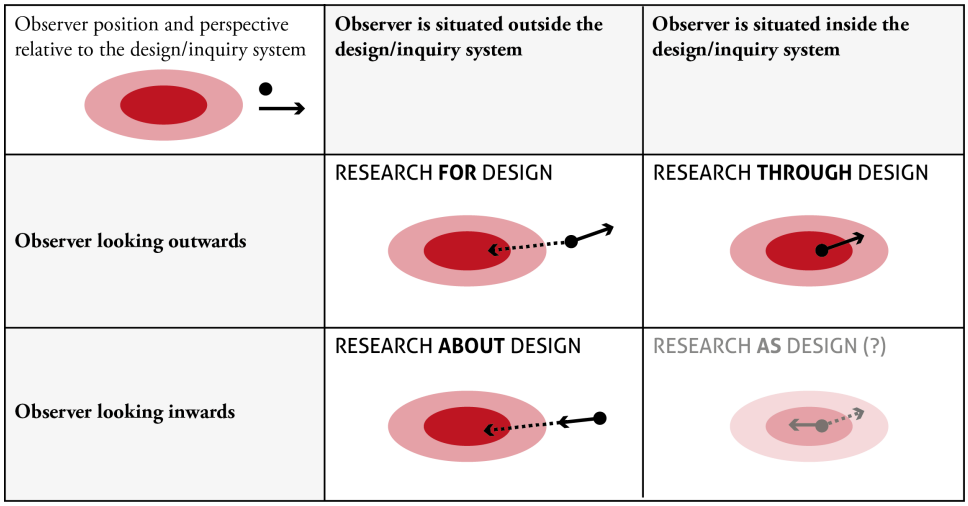


Figure 9 Research through, for, about, as design as related to observer positions and perspectives. Adapted from Jonas 2012 and Glanville 1997

Crucially, Glanville's map also points out that the knowledge produced in processes of Research *through* Design is context-bound, and cannot be directly generalised. A similar position is also shared by Gaver, who asks "what should we expect from research through design?" (2012). For Gaver, the theory produced from design practice, is "provisional, contingent, and aspirational" (Gaver 2012, 941). It also does not address theoretical issues and research questions analytically, but according to the designer's best judgement (ibid.).

Research *through*, *for*, and *about* design differ not only for the way research is carried out, but also, and most importantly, for the type of knowledge that is generated, and the context in which knowledge can be applied. For this reason, the three types of research are not mutually exclusive, but to be used in different moments of the research project, including in "practice based" PhD studies (Jonas 2012; Yee 2010, Ramia Mazé cited in Yee 2010).

For this reason, throughout the research process, I constantly moved in and out of the space of practice, and adopted different modes of research while doing so (see Figure 10). The following sections describe the details of the methodological approach that has been used to do so.

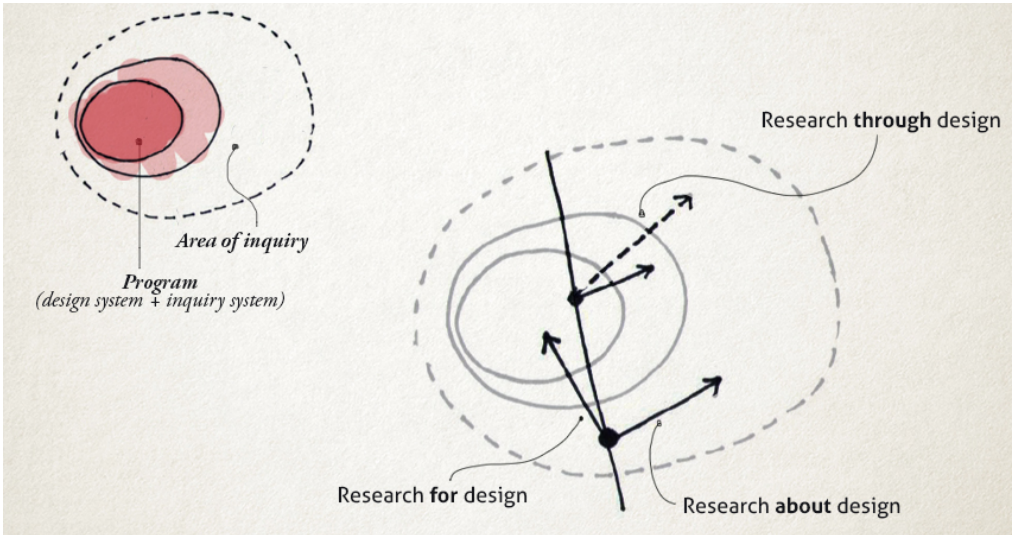


Figure 10 Moving in and out of the practice space to explore various areas of the inquiry through the three modes of Research through Design, research for Design, and Research about Design.

4.2.2 Action Research in Research Through and For Design

This section describes how knowledge is generated in practices of conducting research *through* design. In particular, it focuses on Action Research as a methodology, and Design Experiments as a research strategy.

Action Research (AR) is a methodology that seeks to produce new knowledge through the direct involvement of researchers in concrete actions and interventions (Brydon-Miller, Greenwood, and Maguire 2003; Elden and Chisholm 1993; Reason and Bradbury 2001). Initially conceived in the 1940s to challenge positivistic views of knowledge in anthropology, psychology, and social science, AR has since been adopted in many disciplines celebrating the role of insights that emerge from experience (Brydon-Miller, Greenwood, and Maguire 2003).

Cal Swann argues that design activities that are practiced as a form of inquiry, constitute a form of Action Research, as the processes that the two entail are uncannily similar (2002). Furthermore, design and AR are both generative practices aimed at "creating change" (Swann 2002). Because of the nature of design and design research, the contribution might consist not only of concrete objects or solutions, but also of metadesign tools (i.e. tools for designing (Wood 2008)), including methods, visions, propositions, practices (Mortati and Cruickshank 2012).

Because of the uncanny similarities in actions performed as part of AR and actions of designing (Swann 2002), this methodology appears to be appropriate to be adopted in programs of research through design. In particular:

- **AR is action oriented.** It is intended to achieve change as part of the process, not as a later application of theory (Dick 2007).
- **AR is cyclical and iterative.** Knowledge emerges in AR during critical reflection on action, in the form of an understanding of what happened and how. This understanding helps planning the next action (Dick 2007). Kemmis and McTaggart (1988) synthesise this process as "Plan, act and observe, reflect", while Stringer talks about "look, think, act" (1999).

- **AR is context-bound.** It is responsive to the situation in which it is conducted, and is intended to generate knowledge that is relevant to such context. In addition, the course of AR activities may be heavily influenced by participants and contingencies (Coghlan and Brannick 2005).
- **Contemporary AR is participatory.** While in "classical" AR the researcher is the only one in charge of the scientific aspects of the inquiry, contemporary AR prioritises a participatory stance, in which various actors in a 'community of inquiry' are involved in and influence all of the phases of the research process (Elden and Chisholm 1993).
- **Values and judgements matter in AR.** AR rejects the notion of an objective, value-free approach to knowledge, and recognises that "we cannot (and must not) avoid values and personal commitments" (Fricke, quoted in Brydon-Miller, Greenwood, and Maguire 2003). Similarly, choices that are made in design processes are rarely analytic, but based on the designer's best judgement (Gaver 2012). This is rendered in the way this thesis is redacted (See Section 4.5). As a consequence:
- **Methods and theoretical outputs of AR are almost always emergent.** "The way Action Research is carried out is contingent upon the research aims, the intervention context, and the researcher's intervention style and analytical preferences" (Huxham 2003, 241). In addition, because it is impossible to know in advance exactly what type of data will emerge and become relevant, the researcher cannot know in advance what methods are best suited for the analysis (Dick 2007).

While AR is commonly considered as a methodology, some scholars prefer to call it a "family of practices of inquiry" (Reason and Bradbury 2001, 7), to indicate the diversity of ways in which it can be applied. Choosing research strategies and methods for conducting AR largely depends both on the context of research and the personal inclination of the researcher. In this study, Action Research was conducted through Design Experiments.

4.2.2.1 Action Research through Design Experiments

Engaging in experiments is one of the ways of knowing in practice-based design research. In The "Reflective Practitioner", Donald Schön describes the central role that experiments have in "Reflection in Action", as a way of dealing with new situations that can be grouped within an existing repertoire of practice, but are unique in their defining characteristics (Schön 1984). According to Schön, "to experiment is to act in order to see what the action leads to. The most fundamental question is, 'What if?'" (Schön 1984, 145).

While Schön differentiates experiments in practice and in research, Brandt and Binder, discussing experimental doctorates, observe that an experiment in design research is "on the one hand the result of a truly designerly engagement with possible form (…) and on the other hand [a] deliberate attempt to question what we expect from such design" (2007, 4). Similarly to Schön's practitioners' experiments, design researchers in experimental doctorates often act in society and not just within the controlled environment of the lab that Schön identifies as the context of experimental research.

The role of design experiments is to explore a program: an area of investigation situated within the more broader research question (Binder and Redström 2006; Brandt and Binder 2007). The boundaries and characteristics of this area of exploration are

deliberately left open enough so that it can develop responsively as design work develops (Brandt and Binder 2007). Design experiments generate knowledge by substantiating the program. Their function, at the beginning, is to position the study within the framework (and help formulate and re-formulate the research question). Later on, they are useful to propose and strengthen arguments, and to provide additional evidence (Eriksen and Bang 2013). As designerly ways of engaging with research, their contribution to knowledge is not only theoretical, but also practical, as they collectively contribute to creating and defining the characteristics of a design space (Gaver 2012).

In this thesis, experiments were carried out to explore the practical aspects of conducting Visual Conversations on Urban Futures. A full immersion in the design process helped me to gain a better understanding, and provide a first-hand account of the most critical issues in the approach. This knowledge enabled me to start the process of identifying and understanding the key design principles underpinning practices of VCUF.

Design experiments in a research project build on or complement each other. For this reason, and because of the way they influence and change programs and research questions, they are rarely set from the very beginning of the research, but tend to be planned and shaped in different moments of the research process (Eriksen and Bang 2013).

As the objective of this thesis is the exploration and definition of an approach (VCUF), design experiments conducted in the context of an Action Research methodology appeared early on to be the most appropriate mode of inquiry.

Figure 11 summarises the research approach as described so far. It shows how the area of investigation defined by the Research Question (dotted line) was explored through three modes of research (*through*, *about*, and *for* design). These modes of research were

adopted by continuously moving in and out of the space of practice, and shifting the perspective towards different areas of investigation. The image also shows how design practice was conducted through a number of design experiments (identified with the X marks in the map). Three main experiments are located within the main program of research. One design experiment (on the left) is partly outside the area of inquiry, but helped shaping and initiating the program. Other design experiments (on the right) are somewhat related to the area of inquiry, but are not included in the programme (see 4.3.1).

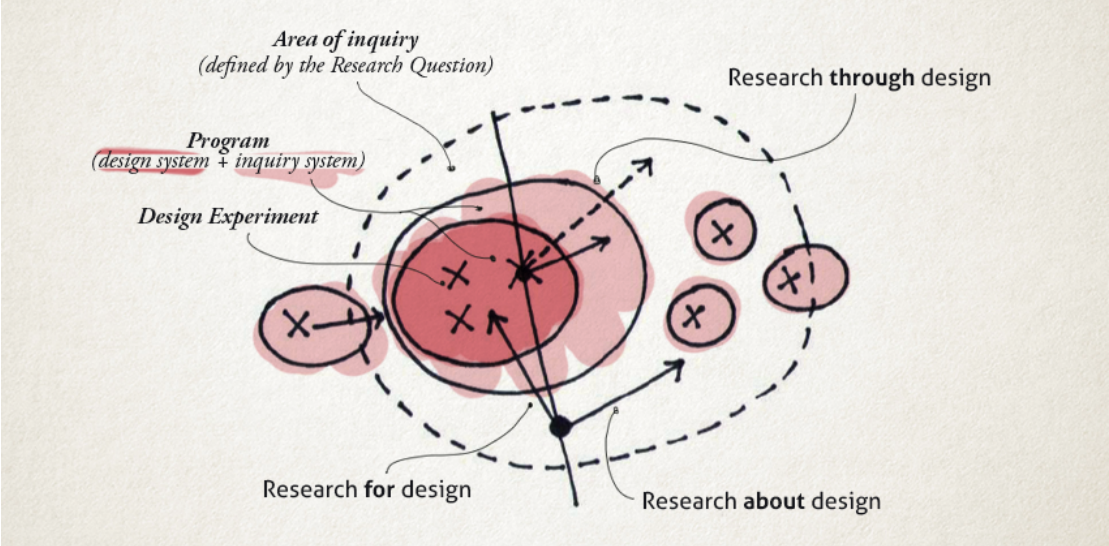


Figure 11 An overview of the research approach. An initial experiment (on the left) helped me identify the area of inquiry and shaping the characteristics of the Program. The Program was explored through three main Design Experiments (Research through Design) that also reflected on the broader area of inquiry (dashed arrow). As anticipated in Figure 33 and 34, theoretical and evidence-based modes of research were also used to inform practice (Research for design) and explore those aspects of the research area that fell beyond the scope of the practice-based inquiry (Research about Design).

4.2.2.1.1 Design Experiments or Case Studies?

The case study (or case studies) is a "research strategy which focuses on understanding the dynamics present within single settings" (Eisenhardt 1989, 533).

In his influential review, Robert Yin (1981b) identifies as the distinguishing characteristics of case study as a research strategy that attempts to examine contemporary phenomena in their "real life" context, especially when the boundaries between phenomena and their context are not evident. As part of this definition, Yin, also suggest an important difference between case studies and experiments, stating that "an experiment deliberately divorces a phenomenon from its context" to allow the researcher to focus on specific variables (Yin 1981a, 98).

Yin's position holds true for certain types of laboratory-based scientific experiments. However, I have discussed in this chapter how design experiments can be incorporated in AR, a methodology that prioritises participation and engagement with the context and "community of inquiries". Similarly, others have also discussed the differences between experiments in science and experiments in design (for example Glanville 1999; Schön 1984).

Many aspects of research through design experiments as described in this chapter closely resemble the characteristics of qualitative research through case studies. Both strategies, for example, advocate for direct observation and "thick descriptions", value multiple perspectives of stakeholders and participants, and prioritise qualitative and interpretive analysis of contexts and situations (Yin 1981a).

Despite the similarities, conducting research through design experiments means foregrounding the constructive role of design practice in the research approach. This thesis is about the role of design in enabling processes and artefacts of VCUF. To do so, it explicitly reflects on design interventions rather than observing and documenting situations and contexts. These design interventions are design experiments, in which the designer/researcher actively directs and shapes contexts and situations.

4.2.2.2 Knowledge from Action Research through Design Experiments

In summary, the practice-based approach I applied in the study was "Action Research through Design Experiments". AR was adopted as methodology, and a series of Design Experiments, rather than a single, iterative project, were conducted to shape and inform the inquiry.

For each experiment, the objective was twofold. As a research strategy, design experiments were conducted with the aim of generating knowledge from practice. As a design action, every practice endeavour was directed towards the achievement of the specific goals that were agreed with the stakeholders involved.

Because of its iterative nature, AR is particularly appropriate for developing knowledge that is relevant for practice (Dick 2007). Indeed, AR goes beyond the idea that theory might inform practice: "theory is only useful if put in service of a practice focussed on achieving positive social change" (Brydon-Miller, Greenwood, and Maguire 2003, 15). It follows that the type of knowledge that is developed through this methodology is primarily practical, and belonging to the design and inquiry space. Experimental knowledge can, later on, be used in combination with other research methodologies to built theory that can be extended to the broader area of the research question (as it will be explained in Section 4.2.3).

AR processes are usually described as cyclic iterations of "plan, act and observe, reflect" (Kemmis, McTaggart, and Nixon 1988). AR is often diagrammatically represented through loops, coils, or revolving circles. These representations are intended to show how the spiralling cycles of AR enable deeper understanding by reflecting back on earlier actions. But while these models provide a conceptual overview of the essence of AR, attempting to adhere too strictly to these cycles might negatively affect the emergent and

responsive nature of AR (Koshy 2005). On the other hand, embracing messy situations but simplifying them later on through methodised diagrams wouldn't allow capturing textures, details, ephemerals, and irregularities (Law 2004).

Figure 12 attempts to represent some of the salient characteristics of AR as they emerged during the study, in order to explain how the methodology was applied in this context. It must not be intended as an exact model of the process, but as a visualisation of how different elements interact with each other to shape the inquiry.

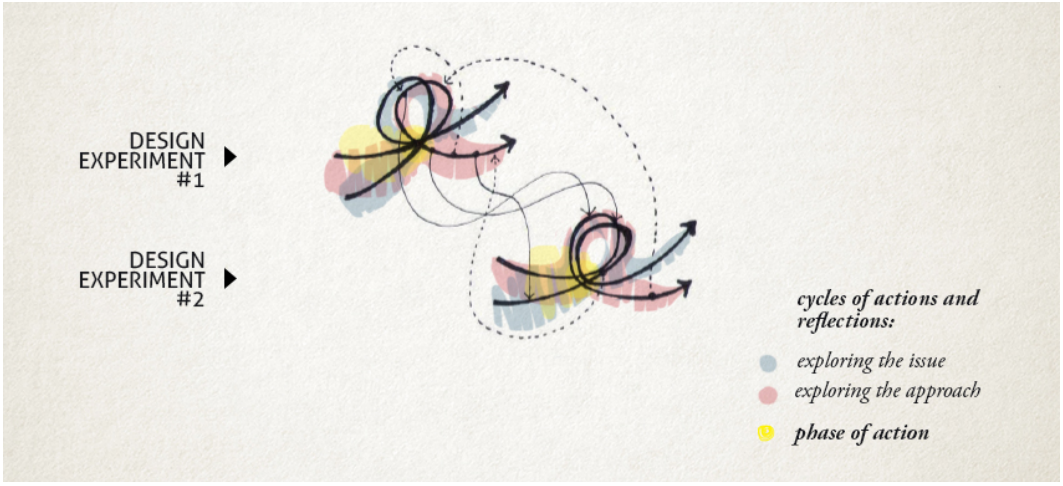


Figure 12 Reflection in Action Research through Design Experiments. Different design experiments involve iterative Action Research cycles, each characterised by phases of action and reflection. Reflections on action inform later experiments or later moments within the same experiments (solid grey lines), or can help making sense of previous events (dotted lines). The Design Experiments conducted as part of this research involve different communities of inquiry, with some actors interested in exploring particular issues, while others (including me) focussing on understanding methods and approaches. In this sense, each Design Experiment encompasses different (yet related) Action Research cycles.

Conducting Design Experiments through AR means that the researcher works within various communities of inquiry. In AR, a community of inquiry is constituted by a group of individual that participate in a process of experiential research (Reason and Bradbury 2001). While AR literature presents participation throughout the research process as a

necessary condition, it is important in this context to unpack this statement, and reflect on who participates, when, and how.

Participation is described in current definition of AR as being the distinctive characteristics of this methodology (Reason and Bradbury 2001). At the same time, several analyses of AR cases suggest that distinct sets of objectives often coexist within the same process. These usually include practical tasks (e.g. solve a problem) and broader research objectives (e.g. develop a methodology) (Coghlan and Brannick 2005). For this reason, modes and degrees of participation may vary for different groups of individuals within the process (Morse 1998). In various phases of planning, doing, and reflecting, groups of actors that constitute the community of inquiry might work together to achieve common objectives, as well as towards independent goals, pursued either independently or in collaboration.

Figure 12, for example, is drawn from reflecting on my work with the Liveable Cities research team. Some of the Design Experiments described in Part B of this thesis involved groups of researchers exploring future-related issues (in blue in the image), myself, mainly interested in exploring the VCUF approach (red), and additional actors participating primarily the phase of action (yellow). While the illustration is drawn empirically, similar conditions can be observed in other cases. For example, Arieli, Friedman and Agbaria (2009), discussing the complexity of participation in AR, describe how the process of transforming experience into theory is characterised by phases of individual review, lengthy discussions, and researchers drafting and redrafting documents to be discussed within the team and with external stakeholders. Other authors believe that participation should not be extended to the whole process, particularly if certain participants are unable or unwilling to be involved in longer-term research (Morse 1998).

Figure 12 also proposes a different interpretation of the iterative nature of AR. While the process as a whole cycles through macro-phases of planning-doing-thinking (thick solid arrows), moments of reflection and learning opportunities tend to happen in numerous moments. Learning outputs might inform decisions to be taken later on, both in the same or in a following Design Experiment (thin solid arrows). Furthermore, reflection on practice may lead to rethinking earlier assumptions or decision, and contribute to making sense of what has already happened (dotted thin arrows) (Huxham 2003).

This section explained how when conducting Design Experiments with an AR methodology, knowledge emerges slowly, through reflection in various moments of the process. But there is a significant difference between knowledge and theory. Design processes generate embodied, experimental knowledge (Polanyi 1966). To construct theory means to find and illustrate those principles and propositions that allow the designer "to move from an endless succession of unique cases to broad explanatory principles" (Friedman 2003, 515). The following section explains how theory can be constructed by combining Action Research with other research approaches to extend the knowledge acquired through practice to the broader area of inquiry.

4.2.3 From contextual knowledge to generalised theory

The previous section explained how reflecting on action is part of a knowledge generation process in Action Research. It also argued that knowledge from practice is often context-specific, and further research is required to move from particular knowledge to theory that can be extended to the broader area of research. In the context of this thesis, this means understanding how knowledge that is generated through the design experiments contributes to the description and understanding of the VCUF approach. AR literature is often unclear on how generalised theory can be generated

from reflection on action (Brydon-Miller, Greenwood, and Maguire 2003). Chris Huxham identifies theory building as the most challenging aspect of AR, partly due to the fact that there "can be no predefined methodology" (2003, 243). Other authors point out that while most texts in AR talk about the importance of integrating theory and practice, very few give an account of how that is or can be done (Dick 2007). For this reason, it is not uncommon for Action Researchers to take an eclectic approach to the methodology, and incorporate in their studies additional modes of research beyond the classical AR cycles of "plan, act and observe, reflect".

For example, Action Researchers embracing critical theory, feminism, or pragmatism, often develop and introduce an explicit theoretical framework that provides grounding for action. Theory is used in this case both to clarify epistemological positions and to provide those insights that are needed for effective intellectual arguments. In return, AR can be used to explore and challenge theoretical assumption (Brydon-Miller, Greenwood, and Maguire 2003).

Bob Dick addresses the issue of theory construction in AR by suggesting that Action Researchers and Grounded Theorists could have something to learn from each other (2007). In its classical definition, Grounded Theory (GT) is "the discovery of theory from data systematically obtained through social research" (Glaser and Strauss 1967). Both AR and GT are emergent methods that share some similarities in their responsiveness and flexibility, and in the grounding of theory in specific evidence. Among the factors that set the two methodologies apart is the fact that GT provide explicit methods for developing theory from experience. Indeed, Bob Dick finds that a great number of PhD students (including design PhD students) doing AR, often chose to add GT towards the end of their AR studies, as a way of producing more systematic or rigorous theory (2007).

GT can be used as part of AR in several ways. These may include: using literature as data to test and refine emergent theory and help generalizing it (Dick 2007), and/or adding to the participatory cycle of AR a non-participatory phase of abstract conceptualisation of experiential data to be carried out by the researcher or research team (Dick 2003).

What the approaches introduced above have in common is that they do not regard AR as a methodology to be necessarily used in isolation. They call for an additional effort from the researcher to integrate additional methods and sources of information (theories or examples) as part of the process of building theory that can be generalised beyond the realm of practice (Dick 2007).

The shortcomings of AR and the need of integrating this methodology with other non-action oriented forms of research are coherent with the discussion of research *through* design in Section 4.2.1. If Action Research is the methodology adopted in Research through Design, additional methods of Research *about* Design are required to integrate specific knowledge with theories and examples. These are necessary to extend the knowledge constructed through reflection-in-action from the specific context of practice to the broader area of inquiry.

4.3 OVERVIEW OF THE RESEARCH PLAN

So far, I have presented in this chapter the epistemological framework of the research. Specifically, I introduced the concepts of Research *through* Design, Research *about* Design, and research *for* Design, elaborating on the purposes and the type of knowledge that these three modes of research can generate. I then described the characteristics of Action Research through Design Experiments, which is the main methodology of this study. I also discussed how theoretical research and collection of examples must be integrated to practice-based research in order to construct theory that can be generalised. In this

section, I will explain how the approach has been adopted in this study, by providing an overview of my research process.

4.3.1 The Design Experiments

There are three main design experiments that informed this research, in addition to one preliminary experiment. As the timeline in Figure 13 shows, the projects had different durations, which were largely determined by the research programme or the stakeholders I collaborated with.

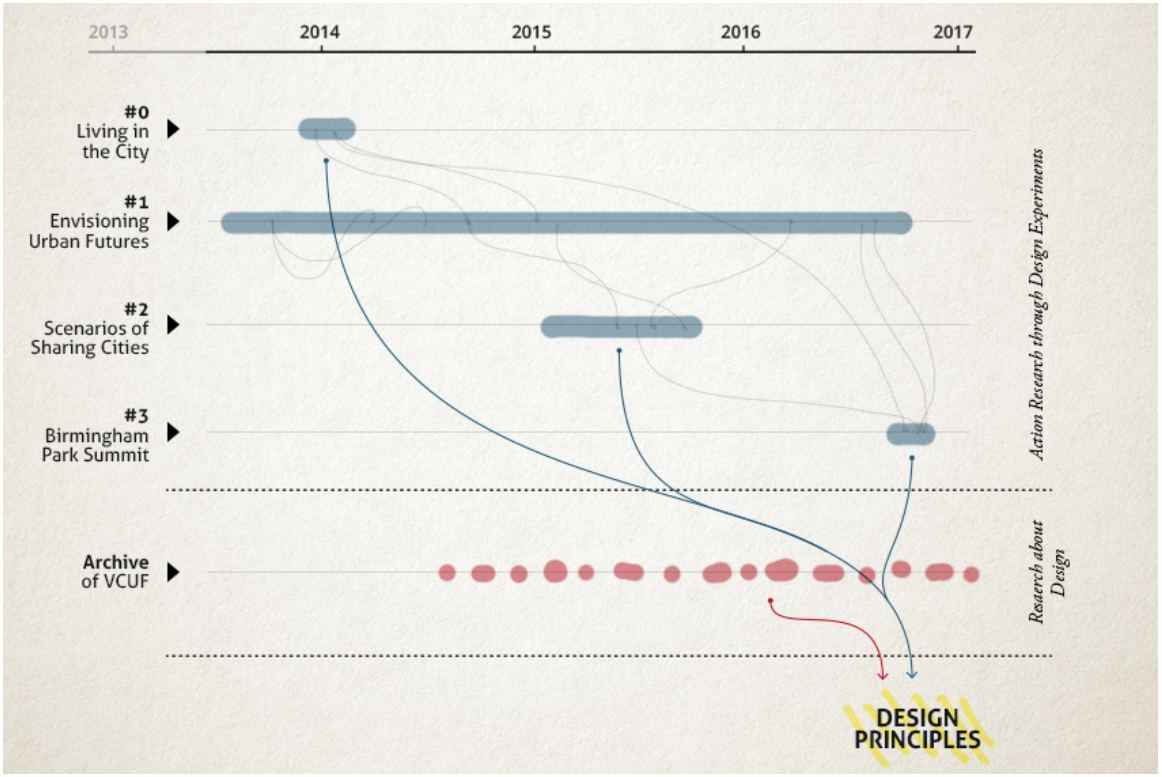


Figure 13 Timeline of the study

The preliminary DE (#0, "Living in the city") was carried out in collaboration with a group of scholars conducting research on future scenarios of urban life in the UK and international cities for the UK Government Office for Science (Foresight).

The opportunity of being involved in such project came at a time when my research question was not clearly stated, and the area of inquiry was still fairly broad and ill-defined. Initially, this collaboration was not framed as an experiment, but as a short-term endeavour running in parallel to the thesis. However, the reflections and learning outputs from this project generated a number of questions that were later on refined and solidified in the Research Questions for the PhD. These, in turn, defined the area of inquiry.

DE #1, "Envisioning Urban Futures" was the longest running experiment: from September 2013 (with preliminary meetings) to July 2016 (when the main output was completed). This project often ran in parallel with other, shorter experiments, which informed and shaped its trajectory.

Like DE#1, DE#2 ("Scenarios of Sharing Cities") was conducted as part of the Liveable Cities programme. For this reason, the methods adopted in this project share many similarities with the ones in DE#1.

DE#3, "Birmingham Park Summit" was conducted in collaboration with Birmingham City Council. Despite being the shortest of the experiments, it allowed me (and the research team I worked with) to develop and test some ideas that were formulated, but not applied, during earlier experiments.

Experimental research arguably led the study, as it was direct experience that generated most of the questions that were then better formulated, explored, and generalised by combining research through design with other modes of research. But while practice is frequently at the core of design PhDs, its emergent character often involves dependence on external stakeholders and conditions, and non-linear journeys (see for example the experience of The Creative Exchange 2016). Because of this, planning a practice-based

PhD must leave room for serendipity, unexpected opportunities, and possible changes of trajectory (Yee 2010). These aspects will be touched upon in the description of the experiments in Part B of the thesis.

It follows that one of the difficulties of the research process was to evaluate as early as possible the relevance of emerging ideas and promising opportunities in the context of the inquiry. Towards the end of the PhD, new questions arose that called for experimenting with different methods and subjects.

The research inspired a number of projects in the area of subjective mapping and multiple futures. Some of these projects are still in their infancy, while others have been initiated or fully completed. While for consistency reasons these projects have not been included in the list of DEs, they nevertheless contributed to the theoretical development of the research project, and opened interesting paths for future research development. These projects are shortly introduced in Appendix X.

4.3.1.1 Methods

As described in the introduction to this thesis, this study brings together three main disciplinary areas, namely: participatory design, speculative design, and visual design in the VCUF approach.

Generally speaking, the methods adopted in this thesis to explore the approach through practice are taken from these three areas, often with a deliberate "pick and mix" approach (Yee 2010). These include: co-creation workshops (participatory design), scenario making (speculative design) and information visualisation processes (visual design).

Because of the novelty of the approach, and the role that experimenting with different processes and techniques had in constructing its principles, the methods will be described in details in Section B, which provides a full recount of each DE.

4.3.2 Research about Design: building a growing archive of VCUF

This section presents a brief account the main method that I used to conduct research *about* design.

In March of 2015, after I drafted an initial extended definition of VCUF, I started to collect examples of this approach on a blog: subjectivefutures.wordpress.org. Subjective Futures is an archive of VCUF that presents an evidence-based overview of the ways in which the approach has been and can be adopted. The objective is to explore VCUF beyond the limitation of what was possible for me to access thorough practice-based research during the PhD. The findings from this research contributed to the definition of the theoretical framework, by providing evidence of existing examples and practices (2.2.1.1).

A systematic review of relevant literature and of current and historical examples is often presented as an essential aspect of academic research. However, one of main the challenges of building an archive of VCUF was the lack of unambiguous keywords to use for searching the literature and existing visual design databases and collections. Indeed, this lack of explicit framing of such approach is one of the main motivations of the study. This is not an uncommon challenge in design research projects, both because of the generative nature of the practice but also because there is relatively little tradition of doctoral and academic studies that focus on design approaches (Evans 2010b).

Nevertheless, a lack of definitions and clear vocabulary doesn't necessarily imply a lack of interesting and thought-provoking examples in which visual methods have been used to capture the pluralism, complexity, and subjectivity of visions of urban futures (2.2.1). Throughout the PhD journey I used the Subjective Futures blog as an online notebook for collecting references and reflections. The archive has therefore been growing organically, and sometimes serendipitously.

The examples in the archive show how Visual Conversations can be conducted or represented through games, zines, exhibitions, interactive platforms, physical models, correspondence, installations and so on. They also provide evidence of the relevance and impact that the approach can have in various fields (art, design, urban planning, policy-making, and shaping the political discourse) and for very different purposes (e.g. imagining, documenting, dissenting and resisting, inspiring, designing).

Compiling the archive is a form of Research *about* Design: an inquiry into the discipline of design, aimed at documenting and understanding design processes and their results (Buchanan 2001; Frankel and Racine 2010; Frayling 1993). Other than to support review of the field, the evidence collected through this mode of Research *about* Design was used in combination with the knowledge generated from reflecting on practice to develop and test the Design Principles of VCUF.

4.4 CONTEXT OF THE RESEARCH

4.4.1 Liveable Cities programme

This PhD study was conducted as part of the Liveable Cities programme.

Liveable Cities is a five-year interdisciplinary programme funded by the Engineering and Physical Science Research Council (EPSRC). It involves Engineering, Social Science, and Design Co-Investigators, researchers, and PhD students from five UK universities (University of Birmingham, Lancaster University, University College London, and University of Southampton). The core objective of Liveable Cities is "to transform the engineering of cities to deliver global and societal wellbeing within the context of low carbon living and resource security through developing realistic and radical engineering that demonstrates the concept of an alternative future" ("The Liveable Cities Project - Liveable Cities," 2013.). At the moment of writing, the programme is still ongoing; it will end in December 2017. Further information about the programme is available on the Liveable Cities website: http://liveablecities.org.uk

The programme was divided into two parts: Phase 1 (2012-2015) and Phase 2 (2015-2017). In reality, the two phases overlap, as some of the research activities that were initiated in Phase 1 continued after the commencing of Phase 2. Similarly, the research projects in Phase 2 informed and prompted further investigations in the research areas in Phase 1.

For the first half of the grant (Phase 1), Liveable Cities was organised into five core Research Challenges (RC) and thirteen research activities. Each RC focussed on one key area that was considered critical for creating an evidence base of research that can create an holistic view of cities. A major Design Experiment that informed this study,

"Envisioning Urban Futures" (DE#1, chapter 6), was conducted as part of the "Future Visions" theme of RC4 - "Future Visions, Radical Engineering". The project was divided into two parts: a series of nine workshops and their analysis and visualisation. The first part was carried out during Phase 1, while the analysis and visualisations continued and overlapped with Phase 2 of the programme.

In October 2014, towards the end of Phase 1, the whole team got together for a co-creation workshop. The aim of the event was to discuss the initial findings from the five research challenges, and identify common threads and new research opportunities. At the end of the workshop, ideas for multidisciplinary, radical interventions were clustered in seven complementary themes. Each theme was to be led by a core group, and was allocated a three-month period to be explored with the support of the rest of Liveable Cities' team. "Sharing Cities" (including Design Experiment #2 conducted for this research) was the first of the seven overarching themes. Most of the activities in the short "thought experiment" took place between February and May 2015, although the core group kept working on the theme until the autumn of 2015.

The timeline in Figure 14 shows an overview of the programme. The research activities in which I have been involved are highlighted in red.

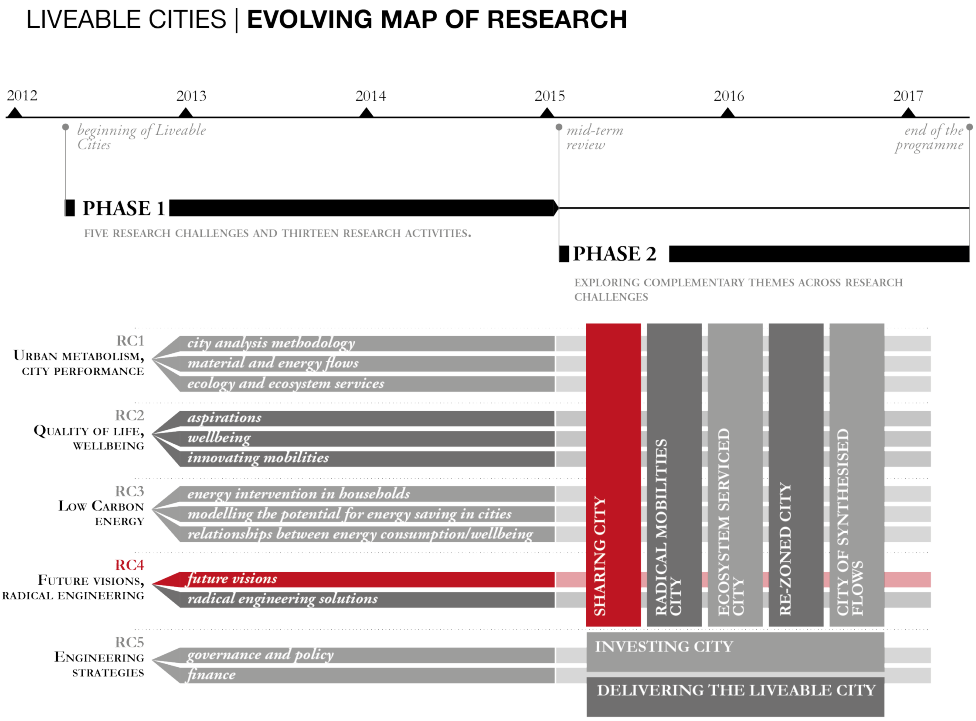


Figure 14 Liveable Cities timeline. Adapted from the document submitted by the Management Committee for the mid-term review of the programme (February 2015).

4.4.2 Limitations and opportunities of a practice-based PhD

Throughout its duration, Liveable Cities funded 21 PhD students. For some students, the research question of the PhD coincided with one of the research questions of the programme, and the investigation for the PhD fed directly into the programme's research activities. In other cases, research projects were developed independently, and bore little connection to the programme. In between these two extremes, there has been a broad range of roles and ways of involvement for PhD students in Liveable Cities.

In May of 2013, I joined the programme as part of ImaginationLancaster. The call I applied to was addressed to perspective doctoral candidates interested in "how to communicate [Liveable Cities'] research which involves radically envisioning sites for low carbon living as a means of providing a brief to engineers, designers and policymakers

and challenge conventional design and engineering approaches" (ImaginationLancaster 2013). During the interview, the direct involvement with the programme's activities as part of the research team was discussed further, and presented as an important aspect of the PhD journey.

ImaginationLancaster is an open, exploratory design-led research centre, employing traditional and social science methods with practice-based arts and design methods to conduct applied and theoretical research into products, places, and systems (http://imagination.lancs.ac.uk/about). It is not unusual for doctoral candidates to contribute directly to a variety of design and research activities taking part in the centre, when these are beneficial to the doctorate. As a result, PhD students often perform multiple roles, depending on the project or research activity they are involved with.

Conducting doctoral research while simultaneously being part of a research team involved invaluable opportunities for training and experimenting, but also challenges and limitations. The most important advantage of the arrangement is the direct access that students are given to a context in which to conduct experiments. Collaborative and designerly research is prioritised in ImaginationLancaster over individual and purely theoretical projects, and PhD students involved in experimental research often work as an integral part of research teams. As students, we are able to learn practical research and design skills from more senior academic staff. Sometimes, certain projects require us to acquire and quickly mature new skills "by doing".

There are also a number of challenges and limitation regarding the integration of PhD students into research teams.

Firstly, while being part of a community of inquiry mitigates the difficulties of having to organise and plan Design Experiments independently, it limits significantly the freedom

of the student to choose the contexts in which to work. Doctoral students conducting AR are responsible for the rigour of the inquiry (Dick 2014). Rigour in experiments is largely determined by planning. Students may often find themselves negotiating the details of participatory activities for the benefit of their inquiry. In some cases, it is necessary to prioritise the overall objectives of the community of inquiry, and bend the PhD research plan accordingly. Expectations in management of times and resources also may sometimes differ, with the schedule of the project determining the depth and type of research inquiry.

Because of the above challenges, I encountered some significant limitations in setting and shaping the space of inquiry to be explored through practice. However, I do argue that this limitation is an inherent condition of most practice-based studies conducted in collaboration with any community of inquiry.

For this reason, I chose to make the constraints of conducting research through practice within a team explicit in this thesis, and in the way it has been written.

4.5 WRITING AN EXPLORATORY JOURNEY

This study is intended first of all as a personal exploration into an area (collaborative visions of urban futures) that, while lacking of explicit formulation and methodological discussions, is rich of examples from various disciplines and fields.

The structure of the thesis seeks to mirror the structure of the inquiry as represented in Figure 11, while the form of the writing is intended to reflect the methodologies used in the different phases.

The thesis is structured as an inward journey from the broader area of research (defined by the theoretical framework) into the first-person hands-on experience of practice, and

then out again from the program to the research area to construct new theory (see the Introduction to this thesis for a detailed outline).

The exploratory practice that informed the study is described in Part B. The learning outputs, failures, and open questions from each Design Experiment informed and shaped subsequent practice, often acting as conceptual threads woven across the research journey.

Collecting all of the Design Experiments in one section of the dissertation, narrating each process almost chronologically, and highlighting the weaving of the threads is intended as a way to render the experiential and iterative nature of Action Research.

AR studies, in fact, require appropriate forms of writing that emerge from the work, rather than being imposed by conventions (Marshall 2000). In particular, where AR is participatory, writing in AR is sometimes (and certainly in the case of this thesis) written from the point of view of a single researcher. The result, is therefore a representation of the constructed perspective of the author (Marshall 2000).

Experiential and experimental research, in general, needs to find ways of foregrounding both the subjectivity of the experience and the "leakages, entanglements, fluidities in research" (Law 2004, 41). John Law proposes a way of doing and disseminating research that doesn't hide the "mess" in research, the findings, and the world. While in science experiments the process of producing information melts into the background (Law, 2004 citing Latour and Woolgar, 1986), in design experiments the processes need to be explicit and documented.

For this reason, I chose to present the design work in this thesis as a step-by-step, first person, subjective recount of the facts. I included my reflections as well as those of the

teams I worked with. These almost journal-like reports of the projects are aimed at contextualising choices and Design Principles, and making the rationale behind them accessible (Gaver 2012).

The detailed description of the methods utilised in the Design Experiments also enhance their transferability. However, while processes can be replicated, the experiences described in this thesis are context-specific, and it would be unlikely for the outcomes to be exactly reproduced. As Cross states, overly formulaic approaches to design that attempt to be "explicitly organized, rational and wholly systematic" have traditionally failed (Cross 2007, 44). The approach and results described in this thesis are only some of multiple ways in which visual participatory conversations and visualisation processes can take place.

PART B.

EXPLORING THE VCUF APPROACH THROUGH PRACTICE

INTRODUCTION

As introduced in the Methodology chapter (4), a series of design experiments were conducted throughout the course of the PhD study. These experiments played an important role at different stages of my investigation on VCUF. From the early stages of the research journey, and throughout its duration, they contributed to clarify and refine the research questions and to point out the key aspects and critical elements of the approach. Towards the end of the study, reflecting on the work conducted through practice helped me to define a set of principles and tools that will be discussed extensively in Part C.

My inquiry into VCUF was conducted through four core projects: a preliminary one (Living in the City (Chapter 5)) and three main experiments, namely:

- Envisioning Urban Futures (Chapter 6);
- Sharing City (Chapter 7);
- Birmingham Parks Summit (Chapter 8);

In this second part of the thesis, I will describe the details of each project, focussing on my design journey and the way the approach was used to respond to research questions and design challenges. Part B (and this thesis in general) is concerned primarily with the *methods*, rather than the *contents* of each project. For this reason, greater importance will be given to the way processes and artefacts of VCUF have been ideated, created, and

adopted, while the content and the findings of the projects themselves will be summarised. For each project, I will direct the reader to reports or publications (conference papers and journal articles) that provide further information on the findings. As anticipated in the previous chapter (4.5), conducting research through practice was an exploratory journey; while choices of action and design will be motivated, it is important to acknowledge that both circumstances and intuition partially contributed to shaping design directions.

In the description of three of the four projects project provided in this chapter, "process" and "artefacts" will be presented separately, coherently with the way visualisations (and particularly VCUF) have been conceptualised in this thesis. This is largely due to the fact that, as explained in chapter 3, processes and artefacts of VCUF require, in many cases, distinct design processes. However, since these two phases are often interrelated as part of the same Action Research cycles (see section 4.2.2.1 in the methodology chapter), this separation is often an artificial one, and is entirely functional to the development of the Design Principles (Part C). Furthermore, when examining the descriptions of the Design Experiments, the reader should keep in mind the aims and objectives of this thesis, which is primarily concerned with how to enable and document conversations, rather than on the technical aspects of the visualisations as graphic artefacts.

At the end of each design experiment I will discuss its "learning points": what worked, what did not work and open questions to explore through further experiments. Finally in the summary of Part B, I will discuss the four projects as a single research journey, focussing on how I learned from failures and how the "hanging threads" of suspended ideas and open questions from earlier experiments have been woven into later projects.

Overview of the design experiments.

TITLE *(CHAPTER)*	ABOUT	PROJECT RESEARCH QUESTIONS (ProjRQ)	RESEARCH QUESTIONS THAT RELATE TO THE PHD RESEARCH QUESTIONS
#0 **Living in the City** *(Chapter 5)*	*A first experiment in methods for visualising future urban scenarios from a collaboratively written text.*	- **ProjRQ:** How to visualise four alternative scenarios of life in future cities?	**-RQ1:** what would be methods for collaborative visual writing? **-RQ2:** How to visualise four future scenarios in a way that could make connections, flows, and correlations visible, while at the same time communicating the main features of each future.
#1 **Envisioning Urban Futures** *(Chapter 6)*	*Speculative Co-Design: designing a space for imaginary explorations and mapping them in an Atlas.*	**- ProjRQ1:** Would visions of cities created by experts in different sectors be different to one another? And in what way would they differ? **- ProjRQ2:** What are the main issues across sectors?	- **RQ1:** how to design spaces for agonism in speculative co-design? - **RQ2:** how can we visually represent the large variety of issues and articulate them in ways that support our understanding of the conversations?
#2 **Sharing Cities** *(Chapter 7)*	*Conducting situated conversations on the relation between social practices and urban futures*	**- ProjRQ1:** What is a sharing city? - **ProjRQ2:** What would it take for a city to become a 'sharing city'?	**- RQ1+2:** How to design processes and artefacts that help us explore possible futures of sharing cities? **- RQ4:** what is the value of VCUF in this context?
#3 **Birmingham Parks Summit** *(Chapter 8)*	*Design of visions that can be unpacked, reworked, transformed into actions.*	**- ProjRQ:** How to involve citizens to design a 25-years natural capital agenda while keeping the council accountable?	**- RQ1+2(a):** What would be processes and artefacts for producing visions that can be used in policy and strategy making? **- RQ1+2(b):** How to enable participants to co-creation activities to present their own vision?

5 DESIGN EXPERIMENT #0: "LIVING IN THE CITY"

A first experiment in visualising future urban scenarios

from a collaboratively written text.

This project pre-dates my earliest attempts at a definition of Visual Conversations on Urban Futures, but includes many of the elements that have been developed in later experiments. Reflecting both on the visualisation process and on the underlying theoretical approach of the project as a whole contributed to a clearer shaping of the problem area, and to the drafting of the main research question in this thesis.

This 2-months project started in February 2014, when the UK government Foresight Future of Cities project commissioned Prof. John Urry to write a report entitled "Living in the City", to understand what would be possible scenarios for UK cities over the next 50 years. The published paper is concerned with the nature of city living, looks at how urban lives have changed in the last 40 years, and establishes a range of possible urban futures for the middle of this century (Urry et al. 2014).

In order to explore and question some of the many issues nested within the overarching concept of urban futures, John invited Javier Caletrio and Thomas Birtchnell, to contribute to the project. In particular, the two researchers were asked to elaborate on an initial draft for a set of four possible future urban scenarios and integrate them with ideas around the future of mobility (Caletrio) and the future of manufacturing and technologies (Birtchnell). Finally, I was asked to join the team, and was given the task to produce a set of visualisations for the scenarios.

The report sought to bring together different areas of research in the sociology of living the city that are normally considered separately, in order to highlight their interdependencies. To help doing so, I proposed to visualise the four scenarios in a way

that could make connections, flows, and correlations visible, while at the same time identifying the main features of each future.

