

# Constructing our futures anew

For greater intensity of becoming

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## Abstract

This thesis investigates futurists' capacity to engage with the future. Inspired by actor–network theory (ANT) and the laboratory studies of Karen Knorr-Cetina and Bruno Latour, it identifies and characterises two aspects of capacity to engage with the future. These aspects are the relational and processual, with a focus on the future and time. The relational aspect is identified through drawing on Knorr-Cetina's work on the post-social epistemic object relations. The processual aspect is identified through drawing on Latour's work on the construction of facts involving inversion and the process of turning time.

The theoretical framework that informs this study combines ANT (through the work by Michel Callon, Latour and John Law) and process philosophy, and is particularly concerned with those principles relating to time. This thesis begins by reviewing the FS literature through the analytical lens of Latour's characterisation of modernity as being the ongoing separation of the social and nature through the work of purification and translation. This thesis identifies similar work of purification and translation in FS and contends that futurists are being distracted by this from resolving the problems they attribute to the purification work. The thesis argues that futurists could start to overcome this problem by re-establishing the connection between the work of translation and the work of purification.

This thesis develops a way through this dilemma through close analysis of empirical data on how FS students and graduates actually engage with the future. The data was collected from 28 hours of in-depth semi-structured life course interviews with students (past and present) of postgraduate futures studies educational courses internationally. The data analysis identifies two types of epistemic object relations, an unfolding relation and a co-creating relation. It also identifies two types of processes for engaging with the future, a reflection process and a process of turning to the conditions. Participant data shows that futurists' capacity to engage with the future, for both the relational and processual aspects, are similar to but extend beyond those identified by Knorr-Cetina and Latour. Whereas Knorr-Cetina characterised scientists as ordering their relation to the future as the unfolding of knowledge towards goals or targets under controlled conditions, the research participants in this study are characterised as going beyond that. Their relation to knowledge is to be actively poised for, yet aware of, the limits to knowing and responding, and the emergence out of inexistence of new and novel events and entities from the world where they have no control. Whereas Latour identified the reflection process of researchers as the ordering and manipulating of entities along a (standard) time framework, the participants in this study go beyond that. This thesis identifies a process wherein they turn to the conditions from which the future is being generated to identify change in what appears to be stable or static. This often involves objects that specify the conditions for change without fixed time frameworks.

Comparisons between the participants at different stages of their studies suggest that futures studies postgraduate education is perhaps relevant to differences in capacity to engage with the future.

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Professional accredited editor Mary-Jo O'Rourke AE provided copyediting and proofreading services according to the university-endorsed national 'Guidelines for editing research theses'.

## Declaration

This thesis:

1. contains no material which has been accepted for an award to the candidate of any other degree or diploma, except where due reference is made in the text of the examinable outcome;
2. to the best of my knowledge contains no material previously published or written by another person except where due reference is made in the text of the examinable outcome; and

Signature:

A handwritten signature in black ink, appearing to read "B. M. Bok". The signature is written in a cursive style with large, bold letters.

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## List of abbreviations

APF	Association of Professional Futurists
FS	Futures studies
KKC	Katrina Knorr-Cetina
LL	<i>Laboratory Life</i>
MFS	Master of Futures Studies (or similar qualification)
MP	Millennium Project
STS	Science and technology studies
TF	Technology foresight
WFS	World Future Society
WFSF	World Futures Studies Federation
WWII	World War II



## Key to interview extracts

Conventions used in the presentation of interview excerpts.

:	a stretched out sound
(.)	a slight pause
(..)	a longer pause
(...)	a much longer pause
.hh	a chuckle, giggle or burst of laughter
<i>word</i>	stronger-than-usual stress on word
<b>WORD</b>	stronger-than-usual stress on word accompanied by raised voice
((observation))	non-verbal elements observed about the conversation or voice quality
/	minor, nonfinal phrase boundaries
//	major, final phrase boundaries
[...]	excluded text
[text]	added text