Effectively, at least from the point of view of its process, the paper took shape as a conversation on pasts, presents, and future of cities. This chapter describes how such conversations were translated visually.

5.1 PROCESS

I started the process of translating from the written to the visual form by identifying the recurring ideas and categories in the main text. The information coded in this way was then organised in a layout that was used to produce preliminary sketches of the visualisation.

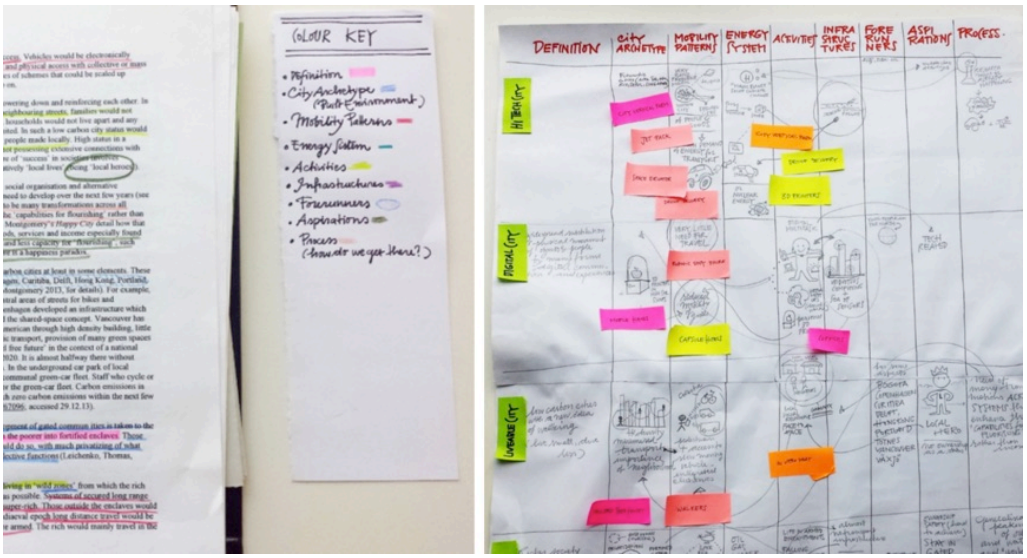


Figure 15 Content analysis (coding) and first sketches of the scenarios

The visualisations and the paper were produced almost simultaneously. Most of the reviews to the text were made through comments and additions to a shared document. While updating the initial draft of the visualisation with the new coded information added to subsequent versions of the text (see the sticky notes in Figure 15), I wondered

whether the visual design of the scenarios could be included in the process of collaboratively editing and commenting.

To do so, I replicated my initial sketches on a shared Draw document on Google Drive (see Figure 16). This particular platform was chosen as a way to involve researchers that are not familiar with graphic design techniques or software. The file created at this stage of the process included all the relevant elements of the visualisation, but in a very simplified way. In an email, I invited all co-authors to contribute to the shared file, by adding comments as well as by integrating or modifying it.

The idea of a shared platform to use for developing the scenarios alongside the development of the narrative in the text of the report was welcomed by the researchers. However, researchers chose for the most part to only add comments (rather than edits and original content) to the file. Despite its limitations, the shared platform opened up the design process to the whole team, encouraging feedback and collaboration. The platform was also used to review and validate the content analysis and confirm the selection of items to represents.

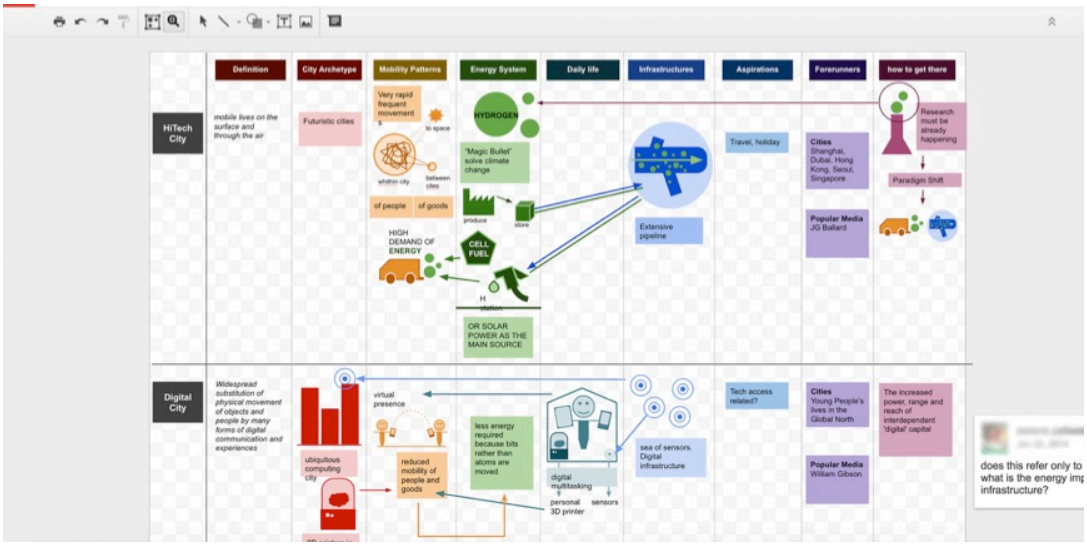


Figure 16 Shared sketch of the scenarios intended for remote collaboration and feedback

Once the final draft of the text and an updated version of the visualisation structure were approved by the whole team, I proceeded with the design of the visual artefact to include in the report.

5.2 ARTEFACT

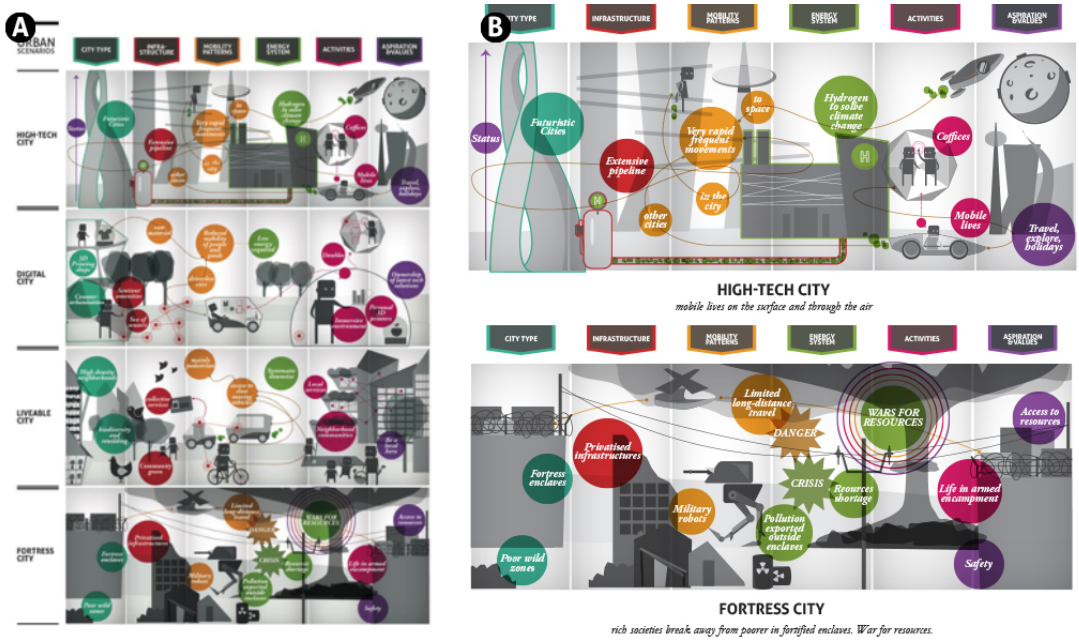


Figure 17 Scenarios for *Living in the City*: (A) The overview of the four scenarios and (B) a detail showing two of the scenarios ('High Tech City', 'Fortress City'). A higher quality image is included in Appendix A.

The design concept for the visualisation was inspired by *We Will Be There - A Map of the Future*, a visualisation produced by DensityDesign for Wired Italia (DensityDesign 2009). This visualisation was intended as a map to translate a report on possible futures created by the Institute For the Future (IFF) into a visual scenario (see also 2.2.1.1and 9.2.2). The resulting artefact is a semantic map of themes and ideas overlaid to an allegorical illustration (see Graffieti et al. 2011 for a description of the visualisation, the design process, and the underlying principles).

Similarly to DensityDesign's A Map of the Future, we decided to combine a set of illustrations of landscapes of the futures described in the main text with a semantic map. In this map, the various elements in each scenario are highlighted and classified into six areas: city type, infrastructure, mobility patterns, energy system, activities, aspiration and values. The semantic map also marks the interdependencies between various elements

and across the six areas. By spatially organising information, the visualisations transformed coherent narrative descriptions of the scenarios into an explorable map. They allow the scenarios to be read both horizontally (i.e. one scenario at the time) or vertically, by semantic areas. For example, the reader could easily compare the patterns of mobility across different scenarios.

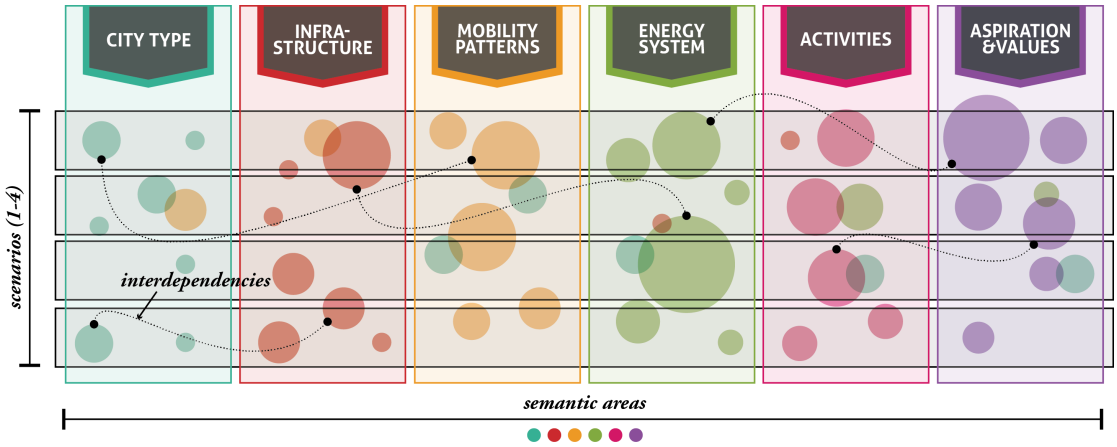


Figure 18 The structure of the visualisation

5.3 LEARNING OUTPUTS AND OPEN QUESTIONS

This project showed how conversations on alternative future urban scenarios can be written visually (Sadokierski 2010), and provided empirical evidence of the ability of the visual language to unveil information otherwise hidden in the written text, by allowing the reader to "see content and form simultaneously" (Dondis 1973).

In addition, the project shows in detail how different semiotic modes – each one with its own affordances – can be used simultaneously to illustrate (literally or figuratively) the multitude of layers and their interdependencies in conversations on urban futures that involve different actors. The written text in the report described each individual scenario, providing the rationale and references to the various statements. The allegoric illustrations provide four "macro-readings" (Graffieti et al. 2011) of the salient

characteristics and the mood of each scenario. The semantic map connects, relates, and compares different dimensions and elements across themes and scenarios.

The many ways in which the artefact can be read – glancing, inspecting, exploring, comparing and so forth – were some of the reasons why the visualisation has, since its publication, been used independently from the paper to generate discussions in a number of workshops or presentations to various audiences.

5.3.1 From panoramas of the future to visual conversations?

The report describes four possible futures through the use of *predictive* scenarios (see 1.3.1.1 and Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006) that could manifest as direct or indirect consequences of the complex interactions of multiple factors. What the report (and the visualisations) does not do is to critically reflect on the role of the authors of the scenarios (1.3.2).

In a way, the four scenarios can be seen as reportages from possible future worlds, visualised through panoramas. The researchers compiling the study did so by analysing emerging phenomena and reporting on their potential future consequences. Altogether, these observations created four alternative worlds that the reader can observe, explore, and discuss, but to which he or she cannot contribute.

It was while designing the visualisations of these scenarios that I started to wonder how to rethink future visions as conversations rather than panoramas.

What became clear at this point in my research journey was that collaboratively created scenarios required a radical rethinking of the process of future visioning, as well as the role of the actors involved: from reporters to participants. It was during this experiment that the theoretical framework presented in Part A started to take shape. The findings

from the literature review brought me to develop the initial ideas for the VCUF approach[17].

[17] *A first attempt at explaining the approach was published as a working paper in the proceedings of the "Relating System Thinking to Design 2014 symposium (Pollastri 2014).*

6 DESIGN EXPERIMENT #1: ENVISIONING URBAN FUTURES

Speculative Co-design practices: Designing spaces for imaginary explorations and mapping them in an Atlas.

6.1 INTRODUCTION

The experiment described in this section starts from the open question that concluded my discussion of the Living in the City experiment: How to co-create speculative visions of urban futures? What processes might we adopt, and what would the characteristics of these visions be?

The Future Visioning Workshop Series was the first project I was asked to participate in when I joined Liveable Cities as a PhD student. My responsibilities included: contributing to the development of the methodology, designing and producing the tools to facilitate the workshops, supporting the delivery of each workshop, and visualising the results.

The direct involvement in all the stages of the project, gave me the opportunity to employ my practice as designer as a method to explore those issues at the intersection of co-design, speculative design, and information visualisation that are central to my inquiry. The initial findings and learning outputs from this project were instrumental for developing the concept of Visual Conversations on Urban Futures and for extracting some initial principles to develop further.

The "Future Visioning Workshop Series" consisted of nine, sector-specific workshops during which experts in various professional fields co-created scenarios of future cities. The research activity was designed, organised, and facilitated by the Liveable Cities research team at ImaginationLancaster with the Future Visions team at UCL,

Department of Transport Engineering. The purpose of the project was to question assumptions on what a desirable urban future might be.

Through this research activity, the research team sought to capture common issues from the different professional sectors, and understand whether and how sector-specific future visions differ from one another. Doing so required the design and development of a set of participatory methods for co-designing future visions as well as tools for capturing the complexity of the discussions. This area of research and design constituted the focus of my contribution. However, the whole research team involved in the project took part to most activities of testing and discussing tools and methods, and helped running and facilitating the workshops.

The following sections describe the project journey. First, I will present the design process and the methods that we developed for conducting the series speculative co-design workshops. I will then explain how information design techniques were adopted to visualise these scenarios in the Atlas of Imaginary Future Cities. I will then present a selection of findings to demonstrate how the Atlas helped us to capture hidden patterns of information.

6.1.1 The research questions

As this project is both part of Liveable Cities and a design experiment in this thesis, there are two separate sets of research questions to consider.

From the point of view of Liveable Cities, the objective of this research activity was to create radical, sector-specific visions of future liveable cities. In particular, among all the possible futures, the research team was interested in exploring with participants the least probable and most unexpected futures, beyond the linear trajectory of current trends.

Each workshop was to answer to a central question: "What would the future of your sector be in the city of 2065?" This was then further specified through four sub-questions to be investigated in each workshop:

- What are the trends in your sector? (How has your sector changed/how is it changing? How does this evolution change the city?)
- What are the radical changes that could happen in the future in your sector?
- What infrastructure is needed to support these changes?
- How will the city look like?

By asking these questions, the workshop series sought to understand:

- **ProjRQ1:** Would visions of cities created by experts in different sectors be different to one another? And in what way would they differ?
- **ProjRQ2:** What are the main issues emerging across sectors?

As a first design experiment in setting up Visual Conversations on Urban Futures, this project was essential for me to understand the methods and tools that are necessary to facilitate the co-creation of a series of scenarios of urban futures that can be translated into legible and comparable visual artefacts. This meant understanding:

- How do we make these conversations happen? (What are the necessary conditions, what tools can be used, how to facilitate them) – this contributes to **RQ1** of the PhD
- How can we visually represent the large variety of issues and articulate them in ways that support our understanding of **ProjRQ1** and **ProjRQ2**? – This contributes to **RQ2** of the PhD

The following sections will describe how processes and artefacts of Visual Conversations on Urban Futures were designed and employed in the project.

6.2 THE PROCESS: THE FUTURE VISIONS WORKSHOP SERIES

The Future Visions Workshop Series is described in this section as a *process* of conducting Visual Conversations on Urban Futures. The following sections will describe the design process and the resulting methodology for the use of workshops as platform for imaginative conversations.

6.2.1 Designing the workshop

The process of designing and organising the Future Visioning Workshops was initiated in September 2013, when the project team met to define the objectives of the research activity, the expected outcomes, and the methodology.

The first five months were used to plan, design, and schedule the series of activities. During this phase three pilot workshops were conducted to test and review our methods. PhD students from Lancaster University and UCL, as well as Liveable Cities researchers were involved as participants. The design process of the workshop series was iterative, with each pilot followed by a team meeting in which we reflected on the experience (what worked and what did not go as planned), and proposed adjustments. Following these group phases of reflection, I would design and produce mock ups of new tools to share with the rest of the team, alongside a detailed description of the activity to be conducted during the new proposed version of the workshop.

One of the constraints that influenced the design of the workshops was that, in order to encourage busy professionals to attend, each workshop could not be more than 2 hours long. For this reason, the first critical issue we encountered was to find a way to

effectively manage the short time available. It was important for the workshops to contribute to each of the research questions in Section 6.1.1, but at the same time, we wanted to encourage participants to be as imaginative as possible, to encourage truly radical ideas to emerge. This meant balancing focussed questions with spaces for open, unstructured discussion.

Three versions of the approach have been designed and tested before consolidating a final methodology.

6.2.1.1 First version of the workshop

The first version of the workshop was designed in September 2013. On October 3rd 2013, a group of 15 PhD students from various UK universities were invited to a pilot event aimed at testing and refining the methodology. Students were approached as "experts in higher education", and the theme of the workshop was "the future city of education".

The aim of the first part of the workshop was to create a collaborative representation of the current situation of the sector in the city. In this activity participants were asked to map places and times of educational production and consumption.

To do so, we provided participants with a form in which they could map their "week in education" (see Figure 19), using a provided set of graphic devices and a notation system described in the instructions. Participants worked individually, and presented their map to the rest of the group at the end of the activity.

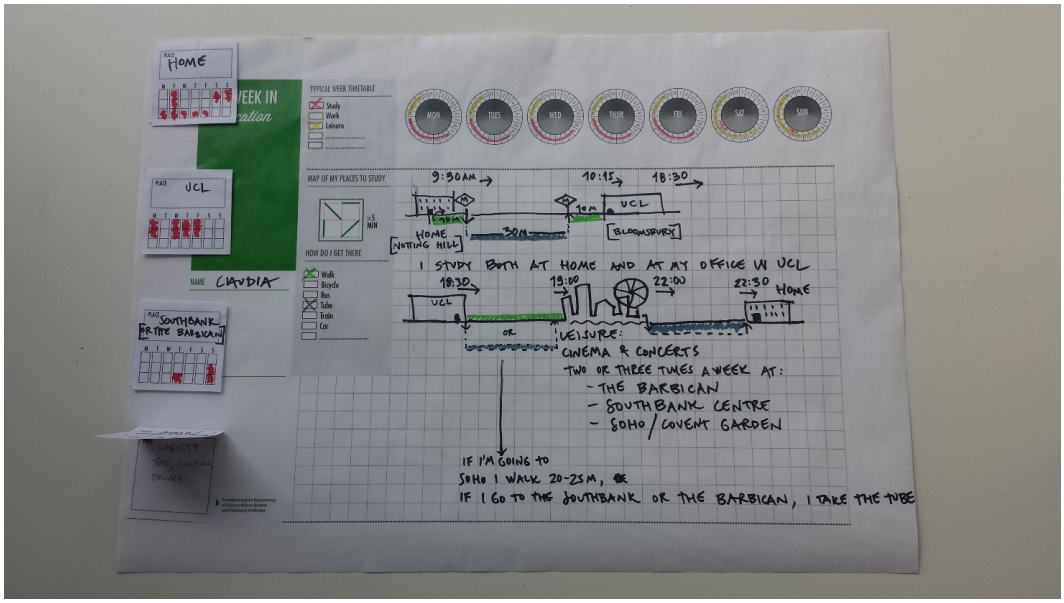


Figure 19 Participant's map of her "Week in Education"

The critical step, at this point, was to move the discussion from the past and present to the future. To encourage participants to broaden their imagination, we designed and produced a set of scenario cards describing possible (but not necessarily predictable) futures. Participants worked in pairs, and each pair received four scenarios from one of the four areas (technology, society, environment, politics/economics) In the following 15 minutes they were asked to think of positive and negative aspects of each scenario and reflect on how education might change in the city in the future. The outcomes of the discussion were then presented to everybody.

Each pair was then asked to design the system of "higher education" in the future city, according to the scenarios described in the previous activity, and focussing on infrastructures and on patterns of production and consumption.

Finally, in a plenary session we talked about the future city, considering all the different aspects discussed by the groups in the previous exercise. As part of this final discussion,

we attempted to draft a vision of a future city that integrated multiple views by highlighting similarities and conflicts between the visions developed in each pair.

Figure 20 Participants discussing the future of higher education during the first pilot workshop

6.2.1.1.1 Feedback from the first pilot

The pilot study allowed us to identify several problems with the methodology adopted.

The most noticeable issue was with the lack of depth in the discussion. For the most part, this had to do with the instructions and the type of material provided for each activity. We tried to encourage creative thinking and radical ideas, but the material provided was over-designed and not flexible enough for participants to experiment with. This significantly limited participants' creativity and made them feel like they were simply "filling a form". Participants were too focussed on following the instructions on how to complete the task assigned, and did not engage in the discussions. The material that was designed to facilitate structured conversations ended up confusing people and slowing the pace of the whole workshop.

Scenario cards appeared to be helpful in inspiring participants to think about a wide range of futures, and created a connection with the broader research in RC4. However, some participants felt intimidated when asked to design a future city in an area with

which they were not particularly familiar. (e.g.: "I Do not know much about technology, I'd rather do the ecology scenario"). Furthermore, some participants questioned the validity and the assumptions of the issues presented on the cards.

The overall feedback from this pilot lead to a substantial redesign of the workshop. The new version was characterised by simpler activities, in order to leave more space to discussion.

6.2.1.2 Second version of the workshop, using Urban Future Scenarios

The second version of the methodology was tested during one of the Liveable Cities Researchers' meeting. Similarly to the previous pilot, the issue explored in this workshop was "education in the city of the future".

One of the problems of the first activity in the previous version of the workshop was that it focussed too much on the personal experience and not enough on the education system itself. In this new version, each participant was asked to indicate on a sticky note one place of education (e.g. library, school, gym, prison etc.). All the notes were then distributed on a board. Participants worked in pairs to map around each sticky note (one sticky note for each pair) all the actors involved in the education service that takes place in that particular space.

We then moved to the scenario-making activity. Since one of the issues with the previous version of the workshop was that participants challenged the criteria we used to pick the issues on the cards, we decided this time to use as a set of four urban future scenarios as a reference, which were developed as part of a previous EPSRC-funded project called *Urban Futures* (Hunt et al. 2012). The four scenarios are: "business as usual", "market forces", "policy reform", and "new sustainability paradigm". Each scenario was detailed in its social, environmental, political, and economic aspects.

Participants were divided into four groups. Each group was given a set of cards representing different aspects of one of the scenarios, and was asked to develop and present a vision for education in the future scenario.

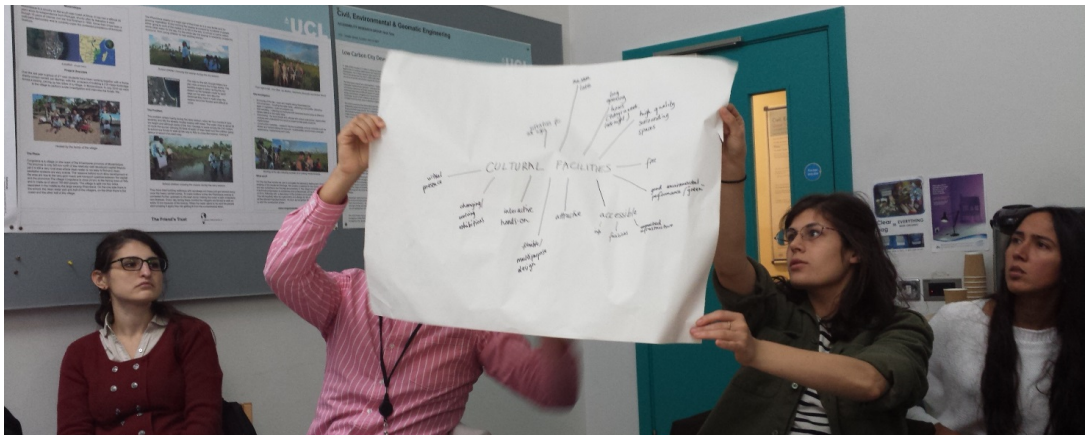


Figure 21 A group of participants presenting a future vision

6.2.1.2.1 Feedback from the second pilot

Participants found the first activity clear and engaging. Together we had the chance to think of alternative places of education, and create a complex map of the actors involved in the system. However, this activity required more than 20 minutes to complete. Given the overall set duration of the workshop (2 hours), we believed this to be too long a time to be focussing on mapping the present. As the aim of the workshop was to develop creative visions of future, more time should be given for participants to immerse themselves in future-focused thinking.

In the scenario activity we found that participants tended to challenge the scenario from the cards they received. All the groups chose to discuss the scenarios, rather than using these as a starting point for imagining visions of education. Interestingly, this happened both with groups exploring catastrophic scenarios, and with groups looking into scenarios that were perceived as desirable. In addition, in both versions of the

methodology, we found that the transition from one activity to the next was not smooth. For this reason the aim of the overall exercise was sometimes unclear to participants.

Finally, we noticed that the discussion was not being as radical and imaginative as we aimed it to be.

6.2.1.3 A concept for the final version of the workshop and one last pilot

Soon after the second pilot of the workshop, we chose to involve a group of six PhD students and researchers from Lancaster University to help us design a new structure for the workshop. All the people invited to this meeting had previous experience in knowledge exchange activities, co-design, and facilitation.

We opened the meeting with a short presentation about the project, the aim of the workshops and the key questions for participants to answer. We also talked about the problems encountered so far, and suggested some initial ideas for solutions. We then revised each activity together, and we worked on the general structure as well as the details in terms of methods, allocated time, and materials.

Several significant insights emerged from the discussion. These insights contributed to the development of the methodology described in Section 6.2.2.

In particular:

- We agreed on the difficulty of developing radical ideas for future cities in a 2-hour workshop. It is very hard in such a short time to push people's imagination beyond the limits of what are perceived as "plausible futures".
- Engaging participants in a detailed description of the current state of the system does not add any new relevant information that could be

discovered otherwise (through, for example, desk research or interviews). Moreover, focussing too much on the present might prevent people from thinking outside the limits of probability and trends. It could be interesting, instead, to talk about the changes that happened in the last decades. Visualising what has changed in the last 50 years would make it easier for participants to imagine what could change in the next 50 years.

- When asked to talk about the future, some people tended to concentrate on the negative aspects of what might happen, moving the general discussion towards visions of dystopian futures. While fears and risks should be considered, the aim of these workshops was to explore visions of future to design towards, and not against.
- Rather than giving out structured forms to compile, it is a good idea to provide participants with an array of materials that they can use to make models and sketches, to help them visualize and present their ideas.

A new version of the methodology was then prototyped with the help of a group of six Masters students from the HighWire Doctoral Training Centre (Lancaster University). This version of the workshop seemed to run quite smoothly, and the material provided allowed participants to present their ideas in the format they feel more comfortable working with.

Figure 22 HighWire PhD master students building a scenario

The final version of the methodology adopted in the Future Visions Workshop Series is outlined in the next section.

6.2.2 The Future Visions Workshop methodology

The nine, Future Visions Workshops were conducted between February 2014 and March 2015. Six of the workshops took place in London (four at the Work Foundation, one at the office of Hawkins\Brown, one at the Royal Society of Civil Engineers) one workshop was conducted at MICRA, in Manchester University (Manchester), and one in the ImaginationLab at Lancaster University (Lancaster). Participants were recruited via email. All workshops were organised either in the early morning or late in the afternoon (depending on participants' general indication of preference and the room availability). Each workshop was 2-hours long, and involved between 8 and 24 participants and 4 to 6 members of the research team to facilitate. For each workshop we aimed at recruiting an average of 16 participants. This number would allow us to design two cities per workshop (with eight people in each group comfortably working around a table), and eight distinct outcomes in activities conducted in pair. However, the number of

participants was also influenced by a variety of contingencies, such as room size, ability to attend/travel, last minute rescheduling, and so on.

In the first workshop we invited members from the retail sector. The workshop was successful in terms of participants' involvement and the information collected. We agreed on minor changes (mainly regarding the material provided to participants) and decided not to modify the design of the activity any further.

The structure of each workshop is outlined below:

- **Introduction** (5 to 10 minutes). A brief introduction of Liveable Cities described the research framework and the purpose of the workshop.
- **Warm up** (10 minutes): The participants were asked to think about what has significantly changed in their sector in the last 50 years. Each participant provided a unique response, as there was a rule: no answer could be repeated. All answers were recorded on a whiteboard.
- **Time-limited negative scenarios** (15 minutes): This exercise was done in pairs, with each pair asked to respond to the following question: What is the worst thing that could happen to your sector in the next 50 years? The groups wrote their responses on sticky notes, read them out, and then deposited the sticky notes in The Box of Negative Scenarios.
- **Imagining futures in the city** (20 minutes): The purpose of this exercise was to stretch the participants' imagination and push their time horizon. Like the previous one, it was also done in pairs, with each pair given two 'Thinking Cards' (see section 6.2.2.1 below) to help them imagine what a future liveable city could be like. Specifically, we asked them what that city of the future would look like and where people would

live 50 years from now. After several minutes, the pairs were given another "Thinking Card", followed by a fourth card a few minutes after that. Silly ideas were encouraged and pairs could use different materials to visualise or explain their ideas (e.g., sticky notes, marker pens).

- **Designing the future city** (30 minutes): All activities lead to this part of the workshop, in which we focused on the future of the sector in the city, 50 years from now. Participants were split into groups of 5 to 8 people, provided with an array of materials (e.g., coloured blocks to represent buildings, small people, tissue paper) and asked to design a future city from their own professional perspective, bearing in mind the issues that they discussed and heard about in the previous activity. The groups were asked to consider in particular consumption and production practices—how, where and when people would consume, produce and live—what infrastructures would need to be in-place and what would be the general vision of the city.

Each workshop was audio recorded and documented through pictures. The transcriptions were then used to compile a series of reports to be shared with participants, together with short video interviews (i.e., *vox-pops*) taken at the end of each event. The raw data and reports were then used as material to produce a set of visualisations, as it will be described in section 6.3.

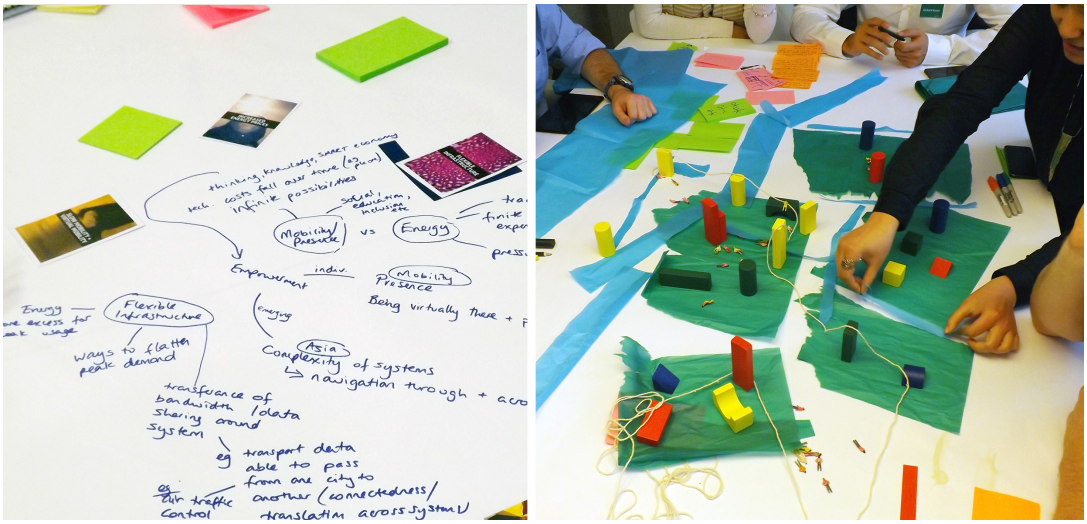


Figure 23 Two moments of a workshop: imagining the future in the city (on the left) and designing the future city (on the right)

6.2.2.1 The Thinking Cards

A deck of Thinking Cards was produced to inspire and provoke participants to think beyond their knowledge and expectations about the future.

Various design groups have produced, and sometimes published and disseminated decks of cards to support idea generation or definition (Golembewski and Selby 2010). There are different types of cards. Some adopt an informative approach, providing the user with data and facts that can be used for contextualising and grounding ideas (for example Arup's *Drivers of Change* series), others suggest methods or actions to undertake to overcome creative block (IDEO's *Methods' Cards*, or Brian Eno's *Oblique Strategies*). Other decks collect enigmatic inspirations with very few details, intended to prompt reactions from users and/or stimulate group discussions (for example Studio Carreras' *Values*). The last one is a methodological approach often adopted by writers of fictions who use tarots as a tool for creative writing (Kenner 2009).

The deck of Thinking Cards produced for the Future Visioning workshop is similar to the last type of cards presented above. The design idea was a response to the way

participants interacted with the future scenarios that were used in the first two pilots of the workshops (i.e. challenging or questioning the scenario, rather than using them as discussion tools).

There are four categories of "Thinking Cards", and each card presents one single issue that might become relevant in the future. These issues are part of future, low-carbon scenarios, developed as part of Liveable Cities, and are grounded in theory. The categories are: 'environment', 'society', 'technology', 'politics/economy'. The front of the card includes a deliberately enigmatic image and a short title. The back of the card clarifies the title of the card through a short, descriptive section.

The issues included in the Thinking Cards were selected by the two research teams (at Lancaster University and UCL) and were informed by previous research activities (for example Hunt et al. 2012; Urry et al. 2014).

Unlike the previous versions of the cards, the information displayed on the Thinking Cards is kept to a minimum, and is meant to provide a hint of something that might become relevant in the future (rather than describing a comprehensive scenario). Each pair of participants was randomly assigned four of the thinking cards, one card for each category. Participants could choose to use some or all of the cards in the discussion or reject them completely.

The full list of cards is provided in Appendix A.

Figure 24 Four Thinking Cards, one from each of the four categories ('technology', 'society', 'politics/economy', 'environment')

6.2.3 Conducting the workshops

Between February 2014 and February 2015 the following workshops were organized:

- Retail Sector (London, 3 February 2014)
- Physicists, natural, and environmental scientists (London, 15 May 2014)
- Archaeologists and historians (London, 11 June 2014);
- Transport and utility sector (London, 3 July 2014);
- Utilities and construction sector (London, 31 July 2014);
- Architects (London, 23 September 2014);
- IT sector (London, 12 November 2014);
- Experts on ageing (Manchester, 5 December 2014);
- Education sector (Lancaster, 28 February 2015);

A phase of analysis and visualisation of the results of the workshop started in June 2015. This phase will be the subject of the next section(6.3).

6.3 THE ARTEFACT: AN ATLAS OF FUTURE IMAGINARY CITIES

This section describes an experiment in communicating the outcomes of the conversations on imaginary futures from the workshops through a visual *artefact*.

Specifically, this project proposes a cartographic approach to the representation of VCUF. The Atlas of Future Imaginary Cities is conceived as an interactive visualisation that allows the reader to explore emerging themes, issues, and ideas from the workshops at various level of detail.

The atlas can be accessed online at: http://seremiru.com/Atlas/export/index.html.

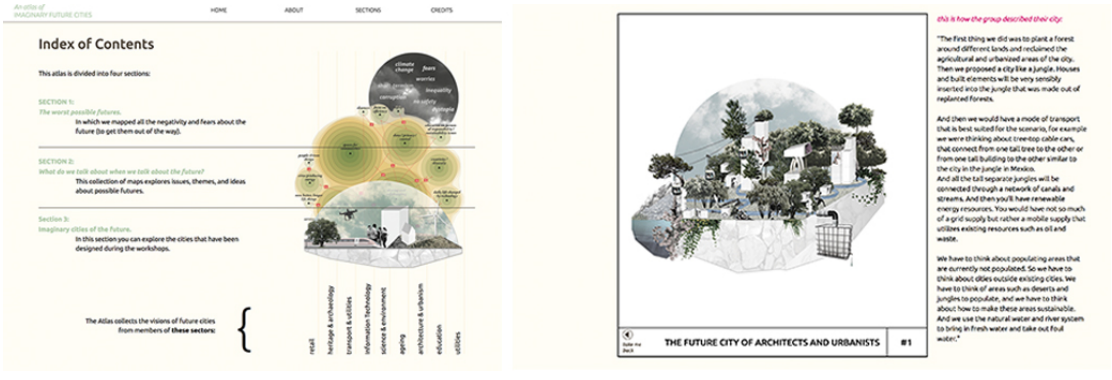


Figure 25 Two images from the Atlas

6.3.1 Research questions. Making conversations on urban futures readable and explorable

After attending the first few Future Visioning workshops, we started to recognise connections and contradictions across sectors, on what people would say and build. With every new workshop we were able not only to understand the scenario of the future city for the particular group we were working with, but also to add pieces of information to a mental map of the imaginary conversation between different groups. The set of reports

produced as a first outcome of the project, however, proved unsuitable to capture this conceptual map.

As the person in charge of visualising the future scenarios, how could I present the conversations in a way that allowed us to highlight these connections and common themes? And how to do so while still providing the reader with a summary and clear detailing of the individual conversations?

Specifically, this meant designing a communicative artefact that could allow to:

- explore differences and similarities across issues discussed by different groups;
- move through layers of granularity of the information: from a general overview, to a very detailed one, in which it is possible to read the exact words of the participants;

Building an atlas appeared to be a promising way to answer these two issues, which are part of the main research question (**RQ2**) of the project. The atlas was adopted here not only as a suggestive metaphor, particularly fitting in a project about cities, but also, and primarily, for the model of interaction it entails.

6.3.2 Why building an Atlas

Mercator used the term 'atlas' for the first time in 1595. He named his book of maps of the world after the Greek Titan condemned by Zeus to hold the sky on his shoulders. Mercator's atlas was a portable collection of geographic maps, scaled and divided in multiple pages to fit the book format. The maps in the Atlas were coherent in style and scale. Individual pages could be pieced together by the reader to compose larger maps of broader geographic areas (Karrow 2000).

Throughout the centuries, the definition of atlas expanded beyond the realm of spatial representation. It has been used to include any collection of representations of a specific universe of objects that are considered systematically in their structures, parts, measures, shapes, and relations (Harley and Woodward 1987; Baule 2006). What differentiate the atlas from other types of organised collections are the explicit relations among entities and between them and the whole.

The atlas is a communication device that represents complexity through the use of overlapping narrations. "In opposition to the totalizing approach of hierarchical models that try to present in a single image the 'true' structure of knowledge (in the Middle Ages) or its most useful representation (in the Enlightenment), the atlas presents a network of partial (incomplete and biased) stories, expressing authorial points of view with no claims of objectivity or comprehensiveness" (Quaggiotto 2010, 1217).

From an epistemological point of view, in the field of Information Design is recognised that maps can not only be passive representations of reality, but also tools for the production of new meaning (Quaggiotto 2007). Maps are visual narrations, created by an author selecting, projecting, and symbolising information for a specific objective. However, their non-linear structure enables readers to navigate the map from their point of view, and allows subjective interpretations and the tracing of trajectories of narration (Baule 2006).

Building an atlas of imaginary future cities means not only representing the outcomes of a series of conversations, but also doing so in a way that allows new interpretations and new narratives to emerge from the dialogue between the map and the reader.

6.3.3 Methodology

The process of making the Atlas can be divided into four steps:

1. **Workshop Series.** The Atlas has as a subject the conversations on urban futures conducted with participants to the Future Visions Workshops described in Section 6.2
2. **Collection of audio-visual material.** During each workshop, we documented the process and the artefacts created by participants through photos and audio recordings that have then been transcribed. These photos and transcriptions constitute the "raw material" for the Atlas.
3. **Analysis and coding**. A qualitative content analysis methodology was used to analyse and code the transcribe text. Images were annotated and coded graphically. This phase of the process will be described in Section 6.3.4
4. **Visualisation of coded information.** Coded information was studied and visualised. Section 6.3.5 elaborates on the details of the design process of the Atlas.

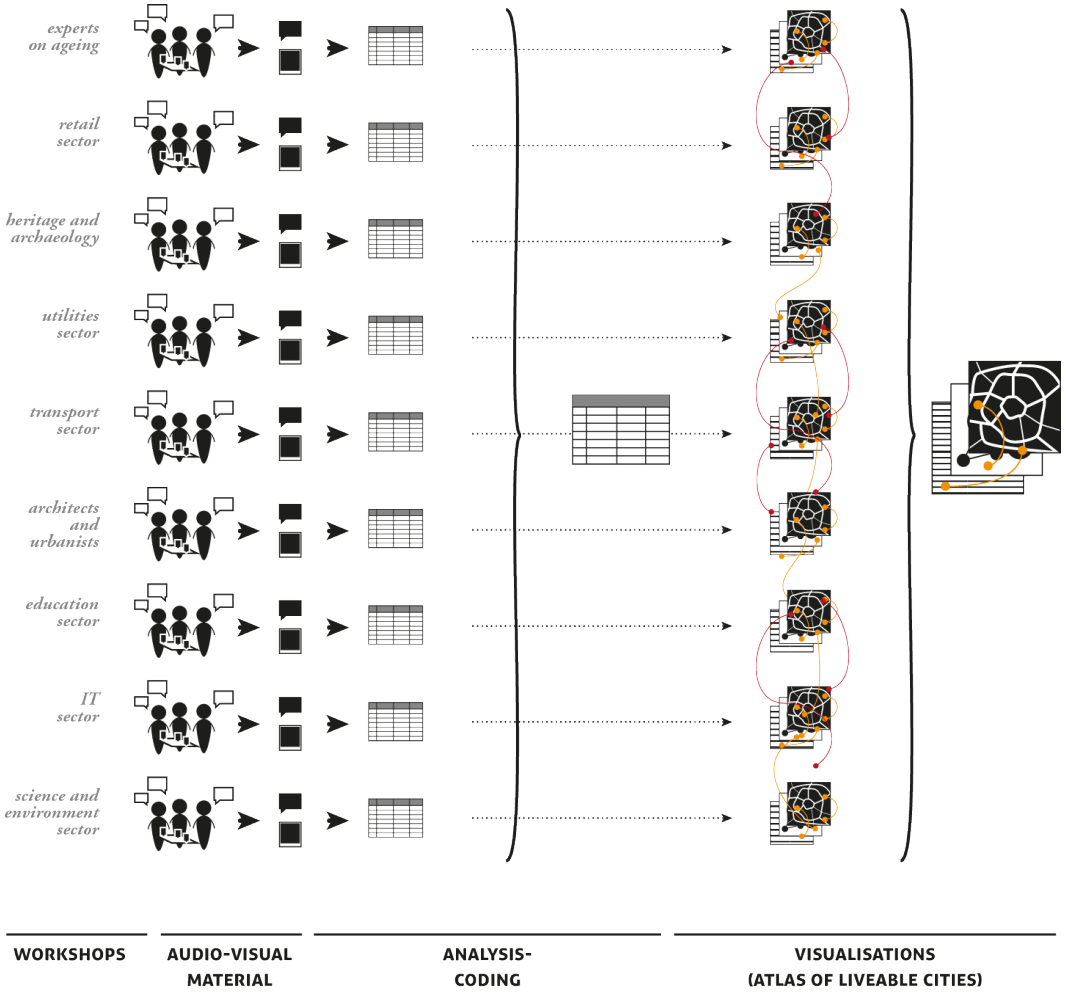


Figure 26 Map of the process of making the Atlas

6.3.4 Analysis and coding

With the exception of some preliminary actions (including debriefing, transcribing, compiling the reports, and doing an initial assessments of the overall outputs), most of the analysis was conducted after the conclusion of the workshop series, and once the conversations were fully transcribed. The following sections describe how text and images were analysed and coded.

6.3.4.1 Qualitative content analysis of the text

The transcribed audio recordings from the workshops were analysed using a conventional approach to qualitative content analysis. In conventional content analysis,

researchers immerse themselves in the data to allow new insights to emerge. The codes and categories that are used for the analysis are naturalistically derived from the text, rather than being set by the researcher ahead of the study (Hsieh and Shannon 2005).

The underlying principles of this approach are not that dissimilar to the ones adopted for translating the textual description of the four scenarios in the 'Living in the City' report into visualisations (5.2). However, in this case, the large amount of data to be coded and the impossibility of maintaining the engagement of all workshop participants throughout the process required a more rigorous and formalised method of analysis.

A first preliminary step in the analysis was to carefully read the transcriptions as a whole, to gain a general understanding of the content of the conversations.

From this initial look at the data we observed that the experts' opinions and the personal thoughts and experiences of participants were often entangled in the discussion, in such way that it would be hard to distinguish and separate one from the other. Despite having been invited for their expertise, all participants had multiple identities that manifested in different ways during various moments of the discussion. For example, a university professor, invited as an expert in the education workshop, might also be an expert in IT and computing, or be involved in recreational gardening. For this reason, rather than proceeding to scope the transcripts to find clear experts' insights, we decided to identify and map the emerging themes that were more or less recurrent in the discussions.

We did so for the three main activities of the workshops: Negative Scenarios, Imagining futures in the city, and Design the future city. In this phase, three members of the research team worked independently (each person focussing on one activity), and met several times to discuss methods and criteria, and to compare findings.

The transcripts from each activity were divided into numbered statements that we refer to as "comments". Each comment was then assigned one or more keywords. The process was then iterated several times to refine and consolidate the keywords, until a number of recurring themes were identified. Figure 27 shows two moments from the coding process. The coded documents are available on request.

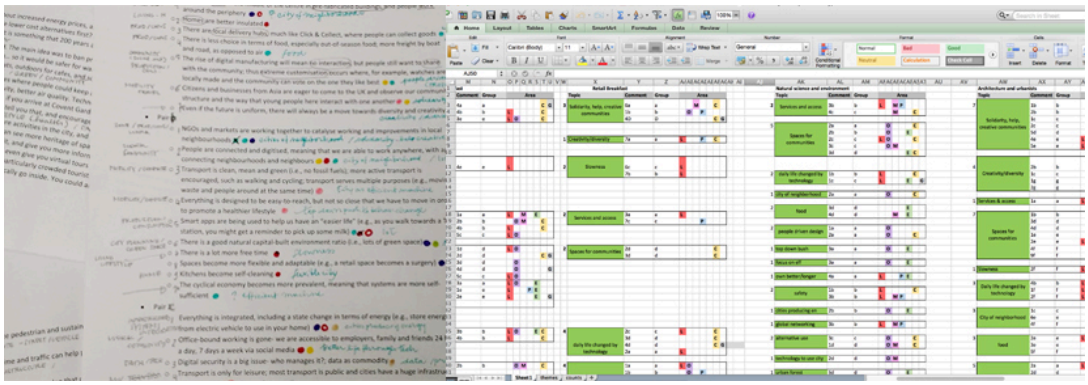


Figure 27 Coding the transcriptions.

The coding was done manually, as we found that relying on software for text mining or text analysis would not have captured subtle references and contextual information, and might have pointed to misleading or superficial results[18].

The two main advantages of manual coding were:

- Being able to connect the verbal information to the models and diagrams that participants referred to (particularly important for Activity 4).
- The possibility to discard the information that was directly influenced by the facilitators. For example, we omitted from the analysis of Activity 3

[18] *This is not necessarily a critique of digital methods per-se, but simply a comment on our experience with this particular dataset, the information we were trying to capture, and the time and resources available to us at the moment of the analysis. Excellent tools for textual analysis have been developed in recent years for the Digital Humanities. See for example IBM supported "Many Eyes" (Viegas et al. 2007) and the list of tools in the MIT "DiRT" online directory (http://dirtdirectory.org)*

all the moments of the discussion in which participants described the "issue cards" used to facilitate the activity, in order to prioritise, in the visualisations, participants' imaginaries over the context in which these emerged(6.3.6.2).

6.3.4.2 Coding the images

The models that participants produced in the final activity of the workshops were often essential to understanding the verbal description of future cities. The city structure, its size, the presence and organisation of green and blue spaces were rarely captured entirely in the transcribed text. Additionally, sometimes participants referred directly to the models while describing the cities (e.g. "Here is a square where we could have a market" – Ageing Population workshop).

As part of the analysis and coding phase, I colour-coded the photos of the models produced during the workshops, to be able to use and compare the spatial information about the cities in the Atlas at a later date.

Figure 28 Example of coded images (transport sector workshop)

6.3.5 Designing the Atlas

The purpose of coding the outputs of the workshops was to identify and understand hidden patterns of information. The following phase in the research process consisted of finding a way of making such patterns visible for readers that were not involved in the analysis. This section will give an account of the design process that ultimately resulted in the creation of an Atlas of Future Imaginary Cities. The process is summarised in the six phases outlined below:

1. **Finding a graphic language to represent information.** This initial phase included a mix of research and idea generation through sketches. Before the idea of the Atlas took shape, I produced some intermediate visualisations as a way of presenting, discussing, and testing possible design directions with an external audience (see Figure 29 in the following section)

2. **Defining and proposing the concept of the Atlas.** The research, sketching, and discussions from the previous phase helped me to identify the idea of building an Atlas as a suitable platform to support explorative reading processes. I presented this idea to the rest of the Lancaster research team, through a brief project summary, which included a general outline of the structure that was refined during the meeting.
3. **Producing a detailed design for the Atlas and its various sections.** I mostly worked independently on the development of the Atlas. However, regular meetings were held (especially at the early stage) with the other researchers involved in the coding. In these meetings we discussed the type of information emerging from the data and how to translate it visually.
4. **Compiling the Atlas.** The Atlas was compiled over a four-months period, in which I developed most of the visuals that can be seen in the final version available online.
5. **Refining.** Two meetings were held to test draft versions of the Atlas with the rest of the Lancaster team. The Atlas was reviewed significantly following the comments and suggestion made by the researchers involved in the project.
6. **Launching and disseminating.** The Atlas was published online in June 2016, and used in the following months to disseminate the results of the research activity within the Liveable Cities programme and externally.

The following section will elaborate on the first two items of the list above and describe the journey towards the definition of the concept of the Atlas of Future Imaginary Cities.

6.3.5.1 Finding a graphic language to represent information. The cartographic metaphor

During the phase of content analysis I started producing a large number of initial sketches testing possible ways for visualising the data.

The pile of sketches that were used as "thinking aids" (Cross 1999) for idea generation could be loosely organised into three categories: visual notes on the general concept, data sketching, and sketches of the visualisations.

Visual notes were used to reflect on the purpose and the general concept of the artefact being designed: what purpose should it serve? What media and platforms should be used? How will it be distributed? These notes consist of mind-maps, conceptual drawings, and system diagrams.

Data sketching involved the manipulation and arranging of coded information on a piece of paper. The questions I was reflecting on included: what information will be visualised with what hierarchy? What will the architecture of the information look like? What techniques will be used?

I also drafted various sketches of the visualisations to understand the graphic aspects of the artefacts. These included format and spatial organisation, signs and symbols, visual metaphors, and use of colours.

Prototypes of visualisations were produced in various occasion to crystallise unfinished work in documents, posters, and slides to be discussed with an external audience. These were used in presentations within the research team (internal meetings, Liveable Cities' project meetings, Liveable Cities' sandpits with expert panellists) and with an external audience (at the Relating System Thinking and Design symposium, Oslo 2014).

These intermediate prototypes were essentially studies on how the information could be displayed on a support that could be circulated and discussed. They consisted entirely of pragmatic visualisations, i.e. graphic displays of information with no figurative or iconic elements (see Figure 29)

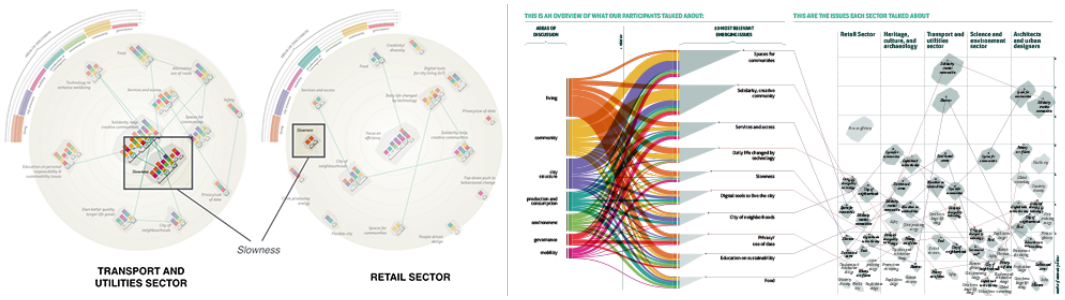


Figure 29 Some initial visualisations.

These visualisations worked effectively when used in presentations that I personally delivered, whether to the internal team or to a broader audience. As a presenter, I was able to guide the audience by providing a narrative of the visualisations, constantly zooming in and out of the diagram and focussing the readers' attention to selected aspects. However, the same visualisations proved to be ineffective when members of the research team and an external audience (expert panellist associated to the Liveable Cities programme) were asked to explore them independently. Readers appeared to be overwhelmed by the detail and complexity of the information. Once the key to the maps was understood and an example of possible use was provided, readers were able to reflect on the diagrams and discuss some of the information in them. Often, they would focus on the quantitative aspects of the visualisations, rather than on the information itself: comparing quantities, measuring dimensions, discussing choices in positioning.

One of the reasons for this was that what emerged during the phase of analysis and coding was made readable through the use of information visualisation techniques that adopted codes and devices similar to the ones normally used in the visual display of

quantitative data. The perils of displaying qualitative data through the language of quantitative information visualisation were confirmed during the reflection and evaluation phases of Design Experiment #2 (see section 7.7.4).

The challenge, at this point, was to devise a visual language that could display information to prioritise a qualitative reading, while also highlighting the relevant quantitative elements that emerged in the phase of analysis (e.g. how often a topic has been discussed, which comments are related).

It was at this point that I decided to experiment with cartographic maps as platforms that display size and relations between elements in such way that encourages users to visually explore space rather than contrast and compare individual dimensions. To minimize even further the perception that we were dealing with quantitative information, and to capture the imaginative character of the workshops I then considered including figurative and deliberatively ambiguous illustrations, as I will explain in section 6.3.6.3 and more extensively in 9.2 of Part C of this thesis.

Finally, and coherently with the cartographic metaphor, I designed an Atlas to aggregate the various maps in a single platform. The sections below describe the structure of the Atlas and the characteristics of its various sections, as well as the findings brought to light by the visualisations.

6.3.6 Outcomes – The Atlas of Imaginary Future Cities

Like all atlases, the Atlas of Imaginary Future Cities is a container of different points of view expressed through different scales and granularities, languages and techniques of representation" (Ricci 2010; Venturini et al. 2015, 6).As such, it is a tool for the reader to

explore issues, worries and creative ideas from the Future Visioning workshops by navigating the collection of maps and illustrations of fictional cities.

The online version of the Atlas was published in July 2016. Its architecture consists of a scrolling single page with a main narrative, linked to various maps for users interested in more details to explore. The main page of the atlas is divided into three sections, each one corresponding to one activity of the workshop:

- The Worst Possible Futures
- Imagining Possible Futures
- Designing the Future City

The sections below will describe the details of each section. In the description, I will focus on the design characteristics of the artefact, more than on the content of the visualisations.

6.3.6.1 The worst possible futures

The "Negative Scenarios" activity in the workshop was designed as a way of getting negativity "out of the room". Negative thoughts written on notes were collected in a box to metaphorically remove them from the rest of the conversation.

As this activity was intended as functional to enhancing the creative flow of the workshop, and since 'negative scenarios' were initially not included within the expected outcomes, I chose not to include visualisations of people's fears, like I did for its core sections[19]. Instead, I provided a short summary of the main themes identified in the

[19] To be sure, the choice of not visualizing the details of the 'negative scenarios' with the same level of detail of the other maps in the Atlas was also, and very importantly, determined by the time and resources available to develop the artifact. This is another example in support of

analysis, complemented by a word-cloud as a snapshot of the matters talked about in the conversation (see Figure 30). The source text used to generate the cloud was the coded transcribed audio from the workshop. In the cloud, greater prominence is given to the themes (keywords) that appear more frequently in the text.

The analysis of the conversations in this activity revealed some interesting insights on people fears about the future. Like for other parts of the workshop, we could identify recurring themes but also sector-specific or individual concerns. However, the short time allocated for this activity during the workshop, and its deliberate free-form structure (with the purpose of giving people ten minutes to 'take it all out') would make it difficult for visualisations to capture the essence of the conversations without being superficial or reductive.

Yet, as people seem to be very keen on dwelling on and discussing "the worst things that could happen", we acknowledged that it would be interesting to conduct Visual Conversations that focus entirely on worst-case scenarios, as a way of exploring dystopian futures in relation to people's values and perceptions (see for example the event *Operating Manual for Living in the Worst Case Scenario, a Boot Camp* (Operating Manual 2017)).

---

the remarks introduced in the methodology chapters, stating that practice (and therefore knowledge generated through practice) as a mode of inquiry is necessarily shaped and limited by the circumstances in which it takes place.

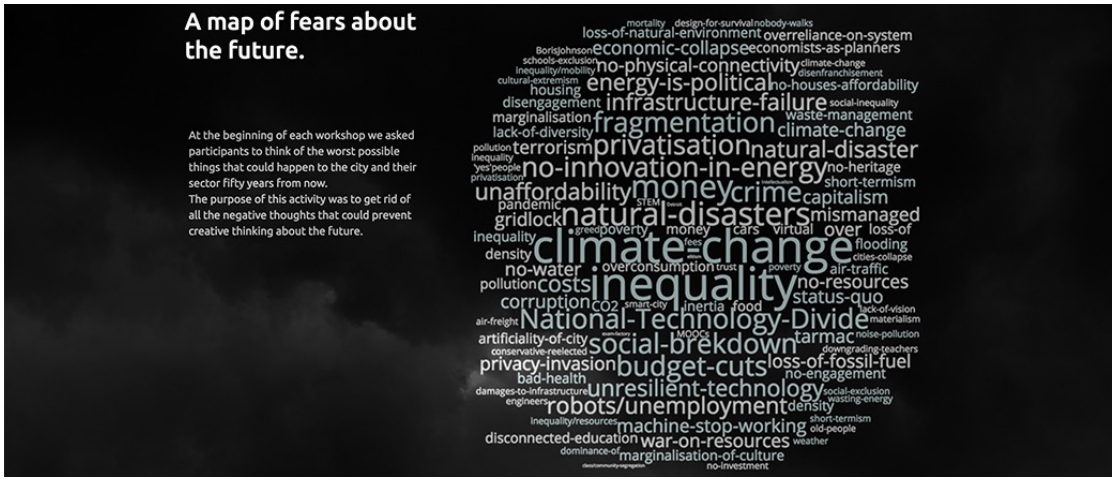


Figure 30 Worst case scenarios: a screenshot from the Atlas

6.3.6.2 Imagining possible futures

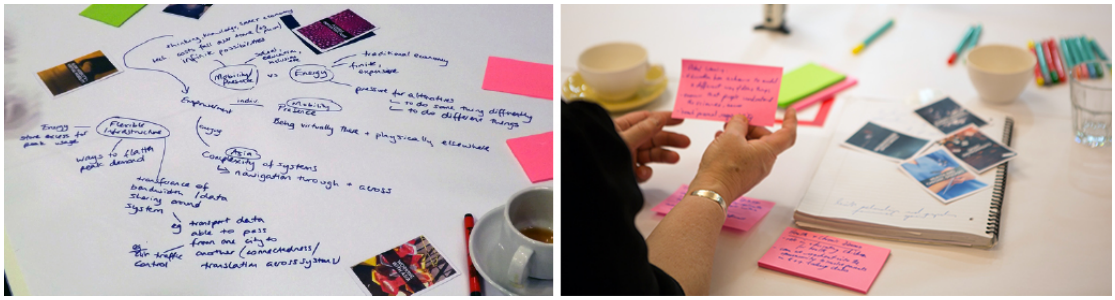


Figure 31 Two groups mapping their ideas about the future during the activity.

In this activity, we asked pairs of participants to think about possible futures: What will they look like? How will we live in them?

We distributed sets of Thinking Cards[20] to inspire and provoke participants to think beyond their expectations and assumptions about the future. We encouraged silly ideas

[20] *There are four categories of "Thinking Cards", and each card presents one single issue that might become relevant in the future. These issues are part of future, low-carbon scenarios being developed as part of Liveable Cities, and are grounded in theory. The categories are: 'environment', 'society', 'technology', 'politics/economy'. The front of the card includes a deliberately enigmatic image and a short title. The back of the card clarifies the title of the card through a short descriptive paragraph.*

and we made available different materials to visualise or explain ideas (e.g., sticky notes, marker pens).

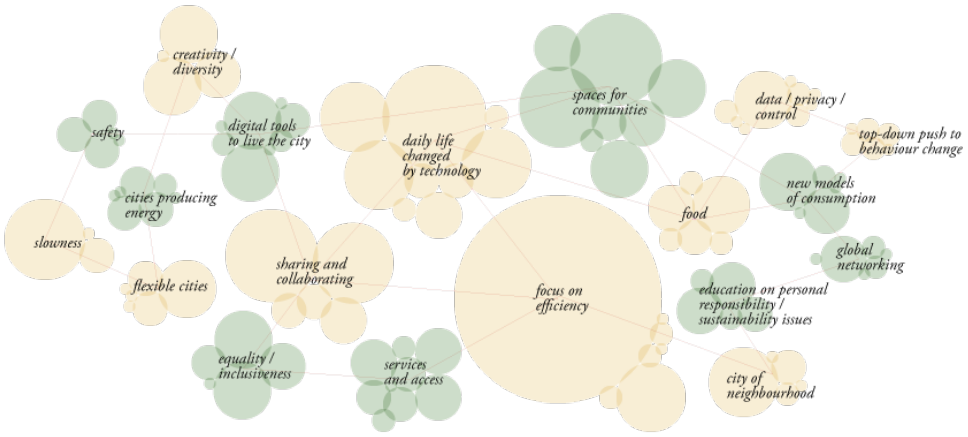


Figure 32 A constellation of emerging themes from 9 workshops.

The content of the discussions in the various workshops are visualised in the Atlas through a series of diagrams that map the individual conversations as well as the constellation of the themes discussed across workshops (Figure 32). This constellation, i.e. a map that groups together the recurring issues and arranges them in a network. It provides a first general overview of the themes that emerged from the workshops.

Overwhelmingly, what participants imagining futures are most concerned with is the way we will live with others: not only in neighbourhoods but also as digitally connected communities.

For the most part, the future discussed here is not the complex system of large-scale phenomena. Rather, it is a human-scale future. Services, infrastructures, policies, and technologies are for the most part ultimately described as platforms to support social life. For this reason, I chose to use a non-figurative type of visual language to map the conversations that took place in this activity, rather than illustrating the objects, structures, and places described in the conversation. Abstract semantic maps allowed me

to visualise abstract and material concepts alike, and focus on relevance of the various issues (overall as well as within each workshop) and their meaning-based connections. It is through these maps that important difference between the futures described by the various sectors can be understood.

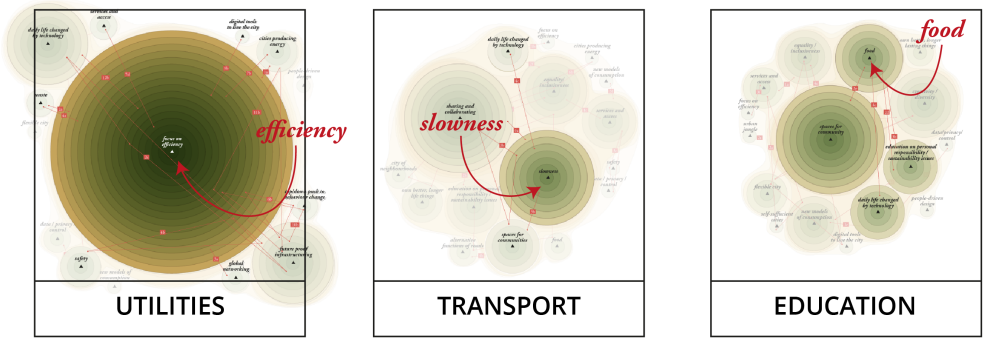


Figure 33 Maps of the conversations in the Utilities, Transport, and Education sectors. The key themes discussed in the paragraph ('efficiency', 'slowness', 'food') are highlighted.

For example, "efficiency" appears in the Atlas as one of the most talked about issues overall, but a closer look at the individual maps shows that it does so only because of the great importance that this topic had in the workshop with members of the Utilities Sector. While this was somewhat unsurprising (because of the importance of efficiency for people dealing with utilities), other maps reveal more curious details. For instance, "slowness" was a relevant theme in the future as imagined by members of the transport sector. Participants envisioned a city designed to promote slow mobility and social interaction, digitally enabled ways of working remotely, as well as a new set of values, prioritising a much slower pace of life (see Figure 33).

6.3.6.2.1 Designing the maps

The maps included in this part of the atlas are a visual representation of the transcribed audio from the workshop after its coding and analysis (see section 6.3.4).

Upon consolidating the list of keywords used to name the themes emerging from the conversations (e.g. "slow mobility", "city of neighbourhoods", "sharing and collaborating", etc.) I experimented with different ways of cartographically mapping them.

The aim of the cartographic representation in this context, as introduced in section 6.3.5.1, was to invite the reader to explore how issues were addressed by various groups, while being able to assess, at a glance, the general "landscape" of the conversations. In short, the challenge was to highlight relevance and connections without doing so through obvious quantitative visual cues.

Each workshop was conceptualised as an island, with hills (the themes) of various sizes and connections between these hills[21]. For each professional sector, I grouped all the comments identified by the same keyword into the same hill. The number of comments within each hill determines its size. If a comment is coded as part of more than one theme, such comment is repeated in all of the pertinent hills, that get then connected with a red path. Selecting one hill gives access to a general description of the theme as addressed in the corresponding workshop as well as the list of pertinent comments.

[21] *The metaphor of the island is a conceptual one, and readers of the Atlas might not interpret the maps collected in this section as island. Indeed, some reader described the maps as "cellular-like organisms". However, this does not hinder the clarity of the reading or exploration as the mode of interaction.*

6.3.6.3 Designing the future city

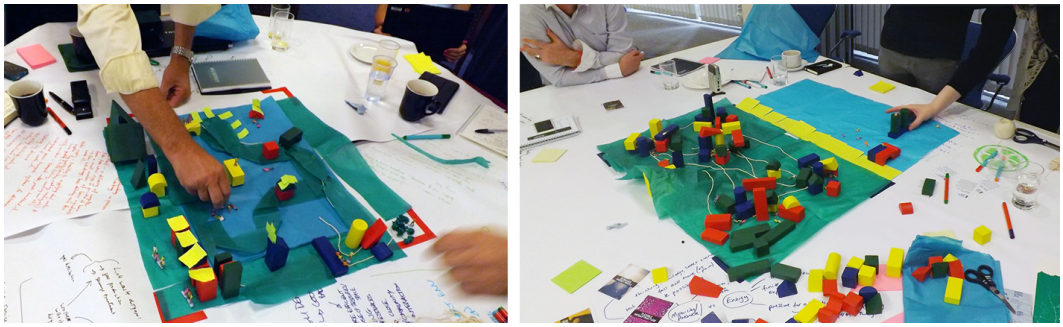


Figure 34 Participants designing future cities in the Architect and Urbanists and in the IT sector workshops

In the final workshop activity, we asked participants to transform the principles and themes that emerged from the open discussions into design ideas for future cities. To do so, we traced on a large sheet of paper the arbitrary boundaries of a fictional city and asked participants working in groups of 8 to 10 people to use the material provided (building blocks, string, coloured paper, sticky notes, markers, and human figurines) to represent their design ideas.

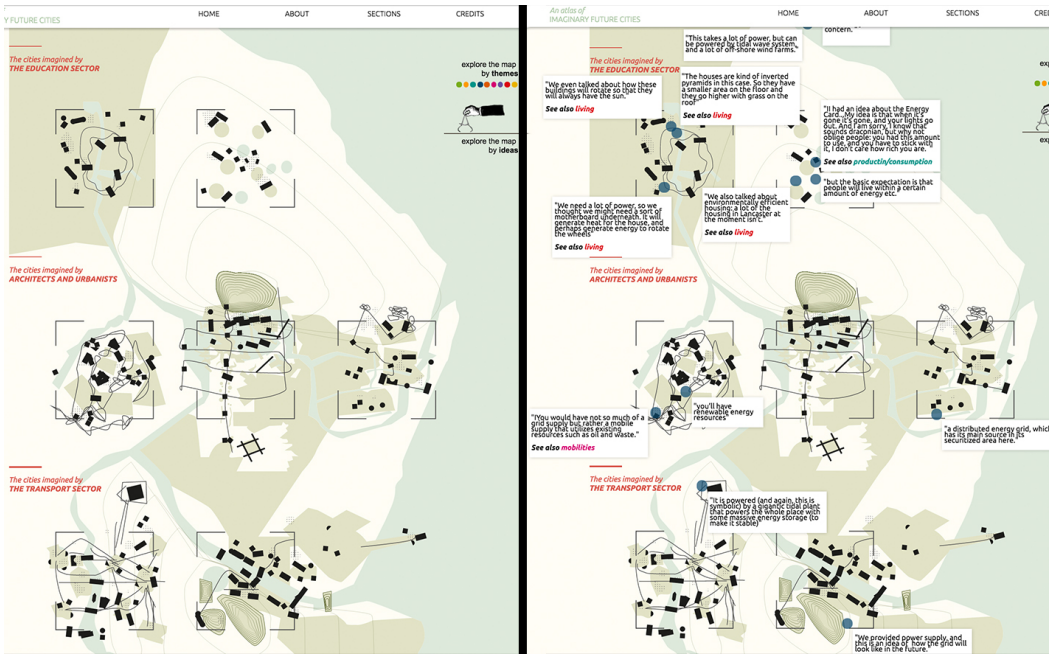


Figure 35 Regional map of imaginary cities (left) with some thematic issues selected (right). Please see the online Atlas (http://seremiru.com/Atlas/export/index.html) for the high quality interactive version.

Similarly to the previous section, this part of the Atlas was designed by translating the outcomes of the content analysis into visual representations. In this case, however, the conversations on possible futures happened around hands-on modelling of future cities. Here, the main design challenge was how to communicate both the content and the spatial and material aspects of the conversations. For this reason, both the results of the analysis of verbal (section 6.3.4.1) and visual information (section 6.3.4.2) were equally important to inform the design process.

Like for other parts of the Atlas, the design process started with experimenting with the architecture of the information as well as with the type of visual language to adopt. Once again, the affordances of the interactive medium of the webpage were used to structure the architecture of the information across different layers.

The system of visualisations combines the overarching narrative with the individual conversations. It does so through a map that locates all of the cities designed in the various workshops in a fictional region. The fictional, topographic map is overlaid with additional information on themes and ideas, and their relation to the various sectors. Individual cities in the map are linked to a dedicated page of the Atlas, which includes an illustration of the city and its detailed description.

The source of the transcribed audio used for the analysis is the collection of the presentation of the future scenarios that each group made at the end of the activity. All the descriptions are mostly focussed on the model of the city that is presented to the audience, and various references are made to individual components or areas of the model.

In the pages of the Atlas that are dedicated to the individual cities, I decided therefore to present the visualisation of the future city as the most prominent element on the screen, with the transcribed description next to it (see Figure 25 and Figure 36).

The visualisation consists of an illustration derived from the model designed by participants. The purpose of making an illustration, rather than simply include a photo of the model, was to assign aesthetic and formal qualities to structures that were crudely represented during the workshops through blocks, strings, or pieces of paper. Furthermore, isometric projections were chosen as a method for arranging three-dimensional objects on the flat surface of the screen. Unlike perspective projections, isometric projections are a type of parallel projection in which the objects represented do not appear larger or smaller based on their relative distance to the viewer. Using this type of projections allowed me to assign equal importance to all the elements in the illustration, regardless of their relative position in the scene.

Participants explicitly referred to aspects of the presents when building their future cities. In many of these cities, change in the future would be brought about by the way people would access places and things (e.g. mobility by tree-top cable car – *Architects and Urbanists workshop*), the displacement, combination, or rearrangement of city elements in innovative ways (e.g. networks of villages with a central hub – *IT sector workshop*), or by bringing small scale promising solutions to the mainstream (e.g. sharing and bartering as the mainstream economic model – *Experts on Ageing workshop*).

Because of the connection to the present of these future oriented designs, I often searched on image banks for images to modify and assemble through collage or composite techniques in the illustration. But while individual elements might look familiar to the viewer, most scenarios include surreal objects and assemblages, distorted

scales and proportions, and an unrealistic, desaturated colour scheme. These are intended to clarify that these illustrations depict imaginary words, and not design plans, or forecasts.

Each sector brought their expertise in designing solutions to specific challenges. For example, the Heritage and Archaeology sector, reflecting on the importance of intangible heritage, designed a fluid Heritage Centre:

> *"we included in our city a Heritage Centre that is normally empty, and gets filled by people exploring their own heritage in their own way, rather than presenting a static narrative of the town. This is also where the digital space becomes important, because it is self-curated"*

Another example comes from the Science and Environment sector, whose participants provided integrated solutions for energy and waste:

> *"We have a bio-mass fuel converter which doubles up as a recycling station, and a small clean nuclear power plant".*

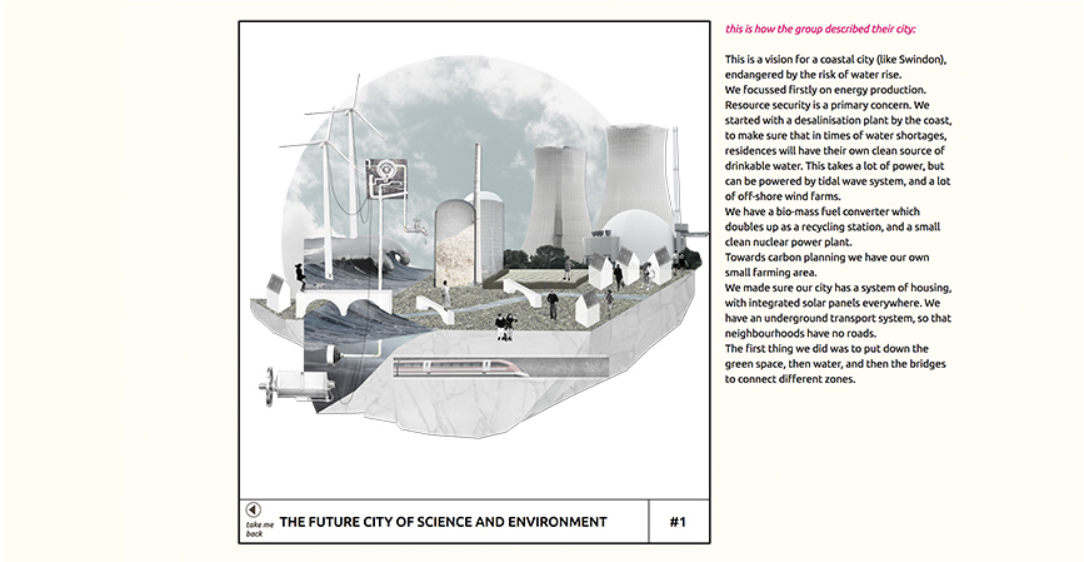


Figure 36 The Future City of Science and Environment

While the individual images elaborate on sector-specific futures, the map that provides an overview of all the cities (Figure 35) brings together the outcomes of the content analysis of the descriptions of all the cities. The reader can chose to overlay this fictional regional map with a number of thematic categories. These categories were chosen based on the areas of research of Liveable Cities, and integrated with other themes that emerged from the analysis.

The map and the overlaid information show the importance of some recurring themes, in particular those of "sharing", "car-free" and "green/blue" cities.

The principles of equality, sharing, collaborating, and connecting that dominated the open conversations in the previous activities were transformed into design ideas for shared transport, sharing economy practices and the abundance of shared spaces and common goods that are available for all citizens. For the most part, cities were envisioned as car-free: roads are non-existent or redesigned as infrastructure for alternative means of transport (like bikes, mobility scooters or even tree-top cable cars). Car-free-ness also influenced the structure of the city itself. Most cities designed in the workshops were either small or polycentric cities, constituted of networks of highly connected yet independent neighbourhoods.

Another striking feature of the map was the predominance of green and blue spaces in the landscapes. The lack of roads and invasive infrastructure, the atomised structure of most cities and the importance of the commons made nature accessible by all residents in the cities.

6.4 LEARNING OUTPUTS AND OPEN QUESTIONS

In this section I will summarise the relevant insights from this first experience of designing processes and artefacts of Visual Conversations on Urban Futures. I will also highlight some limitations and questions to be explored in further projects.

6.4.1 Designing spaces for co-creating speculative urban scenarios

Creating the conditions for open, imaginative conversations about speculative urban futures proved to be more challenging than we initially expected. In the earlier version of the methods, we placed most of our effort in ensuring that the workshop would provide clear answers to the list of research questions set by the research team. In doing that, we overlooked an important aspect of future-focussed conversations, which is that 'urban futures' are a highly personal topic.

Extending the discussion on the future of a particular sector to include the future of the city in which this sector will operate means for participants to imagine the way in which they and their family might live. The conversations collected in the reports and in the Atlas show how professional evaluations, personal interests, values, aspirations, fears, lived experience and expectations are very often tightly entwined and hard to distinguish.

This is why whenever we provided sets of scenarios to structure the conversations, participants reacted to the scenarios rather than using these as a starting point for generating fictional worlds. Imaginative ideas and radical city scenarios started to emerge only once we allowed participants the freedom to express the various aspects of their complex personal experience and drive the conversation towards what mattered the most to them. At the same time, we still found it necessary to provide props and materials to help participants immerse in an imaginative environment as removed as possible from the constraints of the present. To do so while avoiding constraining the breadth and the

fluidity of the conversations, we used provocation tools that participants could weave into their discussion (thinking cards) and materials that could be used in various ways to help them create their visions (e.g., stationary supplies, building blocks).

It was during the process of developing the Future Visions Workshops that we realised that the literature lacks of methods for speculative co-design practices, an issue that I addressed in 1.4.4. The few existing publications that comment on similar methodologies tend to use established methodologies and theoretical frameworks developed for participatory and co-design (for example Forlano and Mathew 2014).

This project (and the ones that follow) highlighted speculative co-design's own challenges. These challenges will be further addressed in the Part C of the dissertation (Design Principles), when I will propose the use of the concept of *Tensegrity* as a model of generative structure for speculative co-design (9.1).

6.4.2 Designing tools for exploring pluralistic future visions

Participatory design methods to build future visions require ways of capturing the complexity of the discussion, rather than just synthetizing the results into a single, narrative vision. The Atlas of Imaginary Future Visions was designed as an interactive artefact adopting a cartographic approach for documenting layers of information within and across speculative urban visions that emerged from co-design workshops.

In Section 6.3.6 of this chapter, I provided an overview of the recurring themes that emerged from the workshop series, as well as a sample of individual and workshop-specific ideas. I showed that, while patterns of data can be used to understand overarching values and most pressing matters of concern, it is important not to miss the context-specific issues, the insights and the design ideas that can be found in the

individual conversations. The synergies and discrepancies between general themes and specific issues may help in understanding the value of artefacts of VCUF as a way of representing conversations about futures as a whole, but also in their individual parts. This, in turn, demonstrates the potential of bringing speculative design, participatory practices and information visualisation together, as proposed in Part A of this thesis.

Information Visualisation techniques allow designers to play with the granularity of data, the framing of the information, and the point of view of the observer, to build composite visions that show the overarching message when seen from afar, but that reveal small details when observed more closely. Designing the Atlas encouraged me to experiment with these dimensions. Doing so made me aware of the impact that design choices have on the overall message, and the quality and type of information that is displayed. Playing with the data from the workshops and experimenting with ways of visualising them was instrumental in informing the definition of a number of dimensions that describe the design space of artefacts of VCUF (as it will be described in Part C).

I also encountered some challenges when making the Atlas. These were mostly related to the technical aspects of using information visualisation methods to represent futures. Unlike other cases of speculative visualisations (Kim and DiSalvo 2010), what is visualised in the Atlas are conversations about imaginary possible worlds, rather than data about present or predicted situations intended to provoke a debate about futures. Visualising information about speculations involves finding ways of visualising uncertainty (Spiegelhalter, Pearson, and Short 2011) as well as various degrees of modality (on what "will", "could" or "might" happen). The issue of visualising uncertainty in VCUF will be further elaborated on in 9.2 (Part C)

Information Visualisations employs diagrams to highlight hidden patterns of information (Scagnetti et al. 2007). But diagrams (sometimes involuntarily) suggest certainty and accuracy. This is why I chose in this work to include surreal illustrations that leave room for subjective interpretations and questions. The visions of futures that have been generated in the workshops are in fact *explorative* scenarios, rather than plans that provide clear directions or strategies.

Finally, I would like to conclude the discussion of these findings with an observation on the unfinished nature of the Atlas of Future Imaginary Cities and of composite visions in general.

The ultimate purpose of cartographic atlases is to include in one artefact the entire geographic knowledge of the World, so that readers exploring its pages can be certain that all the places that are known at the moment of compiling the Atlas can be found in the book. Conversely, the Atlas of Imaginary Cities does not encompass all the existing knowledge about possible futures, but rather invites readers to explore uncharted spaces for further discussion. After all, any project seeking to open the space of visualisation to a plurality of voices is inevitably unfinished, as there will always be more voices that could be included in an open-ended conversation.

6.5 THE DESIGNER BIAS: A CRITICAL ISSUE

Throughout the project, we have been aware of an important limitation in the approach: the power of making meaning that the designer as map-maker has throughout the process of compiling the Atlas.

The overall research schedule set by the project investigators involved two separated phases of participatory workshops and analysis of the results. This meant that participants were not expected to be involved in the phases of analysis and visualisation.

The manual process of analysis employed in this project (6.3.4) shares its limitations with other examples of conventional content analysis. Since categories are assigned by researchers studying a text, they very much depend on the way the content is understood and interpreted by those who conduct the study.

By tracing the patterns of information that emerged from the analysis on a map, I, as a designer, made a series of choices that influenced the message received by the reader. At the same time, however, this practice was necessary in this context to make visible patterns of information that would otherwise remain unseen.

But what could be ways of involving participants in the production of artefacts of VCUF? This possibility will be explored in the Design Experiment #3: Birmingham Park Summit (Chapter 8 of this section)

6.6 LOCATING THE IMAGINARY CITY

During the workshops, we asked participants to imagine "a future UK city", without providing them with specific geographic requirement. While elements of existing cities were often brought in as comparison (mostly London, but also Swindon, Singapore, or Scandinavian cities), all the groups chose to design a new city from scratch. The imaginary regional map in the Atlas shows the differences in topography, size, and urban plans of these cities.

Decontextualized cities are spaces of the imagination, that, like Calvino's Invisible Cities (1979), visualise values and concerns about the future, more than the characteristics of their buildings and infrastructures. But what is the value of VCUF when applied to a specific context? The project presented in the following chapter (Design Experiment #2: Sharing Cities) shows how some of the methods developed for this project were used to

understand the relation between social practices and the urban environment in situated conversations with local experts.

7 DESIGN EXPERIMENT #2: SHARING CITIES

Conducting situated conversations on the relationship between social practices and urban futures: co-creating scenarios of sharing cities.

7.1 INTRODUCTION

This chapter reflects on how VCUF can be used to understand the relationship between social practices and the urban environment when co-creating scenarios of possible futures for specific cities or neighbourhoods. It draws on part of a six-month project in which the Liveable Cities research team sought to understand what a "sharing city" is, and how to help city decision-makers, city leaders and citizens rethink how cities can grow and encourage sharing.

This project was the first of a series of thought-experiment conducted as part of Phase 2 of Liveable Cites (see 4.4.1). It was lead by the team at Lancaster University (Prof. Rachel Cooper, Prof. Nick Dunn, Dr. Christopher Boyko, Dr. Stephen Clune, Dr. Claire Coulton, and myself), with significant contributions from other members of the programme across the four universities. The theme of the project was chosen during the programme's mid-term co-creation workshop, when 'sharing' was identified as one of the cross-cutting issues potentially involving all of the themes within the programme, and tightly linked to urban environments and urban lives.

The VCUF approach was adopted as part of the research strategy for the inquiry. Sharing and collaborating are activities that require the active participation of various actors and infrastructures to take place. For this reason, we engaged groups of citizens involved in sharing in Lancaster and Birmingham to discuss the current landscape and possible

futures of sharing in the city. Drawing on the reflections from DE#1, I developed the methodology that was adopted to conduct these participatory activities.

The following sections provide a necessary introduction to the "Sharing Cities" research theme (Section 7.2) and a detailed overview of the project, and will then discuss the role of VCUF.

7.2 FROM SHARING AND THE CITY TO THE SHARING CITY

The popularity of the sharing economy and collaborative practices of production and consumption have already been changing the way in which we design, deliver, and access services and products, and it is often at the centre of future-oriented conversations on urban living. For example, the Atlas of Future Imaginary Cities shows "sharing and collaborating", "services and access", and "spaces for communities" to be some of the most talked about issues in the conversations on possible futures conducted in the Future Visions Workshop series.

In the last few years, the rise of new models of collaborative economy (Botsman and Rogers 2011) inspired new interest in sharing. Much has been written, especially on popular media, on sharing economy models, in which companies provide platforms that allow individuals to share idle assets (Botsman 2013). However, the way sharing and collaborating as social practices relate to the urban environment and infrastructure has yet to be fully understood at the moment of writing the research plan.

Cities have been essential places of sharing for centuries. But what does it mean for a city to be a 'sharing city' in the age of the reinvention and revival of sharing (Mclaren and Agyeman 2015)?

While the Web (and Web 2.0 in particular) plays a central role in supported and popularising practices of sharing and collaborating (Botsman and Rogers 2011), most models of sharing have at their core physical interactions, and are enabled by a combination of platforms in the urban and digital space (Mclaren and Agyeman 2015; Agyeman, McLaren, and Schaefer-Borrego 2013).

This became particularly evident in recent years, when actors involved in city governments and sharing economies started confronting each other over regulations often unable to deal with these new practices. These confrontations lead to disparate results (Mclaren and Agyeman 2015). In some cities (most notoriously San Francisco) negotiations were dominated by well-established sharing economy companies, lobbying for supportive policies. In other cases (like Seoul or Amsterdam), local administrations took proactive actions to rethink their cities as 'sharing cities'. Elsewhere, efforts focussed on promoting social inclusion by helping communities to thrive (e.g. Medellin) or by improving the shared use of urban commons (e.g. Copenhagen).

Beyond the sharing economy, the term 'sharing city' is also used by groups such as OuiShare and Shareable to define the landscape of grassroots collaborative initiatives that spread in cities around the world, such as food-groups, time-banks, tool libraries and so on. Formalised grassroots initiatives, new examples of the sharing economy, but also informal sharing in close knitted communities, urban commons and shared spaces and resources often coexist and affect each other.

As part of the Liveable Cities project, we proposed a "spectrum of sharing" as a conceptual tool do describe the sharing city to help us understand the dynamics and dimensions of sharing simultaneously at play in the city

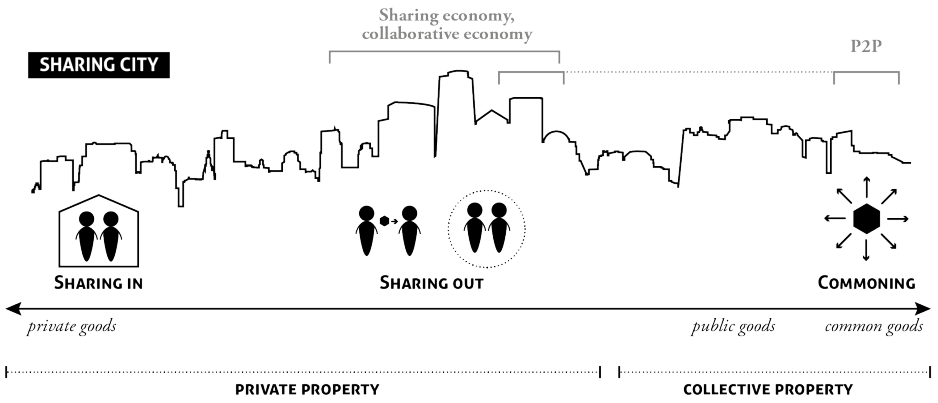


Figure 37 A spectrum of sharing in the city

The spectrum captures models of sharing that occur with private property or collective property. Building on Belk's description of sharing practices (2010), we distinguish informal practices of *sharing in* (i.e. within the family or a small group of close friends) and formal or informal practices of *sharing out* (with others that are not close friends or family members) as models of sharing private property (i.e. goods or resources that are privately owned by individuals or groups). Collective property is an additional dimension in the sharing spectrum that needs to be included in any mapping of the sharing city. Collective property refers to *public goods* (resources provided to citizens and managed by sovereign governments) and *common goods* (collectively owned resources shared through social practices) (Quilligan 2012).

This section provided a short summary of the complexity of actors and practices involved in the 'sharing city'. It is because of this complexity that we decided to adopt the VCUF approach to help us exploring what the sharing city is and could be.

More details on the theoretical framework that we adopted in the project to conceptualise the sharing cities are included in two journal articles ("Dialogues and Visualisations; Co-designing scenarios of sharing cities" (Pollastri et al. 2017) and "How Sharing Can Contribute to More Sustainable Cities" (C. T. Boyko et al. 2017)) and in the

"Little Book of Sharing" (C. Boyko et al. 2016) a publication created for a non-academic audience.

7.3 RESEARCH QUESTIONS

As a whole, the Sharing Cities project was guided by two research questions:

- What could a sharing city look like and how does it function? What are the practices, actors, and dimensions of sharing at play? **(Proj1)**
- What needs to be done to develop and encourage sharing while improving liveability (defined as enhanced wellbeing, lower carbon use and greater resource security)? What are the barriers to creating and maintaining such a sharing city? **(Proj2)**

The activities conducted as part of the study included:

- a review of literature on sharing and international examples of sharing in cities;
- a series of interdisciplinary workshops in which researchers and expert panellists reflected on the implications of sharing through the Liveable Cities research lenses;
- the development of a dynamic typology as a research and design tool, to support the analysis of existing models of sharing and guide future interventions;
- the development and prototyping of participatory methods for the mapping and co-designing of local scenarios of sharing cities.

For the purpose of this study, I will focus in this chapter on the last activity, and explore how processes and artefacts Visual Conversations on Urban Futures can help supporting

and documenting democratic localised dialogues (Huybrechts et al. 2016) on sharing cities. This means understanding:

- How to design processes and artefacts that help us explore possible futures of sharing cities? (this relates to **RQ1** and **RQ2**)
- What is the value of VCUF in this context? (**RQ4**)

When discussing the artefacts produced to visualise the outcomes of the workshop, I will provide a short description of the content. However, a full account of the findings of the project is beyond the scope of this dissertation. These are better described in a forthcoming journal article this chapter draws from (Pollastri et al. 2017), in the "Little Book of Sharing" (C. Boyko et al. 2016), and in the report that can be accessed from the Liveable Cities website (http://liveablecities.org.uk/outcomes/sharing-city-workshop-report).

7.4 METHODOLOGY: MAPPING THE PRESENT AND ENVISIONING FUTURE

As briefly mentioned in the introduction to this section, sharing and collaborating are dynamic activities, the success of which largely depends on the participation of actors directly or indirectly involved. These actors are "local experts" with practical and empirical knowledge on the experiential aspects of sharing in the urban environment.

For this reason, after a phase of literature review and discussion with Liveable Cities research teams (that looked at the "Sharing City" through the programme's lenses[22]), we decided to explore the local landscape of sharing and collaborating and speculate on

[22] *During the three months dedicated to the thought experiment, each team produced a document that related the "sharing cities" to energy, ecosystems, urban flows, mobilities, and governance, respectively.*

possible futures through scenario-making workshops with "local experts". These scenarios are an example of VCUF, as they allow heterogeneous communities to articulate multiple ideas. Unlike the imaginary cities collected in the Atlas, they are a 'situated practice of future-making', in which multiple futures are discussed locally (Bjögvinsson, Ehn, and Hillgren 2012; Ehn, Nilsson, and Topgaard 2014).

In summary, in the sharing cities workshops, I designed spaces and infrastructures for conducting democratic dialogues[23] (Huybrechts et al. 2016) to:

- map the current landscape of sharing (making sharing visible and tangible);
- create and discuss future visions of sharing cities (building scenarios of possible futures)

Visual methods (as part of the VCUF approach) were used:

- During the workshops, in processes of mapping and visioning, to facilitate and document conversations bringing together diverse groups of stakeholders;
- In the outcomes, to describe and map project ideas, themes, and semantic and relational networks.

[23] The term "Democratic Dialogues" has been recently used by Huybrechts et al. (2016) to define the broad range of dialogues that participatory designers engage in. According to Huybrechts and colleagues, types of Democratic Dialogues incude: Strategic Dialogues, (ii) Committing Dialogues, (iii) Questioning Dialogues, (iv) Agonistic Dialogues and (v) Expressing Dialogues. The type of dialogues conducted in this project aligns with the model of "Agonistic Dialogues", "visually confronting different positions and stories on the issue at stake" (Huybrechts et al. 2016, 108; drawing on DiSalvo 2010)

7.5 PROCESS

As we gathered to discuss how to design the methods to adopt in the workshop, we reflected on what we learnt during the design and prototyping sessions and when running the Future Visions workshops, in particular with regard to the design of scenario-making activities.

Similarly to the Future Vision workshop, we wanted to enable participants to create and explore possible scenarios, potentially bending the range of possible futures beyond what we (as research team) could expect. Once again, an important challenge consisted in designing a set of generative tools (E. B.-N. Sanders 2000) to be used by participants to explore divergent ideas, rather than to structure the conversation.

Unlike the previously organised activities, the Sharing Cities workshops were to include moments of mapping and discussing the landscape of existing collaborative practices. The tools that I designed to support the activities in this phase of the workshop were a combination of mostly prescriptive tools (for the mapping of the landscape, to allow us later on to build an accurate map from which to derive a typology) and less-prescriptive tools (to be used by participants when discussing their experiences).

7.5.1 Workshop structure

We conducted two workshops, which adopted the same methods. Each workshop was divided into six activities across two sections:

1. **Mapping the sharing city.** In this section, which took approximately 1.5 hours, participants mapped and outlined current, local initiatives of sharing, thus making sharing visible and tangible. The activities included:

a. Building the map of sharing. Participants were given one hexagonal card and a form, and asked to write an example of sharing in which they partake. The card would have only the example whereas the form would include more details (e.g., who shares, what is being shared, and why). The card would be added to a wall that already contained different categories of sharing (e.g., sharing food, sharing things).
b. Participants were asked to connect their card to the category that best reflected their example of sharing. This revealed a local 'map of sharing' (Figure 38).
c. Learning more about sharing. A facilitator introduced the Liveable Cities project to provide some context, and delivered a short presentation on sharing in cities.
d. Understanding the map. In groups of 4 to 7 people, participants took turns to describe their examples of sharing to each other, using the forms they received at the start of the event as a canvas. One or two members of the Liveable Cities team were seated at each table to encourage listening and discussion, and took notes of what participants said.
e. Finding the links. Once all participants shared their examples at their tables, team members asked a series of questions to the group about making connections. Specifically, the team probed for existing, missing and potential connections between groups and sharing examples.