## Prologue: A fortuitous meeting of time and futures

Bemused but impatient, I drew a piece of a jigsaw puzzle from the envelope. “You now each have a piece of a jigsaw puzzle. Find the other people in the room who can help you complete your puzzle,” the futurists instructed, “and then talk in your group about what your puzzle image means for you”. Still undecided about signing up for a postgraduate strategic foresight course, I have decided to attend this group meeting at a student recruitment event. My puzzle piece fits an image that looks like a dried-up water basin or salt pan in a desert. The image summons up fears of life on Earth destroyed by human greed and pollution, reminders of the problems of drought, such as the one gripping parts of Australia, and hope, knowing that people have built and sustained lives on the resources mined from many types of landscapes. We talk about how each possibility could be an image of an alternative future. The landscape image leaves a profound impression on me. I feel as if I am surveying a landscape that exists from before the dawn of life and endures beyond the end of life, to the dawns and ends of new lives. I can only mumble, “it feels like I’m experiencing time”. My puzzle piece completes an image of a landscape that rekindles my interests in time and in that instant my priorities change so that time becomes my reason for attending. I sign up for the course, but it is many years before I begin work on this research project. First, I have to learn a great deal more about futures studies and futurists.

I begin to notice that among futurists there are those who demonstrate ways of engaging with the future that are not mentioned in mainstream literature or, where they are mentioned, seldom in connection with the future. I can see their ways of engaging with the future are significant for addressing the great challenges facing humanity. It also seems highly relevant to many of my questions about time. I want to know more. One way I describe my observations about futurists is to say they are able to create an opening in a setting (for instance, in a conversation or argument) so that what is ‘missing’ or ‘obscured’ can be recognised, and they then create movement to include what is missing. What is missing or obscured is not what everyone knows is missing or obscured, such as something that is known but not relevant to the situation. Not that sort of missing. These futurists seem to recognise what is *not* there that is hidden or difficult to make out, despite explicit identification. Heidegger (1992, pp. 27–28) calls on readers’ foresight when he writes about truth and falsity. He recalls that the weeping Odysseus was concealed as shedding tears not because those present failed to notice him crying under his cloak, but because they thought around him and his existence lay a concealment that “cut them off from him”. His point is, whether or not something can be experienced “depends on whether concealment or unconcealment *comes to pass*” (*italics added*). Perhaps studying futurists’ engagement with the future will ‘unconceal’ something about time for me. Irrespective, my hope for this research is for another promise to come to pass, that is, for the work of futurists, namely futures studies, to make a difference to our time in the world.

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# Chapter I

## The isolation of being from becoming

### 1.1 Introduction to the thesis

Ideals fashion themselves round these two notions, permanence and flux. In the inescapable flux, there is something that abides; in the overwhelming permanence, there is an element that escapes into flux. Permanence can be snatched only out of flux; and the passing moment can find its adequate intensity only by its submission to permanence. Those who would disjoin the two elements can find no interpretation of patent facts.

Whitehead (1979, p. 338)

It is the third major storm slamming into the country, making it the wettest month ever recorded and causing misery for residents. Frida has been consulting for many years since graduating from the futures studies master's course. The storms are reminding her that she is not making a difference to addressing the significant social and environmental challenges humanity faces. She feels very frustrated even though she and her team are doing great futures analysis work. She decides to walk home and along the way passes the upturned frames of a children's playground. Suddenly it is clear to her. Her life's work is the playground. She wants to bring form and structure to malleable things, to make their parts into temporary wholes that are valuable. She quickly begins transforming her business to fulfil her new vision. Storms, frustrating experiences, concerns and an upside-down playground help her to review her vexed situation and renew her business. She makes an important turn in understanding herself and in knowing how to put her life's work into practice. She describes the turn she has experienced as corresponding to conditions at the bottom of a U. The challenges that Frida concerns herself with have a basis in what is happening in the world, although not everyone responds to the situation in the particular way she has<sup>1</sup>.

The increasing rates of change in industries, the increasing complexity of organisational environments and workplaces, and the increasing challenges facing societies are all matters of concern. Such matters of concern raise questions about the consequences of people's choices and their capacities for developing adequate solutions to problems or issues in complex environments characterised by constant change and uncertainty. Compared to past generations, people today have to make more difficult decisions about how to direct their lives and work, and how to thrive in dynamic and uncertain circumstances. Global challenges are raising doubts about the effectiveness of people's education in helping them develop the range of competencies and skills required for dealing with the uncertainties of complex and constantly changing environments and for leading innovative organisations. For instance, there are calls from the Australian Business Deans Council (2014) and Australian Industry Group (2015) for graduates with the capacity to deal with situations

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<sup>1</sup> This event is taken from one of the participant interviews. I have changed certain details to preserve the anonymity of the participant.

of complexity, uncertainty and change. Furthermore, there is a gap between developing human capital to deal with the complexities of global challenges and the actual practices of people in organisations. This gap is also a concern for governments, such as for the Australian Government (2013).