Figure 38 Participant adding an example to the map. The 'Hexagons' are designed by ImaginationLancaster (http://imagination.lancs.ac.uk/hexagons)

2. **Envisioning scenarios of sharing cities**. In this 2-hour long section, the team hoped to connect the small-scale, often-disconnected examples of sharing with the conceptual ideas of creating, amplifying and destroying within the city. In particular, we wanted to understand from the participants' point of view what services, infrastructures, people and places could be created and/or amplified in cities to promote sharing, and which could be destroyed, as they are perceived as obstacles to sharing. We also did not want participants to be weighted down by negative thinking while designing, so we undertook a quick activity that acknowledged negativity.
    a. Worst case scenarios. Participants in their groups discussed with team members the negative aspects, risks and dangers of the sharing city. We wanted the participants to be able to express their worries and concerns about the future ahead of the final activity so as to 'get their feelings out'.
    b. Designing scenarios of the sharing city. Participants were asked to design a future city or neighbourhood that promoted sharing. Each table was given a set of maps as well as coloured blocks,

tissue paper, marker pens, string, miniature people, modelling clay and a set of signs that said, 'Create', 'Amplify' and 'Destroy'. Participants mapped, created, designed and debated their city or neighbourhood using the tools available. We especially encouraged tables to use the signs to say what they wanted more of (amplify), what they did not like (destroy), and what they could produce that was not currently available (create).

7.5.1.1 Conducting the workshops

The Lancaster workshop was held on 30 March 2015, with 40 people in attendance, including 12 members of the research team to assist on the day. The Birmingham workshop occurred on 7 September 2015 in the Moseley and Kings Heath ward, with 22 participants and 8 Liveable Cities team members in attendance. Moseley and Kings Heath – as opposed to all of Birmingham – was chosen as the ward where the workshop would be held because the Council was hoping to regenerate the area and felt that exploring sharing could be part of a different approach to tackling regeneration.

Participants were recruited by means of a flyer (circulated locally and online) that invited people to a large-scale 'thought experiment' to discuss and debate how the boundaries of sharing might be expanded to ensure resource security, low-carbon, wellbeing and liveability.

In both workshops, participants overwhelmingly were already involved in sharing initiatives, although being part of a sharing project or group was not required. People who felt that they did not share in cities may have believed that the workshops were for 'sharers only' and did not attend. In addition, due to the time of day of the workshops (held from late morning to early afternoon on weekdays), we indirectly excluded certain

people, such as schoolchildren and full-time workers. In doing so, we may have captured the viewpoints of specific demographics and not have obtained a more complete picture on sharing initiatives in these two cities.

The findings from the workshops are summarised in the next section.

7.6 ARTEFACTS: MAPS AND SCENARIOS OF LOCAL SHARING

After the workshop, I collected and analysed maps, scenarios, and notes from the facilitators and note-takers to produce a series of communication as reports from the workshops.

While a series of diagrams and maps were produced for intermediate presentations and discussions within the research team, the main outcome of this process is an interactive report designed for both researchers and participants. The report includes the map of the current landscapes of sharing in Lancaster and Birmingham and the future scenarios produced in the workshops. It is available to download from the Liveable Cities website: (http://liveablecities.org.uk/outcomes/sharing-city-workshop-report).

In this section I will describe the design process and the characteristics of the visualisations in the report, and will provide very short summary of their content.

7.6.1 Mapping the sharing city

After the workshop, I linked the examples participants mapped on the wall to the cards that captured further details about them. I then proceeded to digitalise the dataset, composed of a semantic network (indicating the conceptual relations between sharing examples and categories) and a table. At the end of this phase of analysis and coding, I visualised the dataset through a set of maps that capture the current landscape of sharing in Lancaster and in Birmingham.

These maps maintain the descriptions of the examples and connections traced by participants. They also include additional information such as the popularity of each category (indicated by the size of the circles), whether examples are formal or informal, their spatial properties, and whether or not these examples are part of bigger networks.

7.6.1.1 Findings: what do the maps tell us

The two maps of sharing reveal some important characteristics of the local sharing contexts.

The most popular categories of sharing overall were spaces, knowledge, things, food, and ideas. However, the categories that participants associated with their examples were often an indication of values and aims behind the initiatives, rather than pure descriptors. For examples, many projects relating to community gardens or food growing were described as not being just about 'sharing food', but also about sharing skills, knowledge, space, time.

The maps also spoke about the differences between the two cities. In Lancaster, food production initiatives based on sharing principles are very popular, and were often used to convey a broader message on environmental sustainability. For this reason, these initiatives were also strongly connected with knowledge sharing.

The landscape of sharing in Moseley and Kings Heath is slightly different. Sharing food was still popular, but most initiatives on the map were about sharing skills, time, and things. Many local examples here involved strengthening the ties within and between diverse communities through events and spaces for borrowing, mending and swapping.

In both cases, participants overwhelmingly mapped local examples of sharing initiatives, and the mainstream players often mentioned to signify the 'sharing economy' (e.g. Airbnb) do not feature in the map.

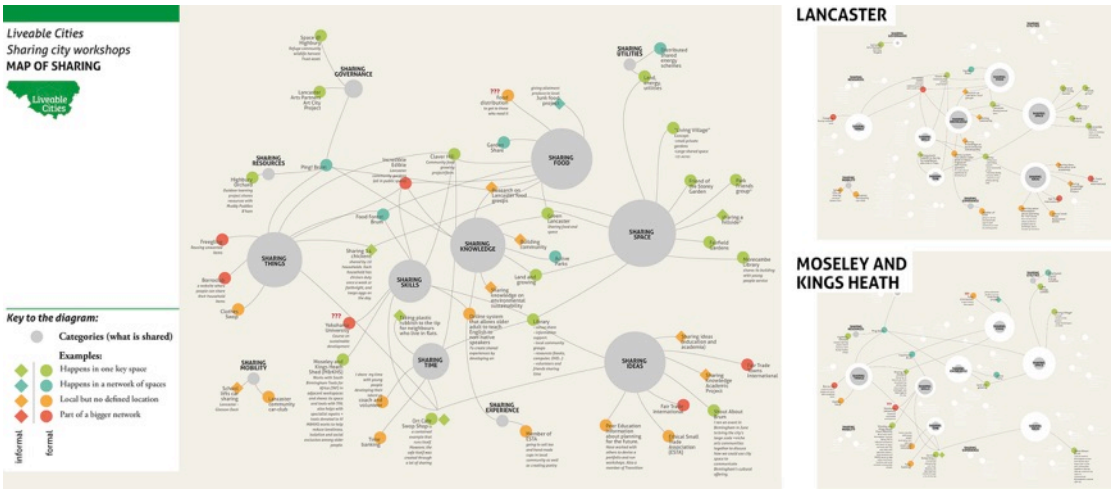


Figure 39 Reproduction of the interactive map that represents current sharing initiatives in Lancaster and in Birmingham's wards of Moseley and Kings Heath.

7.6.2 Visualising scenarios of the sharing city

To visualise the scenarios of sharing, I collected the notes from the facilitators sitting at the various tables, and related the description of the future sharing cities with the design produced on the local maps, and with the *amplify*, *create* and *destroy* marks in particular.

All the material was then organised and coded to reveal themes, relevant topics and emerging ideas. This informed the design of visualisations of scenarios that represented how solutions would play out in the city, and how they could impact both on the urban environment and on the life of local communities.

The first instance, scenarios of sharing cities were visualised through a set of two diagrammatic representations of the conversation on futures, and did not include any figurative element (Figure 40).

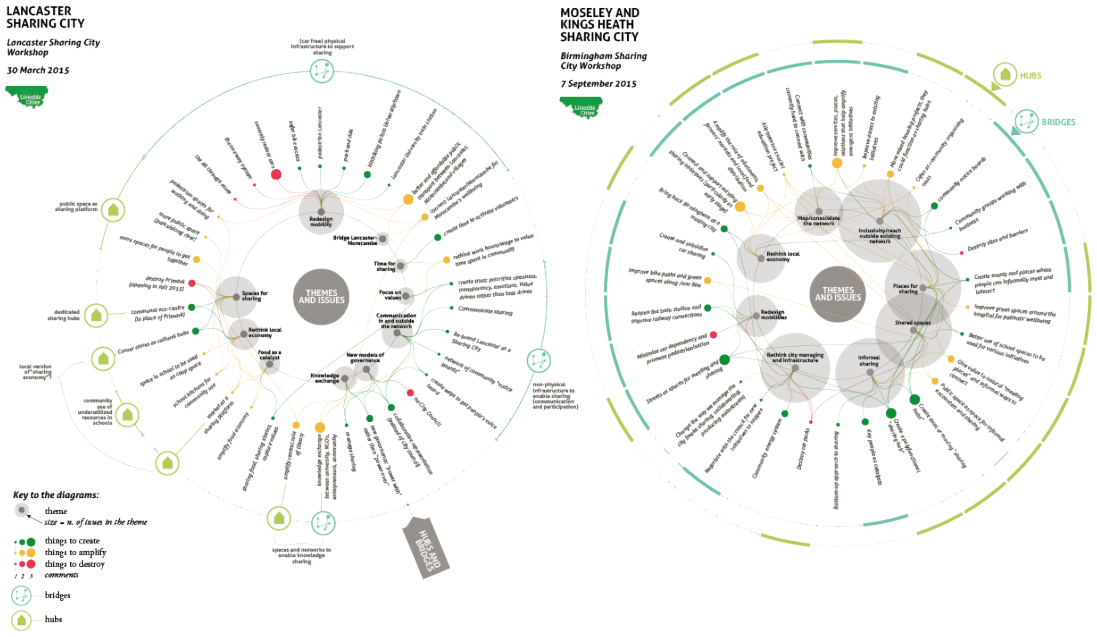


Figure 40 Diagrams of the future scenarios of Lancaster and Moseley and Kings Heath as sharing cities

Just like in the diagrammatic visualisations developed for the Future Vision workshops, such artefacts were very helpful supporting a speaker presenting the finding to an audience, but failed to entice people into reading or exploring the scenarios. Moreover, as it will be explained in Section 7.7.4, they sometimes mislead readers to think of them as visualisations of quantitative data.

For this reason, working on the information represented in the initial version, I translated the scenarios into a combination of figurative illustrations and diagrammatic elements, with some interactivity included in the version that was designed for online sharing. This new version, which overlays semantic diagrams on top of isometric illustrations, was designed as an approachable visualisation that could be understood by less involved readers but also examined by users interested in the details of the scenarios.

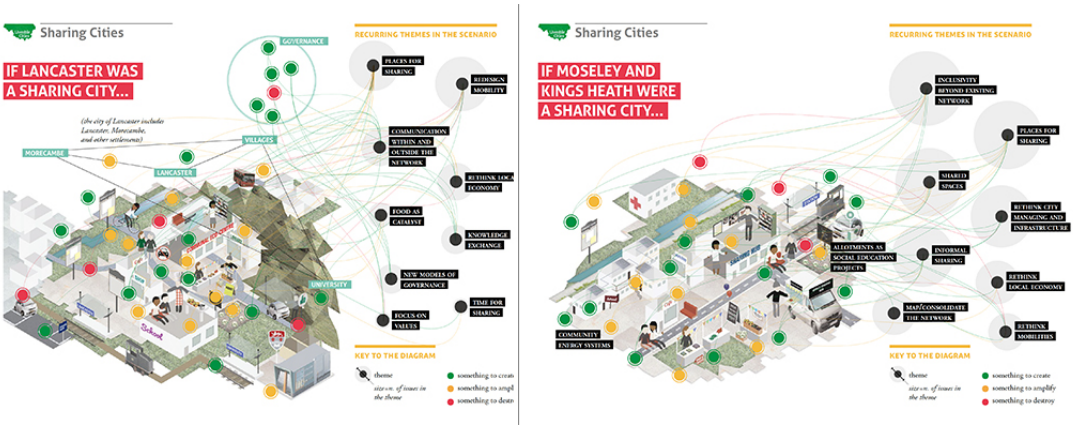


Figure 41 Scenarios of Lancaster and Moseley and Kings Heath as sharing cities (from the report)

7.6.2.1 What do the scenarios tell us (Findings)

In the final part of the workshops, participants started by populating the topographic maps of the city provided to each table as they started to discuss what would they amplify, create, or destroy in the future sharing city. For this reason, the resulting scenarios do not only present ideas about the future, but also relate these to information about present-day practices and infrastructures.

Both scenarios include:

- an isometric illustration of a sharing city, built from the ideas brought about by participants and loosely based on the geography of the city/neighbourhood to which it refers.
- a collection of the overarching themes, with their size corresponding to the number of ideas within the scenario that relate to the theme.

The overarching themes give a general indication of the essence of the conversation in the two workshops, and their commonalities and differences.

For example, "Redesigning Mobility" was one of the most important issues in the Lancaster workshop. Traffic was a primary cause of concern for participants, who felt

sharing and liveability to be negatively influenced by poor infrastructures. Severely reducing cars and car-dependency as well as improved and subsidised bus connections with neighbouring towns and villages, were suggested as ways to connect sharing initiatives in the district, promote pedestrian spaces and safer bike access.

While some ideas for redesigned mobility systems did emerge in Moseley and Kings Heath, in this second workshop the most popular topic was "Inclusivity", and how to reach outside existing networks. Even though a number of very successful initiatives did exist in the Ward, many participants felt efforts should be made to include those communities and groups that appear at the moment to be more difficult to reach.

These two themes revealed some differences in the priorities of the two cities and highlighted the common need for 'bridges', both physical (like the infrastructures designed in the Lancaster's scenario) and relational (like the ones needed to connect communities in Moseley and Kings Heath).

Most of the existing examples and new ideas brought forward in both workshops, required the existence of shared spaces (for example parks or car-free roads) and dedicated places where formal and informal sharing. Some ideas about these "Places for Sharing" included an "Eco-Community Hub" with flexible spaces for various groups to use, but also existing places like cafés or allotments, where sharing and collaborating could happen informally. Other ideas suggested using existing idle spaces and amplifying their functions. For example, school canteens could be used in the out-of-school hours as community kitchens. In some cases, digital spaces were mentioned as enablers of sharing, but priority was for the most part given to face-to-face communication and unmediated encounters.

For this reason, according to participants, we need to radically rethink governance, and the way cities are managed. Redefining the role of local administration to include policies and practices that enable civic participation was often seen as a prerequisite of the sharing city.

7.7 LEARNING OUTPUTS AND OPEN QUESTIONS.

In this section I will firstly discuss the value of situated VCUF to understand what a Sharing City is and what it might be. I will then reflect on some issues related to the specific process and artefacts of VCUF that were used in this project, as well as some shortcomings.

7.7.1 From sharing in cities to the sharing city

In the methodology section of this chapter (7.4), I introduced the motivations for integrating co-design methodologies in the broader research on Sharing Cities. Doing so allowed us to better understand not only formal models of sharing and collaborating, but also informal practices and their relation to the specific context in which they take place.

In the first part of the workshops ('mapping the sharing city'), we gained a deeper understanding of personal experiences and values and on how various groups are connected to each other. In the second part ('envisioning possible futures') hands-on design activities were used to reflect on possible futures for sharing practices and their spatial and contextual implications.

Adopting the VCUF approach in this context allowed us to think more broadly about sharing cities, as elements that are seemingly not related to sharing are brought into the discussion. These include infrastructures, spaces, governance, and values. These aspects are important to promote and enable practices of sharing (Mclaren and Agyeman 2015)

but are often overlooked in studies on sharing cities conducted through surveys, economic analysis, or structured interviews (see for example (Diplock 2013; Latitude 2013; Stokes and Clarence 2014; van de Glind 2013).

Not only engaging participants in open discussions on the relation between sharing and the city helped us capturing and mapping sharing and enablers of sharing, but also that co-creating scenarios of urban futures played a crucial role.

Figure 42 below overlays current examples of sharing mapped by participants on top of the spectrum described in Paragraph 7.2. These examples refer to a large variety of dimensions of sharing across the spectrum: formal and informal practices of collaborating and sharing private goods as well as various models of commoning and of sharing public goods.

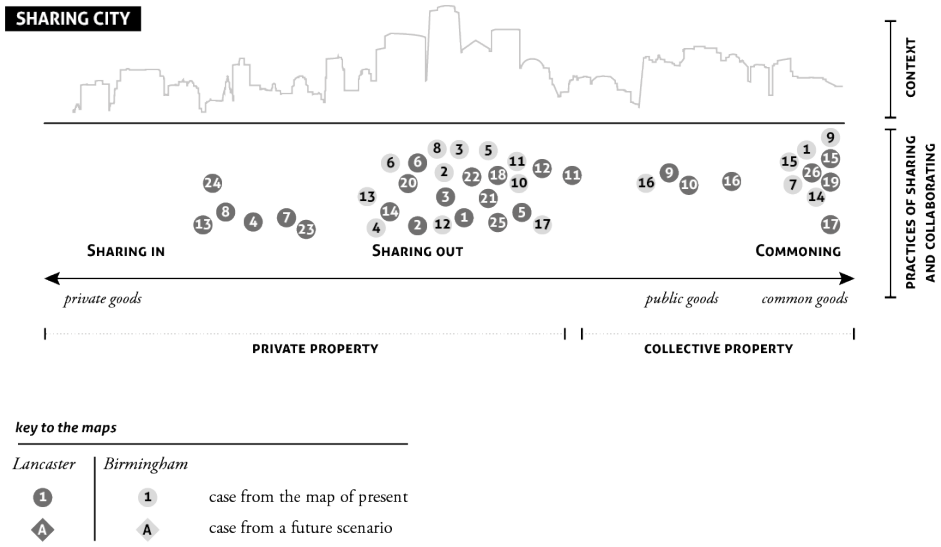


Figure 42 Examples from the mapping activities in Lancaster and Moseley and Kings Heath mapped along the sharing city spectrum.

Figure 43 shows how the second activity (envisioning scenarios) helped expand the conversation beyond practices of sharing, to include the context (both as urban environment and intangible values) in which these practices do or could take place.

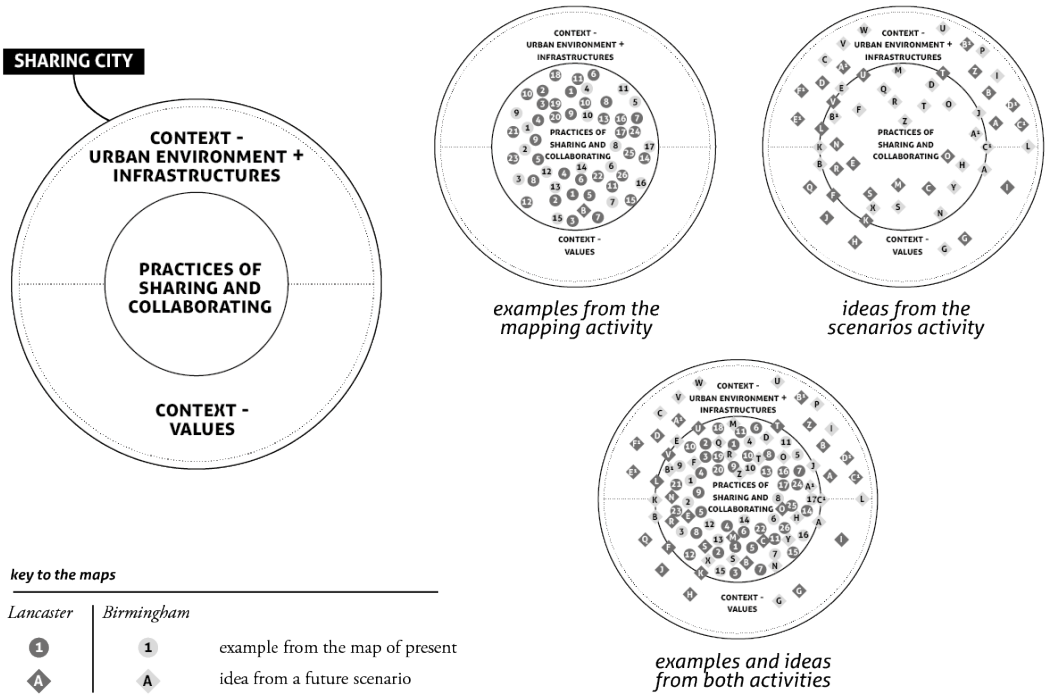


Figure 43 In these diagrams the examples and ideas from the workshops (clockwise: mapping activity, scenario activity, both) have been mapped according to whether they relate to practices of sharing and collaborating or the context of the sharing city.

A possible reason for this could be that when engaged in a design process, participants might have been enticed to consider all of the aspects that could lead to the success or failure of their proposed solutions. The designs proposed by participants included a portfolio of situated examples of sharing and collaborating practices as well as an array of supporting ideas that could enable such practices to take place.

For this reason we consider these scenarios to be a situated and more comprehensive representation of what a Sharing City would be than that of a city where sharing practices abound.

Like all visions of future cities, these scenarios speak of the present just as much as they do about the future (Cook 2012). In this sense, the future scenarios of Sharing Cities could certainly also be used to discuss the current state of the sharing cities.

7.7.2 Process

The workshops were designed as participatory activities that left space for improvisation and engagement with tacit or non-verbal knowledge (Bannon and Ehn 2012). They allowed participants to drive the discussion and focus the conversation and the scenarios about meaningful, critical, and context-specific issues.

Furthermore, platforms for group discussion and co-creation involved interactions not only between participants and organisers, but also within the group of people coming together to discuss shared concerns and new ideas. Some participants commented in the feedback session at the end of the workshop in Lancaster that one of the values of the day was that it created connections and exchange of ideas and experiences around a common interest (sharing and collaborating) between groups and individuals that would not otherwise have had the opportunity to do so.

On one hand, the sharing city workshops succeeded in creating "spaces for agonism" (DiSalvo 2010; Huybrechts et al. 2016) in which heterogeneous groups worked creatively together to incorporate a diversity of values and objectives into inclusive scenarios of urban futures. On the other hand, they created new connections between groups and individuals, and a better awareness of local landscapes of sharing.

7.7.2.1 Create, Amplify, Destroy

The Sharing Cities workshops were also the first time we used "create/amplify/destroy" tools. From an epistemological point of view, the cards are grounded in an understanding of the duality of the creative and destroying powers of design. Designing can sometimes implicate destroying something or the potential of something (Fry 2008). During the workshops, participants used the red cards inviting them to *destroy* unwanted aspects of the present as a way of questioning those aspects of the city that are often

taken for granted. However, in some cases new paradigms can emerge when "positive seeds of innovations" are "amplified" (Manzini and Coad 2015). The yellow *amplify* cards were used by participants to mark positive examples or aspects in the city of today, particularly towards the beginning of the envisioning exercise, and before moving on to think of new solutions to *create*.

These tools were well received by participants, and helped them start with a seemingly complex task (the redesign of a city). Similar "create/amplify/destroy" tools were successfully adopted in other projects of VCUF organised (see Section X).

7.7.3 Artefacts

The maps of the existing local networks of sharing were used by the research team as a way to gain a deep understanding of the context.

However, the process of building and discussing the maps during the workshop was, for the purpose of our research project, as important as the maps themselves.

Many examples brought by participants could not be clearly mapped or classified following objective criteria. Many local initiatives are organised around adaptable platforms (community spaces, associations, meet-ups or events) that enable various forms of collaborating related to the core concept of the initiative and towards sharing objectives. Community growing spaces, for example, often include a number of related activities, such as classes or markets, and key community spaces, like housing projects or cafés, might provide spaces for time-banks, skills sharing and swapping. Open and facilitated discussions are key for gathering information that would be hard to synthesise and classify, and help provide a deeper understanding of what is shared in the city, how and why it is shared and aims and values. While network-diagrams can help understand

the connections between sharing examples, introducing spatial information allowed us to communicate and understand the relation between sharing and the city.

The scenarios of Sharing Cities used illustrations to contextualise the core-issues and showed how they relate to each other and with the urban environment. Like the ones produced for the Atlas of Imaginary Futures, these illustrations are purposely inaccurate. They distort geographic information, highlight and magnify those elements that were at the centre of the discussion while hiding or minimising others. In that sense, they are intended as a visualisation of a conversation, rather than a realistic depiction of the city. The diagrammatic[24] nature of this scenario visualisation is reinforced by the use of cartoonish visual elements(with readable shapes and repetitive elements) and isometric projections (that distort shapes and sense of distance to enhance clarity), as well as the integration of graphic notation in the artwork.

Finally, the role of designers interpreting the conversations to create graphic artefacts must be taken into account. In this process, bias is inevitable, but can be mitigated by:

- Making 'transparent' visualisations (i.e. images that maintain, as much as possible, links to the original data sources). We did that by sharing with the research team not only the final images but also all the steps in the process, which show how data and information have been handled.
- Allowing participants and researchers to comment and edit the visualisation. This could be done by embedding interaction and communication platforms within the artefact, or, as it was done in this case, by setting up further spaces and occasions for discussion.

[24] In this context, diagrammatic visualisations are conceptual devices with a revealing ability (Scagnetti et al. 2007).

7.7.4 Evaluating the usability of the artefacts

The interactive report was presented to participants and members of the research team, and later on used (both by members of the research team as well as some participants themselves) as one of the way in which the outcomes and findings from the research projects were disseminated. But can the scenarios of sharing cities be used as 'thinking tools' (Cross 1999, see also Chapter 2) by the research team? How can visual tools (such as diagram, maps, and scenarios) help create connections between research teams and with external actors? And can this bridge allow the ideas and experiences from "local experts" to be considered as an integral part of the research? To answer these questions, I organised a 1-hour focus group with 15 Liveable Cities researchers.

In preparation for the focus group, I printed on large pieces of paper both the figurative scenarios used in the report and the abstract visualisations produced as an intermediate step. I also prepared individual cards with the examples of sharing previously collected by Liveable Cities researchers as their contribution to the study. The purpose of the activity was to contextualise the scenarios produced by participants within the Liveable Cities research framework, and these tools (scenarios and cards) were intended as props for discussion. Researchers were asked to annotate the scenarios (overlaid by a piece of tracing paper) with notes about the relation between these and the concept of a "liveable" city.

However, the researchers who participated in the focus group felt that both sets of scenarios were unsuitable to be used in the activity. We decided it would be more useful to discuss the reason for this (and think of alternatives) rather than attempt proceeding with the original schedule. Below are some of the learning points from the discussion (full transcripts are available upon request).

1. **Prepare visions that can be deconstructed and give space and tools for creation.**

   The main issue of both scenarios was that "they look too finished". When preparing the posters for the focus group, I paid attention to the layout, the graphic grid of the page, balance of the visual weights of the elements in the page, and coherence of typeface, colour palettes, and graphic motives. While a coherent and pleasing layout enhanced readability, it prevented readers from interacting with the artefact. A different visual language should be found that prioritises the conversation around the subject over the communication of a message (while still allowing participants to understand the message). As one of the researchers said "I want something that I won't feel bad tearing apart, move around, rearranging".

2. **Clarify the purpose of using visualisations.**

   One of the participants said: "you assume I'd rather look at a map, but I'd ask you give me the transcripts instead". This observation challenged the nature of the activity and the value of the scenarios. After further discussion, however, we agreed that the purpose of scenarios (and possibly a potential role for VCUF in academic research) was to explore connections, rather than diving deep into individual issues.

3. **Consider the diversity of approaches and methods**

   When designing tools for research, different approaches, established methods, and disciplinary requirements must be taken into consideration. Moreover, groups are rarely homogeneous, but consisting of individuals who think and act in very different ways.

During the discussion, those researchers within the group that worked habitually with quantitative data immediately questioned issues of scale, coding, and the overall rigour of the analysis. While this did not create any issue per se, it highlighted some distrust of the method, and hesitance to engage.

4. **Illustrations can be engaging but also distracting**

   At the beginning of the discussion I asked participants to choose between the two types of scenarios with which they would most like to work. Almost everybody in the room immediately said they would much rather discuss the mostly figurative option, which was perceived as "easier to understand". However, the preference shifted more towards the diagram as the conversation progressed. This artefact was judged less distracting (because it was free from "information junk", Tufte (2001) would argue). Participants to the discussion proposed a third way of designing the scenarios. This would include both figurative and connotative elements (i.e. the image would 'look like a city') and the groupings and connections overlaid through diagrams.

7.7.5 Conclusion

The design experiment presented in this chapter proposed a way of using the VCUF approach in situated conversations aimed at understanding the relation between particular practices (sharing and collaborating) and the urban environment, and discussed future challenges and possibilities.

Two workshops conducted in Lancaster and Birmingham enabled us to capture not only local examples and models of sharing, but also the nuances, the values, and the spatial

and infrastructural aspects of the sharing city. The maps and scenarios produced as a result of these workshops are designed to capture and communicate all of the dimensions of the sharing city.

In particular, we recognised that one of the merits of engaging participants in creating scenarios of the future is, more than any other type of activity, fears, frustrations, needs, aspirations, and hopes emerge. Imagining the future also gave us a key to understand the present. But some questions are left to be investigated. Specifically: how can we involve workshop participants in the design of visualisations to be used to communicate their visions? And how can these visualisations be used as thinking tools to be reworked in further conversations on urban futures?

The design experiment presented next describes a short project in which I focussed on exploring these two research and design questions.

8 DESIGN EXPERIMENT #3: BIRMINGHAM PARKS SUMMIT

Visions to unpack, rework, transform into actions.

8.1 INTRODUCTION

In September 2016, the Lancaster team was approached by Nick Grayson, Climate Change and Sustainability Manager at Birmingham City Council (BCC) and Liveable Cities project partner. After having attended one of the previously organised 'Sharing Cities' workshops, and having read about the methodology that we adopted in the Future Visioning workshops, Nick suggested a short collaboration between our team and BCC. The context of this collaboration was an effort from the Council to engage citizens in the early stages of the definition of a 25-year strategic agenda for Birmingham's Natural Capital.

Despite its recent industrial past (P. M. Jones 2009), and the intricate and highly congested road infrastructure that defines its urban structure (Urry et al. Forthcoming), Birmingham became in recent years UK *best practice* for the way it manages its natural capital in an integrated way. Birmingham is also part of the international network of Biophilic Cities, i.e. cities where nature and urbanities are highly integrated (Morris 2014).

However, the access to good quality "green", "grey", and "blue" spaces[25] is far from being equally distributed across the cities and to all citizens (Birmingham City Council 2013, Appendix 1 and 2).

[25] *In this context, green spaces are urban pockets of lands (however small) land that are partly or completely covered with grass, trees, shrubs, or other vegetation; blue space stands for all types of visible water (including rivers, canals, ponds, fountains, etc,); grey spaces are paved open urban spaces that provide recreational areas for city dwellers (including squares, playgrounds, pedestrian areas). This terminology is*

During one of the first meeting with the team, Nick described the main issues with the way BCC and Birmingham residents engage with each other. Below is a summary of his introduction.

Overall, Birmingham citizens would appear to be very vocal about the conditions of parks and green spaces, at least judging by the number of petitions and proposals of alternative visions that are submitted to the Council. However, the involvement seems to be for the most part limited to wealthier citizens living in leafy suburbs. Conversely, the voices of those living in inner city areas are rarely heard. In these parts of the city green space is limited, in poorer conditions, and often threatened by development and densification projects.

It follows that despite including a significant amount of natural spaces in urban plans being a priority in Birmingham's agenda as a Biophilic City, the distribution of these spaces in the city might continue to be uneven.

Opportunities for civic engagement that are lead by the council do exist, and are conducted with a panel of more than 100 citizens from different wards and demographics. However, these activities are sporadic and usually short-termed. According to Nick Grayson, BCC needs to rethink the way citizens are engaged in practices of decision-making and management: from consultation to long-term strategic involvement. As a response to these challenges we designed, together with Nick Grayson, a workshop in two parts.

---

commonly used by councils (including Birmingham City Council), academics and practitioners working in the fields of urban design, planning, and urban eco-systems.

The first part of the workshop brought together a panel of citizens from various wards around the city. Participants developed a "Citizens' Vision for Birmingham", with some initial ideas and proposals to be included in BCC's Natural Capital Strategy. In the second part of the workshop, members of BCC and other stakeholders transformed the "Citizens' Vision" into a sets of critical pathways. This activity was intended to understand what would it take for ideas to happen, as well as mapping what could happen in the short term, and what are the longer-term goals.

This experience allowed me to work on one aspect that was left missing in previous design experiments conducted as part of this thesis, namely: how to produce visions that can be reworked to transform them into actions?

8.2 PROCESSES AND ARTEFACTS

One of the premises of this thesis is that visualisations are to be intended as continuums of processes and artefacts, with the artefacts being either, or both, thinking and communication tools.

While in previous examples, processes and artefacts of visual conversations have been discussed independently, in this case the two aspects of VCUF will be presented together. Unlike elsewhere, in fact, it would be impossible to separate the design process of the artefact of VCUF (the "Citizens' Vision") from the process of VCUF that generated it. As the visions produced by participants had to be immediately presented to the councillors and stakeholders attending the second part of the workshop, the process of VCUF conducted in the first part of the workshop had to culminate with the production of an artefact to visualise such conversations.

For this reason, a key requirement for the methodology was the inclusion of a set of tools to record participants' ideas, and a structure for assembling such ideas and

compose the vision. From the comments collected during the evaluation of the "Sharing Cities" scenarios, we also knew that the vision assembled in the structure should have looked "unfinished" enough to entice hands-on interaction. It would only be through the interaction of the members of the council and related stakeholders with citizens' individual proposals that the vision could be transformed into sets of concrete actions.

The workshop took place at Highbury Hall in Birmingham on October 2nd, 2016. The first part was two-hours long (10.00 to 12.00), and had 30 members of the public in attendance. In the second part, which started at 13.00 and ended at 15.00, we worked with 35 participants (BCC officers and other partners).

The sections below provide an overview of the methodology adopted in the workshops.

8.2.1 Part 1: Building the vision.

Upon arrival, we asked each participant to pick a ticket from one of three groups available. Each group referred to green, grey, or blue spaces. Every ticket included two questions: "what is your favourite [green/grey/blue] space in Birmingham?" and "what is the [green/grey/blue] space in Birmingham that you dislike the most. On the tickets there was also some extra space that people could use to explain their choice, if they felt that this would be helpful in the discussion. Participants were asked to pin their "liked" and "disliked" places on a map of the city (Figure 44).

Figure 44 Map of the most liked and disliked green/grey/blue spaces in Birmingham, as mapped by participants

In the first set of activities, participants in their assigned tables (each table sitting 5/6 people) introduced themselves and their favourite places. They then proceeded to discuss their least favourite places and, starting from these, described the worst possible scenarios for Birmingham's green, grey, and blue spaces in the next 25 years. Just like in previous examples (Future Visions and Sharing Cities workshops), the "negative thoughts" generated in this first activity were removed from the tables right after having been presented to encourage participants to focus on constructive thoughts.

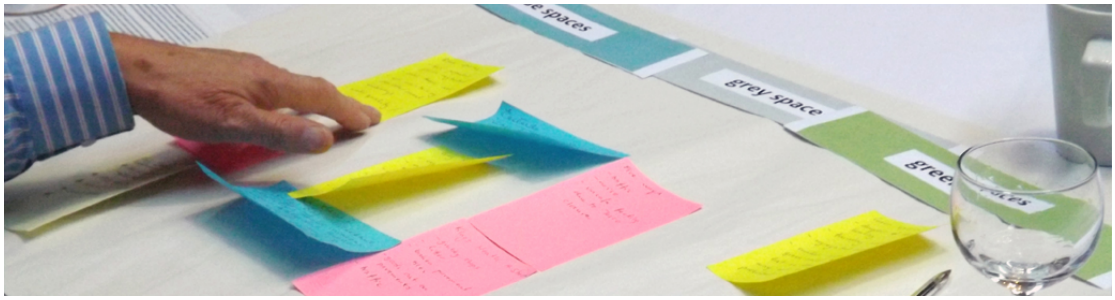


Figure 45 Participant reading the "negative thoughts" mapped by the members of his group

The following activities were aimed at producing and organising the components to be included in the Citizens Visions.

Participants started by working in pairs and reflecting on their most liked and disliked places. They talked with each other about what qualities they would like to create, amplify (i.e. improve or have more of), or destroy. Sets of *create*, *amplify* and *destroy* cards

were scattered on the various tables. Participants were encouraged to write their ideas on the cards (one idea per card). At the end of the session, each pair explained their ideas to the rest of the table. Facilitators helped participants to cluster the ideas on the card sand create thematic groups.

Once the clusters were consolidated and agreed, each table was asked to select the three most important ones. Each table received three boxes into which all the cards from the previous activity could be placed, corresponding to each of the selected clusters. Every box was labelled with a "headline" that summarised its content, which were developed by the participants.

At this point, most of the tables were able to think of concrete project ideas to propose to the council. These ideas were described using the Idea Cards. These cards are basic forms with a series of questions (such as "who is involved?" or "how is it funded?") that help clarifying the details of the proposed solutions. At the end of the activity each "idea card" was placed in the corresponding headline box (Figure 46).

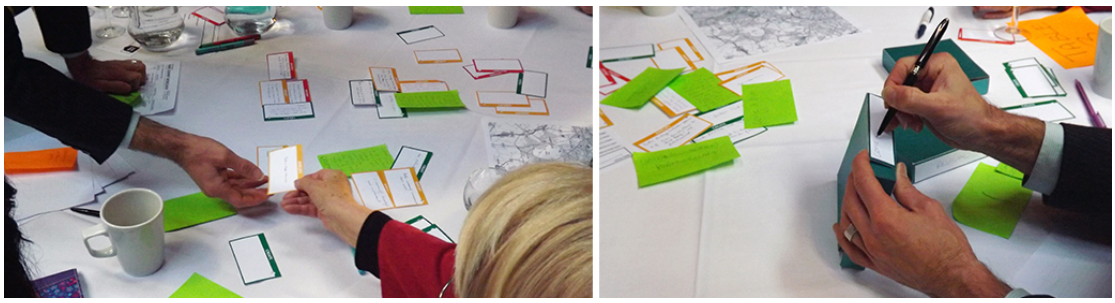


Figure 46 Participants working on ideas for the future of Birmingham's green/grey/blue spaces, and (on the left) collecting related ideas in a "headline box"

All the boxes were brought together on a table for a plenary discussion. Similar ideas were clustered around broader themes. Participants were asked to vote and determine the order in which the "headline boxes" were arranged in the "Citizens' Vision" box.

Adjustments were made to the positioning of the headline boxes in the Vision box, as participants reconsidered some of the clusters. Before the end of this part of the workshop, we asked the group of attendees to select two members who would present the vision to the officers and stakeholders attending the afternoon session.

Figure 47 (left) A detail of the Citizens' Vision box and (right) two participants presenting the vision to officers and stakeholders

8.2.1.1 A composite vision to assemble and unpack

The citizens' vision box was designed as a material framework inside which to assemble and organise a set of modular headlines that summarise the ideas produced by participants.

This format was chosen for three main reasons:

- Working only with a set of boxes (rather than with a large number of ideas and connections) made it possible for participants to move and rearrange the vision multiple times during the final discussion;
- A list of headlines was easy for the selected representatives from the first part of the workshop to present to the attendees in the second part;

- Boxes are mysterious in their content. This discouraged participants in the second part of the workshop from choosing which box to pick based on the number and details of the items included.
- Opening the boxes was necessary to access their content. This action "breaks the ice" of the interaction of participants with the vision.

8.2.2 Part 2: Vision to actions

After a general introduction and the presentation of the Citizens' Vision, the two-hour afternoon session of the workshop focused on mapping the critical pathways to the vision.

The group was divided into five tables. Each table was assigned a box taken from the Vision (with priority given to the boxes that participants to Part 1 placed on top of the list). Participants working in their tables proceeded to open the box, look at the ideas and comments found inside it, and discuss the feasibility and the relevance of the idea in the context of current and potential governance practices and strategies.

From an organisational point of view, the Natural Capital strategy comprises four main areas (or "pillars", to use the BCC's terminology): management, governance, finance, and access. To help BCC understanding how to incorporate ideas and actions into the strategic plan, we used the four areas as a key for mapping the conversation along critical pathways.

Each table was provided with a set of four coloured tags, with each colour representing one of the four areas. Participants were asked to create strings of actions that are needed to realise the ideas and visions. These actions were described on tags of the

corresponding areas and connected through pieces of string. The facilitators at the table encouraged participants to think of alternative paths to achieve ideas and visions.

Blank cards to be woven into the critical paths were also provided. Participants used these cards to add comments to ideas and paths, as well as to propose additional solutions or suggestions.

Figure 48 Participants mapping pathways to transform visions into action

At the end of the activity, each table presented their critical pathways. We asked groups to include information about the time-scale of the various interventions, to identify what are the short and long-term projects.

8.3 LEARNING OUTPUTS AND OPEN QUESTIONS

One of the most common criticisms of utopian future visions is that they often fall short of explaining how would we get from existing conditions to the envisioned ones (Urry 2016). While predictive and prescriptive scenarios generated for strategic purposes often involve backcasting activities (Börjeson et al. 2006; Quist and Vergragt 2006), future visions that are created to open spaces of discussions are rarely followed by a systematic analysis of the pathways towards the vision.

In this thesis, I presented two design experiments (Future Visions and Sharing Cities) in which groups of participants were involved in co-creating visions aimed at better understanding the complexity of certain issues about the future. These experiments were

conducted as part of academic studies. In both cases, participants were made aware of the speculative nature of the visions to be created. For this exact reason, they were allowed to think of highly unrealistic, seemingly impossible ideas, to incorporate in the vision.

When similar activities are conducted on behalf of local authorities, planners, developers, or decision makers in general, the boundaries between strategy and speculation are often blurred. In some cases, the lack of clarity about the role that participatory visions have within a broader strategy, might lead those who are called to collaborate to frustration and mistrust (McCann 2001; Mclaren and Agyeman 2015). It is in fact too common an experience, particularly for larger scale urban development projects, to be articulated with the objectives of powerful decision makers in mind, regardless of the civic engagement efforts made at the visioning stage (Swyngedouw, Moulaert, and Rodriguez 2002).

Figure 49, for example, shows some of the concerned or critical comments on social media that were generated by an invitation to an open event in which participants would have the opportunity to discuss future visions for Lancaster.

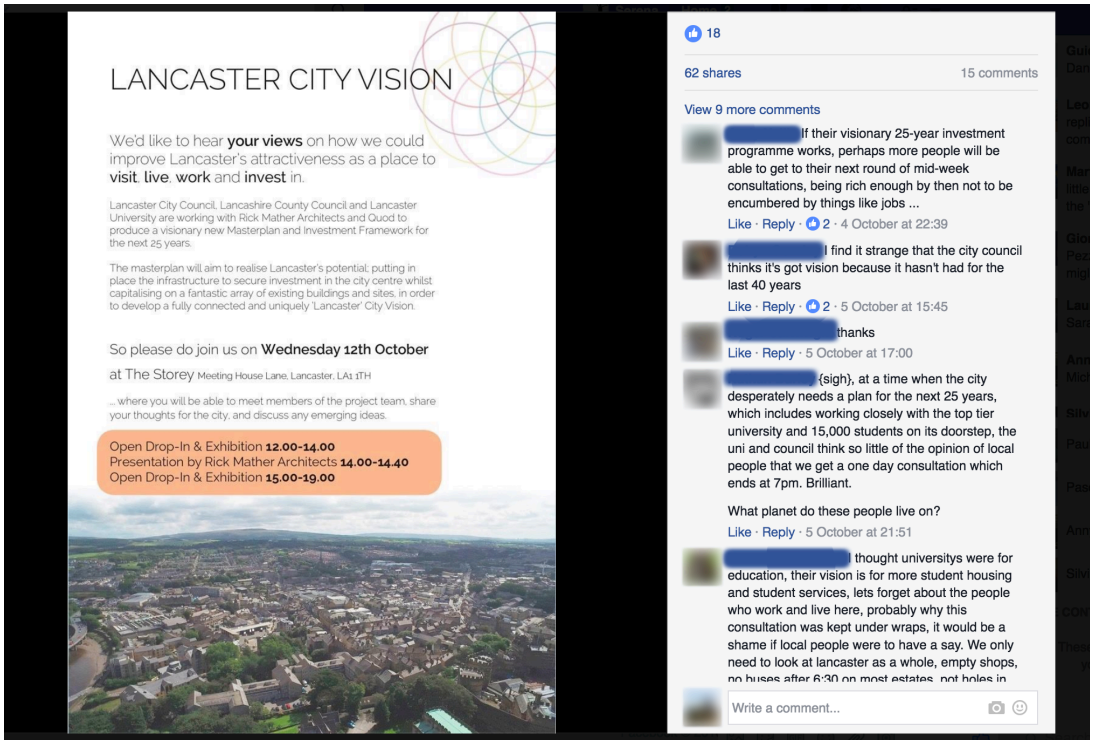


Figure 49 Some of the comments of Lancaster citizens to an invitation to a visioning exercise organised a private organisation and supported by Lancaster City Council, Lancashire County Council, and Lancaster University in October 2016 (shared by a Lancashire County Councillor on a local Facebook group).

While it is true that participatory visioning exercises are in some cases turned into practices of political propaganda, in this thesis I argue that part of the issue lies in the difficulty of incorporating the direct outcomes of such activities as part of traditional strategy or design processes. Visions of future are often difficult to analyse and interpret. For this reason, as it also emerged in the evaluation of the "Sharing Cities" project, they are most commonly used as artefacts to present ideas, rather than to discuss and unpack. In such cases, what happens to the visions after they have been presented is often unclear.

This case study consisted of an experiment in which the Citizens' Vision was communicated through an artefact explicitly designed to be disassembled, unpacked, and explored. As the information that could be seen just by looking at the artefact was

limited to the headlines on the individual boxes, the only way to understand the content of the vision was by taking it apart and opening the individual boxes.

During Part 2 of the workshop, officers and organisations from BCC working in groups were compelled to interact directly with the individual ideas from participants in Part 1. However, this proved to be more challenging that we anticipated.

Soon after the opening of the boxes, after having had a general look at the content, most groups turned the conversation back to their personal issues and agendas, taking advantage of the opportunity to discuss them with colleagues and other stakeholders. Ideas and concerns from Part 1 of the workshop were not being included in the conversation, until the facilitators prompted participants to do so.

At this point, while some tables focussed their attention to the vision, and started to organise the content of the box, others were reluctant to fully embrace citizens' ideas. Some of these ideas were initially deemed as unrealistic and rejected, in some cases without proposing alternatives or amendments.

It took a great deal of effort from the facilitators to keep the discussion focussed and to encourage participants to start weaving the critical pathways.

We identified as one of the main reasons for the difficulty in running Part 2 of the workshop that participants were not aware of the Strategic Agenda, its objectives, and its premises. For example, we assumed that the concept of the "four pillars" was shared among members of BCC. During the workshop, we discovered that participants were not familiar with these concepts, and had not read the background documents that were provided to us to inform the design of the workshop.

At the end of the activity, all tables succeeded in preparing sets of critical pathways. However, we were left wondering whether a more comprehensive engagement of participants in the broader strategy would have lead to a clearer commitment to the activity, to more focussed discussions, and better attention to citizens' ideas.

The artefacts assembled by participants in Part 1 proved it possible to create visions of future that can be disassembled, unpacked and reworked. These visions may incorporate conflicting ideas, that – when taking the box apart – can be identified and creatively negotiated.

However, for this to happen, it requires a comprehensive and longer-term strategy of incorporating participatory and co-design practices in policy. Many examples of such models of collaboration do exist in various cities around the world, and are well-documented in the literature (Manzini and Staszowski 2013; Ehn, Nilsson, and Topgaard 2014).

The collaboration between our team and BCC was limited to the designing, organising, and delivery of the workshop, which was intended as a first step in a longer engagement strategies of the council with Birmingham's citizens, in the context of the development of a strategic agenda. The potential for longer-term collaboration was discussed in the initial meeting, and I shared some resources on design groups working with public offices with the team and Nick Grayson. However, at the moment there are no plans, or resources that would make any longer term involvement possible.

8.3.1 Conclusion

In this chapter, I described a design experiment in which I proposed a method for co-creating future visions that can be used as thinking tools in strategy-making processes. To do so, I proposed the use of a system of boxes that can be used to collect, organise,

and presents ideas generated by participants to the first part of a workshop. In the second part of the same workshop, government actors and stakeholders used these ideas to map the critical pathways of actions to be undertaken to implement these ideas.

The project also highlighted that the design of effective strategies and processes for co-creating future visions that can be transformed into practice requires a better integration of co-design methods and governance practices (8.3).

SUMMARY OF PART B

Exploring the research through practice: learning from failures and weaving hanging threads in the process.

This section presented an account of the four design experiments that informed and shaped my inquiry into Visual Conversations on Urban Futures as a design approach.

I chose to do so by providing an almost-chronological account of each design journey. I believe it is imperative for studies that adopt practice as their main mode of inquiry, to document mistakes, shortcomings, and 'rabbit holes' alongside findings and achievements. However, I am also aware that this candid peak into the messiness of the design process might be somewhat overwhelming and disorienting.

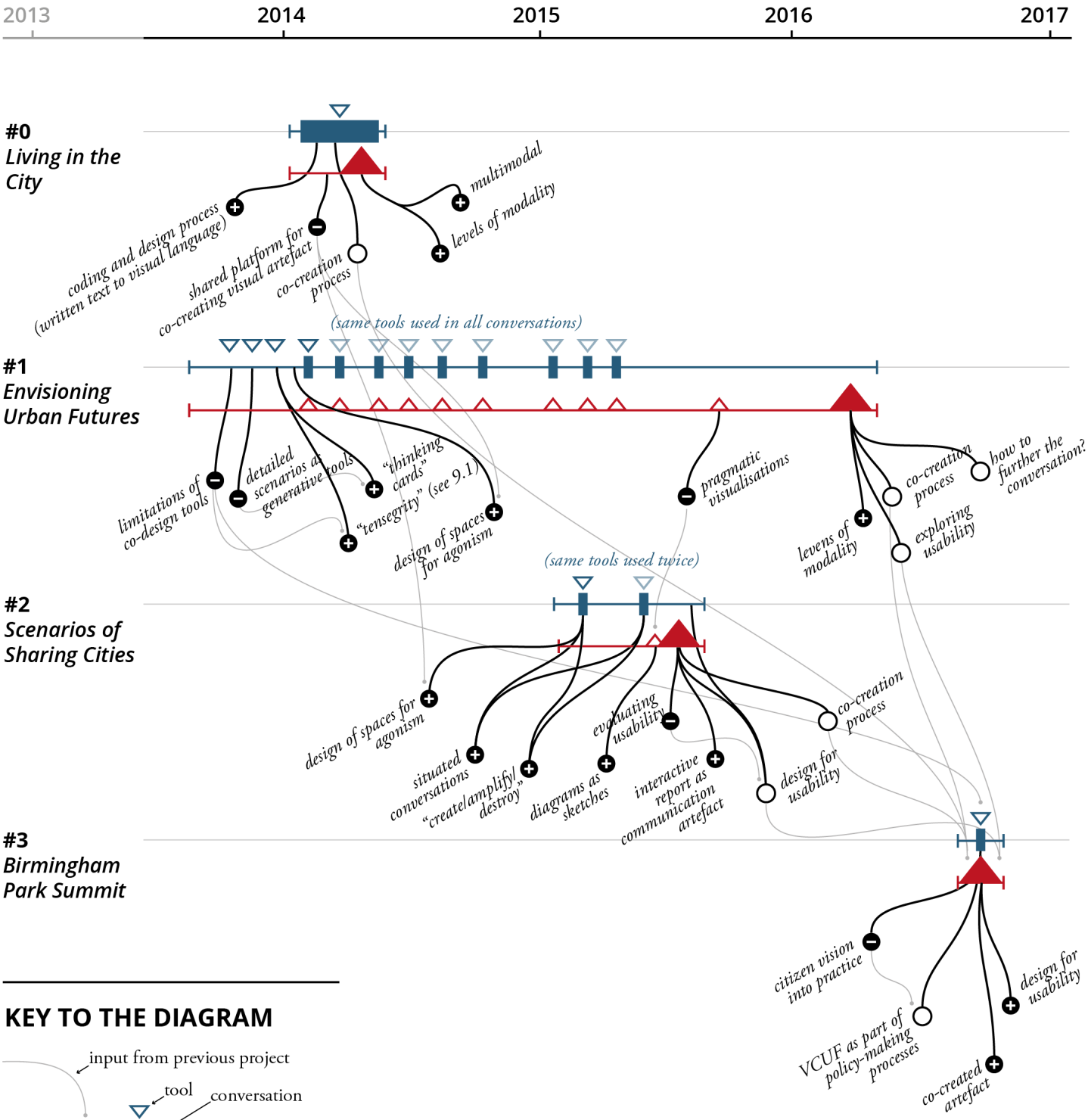
Figure 75 is a map of the projects along a timeline. It shows how learning outcomes and open questions have been woven along the research journey.

The map summarises the key findings from the practice-based research process. The design experiments presented in this section of the research were conducted alongside a continuous activity of collecting and documenting in the online archive, relevant examples of how the VCUF approach has been used in other contexts. In reality, the two methods of inquiry have been highly interconnected, as one informed and influenced the other. In the next chapter I will draw on the knowledge generated through both methods to propose a set of design principles for VCUF.

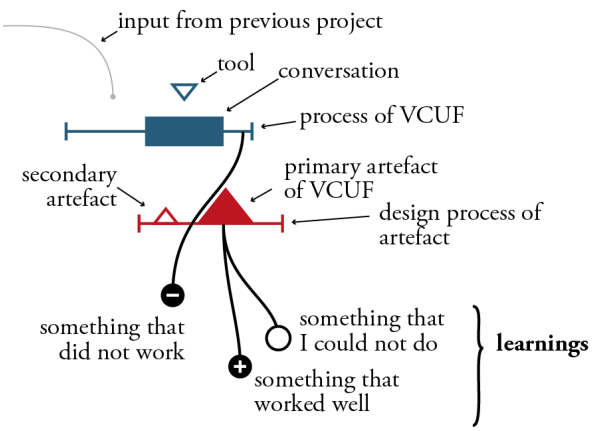
Figure 50 (in the next page): Map of the research timeline which shows the learning outputs and open questions in each Design Experiment and how these are woven within the research process.

EXPLORING THE APPROACH THROUGH PRACTICE;

MAPPING THE TIMELINE



KEY TO THE DIAGRAM



PART C.

DESIGN PRINCIPLES OF VCUF

In Part C of this thesis I will propose a series of design principles that describe the VCUF approach within the theoretical framework introduced in Part A. To define these design principles I draw from reflections on practice (see Part B) and examples from the literature.

Chapter 2 in Part A showed evidence of participatory practices and artefacts for envisioning multiplicity and plurality of possible urban futures in many contexts throughout the years (2.2.1). At the same time, the literature review highlighted a lack of established approaches and discourses that conceptualise such practices and seek to understand their characteristics. The aim of Part C is to draw out a set of principles to support both the analysis as well as the design of Visual Conversations on Urban Futures.

Part C is divided into two main chapters:

- **Chapter 9** presents two overarching principles: one for processes (Section 9.1) and one for artefacts (Section 9.2) of VCUF.
- **Chapter 10** proposes a framework for the description of the design space of VCUF through the use of eight dimensions that define a design space for VCUF.

In a sense, the development of this section followed the journey of the PhD. The first draft of the principles was largely informed by the design practice conducted in the study. Initial ideas have then been refined and substantiated through a review of the

relevant literature in various fields: mostly visual and participatory design, but also social semiotics, urbanism, architecture, and geography.

9 OVERARCHING PRINCIPLES FOR PROCESSES AND ARTEFACTS OF VCUF

Fundamentally, the design process of VCUF in each one of the Design Experiments always started with two general questions:

- how to create spaces for discussion and imagination (designing the process – see RQ1),
- how to represent the polyphonic visions emerging from these conversations (designing the artefacts – see RQ2).

The theoretical framework in Part A explained how methodologies and studies in the fields of co-design and information visualisation can (and certainly did, in my research through design experiments) inform the design of processes and artefacts of VCUF. However, section 9.1 and 9.2 will summarise some additional challenges that are brought about by the speculative nature of VCUF.

This chapter brings together a series of reflections on combining speculative design, co-design, and information visualisation, and proposes some overarching design principles for processes and artefacts of VCUF.

9.1 TENSEGRITY: REPLACING SCAFFOLDS IN PROCESSES OF VCUF.

Participatory and co-design literature often describes the role of the designer as to create scaffolds for enabling creativity in groups of people working together towards a shared goal. Scaffolds provide support to design activities, while defining a clear yet easy to reconfigure structure that keeps the process focussed and constructive. However, when employed in speculative design practices aimed at raising questions and highlighting controversies scaffolds can have a detrimental effect, as they constrain the breadth of conversations that value divergence.

But what conceptual structures can be used as alternatives to scaffolds to support and facilitate processes of speculative co-design? In this section, I propose the use of tensegrity structures as an alternative metaphor in processes of VCUF.

Conversations only happen if participants are actively engaged. For this reason, the design process of any VCUF always involves, in its early stages, the challenge of understanding and creating the conditions for speculative conversations. Such conversations can take many forms. They can be synchronous (i.e. occurring at the same time) or asynchronous (taking place over extended periods of time). They can happen in one place, multiple locations, or even remotely. They can involve closed groups of participants (small or larger), or, particularly in the case of asynchronous, and/or remote conversations, be open for anybody to contribute.

Chapter 2 in Part A of this thesis provided an overview across the many different genres of visualisations of urban futures that can be found in literature, including those characterised by participatory processes and multiple voices (2.2.1.1). The great range of possibilities (in terms of methods, purposes, logistics, etc.) that the VCUF approach may encompass means that it would be impossible, within the scope of this research, to provide detailed design guidelines. The purpose of this section is to reflect on the macro-level, overarching characteristics of such processes, with the aim of understanding how to create the conditions for spaces that enable speculative discussions and imagination.

What has prompted the reflections on methods presented in this chapter was my personal experience of designing the various workshops described in Part B. As the main designer in the Liveable Cities team, I was in charge of designing the infrastructures (i.e. facilitation strategies, organisation of the space, tools and materials) that were needed to bring together various groups of people discussing and designing speculative scenarios of

urban futures. In my experience, the design of the infrastructures for the conversation has revealed itself essential to:

- Set up shared rules and a common language, particularly when participants were complete strangers or only new each other only superficially.
- Help contextualising the scenario making activity in a generic or specific urban future.
- Support different ways of thinking, making, and expressing ideas.

Finding a shared language and platforms, or, as Latour puts it "means for drawing things together" (Latour 2008) particularly relevant in interdisciplinary contexts, as remarked by some participants during the evaluation of DE#2 (7.7.4) as well as in the literature (Holman, Devane, and Cady 2007).

Designing spaces and conditions for co-creation is a common challenge in the field of co-design. In Chapter 1 (Part A), I argued that much could be learnt from approaches and methods of co-design when setting up processes of VCUF, particularly with respect to the redefined role of the designer: from author to facilitator (1.4.4, 1.4.5). But, as it will become evident by the end of this section, co-design strategies and techniques cannot always be directly adapted to speculative contexts. In this thesis, I suggest that a key incongruity is in the co-design metaphor of tools for "scaffolding" conversations.

Participatory and co-design literature often describe the role of the designer as to create "scaffolds" for enabling creativity in groups of people working together towards a shared goal (Hannula and Irmann 2016; Elizabeth B.-N. Sanders 2002). Scaffolds can be physical, cognitive and social augmentations that are employed in collaborative processes of developing knowledge, designing, or making (Cruickshank 2014; Hannula and Irmann

2016; Orlikowski 2006; E. B.-N. Sanders 2000). In co-design processes, the material components of the scaffolds include tools such as images, cards, building blocks, and templates. Such tools are used to support activities of generating, structuring and refining creative ideas (Elizabeth B.-N. Sanders and Stappers 2008).

The metaphor of the scaffolds originated in the 1970s in learning science (where it describes the support needed by children in education), and has been later on adopted in organisation science, as a way of reflecting on the importance of materiality in everyday organizational practices that are aimed at generating knowledge (Orlikowski 2006).

Recently, expanding on the construction-based metaphor, Orlikowski (2006) provided a list of characteristics that define the scaffolds used in generative knowing practices (including co-design practices). Orlikowski notes that as supports to the construction of a structure, scaffolds are *emergent* and *temporary*, existing for the duration of the project. Scaffolds are *generative*: they assist, by providing *stability* to people and structures, in activities that could not be performed without material augmentations. For this reason, they are also *constitutive:* "shaping the kind of construction work that is possible, and the construction outcomes that emerge" (2006, 4).

Scaffolds are also made to be used in different construction projects, and adapted to the requirements of the elements to be supported. For this reason, they are *flexible*, *portable*, *heterogeneous* (composed of many different elements), and *diverse* (of many different kinds).

Just like in construction, scaffolds are often essential in co-design processes: they provide support to design activities, while defining a clear yet easy to reconfigure structure that keeps the process focussed and constructive. Indeed, some co-design processes have been known to fail due to unimaginative methods of engaging participants (Cruickshank, Coupe, and Hennessy 2016; Dede, Dikmen, and Ayten 2012), and for this reason, issues

related to the design of scaffolds are often the main focus of co-design research (for example Elizabeth B.-N. Sanders, Brandt, and Binder 2010).

However, there are situations in which scaffolds may have a detrimental effect. In a commentary to Orlikowski's article, Swan (2006) reflects on the "disciplining" nature of scaffolds. In particular, she points out that while scaffolds are assembled from a heterogeneous collection of reconfigurable elements, they require such elements to be coherent and interdependent with each other and with the building that they aim to support. In other words, scaffolds are excellent tools if the final objective is a structure that can support itself once the scaffolds are removed.

The process of scaffolding is coherent with traditional co-design processes, bringing participants together in creative actions towards a shared goal: some sort of intervention that is meant to exist or have a tangible impact after co-creating activities have ended (E. B.-N. Sanders 2000; Elizabeth B.-N. Sanders, Brandt, and Binder 2010). However, scaffolds can be counterproductive when employed in speculative design practices aimed at raising questions and highlighting controversies (Forlano and Mathew 2014), as they tend to constrain the breadth of conversations that value divergence over coherence, and multiplicity over synthesis (Swan 2006). Speculative co-design practices, including VCUF, are in fact collaborative thought experiments, rooted entirely in the imagination and aimed at exploring limitless possible futures (Bowen 2010; Forlano and Mathew 2014). The objective is not the design of interventions to be implemented in the real world, but of visions of fictional worlds.

But given the differences between traditional co-design and speculative co-design, what conceptual structures could be used as alternatives to scaffolds to support and facilitate processes of VCUF? And beyond the metaphor, what could be the characteristics of the

physical, social, and cognitive augmentations that enable people to think creatively and design divergent imaginary futures?

These questions, and more in general the ideas included in this section, initially emerged while being involved in the Future Cities workshop series. In Part B of this thesis, I described the difficulty of engaging participants in open and imaginative conversations through tools (like maps, forms, cards) when these tools indirectly only allowed a limited range of "answers", and through narratives (like predictive scenarios or trends) that were often questioned, or outright rejected. Further iterations of the methodology, in the Future Visions workshops first, and Sharing Cities and Birmingham Parks Summit later, enabled me to fine-tune the delicate balance between facilitation and openness. However, I still feel that the potential of speculative co-design is still largely unexplored, and that this is due, at least in part, to a lack of research and experimentation in methods and tools. As mentioned in Chapter 1 of Part A, participatory design literature recently acknowledged the value of including speculative design practices (Bannon and Ehn 2013), and identified the potential for developing new methods and techniques. In the last few years, a number of projects have been developed that merge the two disciplines of co-design (or participatory design) and speculative design (see for example Bowen, 2010; DiSalvo, 2012; Forlano & Mathew, 2014). But only few of these involve activities of co-creation, and even in these cases, traditional co-design techniques are applied uncritically. Even when failures and limitations are acknowledged, the underlying methodologies are rarely questioned (see for example the discussion section in Forlano & Mathew, 2014), and the metaphor of "scaffolds" is usually accepted and directly adopted.

Towards the end of my PhD, I discussed this matter at length with various colleagues working both in speculative design and co-design research, as well as with my supervisor, Prof. Nick Dunn, with whom I developed the idea of substituting scaffolds with

tensegrity structures as a more appropriate metaphor in processes of speculative co-design in general, and VCUF in particular.

Tensegrity structures are three-dimensional assemblages that consist of a set of contiguous rods that are kept under tension by a composition of members that are disconnected from each other. Tensegrity structures are highly flexible. Their geometry is shaped by, and shapes in return, the forces at play within and around them (Buckminster Fuller 1961; Motro 2003).

While scaffolds are effective for building structures through the use of compressive forces, tensegrity involves a combination of tension and compression, allowing for divergent and plural interactions. Scaffolds are used with the aim of creating a structure that is independent from the scaffolds, which are ultimately meant to be removed at the end of the building process. Tensegrity structures define a space, but this space is ephemeral and highly contextual to the conditions that give shape to the structure.

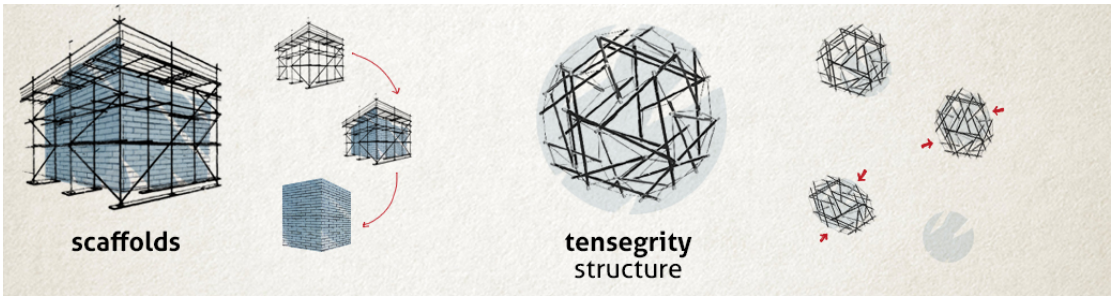


Figure 51 Scaffolds and tensegrity structures

Visual Conversations on Urban Futures are defined by their ability of incorporating multiplicity and divergence. The results of these speculative co-design processes are future cities that are contextualised in an imaginary world; they might in some cases draw from present conditions but are not constrained by it. And while the future scenarios composed as a result of the conversations might be used to inform strategies and

decision-making processes (like in Birmingham Parks Summit), they are not intended as solid and actionable blueprints. Just like the space defined by a tensegrity structure, they are ephemeral and contextual to the conversation in which they emerged.

But what would it mean, in practice, to use tensegrity structures to facilitate creative conversations envisioning possible futures?

The design journey of the Future Visioning workshops could be looked at as an example in which we moved from scaffolds to tensegrity. In the initial iteration of the workshop methodology, tools and materials were designed and organised to guide and support the process, with the ambition of bringing participants to generate, in each activity, ideas that clearly and directly contributed to the research questions of Liveable Cities (organiser of the workshop series). After reflecting on the "disciplining" (Orlikowski 2006) power of the scaffolds we designed for the conversations, the research group agreed to opt for a different model. In this new version, lightweight, disconnected tools (such as the Thinking Cards, or the set of Create/Amplify/Destroy markers) and modelling materials (paper, maps, clay, blocks…), were the rods of the tensegrity model. These rods were combined with the strings: a series of questions, provocations, or a general narrative. Rods and strings (i.e. tools and narratives) create a space for the conversation. However, this space is defined by dynamic relations. Participants, like the forces in the tensegrity model (see Figure 51) may influence and modify the structure as well as the space within it.

As mentioned earlier in this section, literature on speculative co-design is very limited, and examples that explicitly question the traditional co-design approach to investigate speculative ways of co-creating are hard to come by. Admittedly, far more research is needed to develop the tensegrity metaphor into a full approach. This would mean, in the

first place, exploring and experimenting with tools and methods in various contexts and formats (beyond the workshop), but also prototype such methods in various contexts, and discuss and reflect on them.

Finally, as many of us might have experienced in various situations in daily life, conversations about futures rarely lead to certain and agreed conclusions. Similarly, while co-design processes, supported by scaffolds, might result in a coherent synthesis, VCUF are messy, exploratory, and ambiguous. In the next section, I will reflect on the implications that this has on how VCUF can be visualised.

9.2 COMBINING READABILITY AND AMBIGUITY IN ARTEFACTS OF VCUF: SEARCHING FOR VISUAL LANGUAGE

> *Readability and ambiguity are opposites in Information Visualisation. Not so much in verbal language, in which uncertain and ambiguous ideas can be communicated clearly through the use of modal verbs such as will/can/could/might/may. Understanding how can modality be used in Information Visualisation can help designing artefacts of VCUF in which multiple ideas about the future are readable while maintaining their ambiguous nature.*

This thesis proposes the value of visualisations and visual design methods for articulating multiple futures in artefacts of VCUF with the aim of making them readable. In chapter 2 (Part A) I described how the use of these techniques in the urban context has allowed representing, mapping and understanding different perspectives and layers of information about the city. But in addition to the design challenges of graphically represent pluralistic cities, VCUF also seek to do so in a context – possible futures – that is characterised by uncertainty and ambiguity.

What would be the characteristics of a visual language that is able to represent ambiguity, but that at the same time can articulate and make different perspectives readable?

Clarity in the display of information and avoiding ambiguous and enigmatic visual signals are priorities for many types of information visualisations (Cairo 2013), but not for VCUFs. Indeed, DE#1 and DE#2 both demonstrated that forcing coherence through diagrams can be deceiving and counterproductive when visualising information that is inherently, incomplete, unclear, and subjective.

Conversations on possible futures are in fact necessarily partial and subjective. To an extent, this is true even in conversations in which experts are involved, because of the subjective and cultural nature of what is considered "preferable" (see 1.3 and also Son 2015) Despite being often presented as a single 'definitive' interpretation, expert advice is in fact always built on knowledge that is plural, conditional, and not value-free (Stirling 2010). The visions outlined in these conversations are therefore partial and incomplete: presenting only the items of discussion explored by participants. Because of this, they are also fundamentally ambiguous, as they investigate selected local or global issues in detail, while at the same time leaving other aspects lacking of coherency or intelligibility. An indicative example can be found the imaginary city designed by the group of experts in education during one of the Future Visioning workshops conducted as part of DE#1 (Future Visions). As discussed in 6.4 (Part B), some of the members of the group were keen gardeners, and interested in focussing on the relationships between food chains and education when designing their future city. Finally, as propositional responses to larger scale predictive scenarios, VCUF embed all of the "known and not-know unknowns" that characterize any future-oriented activity (Stirling 2010; Urry 2016). This has been explained in detail in Chapter 1 of Part A.

9.2.1 Information visualisation beyond diagrams

In the theoretical framework of this thesis, Information Visualisation has been presented as a discipline that is able to represent and visualise plurality and complexity (see 2.1). While diagrams are usually thought of as Information Visualisation's own language (Jacobson and Wurman 2000), they have never been used alone in any of the design experiments conducted in this research. Indeed, in Chapter 2, of Part A I described the shortcomings of city visions (particularly within the Smart City discourse) that reduce the complex identity of the city to a diagram, and provided a review of literature arguing for the value of experimenting with form as well as content of city visions (see also Dunn, Cureton, and Pollastri 2014). This section, which builds on the experience of researching VCUF through design, explains how a multimodal approach is particularly important for VCUF. Not only diagrams alone fail to capture the essence of the city, but are insufficient to render the nature of conversations on urban futures.

Diagrams are not very good at visualising uncertainty and ambiguity when these constitute the main focus and the subject itself of the artefact. Ambiguity in a diagram is usually considered an indication of poorly executed design (Bertin and Berg 1967; Cairo 2013; Lima 2011; Tufte 2001). Relatively well-codified graphic devices to signify uncertainty or indeterminacy about the future do exist and are commonly used in quantitative visualisations (Spiegelhalter, Pearson, and Short 2011). Examples include hurricanes' "cones of uncertainty" in weather forecasts, tree diagrams visualising possible pathways and results, or "fan charts" to represent estimate future quantitative trends (see Figure X). But in all of these examples, accuracy is the goal, and visual representations of uncertainty are ultimately a way of estimating the degree of accuracy (and therefore "truthfulness" (Cairo 2016)) of the visualisation.

In this section, I suggest that the language of Information Visualisation used to represent VCUF should extend beyond the diagram. Artefacts of VCUF require hybrid visual languages that can at the same time make multiple voices readable while embracing and celebrating uncertainty, subjectivity, and ambiguity. This could be achieved by combining and integrating pragmatic information visualisations (diagrams) and artistic visualisations.

Information and artistic visualisations have, for a long time, been described as performing different and incompatible functions. Pragmatic information visualisation makes use of unambiguous, referential signs to explore, analyse, or present non-visual information for quick and effortless understanding. Conversely, artistic visualisations are usually aimed at communicating a concern with the ultimate objective of generating an emotional response (Ashwin 1984; Kosara 2007). In his Semiology of Graphics, Bertin (1967) describes the "graphic image"(i.e. pragmatic information visualisations) as *monosemic*, that means having only one possible meaning that is usually clarified in the key to the graphic (Tufte 2006). Artistic visualisations can have many possible and debatable meaning (*polysemic)* or no discernable meaning (*pansemic)* at all. Illustrations, and figurative paintings are examples of polysemic visualisations, while most form of abstract art could be classified as pansemic (Bertin and Berg 1967). While monosemic visualisations are often chosen to communicate clear, unequivocal messages, polysemic and pansemic visualisations are usually adopted to represent ambiguity and subjectivity.

Traditionally, pragmatic monosemic visualisations and artistic visualisations (both polysemic and pansemic) were associated to very different contexts and disciplinary fields, with pragmatic visualisations pertaining to the field of information visualisation or information design, and artistic visualisation being used in art or decorative practices. Indeed, even whether or not it is at all appropriate to include illustrations in the visual

display of information has been the subject of debates (most famously between Nigel Holmes, advocating for strong visual imagery to make data meaningful, and Edward Tufte, labelling this "chart junk" (Bateman et al. 2010; Cairo 2013; Heller 2006; Tufte 2001))

But more recently, some authors have challenged these distinctions, and argued for a continuum that is able to extend the boundaries of the field of data-based visualisations to include examples of artistic information visualisation (Kosara 2007; Manovich 2011, 2016). This gamut of visualisations suggests a large number of possibilities between the utilitarian and the emotional (Figure 52). Evidence collected while conducting this research as well as my experience in practice suggest that not only most examples of VCUF are neither pragmatic nor artistic visualisations, but also that they often combine elements of the two in a single artefact[26].

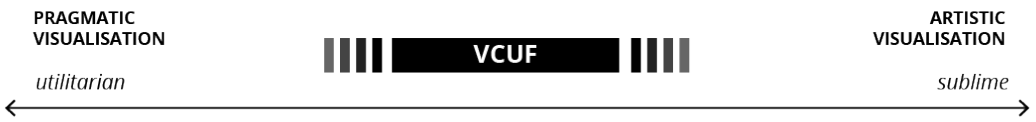


Figure 52 The gamut of data-based visualisation (adapted from R. Kosara, 2011).

By incorporating monosemic, pansemic, and polysemic elements, VCUF can communicate different degrees of uncertainty. As I will explain below, this means incorporating different levels of "modality" within the visualisation.

Modality is, in linguistics, the truth-value or credibility of statements about the world. There are different types of modalities. In this context, I will focus particularly on

[26] *Note here about the risks of misappropriation in combining information and artistic visualisation (Kosara 2010)*

epistemic modality. Epistemic modality does not relate to the truthfulness of the statement itself, but indicates how certain the speaker is of assertion they make (Lyons 1977). In the case of VCUF, epistemic modality does not refer to the probability of the futures described (whether or not things will happen), but to the representation of such futures made by participants to the conversation.

The question of how different degrees of 'modality' are conveyed in visual communication is one of the subjects of Kress and Van Leeuwen's book *Reading Images: The Grammar of Visual Design* (2006, 159–80). Most verbal languages have different ways of communicating levels of uncertainty (for example through modal verbs such as will/would/could/might), ambiguity (through omissions and figures of speech), and subjectivity (through stream of consciousness and other narrative modes). How to express modality in the visual language is less straightforward.

Modality in visual communication is identified by the degree of adherence of an artefact to "the real" (Kress and Van Leeuwen 2006). Kress and Van Leeuwen, however, argue that "the real" does not necessarily have to coincide with what could be seen. For example, a photograph might have a high level of "naturalistic" modality, in that it replicates quite accurately what the world looks like. But if examined for scientific purposes, photographs have a fairly low level of modality, in that they Do not reveal much about how things work and what dynamics are at play in the situation that is depicted. The authors point out that in some cases diagrams "may in fact be *more* real than the photograph, in the sense that they reveal a truth which represents more adequately what [a certain process] is *really* like" (Kress and Van Leeuwen 2006, 163). By extension, as it will be exemplified later on in this section, in visions of urban futures high levels of modality can be represented both through realistic images (with the help of modality markers such as colours, textures, scale) and abstract diagrams, as these can

provide further information on what would normally be invisible, such as values, relations, or flows (as described above and in Chapter 2 of Part A). Furthermore, modality can be modulated differently in different areas of the visualisation (Kress and Van Leeuwen 2006).

Using modality in visual communication has been so far conceptualised through a social semiotic theoretical framework, but is actually a familiar experience for most practitioners working in design-related fields. In design processes, visualisations that are produced to study unrefined ideas, usually adopt different levels of abstraction within the drawing, in which some selected elements are depicted and described in detail, while others are omitted or graphically ambiguous (Cross 1999).

Ambiguity in particular is an important aspect of exploratory study drawings. Herbert points out that in order to communicate ideas that are open to discussions and negotiation, such drawings should be "ambiguous enough to attract, admit, and hold new information" (Herbert 1988, 36). To achieve both clarity in communication and ambiguity of content, sketches and studies often combine diagrams and text with illustrations .

Similarly to design drawings communicating early, unfinished ideas, VCUF utilize different representation modes (text, sketches, diagrams, photos, etc.) and varying levels of modality to visualise propositions about the future.

In Chapter 2 of Part A, I framed artefacts of VCUF as a kind of scenario, drawing from Manzini and Jegou's definitions of design and policy orienting scenarios. In describing these types of scenarios, Jegou notes how they need to be 'realistic enough to make us question our own lifestyles, but still sufficiently open-ended for us to adapt them to our own lives' in order to work as communication and thinking tools (2008). This quote of

Jegou aligns with Herbert's comment on the need and value of graphical ambiguity in drawings (1988). Tuning levels of modality is, in the practice of visualising future scenarios, a way of striking a balance between relatability and credibility on one and open-endedness on another.

9.2.2 Exploring visual languages for VCUF in practice. Playing with modalities

In this section I will describe some examples of using modalities in artefacts of VCUF. Firstly, I will explain how this has been done in my experience of researching VCUF through design. Then, I will describe the strategies adopted in other cases found in literature.

In the visualisations of future imaginary cities designed for Living in the City, Atlas of Future Imaginary Cities, and Sharing Cities I combined high and low modalities with the purpose of creating visual scenarios that readers/users can engage with without expecting them to be a realistic depiction of what a future city would look like. In all of these projects, I used illustrations to depict the material aspects of imaginary future cities (what will they look like) and diagrams to map the semantic networks of the conversations (themes, topics within themes, and connections).

Both in Living in the City and Sharing Cities I chose to illustrate urban futures through highly stylised, cartoonish illustrations. The choice was largely determined by the fact that the primary objective of these visualisations was to communicate and map ideas (Sharing Cities) or themes, flows, and their connections (Living in the City). In both cases clear readability was important than the emotional engagement with the artefact. In other words, these artefacts were intended to be diagrammatic than artistic. The visualisation in the "Living in the City" report was conceived as a way of relating themes within and across scenarios, and communicate the non-linear interdependency of choices and events

(Urry et al. 2014). The scenarios of Sharing Cities were produced as part of a report intended to communicate the outcomes of the workshop series to both researchers and participants. In both illustrations, a low level of naturalistic modality was rendered through the use of few and solid colours, absence of textures and shadows, and the removal of any contextual information that was not strictly necessary for conveying the content of the conversations. Low naturalistic modality through ambiguous illustrations was thus deliberately used as a tactic to prioritise the reading of the semantic information overlaid on the scenarios.

In the Atlas of Imaginary Future Cities I chose to map through diagrams the conversations on possible futures when participants were involved in general discussions about what the future will be like (Activity 3 of the workshop), and represent through figurative illustrations the future scenarios that were visualised through models during the workshops (Activity 4).

The illustrations of Imaginary Future Cities designed for the Atlas are intended as allegorical representations, more than as analytical tools. The analytical function is performed in the Atlas by maps and diagrams, while the illustrations show the material and spatial characteristics of the city.

However, as anticipated earlier in this section, not all aspects of the conversations are described with enough details to inform clearly on what the city will look like. And participants that were given full freedom to fantasize about the future (and encouraged to explore unrealistic ideas) often produced provocative designs (such as the colossal monument to equality built by the group of Experts on Ageing), conceptual models (like the "city as a jungle" of the Architects) or radical solutions (like the revolving city of the Education sector).

In all of these models, illustrations select what to make visible of the city and to what level of detail. They exaggerate and distort those elements that require a more detailed explanation. They gloss over or deliberately hide aspects of the vision that are not tackled or described by participants. As participants mostly described future ideas by referring to existing technologies and solutions, I chose to illustrate what we would encounter in these imaginary cities through photo collages. To lower the perceived high modality of the photos, I significantly altered proportions and manipulated the colours by increasing their contrast and decreasing their saturation. This was done with the intent of situating the city in an imaginary world.

As anticipated in Section 5.2, the initial concept for Living in the City (DE#0), combining surreal illustrations with semantic maps to represent future worlds was inspired by Density Design's Map of the Futures. As described in Part B as well as earlier in this section, the approach was then developed further in later Design Experiments. The research and design work of Density Design (and the Map of the Future in particular) is already mentioned in 2.2.1.1 of Part A.

The map of the future uses surreal, "retro-futuristic" illustrations (Graffieti et al. 2011) with de-saturated colours and distorted proportions. The images are allegorical, in that they are intended as symbolic representations of the themes visualised in the diagrams. Some vignettes within the the visualisation are very detailed, wile other elements are only sketched or outlined. The graphic treatment of the visualisation modulates the modality in its different parts. The illustrations reconstruct visually the concepts that are mapped in the overlaid semantic network (Graffieti 2017). By adopting a surreal imagery, an allegoric meaning, and by employing varying levels of modality within an impossible landscape, the illustration maps an ambiguous future, with blurred and unfinished areas

yet to be explored. Meanwhile, the semantic network makes the data that informed the visualisation visible and readable.

In a similar way, Thomas Rustemeyer used semantic maps and illustrations to visually live document the conversations that animated the symposium "The City as a Sphere for Action", organised by Raumlabor in Darmstadt in 2014. Raumlabor is a Berlin-based group of architects working at the intersection of urbanism and public art. The symposium took place at the end of the Ostham summer school (http://raumlabor.net/osthang-project) and brought together participants to the summer school, international experts, and resident of the area to explore the futures of public realm as a site for action for a multiplicity of lifestyles and for an increasingly digital and virtual public life.

The graphic documentation of the symposium (effectively an artefact of VCUF), illustrates some of the ideas emerged in the conversations as symbolical scenes organised on a hand-drawn isometric grid. The visualisation includes a number of detailed architectural objects (buildings, parks, mounds, conceptual structures) combined with a map of written quotes and issues.

Combining diagrams and illustrations is not the only way of using modality. For example, Smout Allen and Geoff Manaugh, in L.A.T.B.D. used physical models arranged on a board of patterns, connections, and images and descriptions of the scenarios presented through the models. Each model, in fact, depicts a hypothetical moment and space in the future city of Los Angeles. While some models could be part of the same city, others are in clear contradiction. The scenarios on the board are high in modality, as they are represented through meticulously sculpted and assembled objects (the wood towers), and further explained through images and text printed on the board. Conversely, the

interstitial area that surrounds the model is characterized by very low modality, to allow the conflicting scenarios described in detail to coexist on the board. Moreover, the ambiguity of the background is intended to encourage the visitors of the exhibition to interact with the display in a "chose your own adventure" way, helped by the story-making tools provided (Manaugh 2015).

The background can also disappear completely in VCUF that are narrated only through a collection of items that collectively build pluralistic scenarios of futures for which no information about the context is provided. Both "Mobile Utopia" and "Seeing Beyond Ourselves" visualise multiple subjective perspectives about possible futures through the use of objects from everyday life.

Mobile Utopia was an AHRC funded project of the Institute for Social Futures at Lancaster University that ran between April and December 2016. During an exhibition of the project outcome, visitors were encouraged to barter one "utopian object" in exchange for a copy of the Utopian Manifesto illustrated by artist Oliver East. Utopian objects were defined as "pieces of everyday life that one wishes to carry to an hypothetical utopian future"[27]. Participants were asked to label their object with a short description.

Like Mobile Utopia, *Seeing Beyond Ourselves* offers a way of reflecting on the future as a process of becoming, in which vestiges of the present and past are carried through the years. In this case, letters to future selves are presented in a booklet with images of objects from today's everyday life.

[27] *Or at least, this is the description that I provided when I helped the Mobile Utopia team on the day of the exhibition.*

Both projects seek to engage visitors through the direct interaction with objects that can be juxtaposed, combined, grouped, and explored to generate new visions from fragments. Once again, the use of modality plays a crucial role: objects that are directly included in the context are made ambiguous by the total erasure of the background.

The examples presented in this section suggest some of the possible ways of playing with modalities to combine readability and ambiguity to represent VCUF.

9.2.3 From Readability to Usability

The previous section suggested possible ways for making VCUF readable and how to expressing different levels of modality. But in order for artefacts of VCUF to enable further conversations that can inform strategic directions, these have to be not only readable, but also usable.

While readability is a characteristic of the artefact, usability is about supporting users in achieving their goals (Jokela et al. 2003).

The most broadly used definition of usability (from ISO 9241-11*, Guidance on usability*) reads: "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". This purposely vague definition can be adapted to artefacts of VCUF once their goals, expected users, and contexts of use are clarified.

Generally speaking, the purpose of rethinking future visions as conversations is to extend the debate on possibilities, rather than finding closure in one coherent narrative. Individual examples may of course vary in their specific objectives. Some visualisations of conversations are produced as communication artefacts, with the aim of making diverse stories readable in a common space and for an audience that may include actors

that did not take part in the conversation. In other cases these visualisations are intended as an iteration that is part of a more complex process; they are thinking aids that provoke, provide evidence, or support further conversations. As such, they must be produced in ways that encourage comments, edits, reactions, or even disassembly and reassembly.

In the first case, in fact, the user of the visualisation is a reader, whose goal is to understand a conversation that has already happened. In the second, users are themselves participants in the conversation, contributing to VCUFs just like the participants whose conversation is mapped in the particular artefact did. Describing and understanding the role of users interacting with the visualisations is an important aspect to consider when designing artefacts of VCUF. For this reason, a full description of the difference between "readers", "users", and "participants" will be included in the description of the design space of VCUF (10.2.3).

The boundaries in defining users, readers, and participants are in many cased blurred, and actors can perform different roles in different stages of the process. Furthermore, the size and the heterogeneity of groups of stakeholders participating in conversations might vary along processes of VCUF, adding further complexity to the design of usable artefacts.

In Part B, I provided an initial reflection from practice on the usability of VCUF. The experience of evaluating, in DE#2 whether or not the scenarios of sharing cities could be used as "thinking tools" (7.7.4) by the research team led to some important considerations on the difference between designing for readability and designing for usability. These included: the need of embedding spaces and tools for creation as part of the visualisation, clarifying the purpose of the visualisation, considering the diversity of

approaches and methods, and limiting the use of illustrations. The full list of findings and the motivations behind each one of them can be found in the discussion of the Sharing Cities design experiment (4.6.4 - Part B). These considerations are what led, in DE#3, to the design of a box as an artefact to communicate the Birmingham Citizens Vision, and engage participants to rework such vision (see 8.2.1).

Figure 53 Birmingham Parks Summit (DE#3): building, communicating, and using the vision

In summary, for VCUF to be used as tools, my experience, once again, suggests that we should be think more broadly about what constitutes a visualisation, and experiment with ways of making artefacts of VCUF open, reconfigurable, easy to disassemble, and deliberately unfinished.

The box in Birmingham Park Summit showed a way of including such characteristics in the design of the artefacts (Figure 53), experimenting with genres and techniques of VCUF could lead to interesting possibilities. Games, in particular could be used to propose some initial scenarios that are specifically designed to be interacted with, explored, and developed. One such example is the *game The Settlers of Cagran*, developed by Thomas Amman and Joachim Hackl, at the Vienna Institute for Technology (http://archdiploma13.archlab.tuwien.ac.at/). The game consists of a digital interactive display that is mounted on a wooden structure with wheels that is attached to a bike and moved to different places in the city. Starting from a base-line situation, players can

explore different scenarios for public space. When the game is used iteratively, players can test how their choices interact with the decisions made by others before them.

10 THE DESIGN SPACE OF VISUAL CONVERSATIONS ON URBAN FUTURES

In the first section of Part C, I proposed some overarching principles for processes and artefacts of VCUF. In this chapter, I will focus on the details of what does designing VCUFs entail, and propose a design space as a framework for understanding the different dimensions at play.

In certain design disciplines (including visual design), a design space defines a range of design parameters that can be used to construct possible solutions (Brath and Banissi 2016). The design space that I am proposing in this chapter can be used both as an analytical and a generative tool.

As an analytical tool, the framework provides a common language for comparative descriptions. This can contribute to the creation of archives and taxonomies, and towards a better understanding of the variety of possibilities within the approach. It can also be utilised as a diagnostic lens: to identify critical issues and suggest alternatives (see Section 10.1.3 for an example)

As a generative tool to support the planning and design of VCUF, it provides a list of dimensions and related critical questions that can help shaping emerging ideas by anticipating critical design choices or allowing comparisons with previous experiences also described through the framework. Finally, the design space can be used to expand the repertoire of the design team by suggesting possibilities that would be difficult to see otherwise (Brath and Banissi 2016).

Figure 54 represents the design space of VCUF as a framework that can be used for the analysis of existing cases or to support design activities. The framework is overlaid with a

cut-out page that indicates the specific findings from Research through, for and about Design that led to the definition of each dimension.

Coherently with the way visualisations are approached in this study (see Chapter 2), the framework is divided into two sections: the design space of the process and the design space of the artefacts. Mapping the design space of processes of VCUF means describing the conditions that define the way in which conversations are conducted. These conditions include: what are the phases of the conversations, who participates, what artefacts are involved, and what is the subject of the conversation. The design space of artefacts of VCUF is concerned with the visualisations of the conversations, and specifically with how is the information visualised[28] and what is the role of the user.

Section 10.1 and 10.2 describe the details of the framework. Each dimension is explained in a dedicated sub-section, which clarifies the purpose of the dimension in the design space and the terminology used. Some of the dimensions in the framework (such as "scale", "tools", or "complexity") refer to highly discussed and problematized concepts. References that help positioning these concepts within relevant literature have been provided when possible. Further elaborations are possible (and perhaps needed), but that would be beyond the scope of this chapter, that is aimed at proposing an adaptable tool to be used for analysis and design.

[28] *Although not specifically the details of the graphic style (e.g. colour, typography, layout).*

_dimensions within the
DESIGN SPACE

PROCESSES

MODEL OF THE PROCESS

phases

ARTEFACTS

tools

artefacts of VCUF

ACTORS

internal/research
internal/technical
external/selected

externa/open

SCALE

open

multidimensional

focused on a theme

ARTEFACTS

COMPLEXITY OF THE INFORMATION

NAVIGATION MODEL

ENGAGEMENT

INVOLVEMENT

_defined from the following
FINDINGS:

The experience of conducting the design experiments (**DE#1, DE#2, DE#3**), as well as the review of examples (**2.2.1**) demonstrated that processes of VCUF are rarely linear, but move iteratively through different phases.

The critical role played by generative tools as part of facilitation strategies in processes of VCUF has been described both in **1.4.4.1** and in **DE#1** (**6.4.1**). (See also **9.1** for a discussion on the characteristics of generative tools in speculative co-design processes)
The Design Experiments showed that artefacts of VCUF are often produced in various stages of the process, and can be sometimes used later on as generative tools (e.g. the Visioning Box in **DE#3**).

Chapter **1** discussed the importance of understanding the perspective from which visions of futures are generated. The review of examples in section **2.2.1** shows that participatory practices extend the conversations to restricted (e.g. Utopie), large (e.g. Games for Cities), or open (e.g. Imaginable Guidelines) groups of actors. Experience from practice (as well as a review of Action Research literature) showed that different actors might participate in different phases of the process (**4.2.2**).

The physical and conceptual boundaries of the city vary widely depending on the purpose of the conversation, as shown in the Design Experiments as well as in the review of examples in **2.2.1.**

The importance of understanding the framing, scaling, and graining of data when visualising conversations has been discussed by authors designing visualisations for controversy mapping (see **6.3.6**). Conceptually mapping the complexity of the information in relation to the user interaction with the artefact supported the design of the Atlas (**DE#1**)

The three navigation models have been explored in the design experiments: author driven in the Sharing Cities report (**DE#2**), user driven in the Atlas (**DE#1**), and participant led with the Visioning Box (**DE#3**).

The evaluation of **DE#2** (**7.7.4**) (and more in general the experience of conducting the Design Experiments) showed that visualisations can be used for various purposes. Alternative versions of the scenarios might therefore engage more superficially or more in-depth with the data. The Atlas in **DE#1** showed that the level of engagement can be modulated through the interaction model.

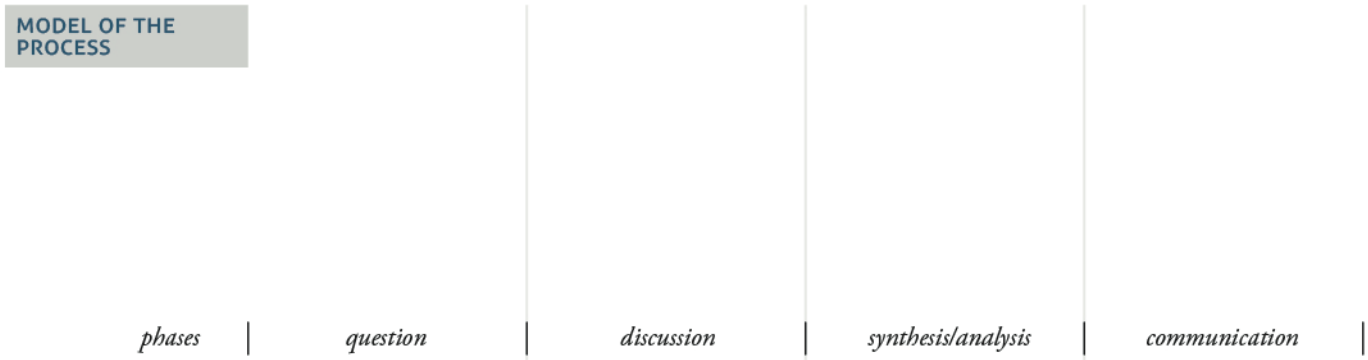
This dimension is strongly related to the navigation model. The three types of involvement have been explored in the design experiments: readers in the Sharing Cities report (**DE#2**), users in the Atlas (**DE#1**), and participants in the Visioning Box (**DE#3**).

_the design space of

TITLE OF THE PROJECT

PROCESSES

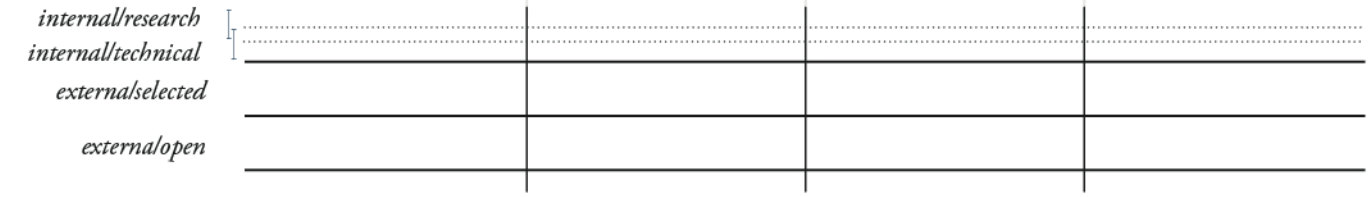
MODEL OF THE PROCESS



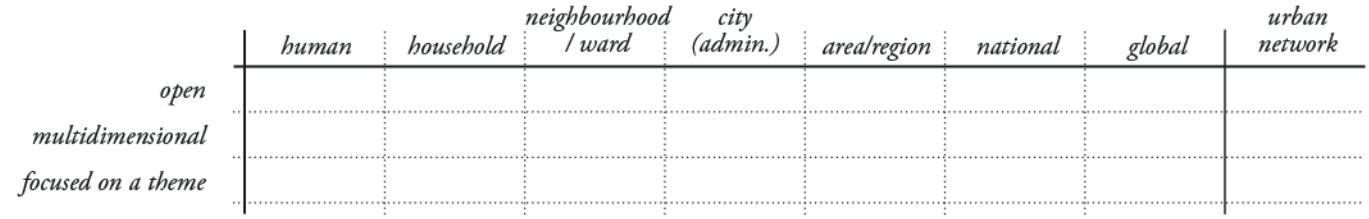
ARTEFACTS

artefacts of VCUF

ACTORS



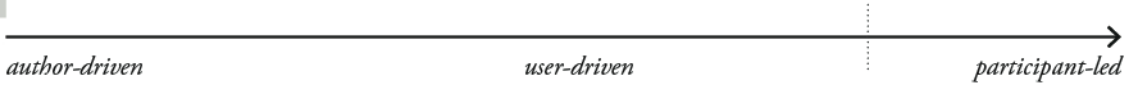
SCALE



ARTEFACTS

COMPLEXITY OF THE INFORMATION

NAVIGATION MODEL



ENGAGEMENT

INVOLVEMENT

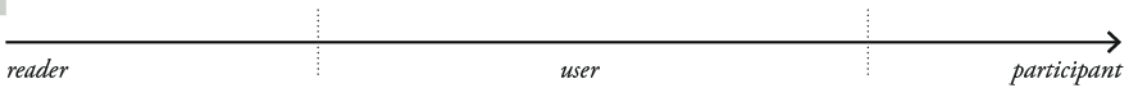
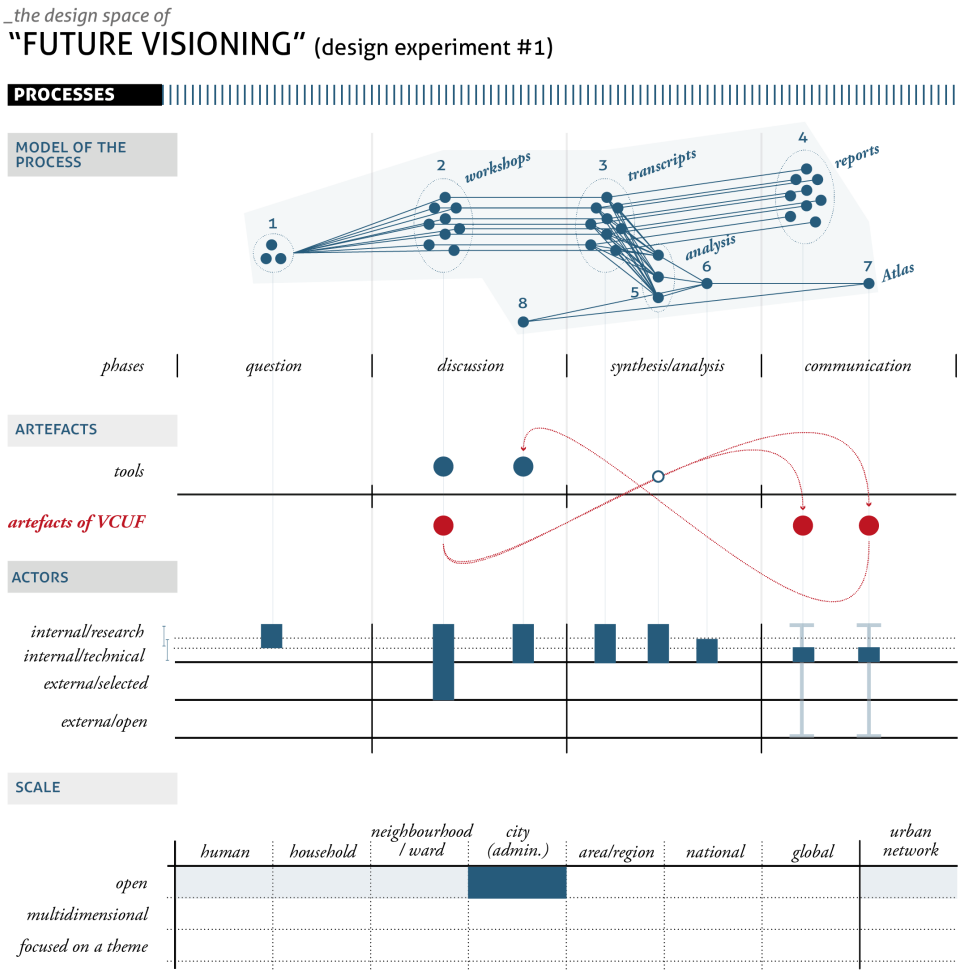


Figure 54 (in the previous page) The design space of Visual Conversations on Urban Futures: Processes and artefacts

10.1 THE DESIGN SPACE OF THE PROCESS

The process of conducting Visual Conversations on Urban futures can be described through four dimensions: model of the process, artefacts, actors, and scale.

Before describing each individual dimension separately, I will present below the design spaces of the processes of DE#1, DE#2 and DE#3.

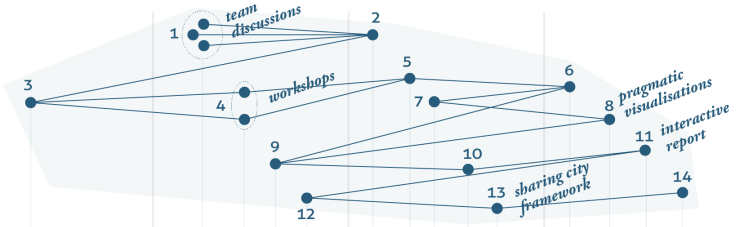


_the design space of

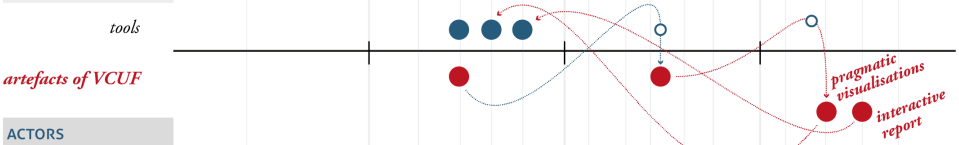
"SHARING CITIES" (design experiment #2)

PROCESSES

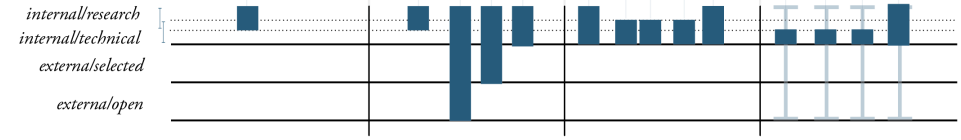
MODEL OF THE PROCESS



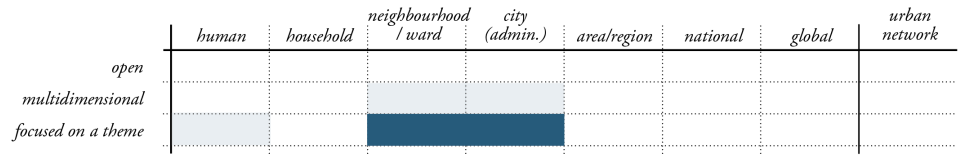
ARTEFACTS



ACTORS



SCALE

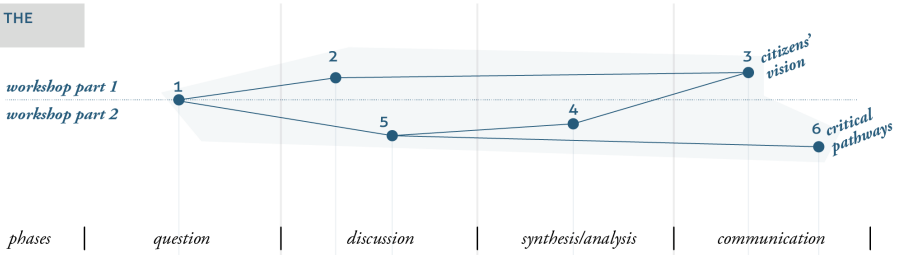


_the design space of

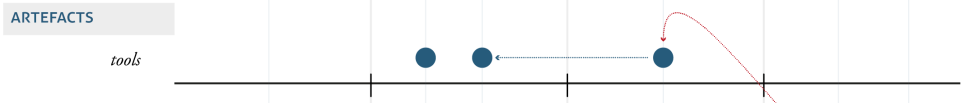
"BIRMINGHAM PARKS SUMMIT" (design experiment #3)

PROCESSES

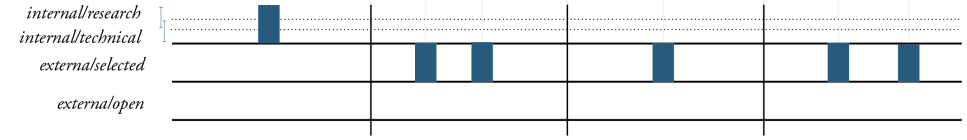
MODEL OF THE PROCESS



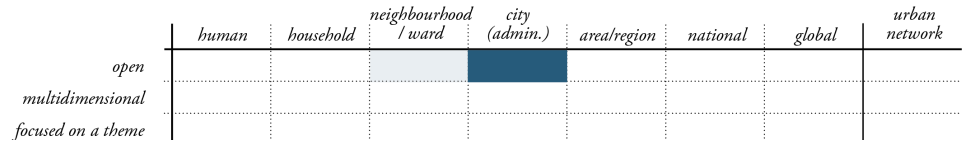
ARTEFACTS



ACTORS



SCALE



10.1.1 Model of the process

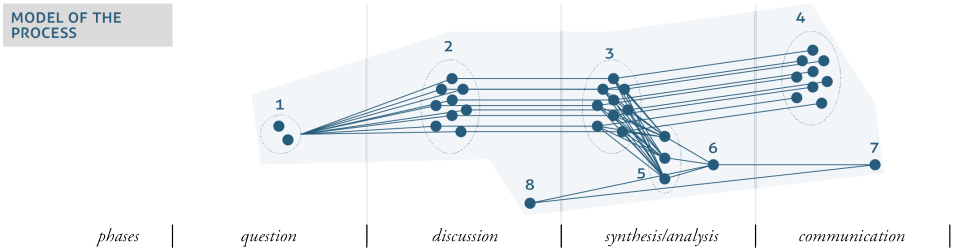


Figure 55 Example of a model of the process (from DE#1, Envisioning Urban Futures)

This dimension provides a space to represent processes of conducting VCUF. In particular, it is meant to be used to map its various phases and their succession and iteration.

Urban futures are inherently characterised by complexity and uncertainty (see 9.2 and Chapter 2 in Section A). For this reason, Visual Conversations on Urban Futures are processes of dealing with wicked problems: ill-defined, tough to describe issues for which there can be no definitive solution or "right" answer (Buchanan 1992; Rittel and Webber 1973).

Processes of Visual Conversations usually follow patterns of wicked problem explorations, in which phases of problem understanding recur alongside attempts formulating solutions. Conklin (2006) represents the cognitive model of wicked problem as a "jagged line" that continuously jumps from problems to solutions and back. Moreover, processes of dealing with wicked problems are also shaped by social complexity, as different actors may have different understanding of the subject matter, and different ideas for possible solutions.

Visual Conversations on Urban Futures can essentially be described as processes of enabling, facilitating, and recording social processes of exploring wicked problems about

urban futures. Unlike other types of visualisations, they explicitly carry within them the traces of social complexity and discussions that characterised the process (see Figure 56).

These models are very different from traditional conceptualisations of design processes, such as the double diamond (Design Council 2007), Lawson's model of the design process (2005), or the fuzzy-end resolving into clarity (Elizabeth B.-N. Sanders and Stappers 2008), all of which may involve final converging phases solution refining, implementing, and evaluating[29].

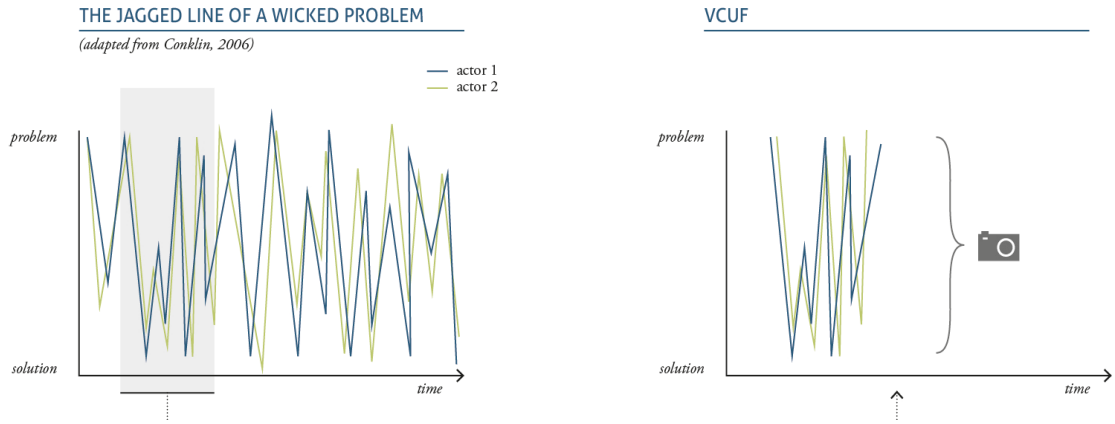


Figure 56 VCUF as snapshots of processes of understanding and solving wicked problems.

In order to help mapping and comparing different examples of VCUF, I identified four phases that typically take place within the process:

- a question (**Q**), or a series of related questions, that are aimed at initiating the discussion by inviting people to explore possibilities (e.g. "what would the city of the future look like?") or by directly challenging the norm (e.g. "what would urban life be like in a oil crisis?");

[29] *To be sure, most models of design processes include a further phase of implementation and evaluation, or what in participatory design is called "design after design" (Binder et al. 2011)*

- a discussion (**D**) to explore the wicked problem and propose, map, and discuss ideas and possible scenarios;
- a phase of synthesis (**S**) in which the outcomes from the previous phases are collected, coded, and analysed;
- the communication (**C**) of the outcomes in the form of visualisations.

The first two phases (question and discussion) refer to the process of exploring the wicked problem through moments of problem understanding and attempts at solution, while the other two phases (synthesis and communication) are about the process of producing an artefact (or a series of artefacts) to represent the conversation.

The characteristics and the organisation of these phases may vary largely from case to case. Processes of VCUF are rarely linear, and more likely to have a more complex progression, such as circular, forked, concatenated, or open-ended.

For example, it could happen that some of the material produced during the discussion is directly used for communication purposes, or that the communication artefacts produced at the end of a process include open questions inviting to further discussions. The four phases described above might be nested, recurrent, or following a different progression.

Figure 57 compares the maps of the processes in DE#1, DE#2, and DE#3.

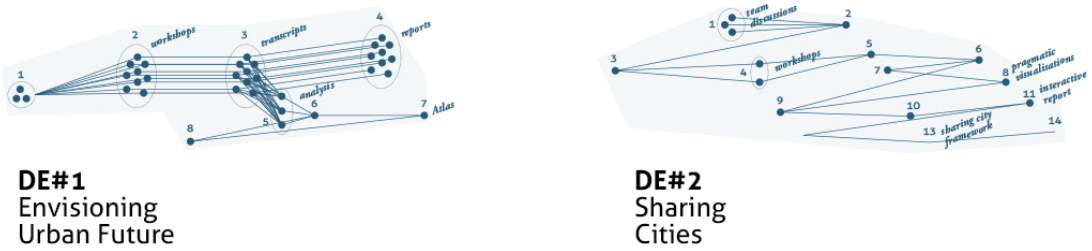


Figure 57 Map of the processes in DE#1, and DE#2.

Understanding and mapping the process in the design space can give an initial idea of the type of activities that VCUFs do or might entail, and the relative importance of the different phases of the process. For example, one of the primary aims of DE #1 (Envisioning Urban Futures) was to understand the content of several conversations by mapping them visually. For this reason, great attention was given to the phases of data analysis and synthesis that led to the development of the Atlas. On the other hand, in the Sharing Cities project (DE#2), the research team was primarily interested in bringing a local perspective and enrich an ongoing academic debate. For this reason, the trajectory of the process moves back and forth and jumps from phase to phase, as the concept and ideas of sharing cities get iteratively discussed, questioned, analysed, and communicated.

10.1.2 Material Aspects of the process

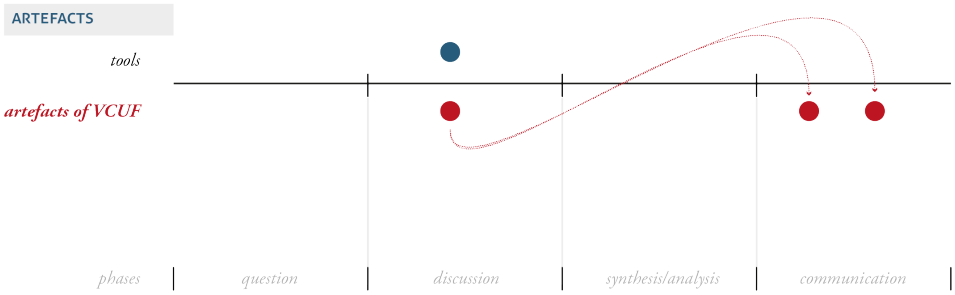


Figure 58 Example of material aspects mapped along the process. The generative tools introduced in processes of VCUF are indicated by blue dots, while the artefacts of VCUF are coloured in red. The arrow

show how in some cases artefacts that are developed during the discussion can later on become visualisations that are used for communication purposes.

This dimension of the framework maps tools and artefacts as material elements associated to VCUF along the process. As introduced in section 9.1, materiality is an essential aspect of designing spaces and conditions for co-creation.

Generative tools are objects that are used to facilitate participatory conversations and collaborative creation–in this case of future scenarios. Tools can be used to understand and explain difficult concepts or to create something new by eliciting emotional responses and expressions (E. B.-N. Sanders 2000). However, as explained in 9.1, tools can sometimes have a detrimental effect: limiting the scope of the conversations and influencing the type of ideas that are generated.

Creating generative tools is a design process in itself. Cruickshank (2014) talks about generative tools through the analogy of typographic fonts, as "creative tools that are both highly designed and facilitate great creativity (…) through their use" (p. 108). The thinking cards used in the Future Visions workshops (DE#1) are an example of simplifying by design the complexity of research on urban futures for the purpose of usability (see 6.2.2.1 in Part B).

Artefacts of VCUF are visual representations of conversations on urban futures (see 3.2 in Part A and also 10.2). Artefacts can be either generated by participants in the conversations through the use of tools or can be post-produced outcomes of the analysis of conversations.

Each conversation might therefore include several artefacts, developed for different audiences and/or at various stage of the process. Paragraph 10.2 elaborates on the design space that describes the main characteristics of artefacts of VCUF.

The roles of the material elements can also be subverted along the process. Communication artefacts of VCUF can become generative tools when used to continue the conversation or elicit new discussions. For example, in Birmingham Park Summit (DE#3) the artefacts produced by participants in Part 1 of the workshop ("Building the vision") were used first as artefacts to communicate the Citizens' Visions to members of Birmingham City Council, and then as generative tools by the members of the council attending Part 2 of the workshop working on transforming visions into strategies (Figure 59).

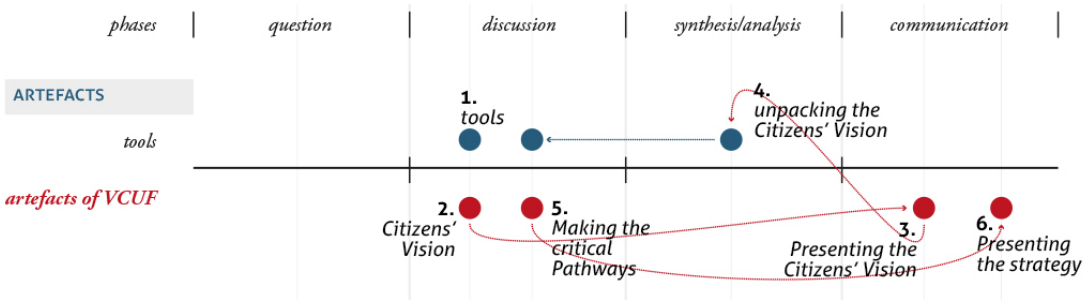


Figure 59 Tools into artefacts (and vice-versa) in Birmingham Parks Summit

10.1.3 Actors

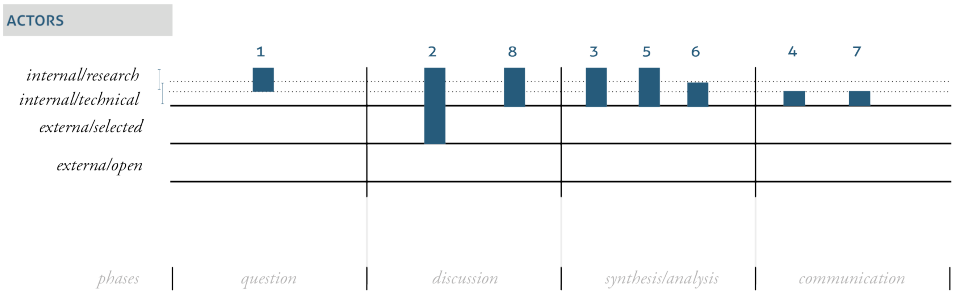


Figure 60 Actors mapped along a process of VCUF (example from DE#1)

As mentioned in 10.1.1, social complexity, a function of the number and diversity of players involved (Conklin 2006), can have a great influence on the way the conversation unfolds.

But the participants in the conversations are not the only actors to map in processes of VCUF. A broader look at the whole process (as opposite to focussing on the discussion phase only) shows how additional stakeholders may intervene in various phases of the process, for example providing research question, supporting the conversations (or sometimes disrupting it!), collecting and analysing outcomes, co-producing communication artefacts, accessing the material as readers or users, and so on.

Actors that appear along the process can be:

- **internal** to the group or research team that initiated/leads the activity
- **internal** to the core team, but performing a **technical** role (e.g. visualisers, illustrators, coders,…).
- **External close,** selected groups that are not part of the core team but invited to join the conversation because of their expertise or their direct interest in the topic.
- **external** groups that can join the conversation once the core team has **opened** the possibility for participation beyond selected contacts.

However, there are many possible ways to define and map the actors involved. The terminology proposed here has been developed for the context of the study. It might need to be reviewed if used for types of VCUF that require a more detailed classification or different terms.

It must also be noted that only the actors that are directly involved in the conversation and visualisations are mapped in this framework, leaving out essential support figures such as project administrators, catering, suppliers etc.

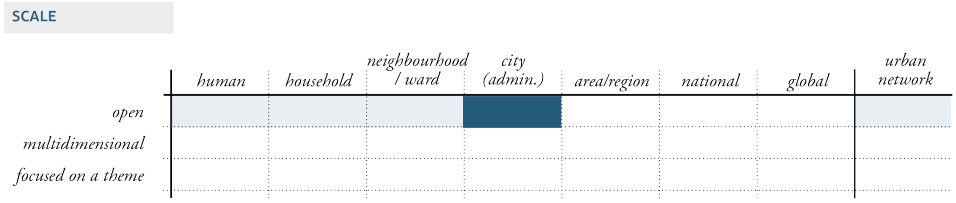
Understanding not only who are the stakeholders involved in the process, but also how the group varies in the different phases of the process can provide interesting insights when discussing experiences or when planning new activities.

Mapping actors that were involved in a VCUF after its completion tells us more about the inclusivity of the process, not only as a whole, but also in its individual phases, highlighting potential problematic areas. Restricting participation in phases of analysis, synthesis, and communication of VCUF, as it often happens, mostly for practical reasons, might lead to unbalanced power dynamics within the group of stakeholders involved. Certainly, this has sometimes been an issue in my own work, when, as a designer, I found myself in the position of interpreting and communicating visually other people's thoughts and ideas.

If the framework is used in phases of planning of activities, these potential risks can be visually identified, and actions can be taken to mitigate them. For example, the design of the Citizens' Vision Box in DE#3 was an explicit attempt to include participants in the "communication" phase of the VCUF process.

More in general, knowing who are the actors expected to intervene along a process, and how, can lead to better-informed and more targeted design of both processes and artefacts.

10.1.4 Scale



This section of the framework is concerned with the scale of the subject matter. It indicates the geographical and conceptual boundaries of the city as represented in the conversation.

While many authors tried to characterize "the urban" and "urban living" (see for example George Simmel 1971; Urry et al. 2014; Wirth 1938), there is no standard international definition of what an "urban" area is (Deuskar 2015). The edges of the city are difficult to demarcate, and are often set arbitrarily. Administrative boundaries do not capture the physical reach of the city, which include suburban and periurban areas, hard and soft infrastructures for the exchange of resources between the city and the surrounding region, as well as the city's global imprint (Gandy 2012). Furthermore, in recent years, some authors have pointed out how writings on urbanism tend to look at the city as an horizontal spread, neglecting its verticality (Graham and Hewitt 2013).

Ultimately, setting the scale of the conversation when talking about urban futures is a rhetorical act. Jones (1998) defines scale as an epistemological frame, that is set to apprehend particular issues related to the city from a certain point of view. In doing so, it deliberately selects, omits, simplify, and classify (Harley 1989). Furthermore, as a rhetorical trope, jumping of scales might occur during the course of discussions in which local issues are connected to global ones (Cox 1998).

In the framework, I propose a matrix that locates the geographical and conceptual scales of the conversation. As conversations might involve different scale, more than one dimension can be marked in the matrix, preferably by also giving an indication of the relevance of each dimension within the conversation.

The columns in the matrix represent the geographical scale, through a selection of dimensions traditionally used in human geography (John Paul Jones III, Sallie A.

Marston, and Keith Woodward 2009). These dimensions are: human body, household/dwelling (home), neighbourhood/ward, city/district (administrative city), area/region. Larger dimensions included in the traditional hierarchy (province/state, nation-state, continent, globe) have been replaced with national, global, and "urban networks". The last dimension indicates situations in which two or more cities are somehow connected in the conversation.

The rows in the matrix do not refer to spatial dimensions, but indicate the conceptual scale of the conversation. They refer to the topic of the conversation within the geographical scale. The conversation could be focused on a particular theme, bring together various dimensions in the space of the debate, or be kept open to allow exploratory discussion.

10.2 THE DESIGN SPACES OF THE ARTEFACTS (FOUR DIMENSIONS)

In this section, I suggest four dimensions to describe artefacts of Visual Conversations on Urban futures:

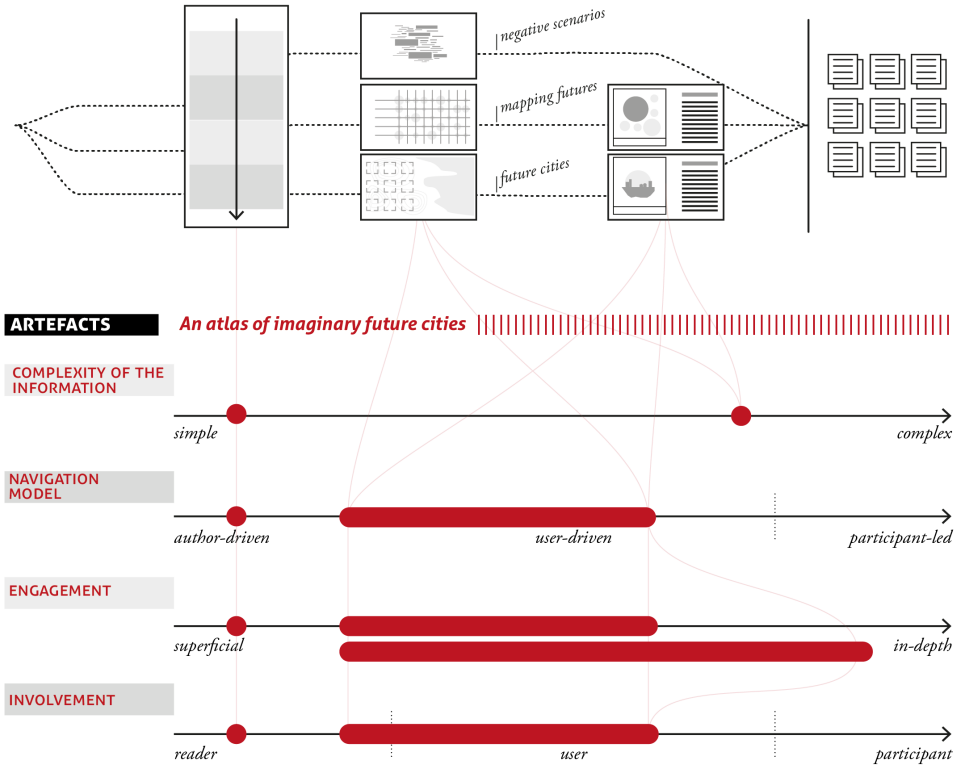
- Complexity of the information: from simple to complex
- Navigation model: from author-driven to participant-led
- Engagement: from superficial to in-depth
- Involvement: from reader to user to participant.

Each one of these dimensions is represented through a spectrum. As I will explain below, individual artefacts can occupy a particular position within each dimension, move dynamically along the spectrum, or even occupy a large part of it.

Before describing the individual dimension, I will present below the design spaces of the artefacts of DE#1, DE#2 and DE#3.

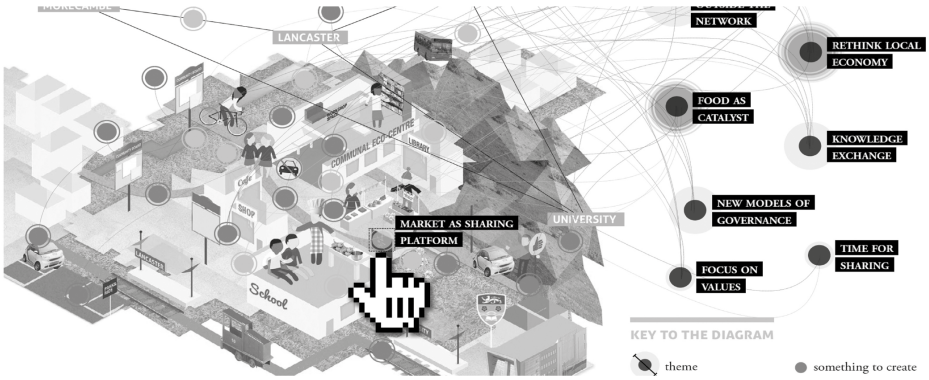
_the design space of

"FUTURE VISIONING" (design experiment #1)



_the design space of

"SHARING CITIES" (design experiment #2)



ARTEFACT: *Sharing Cities interactive report*

COMPLEXITY OF THE INFORMATION

simple — *complex*

NAVIGATION MODEL

author-driven — *user-driven* — *participant-led*

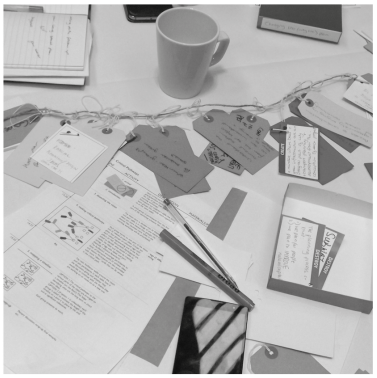
ENGAGEMENT

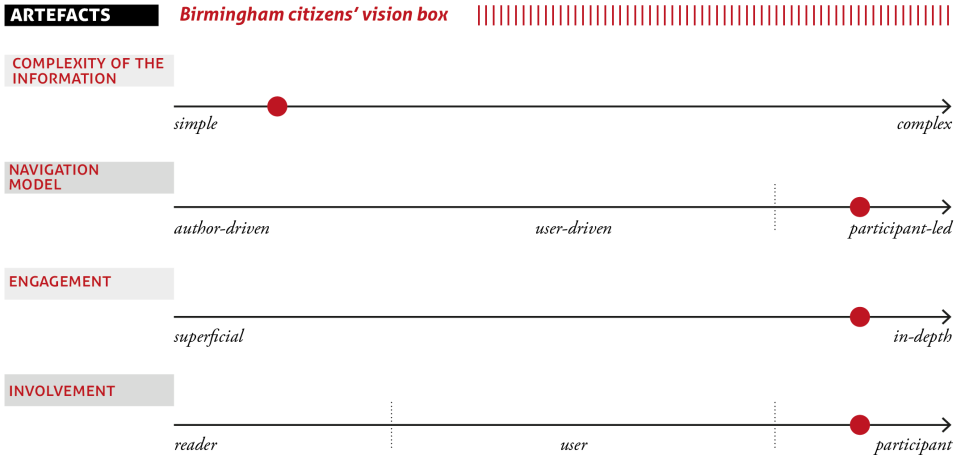
superficial — *in-depth*

INVOLVEMENT

reader — *user* — *participant*

_the design space of
"BIRMINGHAM PARKS SUMMIT" (design experiment #3)





10.2.1 Complexity of the information: from simple to complex

This first dimension provides an indication of the framing and graining of data, as well as how the information is presented.

Adjusting framing and graining of data typically happens early on in the design process, when the visualiser is required to select which data to use (framing) and to what level of detail (graining). These processes involve a series of design choices that largely depend on the purpose and the context of the visualisation. For example, while a finer graining of the data is best suited for examining the details of a conversation, a coarser graining is often necessary to make patterns visible at a glance (Ciuccarelli, Ricci, and Valsecchi 2008).

Once the frame and grain of the data has been set, the way the information is presented determines the positioning of the visualisation along the simplicity-complexity continuum. At this stage, the designer acts as curator of the information. Design choices aimed at making the information legible can move the artefact to the "simplicity" side by limiting the interaction with the data or to the side of "complexity", by presenting a large amount of data while providing keys and tools that help users to orientate themselves within the data.

For example, the Atlas of Future Imaginary Cities (DE#1) is designed to provide a summary of the content and a first overview of the information in the main page. Users can then choose to access more complex and detailed information by accessing and exploring the maps of the individual sections.

10.2.2 Navigation model: from author-driven to user-driven to participant-led

The navigation model describes how users interact with the visualization, indicating the degree of guidance that is given by the author of the artefact. The left-hand side of the continuum spans from author-driven approaches to user (or reader)-driven approaches.

Segel and Heer (2010) provide the following definition of the two approaches:

> *"A purely author-driven approach has a strict linear path through the visualization, relies heavily on messaging, and includes no interactivity. Examples include film and non-interactive slideshows. A strongly author-driven approach works best when the goal is storytelling or efficient communication. (…)*
>
> *A purely reader-driven approach has no prescribed ordering of images, no messaging, and a high degree of interactivity. Examples include visual analysis tools like Tableau or Spotfire. A reader-driven approach supports tasks such as data diagnostics, pattern discovery, and hypothesis formation". (p. 1146)*

However, particularly in the case of VCUF, in which multiple views are mapped in a single artifact, purely author-driven approaches are rare, and most artefacts are hybrid or a combination of the two approaches.

In the context of this thesis, I will replace the term "reader-driven" with "user-driven", to maintain consistency with the observations that will be made in the fourth dimension of the design space (10.2.3). The spectrum will therefore span from "author-driven" to "user-driven", and will be extended to include "participant-led" modes of interaction.

"Participant-led models", which I include as an addiction to Segel and Heers' spectrum, identify situations in which users take part in the conversation, and intervene directly in manipulating and modifying visualisations that are purposely left open-ended by the authors.

Birmingham's citizens visions box in DE#3 is an example of an artefact that invites users to become participants. The ideas that were organised by participants to Part 1 of the Birmingham Park Summit workshop were explicitly prepared to be reworked, refined, and transformed into actions.

10.2.3 Engagement: from superficial to in-depth

This dimension describes the position of the user in relation to the conversation that is visualised in the artefact: is the user interacting with curated material or with raw data from the conversation? The position can be set both by the designer curating the visualisation (see the first dimension) and/or by the user deciding the level of detail they are interested in engaging with.

As composite images built by mapping individual ideas, VCUF are often visualised through layers of information that shape an emerging big picture. Authors of visualisations can either set the level of engagement by focussing the visualisation on a limited portion of the engagement spectrum, or allow the user to move back and forth along the spectrum: from a high-level view to deeper levels of engagement with the data. For example, including layers within a visualisation to enable readers to access the source of data is a common solution adopted in data journalism, a field in which the quality of an artefact depends in part on the sources it draws from (see for example Lupi 2012). Similarly, in the Atlas of Imaginary Future Cities, users are given access to the transcribed audio from the workshop that I used as dataset for designing the maps and visualisation.

10.2.4 Involvement: from reader to user to participant

In this research, the terms "readers", "users", and "participants" are used along a spectrum to indicate an increasing degree of involvement. This paragraph clarifies the differences between the three terms as adopted in this context. In this and other parts of this thesis, the three terms have been used coherently with the description provided in this section. When it is not possible or relevant to provide details about the involvement, the term "user" has been adopted with a generic value.

Most authors in visual design disciplines refer to those who interact with visualisations as "audience", "readers" or "users", without explaining their semantic choices. Sometimes, these three terms are grouped as synonyms and used interchangeably.

Most commonly, the term "reader" identifies the audience of static visualisations, or the audience of visualisations that present a strong narrative component provided by the author (for example in interactive data journalism, where the primary aim is to tell a story). "User" is a term that is often utilised to identify people interacting with artefacts that are designed to be manipulated. For instance, when presenting a list of examples for their taxonomy of "narrative visualisations", Segel and Heer (2010) mention "readers" when discussing annotated graphs, magazine style graphics, and talk about "users" of interactive visualisations, dashboards, and visualisation software[30]. The term audience is

[30] *This is a general observation, but hardly a rule. Sometimes the choice of terms might reflect the role that the designer assigns to the reader/user, particularly when who writes is also the designer of the piece of work that is being discussed. For example, Giorgia Lupi,*

used more broadly, but often in the same context as the term "reader" (Moritz Stefaner et al. 2014).

Finally, the role of the user could extend beyond that of recipient of the message. When users are involved in the co-creation and interpretation of the message, they become "participants" in a visual dialogue (Forlizzi and Lebbon 2002). In the Navigation Model included in this framework (10.2.2) I proposed that artefacts of VCUF might in fact allow users to participate in modifying, editing, furthering or reworking the scenarios. In participatory design, this is part of what Ehn calls "design after design", i.e.: "design a thing that opens up for potential design after the actual design in the project has taken place, to defer some of the design until later on, assuming that people would be interested in doing that". (Binder et al. 2011, 46).

However, while there are various examples in literature of participants involved in shaping a message, the possibilities for visualisations that can be shaped further are much less explored (Venturini et al. 2015). The Citizens' Vision for Birmingham in DE#3 suggests one way of doing so, but there certainly are many more possibilities that can be explored through research and design action.

10.3 ADAPTING THE DESIGN SPACE TO OTHER EXAMPLES AND GENRES OF VCUF

Chapter 2 of Part A showed that VCUF as an approach encompasses a great variety of possible genres. This reflects the breadth of the concept of "visualisation" as defined in 2.1 (Part A).

---

researcher and information designer with her studio Accurat, talks about "readers" of Accurat's magazine style work, and "users" of their interactive visualisations (see https://medium.com/accurat-studio for examples).

The design space in this chapter is informed mainly by reflecting on the practice conducted as part of this research. Because of the focus of this study and the nature of the practice, the nomenclature and structure of the design space might be best suited to describe VCUF created through speculative co-design workshops and visualised through objects, illustrations, diagrams, and interactive artefacts. As much as possible, the framework has been designed to be flexible and adaptable to most types of VCUF, beyond those explored by this research. However, as anticipated in the introductory paragraph to the framework, it is possible that some terms might not be the most appropriate to describe certain types of VCUF. Similarly, some dimensions that constitute the design space might need to be adapted.

In summary, I acknowledge that despite being presented as the final part of this thesis, the Design Space proposed in this chapter is an initial proposal, which will need to be tested, reviewed, and possibly expanded in further research.

SUMMARY OF PART C

Part C of this thesis integrates the definition of VCUF in Part A with a two overarching design principles for processes and artefacts to and a framework to describe the design space of VCUF.

When describing the principles that define processes and artefacts, I highlighted the specific challenges of designing VCUF.

Section 9.1 discussed the difference between co-design processes and speculative co-design processes, arguing for the need of specific approaches, tools, and metaphors to be used in the latter. In this section, I proposed the use of tensegrity structure as alternative to co-design's scaffolds as an alternative metaphor in processes of VCUF.

Section 9.2 reflected on the characteristics of the visual language that is best suited to capture the nature of VCUF. In particular, I reflected on the use of visual modalities to make multiple ideas about the future are readable while maintaining their ambiguous nature.

In the second chapter of Part C, I described eight dimensions that define the design space of VCUF. As an analytical tool the design space provides a framework and a language that allows describing and comparing a great variety of processes and artefacts of VCUF. It can also be used as a supporting, but not prescriptive design tool, as long as it is adapted to fit the characteristics and aims of the projects.

The following chapter will bring together Part A (the theoretical framework), Part B (research through design) and Part C (the principles defining the approach) to conclude the research described in this thesis. In doing so, it will highlight areas of contributions and the validity of this thesis, but also the limitations and shortcomings of this work. It

will also remind the reader of the motivation and potential impact of this approach, and in doing so it will suggest possible directions for further research (see 11.4).

11 CONCLUSIONS

The research presented in this thesis was initially motivated by a personal frustration with the lack of explicit representations of the subjectivity and multiplicity of the urban experience in most visualisations of future cities, which usually focused on coherent visions and single-voice narratives. An awareness of the way in which such visions are used to erase conflicting voices, particularly when imposed from the top down (see the Preamble), encouraged me to explore alternative ways of representing urban futures as part of my practice-based inquiry.

A review of the field of future studies unveiled that the lack of pluralism in visual artefacts is a reflection of a larger issue of how futures are researched. Anticipatory attitudes to futures tend to dismiss or hide socio-cultural values, personal agendas, and subjectivity (1.3.2). Both critical future research and critical speculative design practices subvert this rationalistic approach by opening spaces for discussions through visions of future that question assumptions and expectations (1.3.2 and 1.4.3). However, these visions still only present the view of one or few authors. Authors in participatory and speculative design literature have repeatedly expressed interest in exploring participatory speculative design practices, but efforts in developing methods and tools for involving participants in generative dialogues about speculative futures are still limited (1.4.4).

This research endeavoured to contribute to the practice of designing visions of urban futures by experimenting with participatory processes and visualisation artefacts as "spaces for agonism" (DiSalvo 2010), i.e. spaces that bring together, enable, and articulate conflicting views. As my primary research interest was a methodological one, the research was conducted primarily through practice. Four design experiments (Living in the City (5), Envisioning Urban Futures (6), Sharing Cities (7), and Birmingham Park

Summit (8)) were conducted as part of an Action-Research methodology. This mode of Research *through* design was combined with Research *about* design and research *for* design (Frayling 1993) to explore the broader area of research, and translate context-specific reflection into generalised theory that can be transferred (4.2.1, 4.2.2, 4.2.3). The three research modes enabled me to answer the research questions posed at the beginning of the thesis. Those answers included proposing a definition of the Visual Conversations on Urban Futures approach and a series of design principles that support the analysis of existing examples and the design of new ones. These principles constitute the main contribution offered by this thesis.

11.1.1 Answering the research questions

The study was guided by one main research question, which is:

RQ: How can the diversity that characterises the city be represented in visions of future(s) that give voice to different, diverging ways of living and experiencing the city?

While a considerable amount of literature has been published on the role and agency of visualisations of urban futures (2.2), there is a general lack of research that focuses specifically on pluralistic visualisations of urban futures. At the same time, an evidence-based inquiry showed a significant number of examples in which such an approach has been used in practice (2.2.1). In other words, what appeared to be missing was not the interest or the practical means, but explicit ways of describing such an approach. For this reason, an initial contribution towards the answer to this research question was to provide a name and a definition for this approach. The definition of Visual Conversations on Urban Futures (VCUF) proposed in this thesis reads as follows:

Visual Conversations on Urban Futures (VCUF) are visualisations of urban future scenarios that utilise visual methods and tools to articulate multiple voices discussing possible futures for life in the city.

Naming and defining the approach makes it possible to both collect, archive, and compare existing examples, and understand the possibilities in terms of methods, processes, and techniques. This existing body of work can then be used to inform and inspire the design of visualisations that adopt the VCUF approach as an explicit starting point. In this thesis I define VCUF as an approach, rather than a methodology, because VCUF may be conducted in a great variety of contexts, and may therefore require very different sets of methods (as seen in 2.2.1.1).

Chapter 2 highlighted the importance of conceptualising visualisations as artefacts situated within communication processes (2.1). This theoretical framing has been validated by the practice I conducted as part of my PhD. Designing participatory processes for enabling multiple perspectives and documenting such perspectives in visual artefacts are both design activities in their own right (although tightly connected). For this reason, it was important to unpack the main research question into two sub-questions.

(RQ1) What are the processes that can be designed to enable these visions to emerge?

Reflecting on the design practice conducted in the design experiments highlighted the challenges that involving heterogeneous groups in speculative co-design processes of future urban scenarios entail. Established methods and metaphors of co-design could not be directly applied to speculative co-design practices. Unlike most types of co-design processes, speculative design practices do not usually seek to converge towards a shared

goal, but are aimed at raising questions and highlighting controversies. For this reason, co-design models can often have a detrimental effect, as they constrain the breadth of conversations that value divergence over consensus. In 9.1 I propose the use of tensegrity structures, as an alternative metaphor to co-design's scaffolds to support and facilitate processes of VCUF. The key difference between scaffolds and tensegrity structures is that the latter provides a flexible structure that can be manipulated and reshaped by participants building imaginary worlds.

In Chapter 10, I proposed a framework to describe the design space of processes of VCUF. The framework is composed of four dimensions:

- model of the process: a space to map the process of conducting VCUF in four phases (not necessarily in this order): question, discussion, synthesis communication;
- artefacts: the list of generative tools used to support the conversations and the artefacts produced during the process;
- actors: the characteristics of the actors and groups that intervene in the different phases of the process;
- scale: the conceptual and geographical scale of the subject of the conversation (from focussed on a theme to open; from the human to the global scale)

These dimensions of the design space can be used both to describe existing examples and for guiding or redirecting design actions (see also 11.4).

(RQ2) What are the characteristics of these artefacts?

The aim of the artefacts of VCUF is to represent urban futures that articulate the multiple voices and ideas which emerged in the conversations. To do so, artefacts of VCUF should explore ways of playing with visual methods for expressing various degrees of modality. This would help to make the complex landscape of ideas about possible futures readable while maintaining the ambiguous nature of future-oriented speculations (9.2). Once again, the key precondition for this approach is to conceptualise visualisations as more than images, and explore a broader variety of genres. In 9.2.2 I described how artefacts that combine, for example, maps, illustrations, objects, and written text, use different semiotic modes to express various degrees of modality.

Like I did for processes of VCUF, in 10.2. I provided a description of four dimensions that describe the design space of artefacts of VCUF. These dimensions are:

- Complexity of the information: from simple to complex
- Navigation model: from author-driven to participant-led
- Engagement: from superficial to in-depth
- Involvement: from reader to user to participant.

Each one of these dimensions is represented through a spectrum. Individual artefacts can occupy a particular position within each dimension, move dynamically along the spectrum, or even occupy a large part of it. For example, interactive artefacts can allow the user to move across different levels of complexity and engagement with the data.

(RQ3) Who has already used a similar approach? How was the approach used?

This research question was answered by collecting evidence of participatory, divergent, and multiple visions of futures throughout the entirety of the study. The main challenge in conducting this type of research *about* design was the lack of agreed terminology and a

pre-existing definition of approaches that could be loosely related to VCUF. For this reason, the investigation was somewhat serendipitous and emergent in nature. I have been collecting all existing examples of VCUF here:

https://subjectivefutures.wordpress.com/

Section 2.2.1.1 provides an account of the last 100 years of visualisations of urban futures that bring together multiple perspectives. The review demonstrates the variety of genres, tools, and methodologies that have been adopted. These include games, interactive platforms, workshops, letter exchanges, magazines, objects, digital tools, and exhibitions.

(RQ4) How do these visualisations contribute to inclusive design and research actions aimed at envisioning, prototyping and reflecting on possible scenarios of liveable cities?

This thesis can answer this question in relation to the role that VCUF played in the contexts of each of the design experiments (see the discussion section of each experiment in Part B for further details).

- DE#0 (Living in the City): the visualisations designed for this project helped unveil hidden connections and conceptual relations across four scenarios described verbally in an academic report (5).
- DE#1 (Envisioning Urban Futures): showed how VCUF can help to open up and expand the scope of research to include new, radical ideas that might challenge researchers' assumptions (6).
- DE#2 (Sharing Cities): involving local stakeholders in VCUF helped us better understand the relationship between social practice and the urban environment in which they take place (both in the present and in possible

futures). The experiment also helped connect local stakeholders in a platform for discussion on a topic of interest (7).

- DE#3 (Birmingham Parks Summit): This project showed how VCUF can be adopted by local authorities as thinking tools for involving citizens in strategy-making processes (8).

Thus, the design experiments showed that VCUF can play a role in creating a better understanding (unveiling hidden connections and conflicts), broadening the scope of the discussion, engaging local actors in situated conversations on possible futures, and supporting the development of strategic agendas.

11.2 THE CONTRIBUTIONS OF THIS STUDY

The main objectives of this study were primarily methodological. What I set out to explore were methods and tools that could be used by design practitioners both within and outside academia. It is for this reason that this thesis is written with great emphasis on the personal journey, particularly in Part B, in which I recount the design process of each experiment in great detail, focussing on what I learnt from success and failures, and how these findings were used constructively elsewhere. My interest in contributing to design practice is also the reason why the findings of this thesis are presented in Part C as design principles and a design space that can be adapted by others who might be interested in experimenting with the approach.

However, the contribution of this thesis pertains not only to design practice but also to academic design research. My work contributes to the literature on visualisations of urban futures by providing a definition and proposing a methodological framework for a practice (VCUF) that lacks theoretical discussions and systematic documentation. From a

disciplinary point of view, this discourse is situated at the intersection between speculative design, participatory (or co-) design, and information visualisation.

Beyond the design discipline, the practice conducted as part of this investigation demonstrated the contribution that the Visual Conversations on Urban Futures can bring to interdisciplinary practices of future-oriented research (such as Liveable Cities). VCUF have been used both as an approach to communicate research findings ("Living in the City", DE#0) and to promote speculative conversations in an academic context (DE#1: "Envisioning Urban Futures", DE#2: "Sharing Cities"). As demonstrated in DE#3 ("Birmingham Parks Summit") VCUF can have an impact beyond academia, by supporting participatory actions of civic engagement around long-term strategic issues. In such contexts, reclaiming future visions as conversation processes can have a significant impact on the inclusion of the marginal and dissenting voices that give cities their character. In this sense, VCUF can play an important role in supporting the engagement with the many actors and multiple perspectives that are involved in envisioning, planning, shaping, and questioning urban futures.

Visual Conversations on Urban Futures are not themselves agents of change, but can support the early stages of processes of building scenarios for possible futures. Manzini and Coad (2015) describe scenarios as "communicative artifacts produced to further the social conversation about what to do". This designerly way of imagining futures is ultimately about building alternatives to the dominant order by "making possible what apperar(s) to be impossible" (Lefebvre, 1970, cited in (Buckley & Violeau, 2011).

While in times of urgent change seeking clarity and agreement might seem a much preferable route, I argue that articulating divergence can enable the exploration of truly radical solutions. Stepping back from a solution-oriented approach allows us to critically

question the present and the underlying assumptions of current research and political discourse on "growth" and "sustainability".

11.3 LIMITATIONS OF THE STUDY

Some limitations of this study must at this point be acknowledged.

First of all, as already explained in 4.4.2, practice-based PhDs conducted as part of specific research programmes (in this case Liveable Cities) are limited in scope by the context and issues that are of interest for the research conducted in the programme. If given the opportunity, I would have found it optimal to test the approach in different contexts, and with more diverse groups of participants, to assess its adaptability. This would have also enabled me to experiment with a broader range of visualisation modes. For example, while the literature review in Chapter 2 showed the benefit of using games as platforms to bring people together in speculative conversations, it was not possible for me to test this methodology within the approach as part of the work conducted with Liveable Cities.

Furthermore, the time constraints of the programme agenda determined, to an extent, the duration I could dedicate to each project, and limited, as a consequence, the possibilities to evaluate the impact of each intervention.

11.4 SUGGESTIONS FOR FURTHER RESEARCH

As a result of my study, and considering the limitations noted in the previous paragraphs, I recommend that further research should be conducted to understand and test the adaptability of VCUF in different contexts. These may include, for example: urban planning and consultation, new policy negotiation and implementation, strategies for

adaptation to climate and environmental change. In particular, it is important to gain a better understanding of the specific challenges arising from involving groups that are in open conflict on sensitive issues in the conversation. Specific research on how to include vulnerable actors and how to create safe and inclusive spaces for VCUF is also needed.

From a design perspective, further experiments are required for testing and substantiating the formulation of the dimensions of the design space (10.1 and 10.2), as well as the two overarching principles (9.1 and 9.2). For example, the characteristics of the graphic design of the artefacts of VCUF could be further explored through practice, experiments, and user testing, in order to propose some guidelines and basic principles that could inform the design of the visualisations.

11.4.1 More Visual Conversations

Finally, just as I started, I would like to conclude with a personal note.

The study described in this thesis was conducted as part of the Liveable Cities programme. For this reason, the design experiments that contributed to the definition of the VCUF approach were tightly related to the main objective of the larger research programme: the engineering of future low-carbon, resilient, wellbeing maximised UK cities. My future research plans involve experimenting with Visual Conversations in new geographic and thematic contexts, where the understanding of pluralism and diversity of culture, values and aspirations is key. In particular, I wish to move from large-scale visions of urban futures that look at the city as a whole, and concentrate on specific social practices and their possible futures as these can be more directly influenced through smaller scale design interventions.

As I write the conclusions to this thesis, I glance at the notebook where I have been collecting the initial notes for a series of short-term projects that are starting to take form. The "to-do list" for the next few months anticipates quite an eclectic schedule of: designing objects for subjective mapping, writing about communities and values, learning about non-European design, researching urban food futures, mapping pasts and presents of resistance in urban environments, and possibly playing some more with tensegrity models. This miscellany is the outcome of a PhD that took place in open and interdisciplinary spaces, and that benefitted from long discussions, side-projects, and creative distractions with colleagues and friends. Throughout the duration of the PhD I learnt from and let myself be influenced by the work of others. But equally, all of the collaborative projects named in the list above continue the explorations that this thesis started, as they look at pasts, presents, and futures by valuing and celebrating their diversity, complexity, and subjectivity.

REFERENCE

Adam, Barbara. 2010. "History of the Future: Paradoxes and Challenges." *Rethinking History* 14 (3): 361–78. doi:10.1080/13642529.2010.482790.

Agyeman, Julian, Duncan McLaren, and Adrianne Schaefer-Borrego. 2013. "Sharing Cities." *Friends of the Earth Briefing*.

Albrecht, Donald. 2012. *Norman Bel Geddes Designs America: I Have Seen the Future*. 01 edition. New York: Abrams.

Allen, Stan. 1999. *Points and Lines: Diagrams and Projects for the City*. Princeton Architectural Press.

Amara, R. 1981. "The Futures Field: Searching for Definitions and Boundaries." *The Futurist* 15 (1): 25–29.

Archer, Bruce. 1979. "Design as a Discipline." *Design Studies* 1 (1): 17–20. doi:10.1016/0142-694X(79)90023-1.

Arieli, Daniella, Victor J. Friedman, and Kamil Agbaria. 2009. "The Paradox of Participation in Action Research." *Action Research* 7 (3): 263–90. doi:10.1177/1476750309336718.

Ashwin, Clive. 1984. "Drawing, Design and Semiotics." *Design Issues* 1 (2): 42. doi:10.2307/1511498.

Auger, James. 2013. "Speculative Design: Crafting the Speculation." *Digital Creativity* 24 (1): 11–35. doi:10.1080/14626268.2013.767276.

Awan, Nishat, Tatjana Schneider, and Jeremy Till. 2011. *Spatial Agency: Other Ways of Doing Architecture*. Routledge.

Bannon, Liam J., and Pelle Ehn. 2012. "Design Matters in Participatory Design." In *Routledge International Handbook of Participatory Design*, 1 edition. New York: Routledge.

———. 2013. "Design Matters in Participatory Design." In *Routledge International Handbook of Participatory Design*, edited by Jesper Simonsen and Toni Robertson, 37–63. New York, N.Y.: Routledge.

Bassett, Caroline, Ed Steinmueller, and George Voss. 2013. "Better Made Up: The Mutual Influence of Science Fiction and Innovation." *Nesta Working Paper* 13/07 (March). http://www.academia.edu/download/31044405/bettermadeup.pdf.

Bateman, Scott, Regan L. Mandryk, Carl Gutwin, Aaron Genest, David McDine, and Christopher Brooks. 2010. "Useful Junk?: The Effects of Visual Embellishment on Comprehension and Memorability of Charts." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 2573–2582. CHI '10. New York, NY, USA: ACM. doi:10.1145/1753326.1753716.

Baule, Giovanni. 2006. "Atlanti per La Comunicazione Del Territorio." *Lineagrafica*.

Belk, Russell. 2010. "Sharing." *Journal of Consumer Research* 36 (5): 715–34. doi:10.1086/612649.

Bell, Wendell. 2002. "What Do We Mean by Future Studies?" In *New Thinking for a New Millennium: The Knowledge Base of Futures Studies*, edited by Richard A. Slaughter. Routledge.

Berger, John. 1972. *Ways of Seeing*. London: Penguin Books.

Bertin, Jacques, and William J Berg. 1967. *Semiology of Graphics: Diagrams, Networks, Maps*. Redlands, Calif.: ESRI Press : Distributed by Ingram Publisher Services.

Bhagat, Alexis, and Lize Mogel, eds. 2008. *An Atlas of Radical Cartography*. Slp edition. Los Angeles, Calif: Journal of Aesthetics and Protest Press.

Binder, Thomas, Pelle Ehn, Giorgio De Michelis, Giulio Jacucci, and Giulio Linde. 2011. *Design Things*. Cambridge, Mass: MIT Press.

Binder, Thomas, and Johan Redström. 2006. "Exemplary Design Research." In *Proceedings of Design Research Society Wonderground International Conference 2006*. Lisbon, Portugal. http://soda.swedish-ict.se/920/.

Birmingham City Council. 2013. "Green Living Spaces Plan." https://www.birmingham.gov.uk/downloads/download/208/green_living_spaces_plan.

Bjögvinsson, Erling, Pelle Ehn, and Per-Anders Hillgren. 2012. "Design Things and Design Thinking: Contemporary Participatory Design Challenges." *Design Issues* 28 (3): 101–16. doi:10.1162/DESI_a_00165.

Bleecker, Julian. 2009. "Design Fiction: A Short Essay on Design, Science, Fact and Fiction | Near Future Laboratory." http://blog.nearfuturelaboratory.com/2009/03/17/design-fiction-a-short-essay-on-design-science-fact-and-fiction/.

Bogost, Ian. 2010. *Persuasive Games*. Cambridge, Mass.: MIT Press.

Börjeson, Lena, Mattias Höjer, Karl-Henrik Dreborg, Tomas Ekvall, and Göran Finnveden. 2006. "Scenario Types and Techniques: Towards a User's Guide." *Futures* 38 (7): 723–39. doi:10.1016/j.futures.2005.12.002.

Botsman, Rachel. 2013. "The Sharing Economy Lacks A Shared Definition." *Co.Exist*. http://www.fastcoexist.com/3022028/the-sharing-economy-lacks-a-shared-definition.

Botsman, Rachel, and Roo Rogers. 2011. *What's Mine Is Yours: How Collaborative Consumption Is Changing the Way We Live*. London: HarperCollins Business.

Bowen, Simon. 2010. "Critical Theory and Participatory Design." In *Proceedings of CHI*.

Boyko, Christopher, Claire Coulton, Serena Pollastri, Rachel F. D. Cooper, Nick Dunn, and Stephen Clune. 2016. *The Little Book of Sharing in the City*. University of Lancaster.

Boyko, Christopher T., Stephen J. Clune, Rachel F. D. Cooper, Claire J. Coulton, Nick S. Dunn, Serena Pollastri, Joanne M. Leach, et al. 2017. "How Sharing Can Contribute to More Sustainable Cities." *Sustainability* 9 (5): 701. doi:10.3390/su9050701.

Bradfield, Ron, George Wright, George Burt, George Cairns, and Kees Van Der Heijden. 2005. "The Origins and Evolution of Scenario Techniques in Long Range Business Planning." *Futures* 37 (8): 795–812. doi:10.1016/j.futures.2005.01.003.

Brandt, Eva. 2006. "Designing Exploratory Design Games: A Framework for Participation in Participatory Design?" In *Proceedings of the Ninth Conference on Participatory Design: Expanding Boundaries in Design - Volume 1*, 57–66. PDC '06. New York, NY, USA: ACM. doi:10.1145/1147261.1147271.

Brandt, Eva, and Thomas Binder. 2007. "Experimental Design Research: Genealogy, Intervention, Argument." In *International Association of Societies of Design Research*. Hong Kong. https://www.researchgate.net/profile/Eva_Brandt/publication/262037737_Experimental_design_research_Genealogy_-_intervention_-_argument/links/54ae303c0cf24aca1c6f7630.pdf.

Brath, Richard, and Ebad Banissi. 2016. "Using Typography to Expand the Design Space of Data Visualization." *She Ji: The Journal of Design, Economics, and Innovation* 2 (1): 59–87. doi:10.1016/j.sheji.2016.05.003.

Brooker, Peter. 2002. *Modernity and Metropolis: Writing, Film and Urban Formations*. 2002 edition. New York: AIAA.

Bruno, Giuliana. 1987. "Ramble City: Postmodernism and 'Blade Runner.'" *October* 41 (ArticleType: research-article / Full publication date: Summer, 1987 / Copyright © 1987 The MIT Press): 61–74. doi:10.2307/778330.

———. 2007. *Atlas of Emotion: Journeys in Art, Architecture, and Film*. New York: Verso.

Brydon-Miller, Mary, Davydd Greenwood, and Patricia Maguire. 2003. "Why Action Research?" *Action Research* 1 (1): 9–28. doi:10.1177/14767503030011002.

Buchanan, Richard. 1992. "Wicked Problems in Design Thinking." *Design Issues* 8 (2): 5–21. doi:10.2307/1511637.

———. 2001. "Design Research and the New Learning." *Design Issues* 17 (4): 3–23. doi:10.1162/07479360152681056.

Buckley, Craig, and Jean-louis Violeau. 2011. *Utopie: Texts and Projects, 1967--1978*. Los Angeles, Calif. : Cambridge, Mass: MIT Press.

Buckminster Fuller, Robert. 1961. "TENSEGRITY." http://www.rwgrayprojects.com/rbfnotes/fpapers/tensegrity/tenseg01.html.

Bundy, Robert. 1976. *Images of the Future: The Twenty-First Century and beyond*. Buffalo, N.Y.: Prometheus Books. http://books.google.com/books?id=bxxmAAAAMAAJ.

Bunschoten, Raoul. 2005. "Chora." In *Chora / Raoul Bunschoten*, 1–118. Consequence Book Series on Fresh Architecture 4. Springer Vienna. doi:10.1007/3-211-37869-3_1.

Cairo, Alberto. 2013. *The Functional Art: An Introduction to Information Graphics and Visualization*.

———. 2016. *The Truthful Art: Data, Charts, and Maps for Communication*. 01 edition. New Riders.

Campaign for Better Transport. 2014. "Car Dependency Scorecard 2014." http://www.bettertransport.org.uk/.

Chombart de Lauwe, Paul-Henry. 1957. "Trajects Pendant Un an D'une Jeune Fille Du XVIe Arrondissement."

Chora. 2009. "Cross River Park Scenario Game II." *Chora.org*. http://www.chora.org/?p=62.

Ciuccarelli, Paolo, Donato Ricci, and Francesca Valsecchi. 2008. "Handling Changes through Diagrams: Scale and Grain in the Visual Representation of Complex Systems." In *Changing the Change Proceedings*. Turin, Italy. http://issuu.com/densitydesign/docs/paolo_ciuccarelli__donato_ricci__francesca_valsecc.

Coghlan, David, and Teresa Brannick. 2005. *Doing Action Research in Your Own Organization*. SAGE.

Coleman, Nathaniel. 2005. *Utopias and Architecture*. Taylor & Francis.

Coles, Alex, and Catharine Rossi. 2013. *EP Vol. 1 - The Italian Avant-Garde: 1968-1976*. First Edition edition. Berlin: Sternberg Press.

Colomina, Beatriz. 2010. *Clip, Stamp, Fold: The Radical Architecture of Little Magazines, 196X to 197X*. ACTAR Publishers.

Conklin, E. Jeffrey. 2006. *Dialogue Mapping: Building Shared Understanding of Wicked Problems*. Chichester, England; Hoboken, NJ: Wiley.

Cook, Peter. 2008. *Drawing: The Motive Force of Architecture*. 2nd Revised edition edition. Chichester: John Wiley & Sons.

———. 2012. "Real Is Only Halfway There." Keynote speech presented at the Is Drawing Dead?, Yale, March 20. https://www.youtube.com/watch?v=Jpw3Lm8ZKOY&feature=youtube_gdata_player.

Corner, James. 1999. "Eidetic Operations and New Landscapes." In *Recovering Landscape: Essays in Contemporary Landscape Architecture*, 1st ed., 153–69. Princeton Architectural Press. https://parksandrec3.files.wordpress.com/2012/06/corner_eideticoperations.pdf.

Cornish, Edward. 1977. *The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World*. Washington, D.C.: World Future Society.

Coulton, Paul, Dan Burnett, and Adrian Gradinar. 2016. "Games as Speculative Design: Allowing Players to Consider Alternate Presents and Plausible Futures." In *Proceedings of DRS2016: Design + Research + Society - Future-Focused Thinking*. Brighton.

Cox, Kevin R. 1998. "Spaces of Dependence, Spaces of Engagement and the Politics of Scale, or: Looking for Local Politics." *Political Geography* 17 (1): 1–23. doi:10.1016/S0962-6298(97)00048-6.

Cross, Nigel. 1999. "Natural Intelligence in Design." *Design Studies* 20 (1): 25–39.

———. 2001. "Designerly Ways of Knowing: Design Discipline Versus Design Science." *Design Issues* 17 (3): 49–55. doi:10.1162/074793601750357196.

———. 2007. "From a Design Science to a Design Discipline: Understanding Designerly Ways of Knowing and Thinking." In *Design Research Now*, edited by Ralf Michel, 41–54. Board of International Research in Design. Birkhäuser Basel. doi:10.1007/978-3-7643-8472-2_3.

Crowe, Norman, and Paul Laseau. 1986. *Visual Notes for Architects and Designers*. John Wiley & Sons.

Cruickshank, Leon. 2014. *Open Design and Innovation: Facilitating Creativity in Everyone*. Gower.

Cruickshank, Leon, Gemma Coupe, and Dee Hennessy. 2016. "Co-Design: Fundamental Issues and Guidelines for Designers: Beyond the Castle Case Study." *Swedish Design Research Journal* 9 (2): 46–57.

Csikszentmilhalyi, Mihaly, Isabella Csikszentmilhalyi, Ronald Graef, Jean Hamilton Holcomb, Judy Hendin, and MacAloon (John.). 1982. *Beyond Boredom and Anxiety: The Experience of Play in Work and Games*. Jossey-Bass Publishers.

Curry, Andrew. 2009. "From Foresight to Insight: Using Scenarios Well." *Journal of Futures Studies* 13 (3). http://jfsdigital.org/articles-and-essays/2009-2/vol-13-no-3-february/.

Dahl, Darren W, Amitava Chattopadhyay, and Gerald J Gorn. 2001. "The Importance of Visualisation in Concept Design." *Design Studies* 22 (1): 5–26. doi:10.1016/S0142-694X(99)00028-9.

Dator, Jim. 2002. "Future Studies as Applied Knowledge." In *New Thinking for a New Millennium: The Knowledge Base of Futures Studies*, by Richard A. Slaughter, 105–15. Routledge.

———. 2007. "What Futures Studies Is, and Is Not." University of Hawaii, Hawaii Research Center for Futures Studies.

———. 2009. "Alternative Futures at the Manoa School." *Journal of Futures Studies* 14 (2): 1–18.

De Rosnay, Joel. 1979. *The Macroscope*. New York: Harper & Row.

Debord, Guy. 1981. "Introduction to a Critique of Urban Geography." In *Situationist International Anthology*, edited by Ken Knabb, Revised and expanded ed edition. Berkeley, CA: Bureau of Public Secrets,U.S.

Dede, Okan Murat, Çigdem Belgin Dikmen, and Asim Mustafa Ayten. 2012. "A New Approach for Participative Urban Design: An Urban Design Study of Cumhuriyet Urban Square in Yozgat Turkey." *Journal of Geography and Regional Planning; Victoria Island* 5 (5): 122–31. doi:http://dx.doi.org/10.5897/JGRP11.129.

DensityDesign. 2009. "We Will Be Here - Map of the Future." *Wired Magazine - Italian Edition.*, September.

Department for Communities and Local Government, and Gavin Barwell. 2017. "First Ever Garden Villages Named with Government Support - GOV.UK." January 2.

https://www.gov.uk/government/news/first-ever-garden-villages-named-with-government-support.

Design Council. 2007. "A Study of the Design Process." Design Council. http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20(2).pdf.

Deuskar, Chandan. 2015. "What Does 'urban' Mean?" Text. *Sustainable Cities*. June 2. http://blogs.worldbank.org/sustainablecities/what-does-urban-mean.

Dick, Bob. 2003. "AR and Grounded Theory." What Can Action Researchers Learn from Grounded Theorists.

———. 2007. "What Can Grounded Theorists and Action Researchers Learn from Each Others?" In *The Sage Handbook of Grounded Theory*, edited by Antony Bryant and Kathy Charmaz, 1 edition. Los Angeles; London: Sage Publications Ltd.

———. 2014. "Sources of Rigour in Action Research." http://www.aral.com.au/resources/rigour3.html.

Diplock, Chris. 2013. "The Sharing Project." Vancouver. http://thesharingproject.ca/.

DiSalvo, Carl. 2010. "Design, Democracy, and Agonistic Pluralism." In *Design & Complexity*. Montreal. http://www.drs2010.umontreal.ca/data/PDF/031.pdf.

———. 2012a. "Adversarial Design as Inquiry and Practice." In *Adversarial Design (Design Thinking, Design Theory)*. the mit press.

———. 2012b. "Spectacles and Tropes: Speculative Design and Contemporary Food Cultures | Fibreculture Journal." *Fibreculture Journal*, no. 20. http://twenty.fibreculturejournal.org/2012/06/19/fcj-142-spectacles-and-tropes-speculative-design-and-contemporary-food-cultures/.

———. 2012c. *Adversarial Design (Design Thinking, Design Theory)*. the mit press.

Dondis, Donis A. 1973. *A Primer of Visual Literacy*. MIT Press.

Dörk, Marian, Christopher Collins, Patrick Feng, and Sheelagh Carpendale. 2013. "Critical InfoVis: Exploring the Politics of Visualization." In *Proceedings of CHI 2013*. Paris.

Dunn, Nick. 2013. "Mapping Interstices: Understanding Urban Conditions through the Lived Experience of Societal Margins in Contemporary Film." In *Once Upon a Place: Architecture and Fiction*, 185–95. Editora Caleidoscópio.

Dunn, Nick, Paul Cureton, and Serena Pollastri. 2014. "A Visual History of the Future." Future Cities. UK Government, Office for Science. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360814/14-814-future-cities-visual-history.pdf.

Dunne, Anthony. 1997. *Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design*. Cambridge, Mass.; London: MIT Press.

Dunne, Anthony, and Fiona Raby. 2001. *Design Noir: The Secret Life of Electronic Objects*. Basel: August/Birkhauser.

———. 2009. "Critical Design FAQ." http://www.dunneandraby.co.uk/content/bydandr/13/0.

———. 2014. *Speculative Everything: Design, Fiction, and Social Dreaming*. Cambridge, Massachusetts ; London: MIT Press.

Edwards, C. D., ed. 2015. *The Bloomsbury Encyclopedia of Design*. Box edition. New York: Bloomsbury Academic.

Ehn, Pelle, Elisabet Nilsson, and Richard Topgaard. 2014. *Making Futures: Marginal Notes on Innovation, Design, and Democracy*. Cambridge, Massachusetts: MIT Press.

Eisenhardt, Kathleen M. 1989. "Building Theories from Case Study Research." *Academy of Management Review* 14 (4): 532–50. doi:10.5465/AMR.1989.4308385.

Eisenstein, Elizabeth L. 1982. *The Printing Press as an Agent of Change*. Cambridge England; New York: Cambridge University Press.

Elden, Max, and Rupert F. Chisholm. 1993. "Emerging Varieties of Action Research: Introduction to the Special Issue." *Human Relations* 46 (2): 121–42. doi:10.1177/001872679304600201.

Eriksen, Mette Agger, and Anne Louise Bang. 2013. "Experiments All the Way : Diagrams of Dialectics between a Design Research Program and Experiments." In . Copenhagen, Denmark and Malmö, Sweden: The Royal Danish Academy of Fine Arts, Schools for Architecture, Design and Conservation. http://dspace.mah.se/handle/2043/15731.

Evans, Martyn. 2010a. "An Investigation into the Role of Futures Thinking in Design." Lancaster, UK: Lancaster University.

———. 2010b. "The Design Social: Framing Social Research Methods for Design Postgraduates."

———. 2014. "Researching the Future by Design." In *The Routledge Companion to Design Research*, edited by Paul Rodgers and Joyce Yee. New York: Routledge.

Farrauto, Luigi, and Paolo Ciuccarelli. 2010. "The Image of the Divided City through Maps: The Territory without the Territory." In *Proceedings of the Everyday Life in the Segmented City Conference*. Florence.

Forlano, Laura, and Anijo Mathew. 2014. "From Design Fiction to Design Friction: Speculative and Participatory Design of Values-Embedded Urban Technology." *Journal of Urban Technology* 21 (4): 7–24. doi:10.1080/10630732.2014.971525.

Forlizzi, Jodi, and Cherie Lebbon. 2002. "From Formalism to Social Significance in Communication Design." *Design Issues* 18 (4): 3–13. doi:10.1162/074793602320827389.

Fox, R. C., Kate Rowntree, and J. Kaskinen. 2012. "Futures Studies for the Southern African Region: 'from Africa' Not 'on Africa.'" In *Proceedings of the 3rd International SANORD Symposium*. Aarhus, Denmark. https://www.mysciencework.com/publication/show/b132ebf86aee6aa728769dcb7b6851ec.

Frankel, Lois, and Mark Racine. 2010. "The Complex Field of Research: For Design, through Design, and about Design." In *DRS2010 - Design & Complexity*. http://www.drs2010.umontreal.ca/proceedings.php.

Franzato, Carlo, Giacomo Poderi, and Chiara Del Gaudio. 2016. "Call for Paper Exploring Participatory Design as a Strategy to Act Within The City - Call for Papers." *Strategic Design Research Journal*. http://revistas.unisinos.br/index.php/sdrj/pages/view/call.

Frayling, Christopher. 1993. *Research in Art and Design*. Royal College of Art Research Papers. Royal College of Art. http://www.transart.org/wp-content/uploads/group-documents/79/1372332724-Frayling_Research-in-Art-and-Design.pdf.

———. 2015. *RTD 2015 Provocation by Sir Christopher Frayling Part 1: Research Through Design Evolution*. https://vimeo.com/129775325.

Friedman, Ken. 2003. "Theory Construction in Design Research: Criteria: Approaches, and Methods." *Design Studies*, Common Ground, 24 (6): 507–22. doi:10.1016/S0142-694X(03)00039-5.

Fry, Tony. 2008. *Design Futuring: Sustainability, Ethics and New Practice*. English Ed edition. Oxford ; New York: BERG.

"Futures—Confidence from Chaos." 1969. *Futures* 1 (1): 2–3. doi:10.1016/S0016-3287(69)80001-7.

Gandy, Matthew. 2012. "Where Does the City End??" *Architectural Design* 82 (1): 128–119. doi:10.1002/ad.1363.

Gaver, William. 2011. "Making Spaces: How Design Workbooks Work." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1551–1560. CHI '11. New York, NY, USA: ACM. doi:10.1145/1978942.1979169.

———. 2012. "What Should We Expect from Research Through Design?" In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 937–946. CHI '12. New York, NY, USA: ACM. doi:10.1145/2207676.2208538.

Gell-Mann, Murray. 1995. *The Quark and the Jaguar: Adventures in the Simple and the Complex*. St. Martin's Press.

George Simmel. 1971. "The Metropolis of Modern Life." In *On Individuality and Social Forms*, 324. Levine, Donald, Simmel.

Glanville, Ranulph. 1999. "Researching Design and Designing Research." *Design Issues* 15 (2): 80–91. doi:10.2307/1511844.

Glaser, Barney, and Anselm L. Strauss. 1967. *Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine Transaction.

Glenn, Jerome C. 2003. "Introduction to Futures Research." In *Futures Research Methodology Version*, edited by Theodor J. Gordon and Jerome C. Glenn.

Glennie, Paul, and N. J. Thrift. 2009. *Shaping the Day [Electronic Resource]: A History of Timekeeping in England and Wales 1300-1800*. Oxford ; New York: Oxford University Press. http://lib.myilibrary.com?id=212611.

Glind, Pieter van de. 2013. "The Consumer Potential of Collaborative Consumption. Identifying (the) Motives of Dutch Collaborative Consumers & Measuring the Consumer Potential of Collaborative Consumption within the Municipality of Amsterdam." Research MSc in Sustainable Development - Environmental Governance, Utrecht, the Netherlands: Faculty of Geosciences, Utrecht University. http://www.collaborativeconsumption.com/2013/09/24/study-the-consumer-potential-of-collaborative-consumption/.

Goldschmidt, Gabriela. 1991. "The Dialectics of Sketching." *Creativity Research Journal* 4 (2): 123–43. doi:10.1080/10400419109534381.

Golembewski, Michael, and Mark Selby. 2010. "Ideation Decks: A Card-Based Design Ideation Tool." In *Proceedings of the 8th ACM Conference on Designing Interactive Systems*, 89–92. DIS '10. New York, NY, USA: ACM. doi:10.1145/1858171.1858189.

Gonzatto, Rodrigo Freese, Frederick M. C. van Amstel, Luiz Ernesto Merkle, and Timo Hartmann. 2013. "The Ideology of the Future in Design Fictions." *Digital Creativity* 24 (1): 36–45. doi:10.1080/14626268.2013.772524.

Graffieti, Michele. 2017. "The Map of the Future." *Graphieti*. Accessed March 6. http://www.graphieti.com/the-map-of-the-future/.

Graffieti, Michele, Gaia Scagnetti, Donato Ricci, Luca Masud, and Mario Porpora. 2011. "Tell Them Anything but the Truth: They Will Find Their Own. How We Visualized the Map of the Future with Respect to the Audience of Our Story." *Leonardo* 44 (3): 250–51. doi:10.1162/LEON_a_00174.

Graham, Stephen, and Lucy Hewitt. 2013. "Getting off the Ground: On the Politics of Urban Verticality." *Progress in Human Geography* 37 (1): 72–92. doi:10.1177/0309132512443147.

Grand, Simon, and Wolfgang Jonas, eds. 2012. *Mapping Design Research: Positions and Perspectives*. Basel: Birkhauser Verlag AG.

Gray, Carole. 2004. *Visualizing Research [Electronic Resource]: A Guide to the Research Process in Art and Design*. Farnham ; Burlington, Vt.: Ashgate. http://ezproxy.lancs.ac.uk/login?url=http://lib.myilibrary.com?id=109644.

Greenfield, Adam. 2013. *Against the Smart City*. 1.3 edition. Do projects.

Grindrod, John. 2013. *Concretopia: A Journey Around the Rebuilding of Postwar Britain*. Brecon: Old Street Publishing.

GSG. 1995. "Global Scenario Group. An International Initiative to Explore Alternative Futures." *Global Scenario Group*. http://www.gsg.org/.

Hall, Peter. 1988. *Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century*. Oxford, UK ; Malden, MA: Wiley-Blackwell.

Halper, Thomas, and Douglas Muzzio. 2007. "Hobbes in the City: Urban Dystopias in American Movies." *The Journal of American Culture* 30 (4): 379–90. doi:10.1111/j.1542-734X.2007.00615.x.

Hancock, Trevor, and Clement Bezold. 1994. "Possible Futures, Preferable Futures." *The Healthcare Forum Journal* 2 (37): 23–29.

Hannula, Otso, and Olivier Irmann. 2016. "Played Into Collaborating: Design Games as Scaffolding for Service Co-Design Project Planning." *Simulation & Gaming* 47 (5): 599–627.

Harley, J B. 1989. "Deconstructing the Map." *Cartographica: The International Journal for Geographic Information and Geovisualization* 26 (2): 1–20. doi:10.3138/E635-7827-1757-9T53.

Harley, J. B., and David Woodward, eds. 1987. *The History of Cartography: Cartography in Prehistoric, Ancient and Medieval Europe and the Mediterranean, Vol. 1*. Chicago: University Of Chicago Press.

Hartmann, Jochen. 2014. "Paper Time-Machine." *ARPA Journal*, no. 2. http://www.arpajournal.net/paper-time-machine/.

Heijden, Kees van der. 2005. *Scenarios: The Art of Strategic Conversation*. 2 edition. Chichester, West Sussex ; Hoboken, N.J: Wiley.

Hejazi, Alireza. 2010. "Futures Discovery." *Futures Discovery*. https://www.yumpu.com/la/document/view/5028922/alireza-hejazi-futures-discovery/7.

Heller, Steven. 2006. *Nigel Holmes On Information Design*. New York: Jorge Pinto Books Inc.

Henchley, Norman. 1978. "Making Sense of Future Studies." *Alternatives*.

Herbert, Daniel M. 1988. "Study Drawings in Architectural Design: Their Properties as a Graphic Medium." *Journal of Architectural Education* 41 (2): 26–38. doi:10.1080/10464883.1988.10758473.

Hodge, Robert, and Gunther Kress. 1988. *Social Semiotics*. Cambridge, UK: Polity Press.

Hollands, Robert G. 2008. "Will the Real Smart City Please Stand Up?" *City* 12 (3): 303–20. doi:10.1080/13604810802479126.

Holman, Peggy, Tom Devane, and Steven Cady. 2007. *The Change Handbook the Definitive Resource on Today's Best Methods for Engaging Whole Systems*. San Francisco: Berrett-Koehler.

Hölscher, Lucian. 2014. "5. Time Gardens: Historical Concepts in Modern Historiography." *History and Theory* 53 (4): 577–91. doi:10.1111/hith.10732.

Hsieh, Hsiu-Fang, and Sarah E. Shannon. 2005. "Three Approaches to Qualitative Content Analysis." *Qualitative Health Research* 15 (9): 1277–88. doi:10.1177/1049732305276687.

http://archive.superstructgame.net/. 2017. "Welcome to the Superstruct Game Archive." Accessed April 23. http://archive.superstructgame.net/.

http://hey.imaginableguidelines.org. 2014. "Imaginable Guidelines." *Hey Imaginable Guidelines*. http://hey.imaginableguidelines.org/platform?locale=en.

https://www.playthecity.nl/. 2017. "Play the City." *Play the City*. Accessed April 23. http://www.playthecity.nl/page/370/play-the-city.

http://www.osearth.com/. 2017. "o.s.Earth." Accessed April 23. http://www.osearth.com/.

Huizinga, Johan H. 1938. *Homo Ludens: A Study of the Play-Element in Culture*. Boston: Beacon Press.

Hunt, Dexter V. L., D. Rachel Lombardi, Stuart Atkinson, Austin R. G. Barber, Matthew Barnes, Christopher T. Boyko, Julie Brown, et al. 2012. "Scenario Archetypes: Converging Rather than Diverging Themes." *Sustainability* 4 (4): 740–72. doi:10.3390/su4040740.

Huxham, Chris. 2003. "Action Research as a Methodology for Theory Development." *Policy & Politics* 31 (2): 239–48. doi:10.1332/030557303765371726.

Huybrechts, Liesbeth, Katrien Dreessen, Selina Schepers, and Pablo Calderon Salazar. 2016. "Democratic Dialogues That Make Cities 'work.'" *Strategic Design Research Journal* 9 (2): 100–111. doi:10.4013/sdrj.2016.92.05.

Iconoclasistas. 2013. *Manual de Mapeo Colectivo: Recursos Cartográficos Críticis Para Procesos Territoriales de Creacíon Colaborativa*. Buenos Aires. http://www.iconoclasistas.net/mapeo-colectivo/.

ImaginationLancaster. 2013. "Funded PhD Studentship: Liveable Cities." January. http://imagination.lancs.ac.uk/news/Funded_PhD_Studentship_Liveable_Cities .

Inayatullah, Sohail. 1990. "Deconstructing and Reconstructing the Future." *Futures* 22 (2): 115–41. doi:10.1016/0016-3287(90)90077-U.

———. 1998. "Causal Layered Analysis: Poststructuralism as Method." *Futures* 30 (8): 815–29. doi:10.1016/S0016-3287(98)00086-X.

———. 2007. "Futures Studies in Asia: Players and Institutions." In *3rd Global Knowledge Conference, Kuala Lumpur, Malaysia*. http://www.meta-future.org/uploads/7/7/3/2/7732993/futures_studies_in_asia_-_players_and_institutions_2007.pdf.

———. 2010. "Epistemological Pluralism in Futures Studies: The CLA–Integral Debates." *Futures* 2 (42): 99–102. doi:10.1016/j.futures.2009.09.001.

———. 2013. "Causal Layered Analysis." presented at the TEDxNoosa 2013, Noosa.

Jacob, Sam, and Wouter Vanstiphout. 2014. "From Garden City to New Towns: Why Britain Should Be Proud of Its Planners." *The Guardian*, June 3, sec. Cities.

https://www.theguardian.com/cities/2014/jun/03/from-garden-city-to-new-towns-why-britain-should-be-proud-of-its-planners.

Jacobs, Jane. 1961. *The Death and Life of Great American Cities*. New York: Vintage Books.

Jacobson, Robert, and Richard Saul Wurman. 2000. *Information Design*. Cambridge, Mass: The MIT Press.

Jegou, Francois. 2008. "City Eco Lab: 'hybrid Reality Story Scripts' about Creative Communities." *Doors of Perception*. December 7. http://www.doorsofperception.com/city-eco-lab/city-eco-lab-hybrid-reality-story-scripts-about-creative-communities/.

———. 2010. "Narrative:Sustainable Everyday Project - FORwiki." http://www.forwiki.ro/wiki/Narrative:Sustainable_Everyday_Project.

Jegou, Francois, and Ezio Manzini. 2004. "Design degli scenari." In *Design multiverso, appunti di fenomenologia del design.*, edited by Paola Bertola and Ezio Manzini, 177–95. Milan: Polidesign.

Jewitt, Carey, ed. 2011. *The Routledge Handbook of Multimodal Analysis*. Reprint edition. London; New York: Routledge.

John Paul Jones III, Sallie A. Marston, and Keith Woodward. 2009. "Scale." *The Dictionary Of Human Geography*. Credo. http://search.credoreference.com.ezproxy.lancs.ac.uk/content/entry/bkhumgeo/scale/0?PHPSESSID=vhhckasoe00h64gj5its7j7ve6.

Jokela, Timo, Netta Iivari, Juha Matero, and Minna Karukka. 2003. "The Standard of User-Centered Design and the Standard Definition of Usability: Analyzing ISO 13407 Against ISO 9241-11." In *Proceedings of the Latin American Conference on*

Human-Computer Interaction, 53–60. CLIHC '03. New York, NY, USA: ACM. doi:10.1145/944519.944525.

Jonas, Wolfgang. 2012. "Exploring the Swampy Ground. An Inquiry into the Logic of Design Research." In *Mapping Design Research: Positions and Perspectives*, edited by Simon Grand and Wolfgang Jonas. Basel: Birkhauser Verlag AG.

Jones, Katherine T. 1998. "Scale as Epistemology." *Political Geography* 17 (1): 25–28. doi:10.1016/S0962-6298(97)00049-8.

Jones, Peter M. 2009. *Industrial Enlightenment: Science, Technology and Culture in Birmingham and the West Midlands, 1760-1820*. Manchester ; New York : New York: Manchester University Press.

Kahn, Herman, and Anthony J. Wiener. 1968. *Year Two Thousand*. Collier Macmillan Ltd.

Karrow, Robert W. Jr. 2000. "Commentary." In *Atlas sive Cosmographicae Meditationes de Fabrica Mundi et Fabricati Figura*, by Gerardus Mercator, Cdr Blg edition. Oakland, Calif.: Octavo.

Kemmis, Stephen, Robin McTaggart, and Rhonda Nixon. 1988. *The Action Research Planner: Doing Critical Participatory Action Research*. New York: Springer.

Kenner, Corrine. 2009. *Tarot for Writers*. Woodbury, Minn: Llewellyn Publications,U.S.

Kensing, Finn, and Jeanette Blomberg. 1998. "Participatory Design: Issues and Concerns." *Computer Supported Cooperative Work (CSCW)* 7 (3–4): 167–85. doi:10.1023/A:1008689307411.

Kerridge, Tobie. 2015. "Designing Debate: The Entanglement of Speculative Design and Upstream Engagement." Doctoral, Goldsmiths, University of London. http://research.gold.ac.uk/12694/.

Kim, Tanyoung, and Carl DiSalvo. 2010. "Speculative Visualization: A New Rhetoric for Communicating Public Concerns." In . Montreal.

Kinsley, Samuel. 2010. "Representing 'Things to Come': Feeling the Visions of Future Technologies." *Environment and Planning A* 42 (11): 2771–90. doi:10.1068/a42371.

Kirby, David. 2009. "The Future Is Now: Diegetic Prototypes and the Role of Popular Films in Generating Real-World Technological Development." *Social Studies of Science*, September. doi:10.1177/0306312709338325.

Knabb, Ken, ed. 2007. *Situationist International Anthology*. Revised and expanded ed edition. Berkeley, CA: Bureau of Public Secrets,U.S.

Kosara, Robert. 2007. "Visualization Criticism-the Missing Link between Information Visualization and Art." In *Information Visualisation, IV'07. 11th International Conference*, 631–36.

———. 2010. "The Visualization Cargo Cult." *Eagereyes*. April 7. https://eagereyes.org/criticism/the-visualization-cargo-cult.

Koshy, Valsa. 2005. *Action Research for Improving Practice: A Practical Guide*. 1 edition. London: SAGE Publications Ltd.

Kress, Gunther, and Theo Van Leeuwen. 2006. *Reading Images: The Grammar of Visual Design*. 2 edition. London; New York: Routledge.

Latitude. 2013. "The New Sharing Economy." Latitude. http://www.collaborativeconsumption.com/2013/03/18/study-the-new-sharing-economy-latitude/.

Latour, Bruno. 1988. "Visualisation and Cognition: Drawing Things Together." In *Knowledge and Society: Studies in the Sociology of Culture Past and Present : A Research*

Annual : Cultural Traditions and Words of Knowledge : Explo, 6:1–40. Knowledge and Society. Greenwich, Conn.: Jai Press. http://www.bruno-latour.fr/node/293.

———. 2008. "A Cautious Prometheus? A Few Steps Toward a Philosophy of Design (with Special Attention to Peter Sloterdijk)." In *Keynote Lecture*. Falmouth, Cornwall: Design History Society. http://www.bruno-latour.fr/sites/default/files/112-DESIGN-CORNWALL-GB.pdf.

Law, John. 2004. *After Method: Mess in Social Science Research*. Reprint edition. London ; New York: Routledge.

Law, John, and John Urry. 2004. "Enacting the Social." *Economy and Society* 33 (3): 390–410. doi:10.1080/0308514042000225716.

Lawson, Bryan. 2005. *How Designers Think: The Design Process Demystified*. 4 edition. Oxford; Burlington, MA: Routledge.

Le Goff, Jacques. 1982. *Time, Work, and Culture in the Middle Ages*. University of Chicago Press.

Lefebvre, Henri. 1991. *Critique of Everyday Life*. Verso.

———. 1996. *Writings on Cities*. Wiley.

Levitas, Ruth. 2013. *Utopia as Method: The Imaginary Reconstitution of Society*. First Edition edition. Houndmills : New York: Palgrave Schol, Print UK.

Lewin, Roger. 1999. *Complexity: Life at the Edge of Chaos*. Chicago, Ill.: University of Chicago Press.

Lima, Manuel. 2011. *Visual Complexity: Mapping Patterns of Information*. New York: Princeton Architectural Press.

Lindley, Joseph, and Paul Coulton. 2015. "Back to the Future: 10 Years of Design Fiction." In *Proceedings of the 2015 British HCI Conference*, 210–211. British HCI '15. New York, NY, USA: ACM. doi:10.1145/2783446.2783592.

Linneman, Robert E., and Harold E. Klein. 1983. "The Use of Multiple Scenarios by U.S. Industrial Companies: A Comparison Study, 1977–1981." *Long Range Planning* 16 (6): 94–101. doi:10.1016/0024-6301(83)90013-4.

List, Dennis. 2005. "Scenario Network Mapping: The Development of a Methodology for Social Inquiry." University of South Australia. http://www.audiencedialogue.net/snm.html.

Lobao, Linda. 1996. "A Sociology of the Periphery Versus a Peripheral Sociology: Rural Sociology and the Dimension of Space1." *Rural Sociology* 61 (1): 77–102. doi:10.1111/j.1549-0831.1996.tb00611.x.

Lou, Yongqi, Francesca Valsecchi, and Clarisa Diaz. 2013. *Design Harvests. An Acupunctural Design Approach towards Sustainability*. Mistra Urban Future.

Lupi, Giorgia. 2012. "Non-Linear Storytelling: Journalism through 'Info-Spatial' Compositions." *Parsons Journal for Information Mapping*. http://piim.newschool.edu/journal/issues/2012/04/index.php.

Lynch, Kevin. 1960. *The Image of the City*. MIT Press.

Lyons, John. 1977. *Semantics*. Cambridge University Press.

Malpass, Matt. 2012. "Contextualising Critical Design: Towards a Taxonomy of Ctitical Practices in Product Design." Nottingham, UK: Nottingham Trent University.

———. 2017. *Critical Design in Context: History, Theory, and Practices*. Bloomsbury Publishing.

Manaugh, Author Geoff. 2015. "L.A.T.B.D." *BLDGBLOG*. October 15. http://www.bldgblog.com/2015/10/l-a-t-b-d/.

Manovich, Lev. 2011. "What Is Visualisation?" *Visual Studies* 26 (1): 36–49. doi:10.1080/1472586X.2011.548488.

———. 2016. "The Anti-Sublime Ideal in New Media." Accessed April 18. http://users.fba.up.pt/~ldcag01003/antisublime/meaningfulbeauty.html.

Manzini, Ezio, and Rachel Coad. 2015. *Design, When Everybody Designs: An Introduction to Design for Social Innovation*. Cambridge, Massachusetts: MIT Press.

Manzini, Ezio, and Staszowski. 2013. "Public and Collaborative; Exploring the Intersection of Design, Social Innovation and Public Policy." http://www.designagainstcrime.com/files/publications/pub_2013_public_and_collaborative.pdf.

Margolin, Victor. 2007. "Design, the Future and Human Spirit." *Design Issues* 23 (3): 4–15.

Marshall, Judi. 2000. "Finding Form in Writing for Action Research." In *Handbook of Action Research: Participative Inquiry and Practice*, edited by Peter Reason and Hilary Bradbury-Huang, 1 edition. London ; Thousand Oaks, Calif: SAGE Publications Ltd.

Mazé, Ramia. 2007. *Occupying Time: Design, Time, and the Form of Interaction*. Stockholm, Sweden: Axl Books. http://soda.swedishict.se/3408/.

McCann, Eugene J. 2001. "Collaborative Visioning or Urban Planning as Therapy? The Politics of Public-Private Policy Making." *The Professional Geographer* 53 (2): 207–18. doi:10.1111/0033-0124.00280.

Mclaren, Duncan, and Julian Agyeman. 2015. *Sharing Cities: A Case for Truly Smart and Sustainable Cities*. Place of publication not identified: MIT Press.

McLean, Kate. 2016. "Smellmap: Amsterdam—Olfactory Art and Smell Visualization." *Leonardo* 50 (1): 92–93. doi:10.1162/LEON_a_01225.

McLuhan, Marshall, and Quentin Fiore. 1967. *The Medium Is the Massage*. Gingko Press.

Mitrović, Ivica. 2015. "Introduction to Speculative Design Practice." http://speculative.hr/en/introduction-to-speculative-design-practice/.

Moritz Stefaner, Enrico Bertin, Robert Kosara, and Alberto Cairo. 2014. *Visual Storytelling*. Data Stories. Accessed April 16. datastori.es.

Morris, Steven. 2014. "Birmingham Joins San Francisco and Oslo in Global Green Cities Club." *The Guardian*, April 3, sec. Cities. https://www.theguardian.com/cities/2014/apr/03/birmingham-san-francisco-oslo-global-green-biophilic-cities-club.

Morse, Janice. 1998. "Validity by Committee." *Qualitative Health Research*, 443–45.

Mortati, Marzia, and Leon Cruickshank. 2012. "NETS: A Design Tool for Activating Social Networks." Edited by Sarah Jack. *International Journal of Entrepreneurial Behavior & Research* 18 (4): 509–23. doi:10.1108/13552551211239528.

Motro, René. 2003. *Tensegrity: Structural Systems for the Future*. 1 edition. Butterworth-Heinemann.

Mouffe, Chantal. 2000. *The Democratic Paradox*. London; New York: Verso.

———. 2007. "Artistic Activism and Agonistic Spaces." *Art&Research. A Journal of Ideas, Contexts and Methods* 1 (2). http://www.artandresearch.org.uk/v1n2/pdfs/mouffe.pdf.

———. 2012. "Democratic Politics and Agonistic Public Spaces." Harvard University. Graduate School of Design. https://www.youtube.com/watch?v=4Wpwwc25JRU.

Mumford, Lewis. 1937. "What Is a City." *Architectural Record* 82 (5): 59–62.

Near Future Laboratory. 2014. "Design Fiction Product Design Work Kit 0-TBD-D012." Online shop. *Near Future Laboratory Shop*. https://nearfuturelaboratory.myshopify.com/products/design-fiction-product-design-work-kit.

Nold, Christian, ed. 2009. *Emotional Cartography*.

Nordin, Astrid, and Lisa Richaud. 2014. "Subverting Official Language and Discourse in China? Type River Crab for Harmony." *China Information* 28 (1): 47–67. doi:10.1177/0920203X14524687.

Office Videos. 2009. *Productivity Future Vision*. https://www.youtube.com/watch?v=t5X2PxtvMsU.

Operating Manual. 2017. "Operating Manual for Living in the Worst-Case Scenario: The Boot Camp." *Event*. https://www.eventbrite.com/e/31291398415?aff=efbneb.

Orlikowski, Wanda J. 2006. "Material Knowing: The Scaffolding of Human Knowledgeability." *European Journal of Information Systems* 15 (5): 460.

Philips. 2008. "Philips Design Probes. Visions of the Future." https://www.90yearsofdesign.philips.com/.

Pinder, David. 1996. "Subverting Cartography: The Situationists and Maps of the City." *Environment and Planning A* 28: 405–27.

———. 2013. “Reconstituting the Possible: Lefebvre, Utopia and the Urban Question.” *International Journal of Urban and Regional Research* 39 (1): 28–45. doi:10.1111/1468-2427.12083.

Polanyi, Michael. 1966. *The Tacit Dimension*. Revised ed. edition. Chicago ; London: University of Chicago Press.

Pollastri, Serena. 2014. “Drawing Futures Together. Diagrams for the Design of Scenarios of Future Liveable Cities.” In *Proceedings of RSD3, Third Symposium of Relating System Thinking to Design*, edited by Birger Sevaldson and Peter M. Jones. Oslo, Norway: Oslo School of Architecture and Design.

Pollastri, Serena, Christopher T. Boyko, Stephen Clune, Rachel F. D. Cooper, Nick Dunn, and Claire Coulton. 2017. “Dialogues and Visualisations. Co-Designing Scenarios of Sharing Cities.” *CoDesign*, no. Special issue: "Co-design and the Public Realm" (September).

Prado, Luiza, and Pedro Olivera. 2015. “Futuristic Gizmos, Conservative Ideals.” *Modes of Criticism*, February 11. http://modesofcriticism.org/futuristic-gizmos-conservative-ideals/.

Production, D8. 2011. *Nokia Mixed Reality*. https://vimeo.com/18421490.

Quaggiotto, Marco. 2007. “Knowledge Cartographies. Tools for the Social Structures of Knowledge.” In *Changing the Change. Design Visions Proposals and Tools*. http://www.knowledgecartography.org/PDF/knowledge-cartographies.pdf.

———. 2010. “A New Atlas for Abstract Spaces. Visual Tools for the Exploration of Complex Contexts.” In *DRS2010 - Design & Complexity*. Montreal.

Quilligan, James B. 2012. “Why Distinguish Common Goods from Public Goods?” In *Wealth of the Commons A World Beyond Market and State*, edited by David Bollier and

Silke Helfrich. Levellers Press. http://wealthofthecommons.org/essay/why-distinguish-common-goods-public-goods.

Quist, Jaco, and Philip Vergragt. 2006. "Past and Future of Backcasting: The Shift to Stakeholder Participation and a Proposal for a Methodological Framework." *Futures* 38 (9): 1027–45. doi:10.1016/j.futures.2006.02.010.

Ramos, Jose M. 2004. *Foresight Practice in Australia: A Meta-Scan of Practitioners and Organisations*. Melbourne, VIC: Australian Foresight Institute. http://researchbank.swinburne.edu.au/vital/access/manager/Repository/swin:8260?f0=creator%3A%22Ramos%2C+Jose+M.%22&query=ramos%2C+jose&sort=type%2F&y=0&x=0.

Ratti, Carlo, and Alex Haw. 2012. "Living Bits and Bricks." *Architectural Review*. April 24. http://www.architectural-review.com/essays/living-bits-and-bricks/8629380.article.

Reason, Peter, and Hilary Bradbury. 2001. *Handbook of Action Research: Participative Inquiry and Practice*. SAGE.

Rescher, Nicholas. 1998. *Predicting the Future: An Introduction to the Theory of Forecasting*. SUNY Press.

Revell, Tobias. 2013. "Critical Design / Design Fiction Lecture Finally Written Up." http://blog.tobiasrevell.com/2013/12/critical-design-design-fiction-lecture.html.

Ricci, Donato. 2010. "Seeing What They Are Saying: Diagrams for Socio-Technical Controversies"." In . Montreal.

Rittel, Horst W. J, and Melvin M Webber. 1973. "Dilemmas in a General Theory of Planning." *Policy Sciences* 4 (2): 155–69.

Robertson, Toni, and Jesper Simonsen. 2012. "Participatory Design. An Introduction." In *Routledge International Handbook of Participatory Design*, 1 edition, 1–17. New York: Routledge.

Robinson, J. 2003. "Future Subjunctive: Backcasting as Social Learning." *Futures* 35 (8): 839–56. doi:10.1016/S0016-3287(03)00039-9.

Rodgers, Paul, and Joyce Yee, eds. 2014. *The Routledge Companion to Design Research*. New York: Routledge.

Rust, Chris, Judith Mottram, and Jeremy Till. 2007. "AHRC Research Review: Practice-Led Research in Art, Design and Architecture." http://arts.brighton.ac.uk/__data/assets/pdf_file/0018/43065/Practice-Led_Review_Nov07.pdf.

Rust, Chris, and Adrian Wilson. 2001. "A Visual Thesis? Techniques for Reporting Practice-Led Research." In *Proceedings of 4th European Academy of Design Conference*. Alveiro, Portugal.

Sadler, Simon. 2005. *Archigram: Architecture Without Architecture*. MIT Press.

Sadokierski, Zoe. 2010. "Visual Writing: A Critique of Graphic Devices in Hybrid Novels." PhD thesis, Sydney, Australia.: University of Technology Sydney.

Saikaly, Fatina. 2005. "Approaches to Design Research: Towards the Designerly Way." In . Bremen, Germany.

Salen, Katie, and Eric Zimmerman. 2004. *Rules of Play: Game Design Fundamentals*. MIT Press.

Salinas, Lara, Paul Coulton, and Nick Dunn. 2016. "Using Game Design as a Frame for Evaluating Experiences in Hybrid Digital/Physical Spaces." *Architecture and Culture* 4 (1): 115–35. doi:10.1080/20507828.2015.1094227.

Samsung Display. 2015. *Display Centric World.* https://www.youtube.com/watch?v=tHUNBMSEi_4.

Sanders, E. B.-N. 2000. "Generative Tools for Co-Designing." In *Collaborative Design*, edited by Stephen A. R. Scrivener, Linden J. Ball, and Andrée Woodcock, 3–12. Springer London. doi:10.1007/978-1-4471-0779-8_1.

Sanders, Elizabeth B.-N. 2002. "Scaffolds for Experiencing in the New Design Space." *Information Design* 1 (6).

Sanders, Elizabeth B.-N., Eva Brandt, and Thomas Binder. 2010. "A Framework for Organizing the Tools and Techniques of Participatory Design." In *Proceedings of the 11th Biennial Participatory Design Conference*, 195–198. PDC '10. New York, NY, USA: ACM. doi:10.1145/1900441.1900476.

Sanders, Elizabeth B.-N., and Pieter Jan Stappers. 2008. "Co-Creation and the New Landscapes of Design." *CoDesign* 4 (1): 5–18. doi:10.1080/15710880701875068.

Sardar, Ziauddin. 2010. "The Namesake: Futures; Futures Studies; Futurology; Futuristic; foresight—What's in a Name?" *Futures* 42 (3): 177–84. doi:10.1016/j.futures.2009.11.001.

Savransky, Martin, and Marsha Rosengarten. 2017. "The Lure Pf Possible Futures. On Speculative Research." In *Speculative Research: The Lure of Possible Futures*, edited by Alex Wilkie and Martin Savransky, 1 edition, 1–17. New York, NY: Routledge.

Scagnetti, Gaia, Donato Ricci, Giovanni Baule, and Paolo Ciuccarelli. 2007. "Reshaping Communication Design Tools. Complex Systems Structural Features for Design Tools." In . The Hong Kong Polytechnic University. http://halshs.archives-ouvertes.fr/docs/00/26/43/32/PDF/Reshaping_tools.pdf.

Schenk, Pam. 2007. "Developing a Taxonomy on Drawing for Design." In *Proceeding of IASDR07*. The Hong Kong Polytechnic University. http://www.sd.polyu.edu.hk/iasdr/proceeding/papers/Developing%20a%20Taxonomy%20on%20Drawing%20in%20Design.pdf.

Schon, Donald A. 1984. *The Reflective Practitioner: How Professionals Think in Action*. New York, NY: Basic Books.

Schwartz, Peter. 1996. *The Art of the Long View: Planning for the Future in an Uncertain World*. Reprint edition. Sydney: Currency Doubleday.

Schwarzer, Mitchell. 2004. *Zoomscape: Architecture in Motion and Media*. 01 edition. New York: Princeton Architectural Press.

Sclavi, Marianella. 2002. *Avventure urbane. Progettare la città con gli abitanti*. Milano: Elèuthera.

Segel, Edward, and Jeffrey Heer. 2010. "Narrative Visualisation: Telling Stories with Data." In *InfoVis*, 1139–48. http://vis.stanford.edu/files/2010-Narrative-InfoVis.pdf.

Simmel, Georg. 1903. "Georg Simmel,The Metropolis and Mental Life (1903) in Gary Bridge and Sophie Watson, Eds - Simmel_21.pdf." http://www.esperdy.net/wp-content/uploads/2009/09/Simmel_21.pdf.

Simonsen, Jesper, and Toni Robertson, eds. 2012. *Routledge International Handbook of Participatory Design*. 1 edition. New York: Routledge.

Singelmann, Joachim. 1996. "Will Rural Areas Still Matter in the 21st Century? (Or) Can Rural Sociology Remain Relevant?1." *Rural Sociology* 61 (1): 143–58. doi:10.1111/j.1549-0831.1996.tb00614.x.

Slaughter, Richard. 2004. *Futures Beyond Dystopia: Creating Social Foresight*. Psychology Press.

Slaughter, Richard A. 2002. "Critical Futures Study as an Educational Strategy." In *New Thinking for a New Millennium: The Knowledge Base of Futures Studies*, edited by Richard A. Slaughter. Routledge.

Söderström, Ola, Till Paasche, and Francisco Klauser. 2014. "Smart Cities as Corporate Storytelling." *City* 18 (3): 307–20. doi:10.1080/13604813.2014.906716.

Son, Hyeonju. 2013. "Alternative Future Scenarios for South Korea in 2030." *Futures* 52 (August): 27–41. doi:10.1016/j.futures.2013.06.005.

———. 2015. "The History of Western Futures Studies: An Exploration of the Intellectual Traditions and Three-Phase Periodization." *Futures* 66 (February): 120–37. doi:10.1016/j.futures.2014.12.013.

Sparke, Penny. 2013. "Ettore Sottsass and Critical Design in Italy, 1965-1985." In *Made in Italy: Rethinking a Century of Italian Design*, by Grace Lees-Maffei and Kjetil Fallan. A&C Black.

"Speculation." 2017. *Oxford Dictionaries | English*. Accessed March 28. https://en.oxforddictionaries.com/definition/speculation.

Spiegelhalter, David, Mike Pearson, and Ian Short. 2011. "Visualizing Uncertainty About the Future." *Science* 333 (6048): 1393–1400. doi:10.1126/science.1191181.

Spies, P. H. 1982. "Scenario Development: Its Role and Importance in Future Research." *Scenario Development for Strategic Management. UFR Occasional Paper* 82 (1): 2–9.

Steenbergen, Bart van. 1970. "Critical and Establishment Futurology." In *Challenges From the Future*, edited by Kato Hidetoshi, 1:93–103. Tokyo.

Sterling, Bruce. 2005. *Shaping Things*. Cambridge, Mass: MIT Press.

———. 2012. "Sci-Fi Writer Bruce Sterling Explains the Intriguing New Concept of Design Fiction (Interview by Torie Bosch)." *Slate*, March 2. http://www.slate.com/blogs/future_tense/2012/03/02/bruce_sterling_on_design_fictions_.html.

Stirling, Andy. 2010. "Keep It Complex." *Nature* 468 (7327): 1029–31. doi:10.1038/4681029a.

Stokes, Kathleen, and Emma Clarence. 2014. "Making Sense of the UK Collaborative Economy." Nesta. http://www.nesta.org.uk/publications/making-sense-uk-collaborative-economy.

Stringer, Ernest T. 1999. *Action Research*. Sage Publications.

Stuart, John A. 1999. "Unweaving Narrative Fabric: Bruno Taut, Walter Benjamin, and Paul Scheerbart's the Gray Cloth." *Journal of Architectural Education* 53 (2): 61–73. doi:10.1162/104648899564439.

Swan, Jacky. 2006. "Commentary on Wanda Orlikowski's 'Material Knowing: The Scaffolding of Human Knowledgeability.'" *European Journal of Information Systems* 15 (5): 467. doi:http://dx.doi.org.ezproxy.lancs.ac.uk/10.1057/palgrave.ejis.3000640.

Swann, Cal. 2002. "Action Research and the Practice of Design." *Design Issues* 18 (1): 49–61. doi:10.1162/07479360252756287.

Swyngedouw, Erik, Frank Moulaert, and Arantxa Rodriguez. 2002. "Neoliberal Urbanization in Europe: Large–Scale Urban Development Projects and the New Urban Policy." *Antipode* 34 (3): 542–77. doi:10.1111/1467-8330.00254.

The Creative Exchange. 2016. "The Creative Exchange Final Report to AHRC." http://thecreativeexchange.org/reports/CX_Final_Report.pdf.

"The Liveable Cities Project - Liveable Cities." 2015. Accessed October 28. http://liveablecities.org.uk/content/liveable-cities-project.

The Public Design Workshop. 2010. "Growbot Garden." http://publicdesignworkshop.net/portfolio/growbot-garden/.

Thompson, John B. 1984. *Studies in the Theory of Ideology*. University of California Press.

Thomsen, Christian Werner. 1994. *Visionary Architecture: From Babylon to Virtual Reality*. Prestel.

Thorp, Jer. 2013. "Visualization as Process, Not Output." *Harvard Business Review*. April 8. http://blogs.hbr.org/2013/04/visualization-as-process/.

Tolon, Kaya. 2012. "Futures Studies: A New Social Science Rooted in Cold War Strategic Thinking." In *Cold War Social Science*, edited by Mark Solovey and Hamilton Cravens, 45–62. Palgrave Macmillan US. doi:10.1057/9781137013224_3.

Tonkinwise, Cameron. 2014. "How We Intend to Future: Review of Anthony Dunne and Fiona Raby, Speculative Everything: Design, Fiction, and Social Dreaming." *Design Philosophy Papers* 12 (2): 169–87. doi:10.2752/144871314X14159818597676.

———. 2015. "Design Fictions About Critical Design." *Modes of Criticism*, February 11. http://modesofcriticism.org/design-fictions-about-critical-design/.

———. 2016. "Cameron Tonkinwise: Speculative Practice Needs Diverse Cultures (Interviewed by Speculative.hr)." http://speculative.hr/en/cameron-tonkinwise/.

Topgaard, Richard. 2012. "Call for Submissions: Making Futures - Challenging Innovation (PDC Workshop, Aug 13, Roskilde)." *Medea*. May 7.

http://medea.mah.se/2012/05/pdc2012-workshop-making-futures-challenging-innovation/.

Tufte, Edward R. 2001. *The Visual Display of Quantitative Information*. 2nd ed. Cheshire, Conn: Graphics Press.

———. 2006. *Beautiful Evidence*. Cheshire, Conn.: Graphics Press.

UK Government Office for Science. 2013. "Foresight Projects - GOV.UK." https://www.gov.uk/government/collections/foresight-projects.

Urry, John. 2002. *Global Complexity*. Malden, MA: Polity Press.

———. 2016. *What Is the Future?* Cambridge, UK ; Malden, MA: Polity Press.

Urry, John, Javier Caletrio, Thomas Birtchnell, and Serena Pollastri. 2014. "Living in the City." Future Cities. UK Government, Office for Science. https://www.gov.uk/government/publications/future-cities-living-in-the-city.

Urry, John, Christopher D. F. Rogers, Nick Dunn, Adriana Ortegon, Cosmin Popan, Katerina Psarikidou, Serena Pollastri, et al. Forthcoming. "Is Car-Free the Future for Cities?"

Valsecchi, Francesca, Paolo Ciuccarelli, Donato Ricci, and Giorgio Caviglia. 2010. "A Didactical Framework to Experiment the Potential of Visual Languages in Engaging Social Complexity." In *Proceedings of DRS2010*. Montreal.

Valsecchi, Francesca, Serena Pollastri, and Yongqi Lou. 2011. "DESIGN Harvests: A Network of Social Collaborative Innovation Hubs." In . Delft.

Venturini, Tommaso. 2009. "Diving in Magma: How to Explore Controversies with Actor-Network Theory." *Public Understanding of Science*, May. doi:10.1177/0963662509102694.

Venturini, Tommaso, Donato Ricci, Michele Mauri, Lucy Kimbell, and Alex Meunier. 2015. "Designing Controversies and Their Publics." *Design Issues* 31 (3): 74–87. doi:10.1162/DESI_a_00340.

Viegas, F. B., M. Wattenberg, F. van Ham, J. Kriss, and M. McKeon. 2007. "ManyEyes: A Site for Visualization at Internet Scale." *IEEE Transactions on Visualization and Computer Graphics* 13 (6): 1121–28. doi:10.1109/TVCG.2007.70577.

Voros, Joseph. 2003. "A Generic Foresight Process Framework." *Foresight* 5 (3): 10/21. doi:10.1108/14636680310698379.

Webb, Michael. 2011. Interview: Michael Webb Interview by Tim Abrahams. https://cosmopolitanscum.com/2011/10/28/interview-michael-webb/.

Whitehead, Alfred North. 2010. *Process and Reality*. Simon and Schuster.

Whyte, Iain Boyd, ed. 1985. *Crystal Chain Letters: Architectural Fantasies by Bruno Taut and His Circle*. Cambridge, Mass: The MIT Press.

Wirth, Louis. 1938. "Urbanism as a Way of Life." *American Journal of Sociology* 44 (1): 1–24.

Wood, John. 2008. "Changing the Change:A Fractal Framework for Metadesign." In *Changing the Change Proceedings*. Turin, Italy. file:///C:/Users/asus/Downloads/JW_Changing_Change_08%20(1).pdf.

worldwithoutoil.org. 2017. "Home :: World Without Oil." Accessed April 23. http://writerguy.com/wwo/metahome.htm.

www.gamesforcities.com. 2017. "Games for Cities." Accessed April 23. http://www.gamesforcities.com.

Yaneva, Albena. 2012. *Mapping Controversies in Architecture*. Burlington: Ashgate.

Yee, Joyce S. R. 2010. "Methodological Innovation in Practice-Based Design Doctorates." *Journal of Research Practice* 6 (2): Article M15.

Yin, Robert K. 1981a. "The Case Study as a Serious Research Strategy." *Knowledge* 3 (1).

———. 1981b. "The Case Study Crisis: Some Answers." *Administrative Science Quarterly* 26 (1): 58–65. doi:10.2307/2392599.

Zakaria, Wan Fariza Alyati Binti Wan. 2010. "Future Studies in Contemporary Study of the Works of Ziauddin Sardar, Mahdi Elmandjra, Alvin Toffler and Daniel Bell." The University of Birmingham.

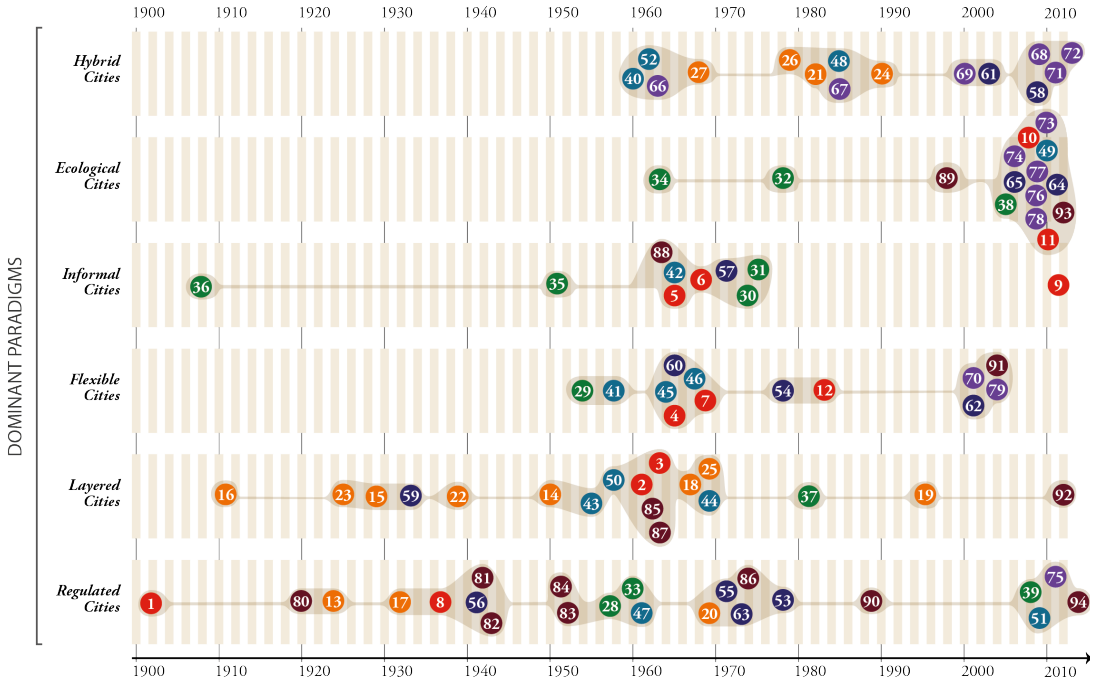
Zask, Joëlle. 2016. *La Démocratie Aux Champs. Du Jardin d'Éden Aux Jardins Partagés, Comment L'agriculture Cultive Les Valeurs Démocratiques*. Paris: La Découverte, Les Empêchours de penser en rond.

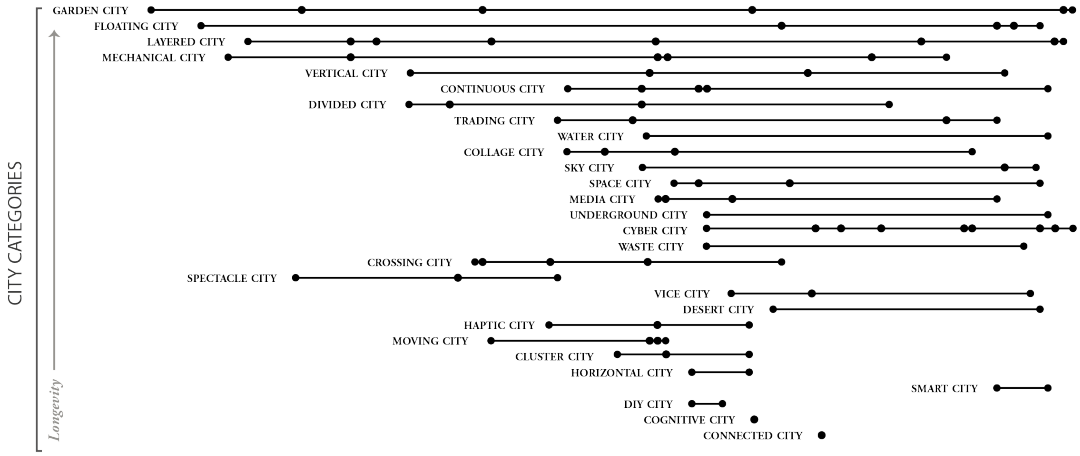
APPENDIX A – ADDITIONAL INFORMATION AND FULL-SIZE IMAGES

A VISUAL HISTORY OF THE FUTURE. A TIMELINE AND A TAXONOMY

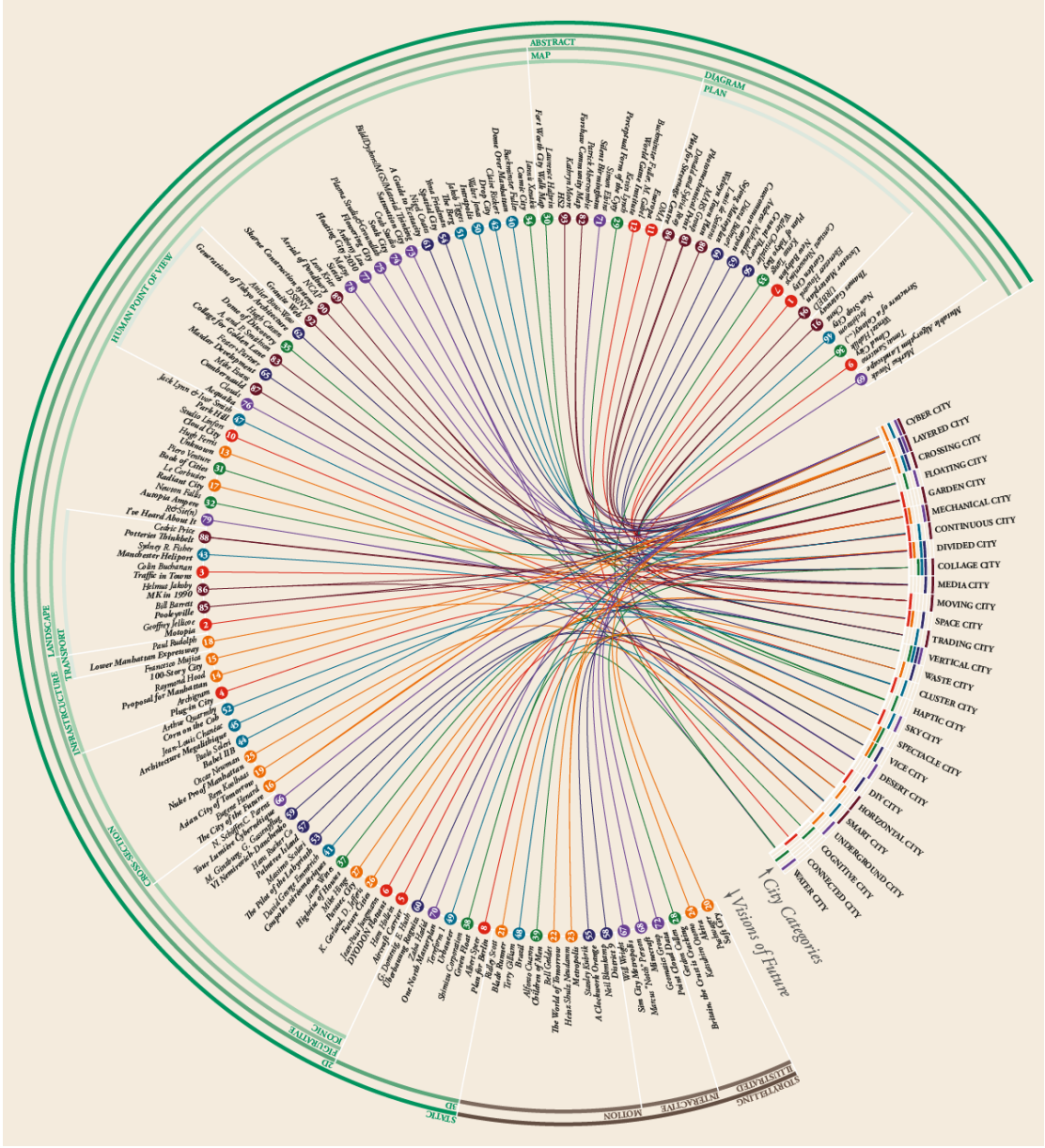
The timeline and the taxonomy included in this appendix are part of the report *A Visual History of the Future* (Dunn, Cureton, and Pollastri 2014); see Chapter 2 for more information

- A timeline of the last 100 years of future visions.

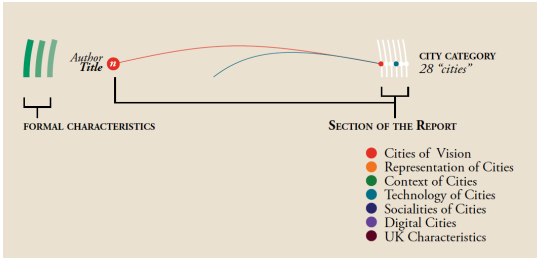




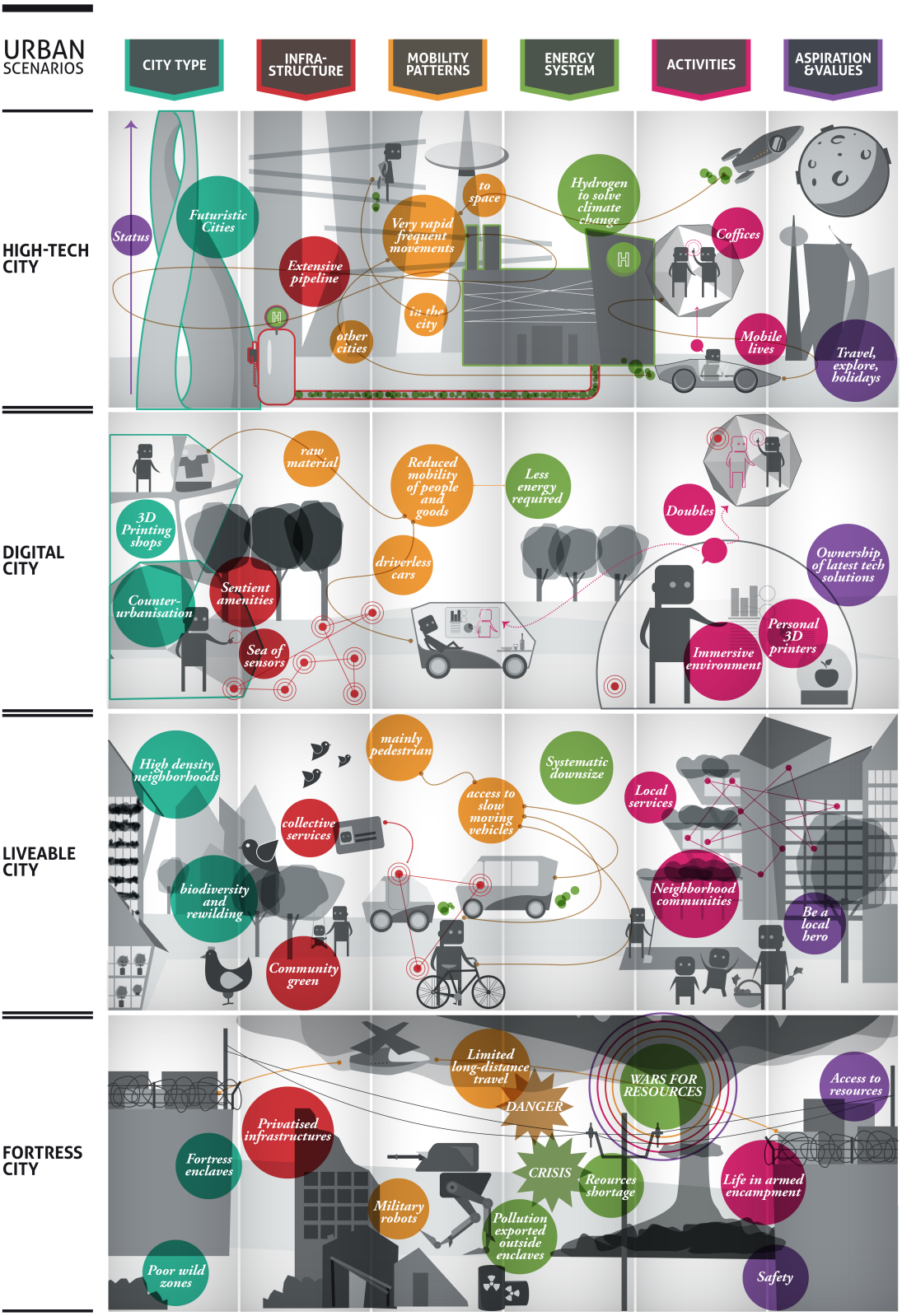
- A Taxonomy of visualisations of urban futures.



How to read the taxonomy:



DE#0, LIVING IN THE CITY. THE FOUR SCENARIOS.



DE#1 ENVISIONING URBAN FUTURES

The table below includes the texts of the Thinking Cards used in the workshops.

Category	Name	Description
Technology	Smart Environments	Real life and digital life converge in environments that sense people's behaviour and respond to it.
	Smart Homes	Smart Homes regain a position at the centre of urban life as some social and economic activities and services can be developed within them (i.e. health care, energy production, distributed work, learning, entertainment, and communication).
	Real Time News Spread	The pervasive diffusion of connected devices allows anyone to broadcast anything, anywhere, to anybody. News is amplified and delivered real-time on multiple platforms.
	Wisdom of the Cloud	Most of the data available is stored or passes through the Cloud. This knowledge is accessible anytime and anywhere.
	Mind Control	Brain implants translate brain waves into computational data. Devices can be mind-controlled and brain-to-brain sharing of knowledge is possible.
	Digital Manufacturing	Goods can be produced at the site of consumption and customised for the individual user. Compact 3D printers are available for home use.
	Flexible infrastructure	New intelligent technologies and substances like carbon nanotubes and graphene are likely to change the way we build and repair on multiple scales and in a multiplicity of settings. This have implications on the longevity and flexibility of buildings and infrastructures as they can be easily adapted.
Social	High Density	According to EU projections, Britain's population will increase by 25% by 2060. Most people choose to live in cities, which haven't lost their role as cultural and economic hubs.

	Smart Homes	Smart Homes regain a position at the centre of urban life as some social and economic activities and services can be developed within them (i.e. health care, energy production, distributed work, learning, entertainment, and communication).
	Slow Mobility + Virtual Mobility	A network of slow mobility solutions (bike sharing, eco-cars etc) can be accessed at any time, for short distance commute. Virtual access is the preferred solution to reach distant locations.
	More access, less ownership	A different concept of happiness and wellbeing, based on access to services, slow life and quality of social relations rather than on the ownership of goods, is promoted as a value.
	Multiculturalism	International mobility increases towards cities with promising cultural or employment opportunities. In the UK, migration represents the most important population growth factor.
	Ageing Society	Innovation in Health Care, and easier access to self-check up and monitoring, extend life expectancy. The impact of retired people on the demographic is higher than it has ever been.
	Community Life	Public spaces (including roads) are designed to facilitate community life
	Health and Chronic Diseases	Linked to ageing society and covering the fact that the majority of deaths are now caused by chronic diseases. People are living longer, but not necessarily healthier and the burden is being felt by increased demand for social care (as opposed to healthcare)
	Corteous Public Infrastructure	The city' public spaces and infrastructures are designed to reduce stress by stimulating trust and positive social interactions and promoting behaviours and attitudes that facilitate the functionality of the city.
	Active and Inclusive Mobility	The city ensures people's access to opportunities, activities, goods and services required to meet their main needs and aspirations within walking and/or cycling distances

Politics and Economics	Digital Security	A sea of sensors is integrated into the city's infrastructure to monitor its performance. People's "digital traces" are tracked and stored as a security measure.
	Unconventional Office Spaces	Neighbourhood co-working spaces are used more frequently than traditional office spaces. Most of the work can be done remotely and in virtual presence.
	Working with Asia	Asia (and China in particularly) becomes a crucial actor in the global political and economic scenario. Local governments promote different channels for collaboration, and try, at the same time, to improve their competitiveness.
	Mobile Governance	Decision making processes are shaped by fast effective citizen-local government communication made possible through geo-referencing and mobile communication giving people a tool to draw attention to local issues
	Integrated Services Packages	Preference is given to acces over ownership. Both government and private service providers develop multi-brand, private-public mixed strategies for the integration of services.
	New Economic Metrics	The main economic objective is no longer to increase GDP, but to increase GPI (genuine progress indicator) a metric that accounts for individual consumption but also for social, ethical and environmental values (i.e. carbon and ecological footprint, crime, health access, etc)
	Green Businesses	Government procurement is mostly directed to boost the creation of green bussineses and jobs
	Ecological Regenerative Cities	The city seeks to continuously regenerate natural systems, from which they draw resources, through policies to promote use of renewable energies and economic tools such as waste disposal taxation and carbon taxes to achieve zero waste targets
Environment	Air Quality Monitoring	Environmental data are constantly monitored. Strict measures regulate private transport and emissions to improve the quality of air in cities.

	Urban Agriculture	Urban agriculture is the main mechanism for food supply in cities. Several forms of farming such as community farms, commercial farms, institutional farms, and community gardens are established. New ways to grow products are tested.
	Increased Energy Prices	A very basic plan is provided to everybody at a fair price, but any extra usage is paid a premium price. (And it is very easy to exceed the basic limits, when most of our life is digital)
	Climate Change (Global Warming)	Weather unpredictability and extreme natural phenomena caused by climate change are more and more frequent.
	Small homes, bigger green common areas	Houses are tiny, often shared with others. Private space is a luxury, because green common areas are incentivised. (for urban farming, biodiversity, rain water harvesting etc.)

APPENDIX B – BEYOND THE THESIS

This Appendix includes side projects and publications

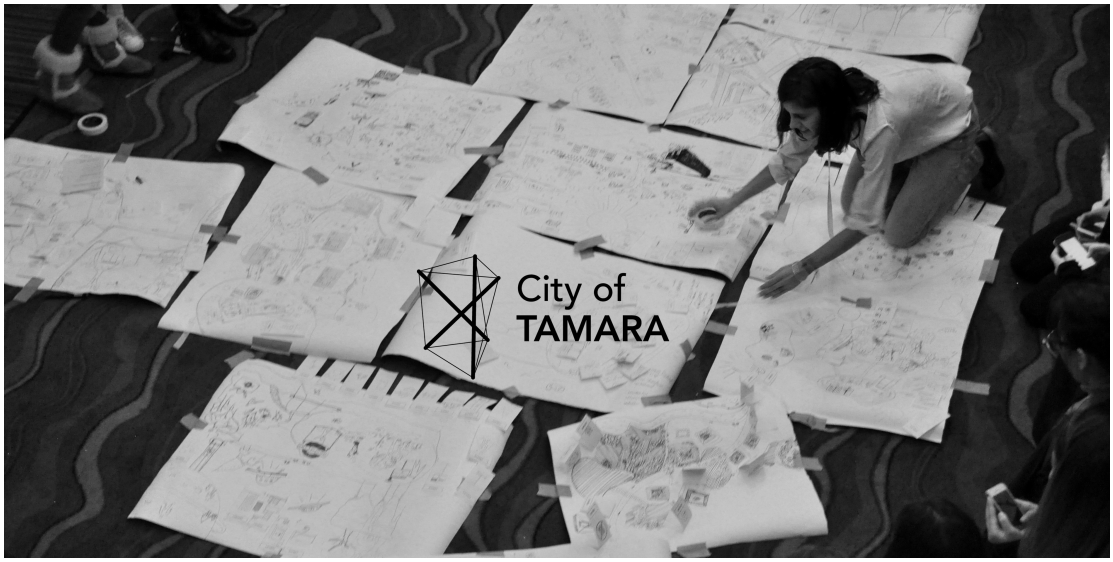
PROJECTS

This section includes two projects that have been inspired by the VCUF approach, but that for different reasons could not be included in the main body of the thesis.

- Designing Tamara was a workshop conducted at Chelsea College of Art (UAL).
- Wearable Maps for Data Walks is an ongoing project that was initially developed as part of a "Walk and Talk" event organised in November 2016 with Dr. Maria Angela Ferrario (Lancaster University, SCC) and Louise Mullagh (Lancaster University HighWire).

These two projects have been inspired by the research conducted for this PhD. They are the two "Design Experiments" outside of the inquiry area represented in Figure 11 (Part A, Chapter 4).

Designing Tamara



Designing Tamara was a Visual Conversations on Urban Futures (VCUF) workshop that took place at the Musing inside Systems event at Chelsea College of Art on November 8th 2016.

The workshop was intended as a playful way of engaging participants to reflect on collaborative city-imaginaries: what are the forces and dynamics that shape the city? What are the challenges? Can visions of possible futures have a role in supporting democratic dialogues? To do so, 170 students from the BA in Interior and Spatial Design were involved in a role-play experiment that transported them to the year 2100. Here, they were invited to join the "Centre for Urbanism Prototyping", a fictional participatory design agency that prototypes new ways of urban living in the "Alternate Reality Mesh", before exporting the best ideas to Planet Earth.

Each participant was assigned a character, and collaborated with others in groups of 8 to design a neighbourhood, thinking of which urban objects could be created, amplified, or destroyed. Each group reflected on the values portrayed in the neighbourhood and

synthesise them in a Neighbourhood Micro-Manifesto. After a while, all neighbourhoods were assembled to create a large city in the middle of the room. The Neighbourhood Manifestos were placed on the corresponding neighbourhoods, and the collaborative artefact was photographed and translated into a compositional manifesto of the imaginary city.

In the second part of the workshop, individual groups were given a series of challenges that disrupted the equilibrium of the utopian city built in the first part, and forced them to negotiate strategies, design solutions, and highlight conflicts across neighbourhoods. At the end of the workshop, we reflected on dynamics that emerged during the activity, and the purpose of designing speculative cities.

A video of the event was published (with permission from the course conveyor) online: https://vimeo.com/191015414

Wearable Maps for Data Walks

The aim of this project was to consider the different types of data that can be mapped by exploring an outdoor environment, and understand how to map and visualise this heterogeneous information.

In December 2016 a group of 20 people from differing backgrounds including post-graduate students, writers, artists and academics were invited to a walk exploring the histories, the stories, and the elements of Sunderland Point, in Morecambe Bay. The aim of the project was to explore methods for the collection of multiple types of data from the same place. Inspiration for the content was drawn from The Gathering Tide, a book charting the history of Morecambe Bay in which Sunderland Point is featured.

Each participant was given a wearable map, a tool to help capture subjective territorial data through samples, notes and sketches. The maps enabled a pluralistic representation of space, to promote understanding and discussion. The wearable map is a long string with markers that indicate the five locations where we stopped during the walk. Participants use the provided clips and sample bags to map the data they collect as they walk. By not providing any geographical reference other than the stopping point, the map replicated the experience of the participant mapping the walk, as it would have been impossible to precisely locate the data samples on the map. The result of the project was a series of 15 unique and purposely inaccurate maps, populated with objects (sand, seaweed, stones, leaves…), notes, and drawings by participants.

The maps were displayed in an exhibit part of the Data Public Conference that took place in Lancaster in April 2017. The installation explores how we can make sense of and display subjective data collected through the Wearable Maps as well as with other digital methods. It asks questions such as; what do the two methods afford? How does looking at multiple sources of data contribute to the understanding of the complexity of a place?