Next I take a look at two of the many examples that illustrate that how people deal with situations of complexity, change and uncertainty can have significant consequences for current and future generations.<sup>2</sup> The first example is of the cycles of crashes and crises in the complex systems of the global financial/banking sector described by, for example, Matthew, Folarin and Ranald (2016) and Zeidan and Richardson (2010). The global financial crisis of 2007–2008 was a major disruptive event affecting national economies. According to the British Academy (2009, p. 2) in their letter to Her Majesty the Queen, many people predicted the disastrous event but trusted that the experts “knew what they were doing”, everyone believed any irregular situation could be controlled and managed. After all, people believe experts and professionals, they trust the thousands of talented people with impressive careers and they are sure those in charge have the “will to act” and “the right instruments to bring to bear” (p. 1). Or, to put it like Carr (2014, p. 9), these people are entrusted with rights, obligations and public accountability, with the moral contract specifying the “public service criterion of professions”. As it turned out, it was beyond the powers of the professionals, experts or anyone else to prevent a severe global crunch impacting on many millions of people’s work, accumulated assets and means of supporting their families.

The second example is the case of levee breaches around New Orleans, as described by Pickering (2008). Engineers and scientists designed the levees in the Mississippi to protect New Orleans from floods. The function of the levees is to confine and control the river to flow around the city. However, Pickering notes, this has never worked because the levees need to be continually raised to hold back the river. The problem is that as the levees increase in height, so the river rises higher, damages the levees and floods the city. Every time engineers and scientists design a solution sure to resolve the problem, the river rises and finds its way over and through the levees. Pickering describes the situation as a very costly interplay, a “dance of agency,” between people and river in an ongoing battle and struggle (pp. 1, 7). Pickering’s point is that by trying to stop time, by trying to portray the world as unchanging and without complex interactions, that is, by not recognising the world as *becoming*, the experts’ solutions remain unsuccessful.

These are two compelling cases of a tension between, on the one hand, the need for experts to deal with complex situations and states of ongoing change with little certainty over consequences, and on the other hand, the results of expertise established on beliefs in a world behaving according to stable and unchanging principles.

The systematic methods of scientific enquiry for building knowledge about the world inspire

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<sup>2</sup> These examples are only illustrative of the types of problems generated and are not intended to limit the discussion to any particular group or category. For example, the demographic crisis generated by the one child policy in China has produced economic and other imbalances that severely affect millions of people’s lives across multiple generations even though it was in force for only about 25 years.

confidence in expertise and thus a sense of the inevitability of stability and certainty. There is a catch, however. Schon (1973) describes how constancy, unchangeability and stable states provide certainty in life and reduce our apprehension over threats that go along with change. That is, stability is associated with feelings of certainty and confidence, while change is associated with feelings of uncertainty and threat. Many scholars, including Schon (1973) and Slaughter (2012), identify the scientific experimental enquiry framework, that is, the *being* view of the world, as central to how the Western industrial world view was shaped and how it came to occupy a dominant position in the world today. Pickering describes it as a view that does not recognise the world as *becoming*. Admittedly, professionalism and expertise are not associated with a particular world view. However, Carr (2014, p. 9), in his careful analysis of the differences between occupations, defines the expertise of professionals and experts as the “academic or research-based knowledge and understanding normally acquired through graduate and/or postgraduate study”. Therefore, given the (Western) academic link, expertise is steeped in the *being* view of the world.

It is here that Fraser (2007, p. 78) provides a twist in the ‘*being* or *becoming*’ tale of the world: natural science has found, through the discovery of the probabilistic laws of quantum theory, that a world of *becoming* may be prior to (more basic than) a world of *being*. Fraser is referring to a debate that has been going on for thousands of years, a disagreement over two views of the essence of the world. According to one view, the world is a world of *being* or permanence. According to the other view, the world is a world of *becoming* or change. Fraser argues that the *being* view is given priority in the natural sciences, meaning that sciences like quantum physics argue from a position that gives prominence to timeless being or permanence and an inferior role to change and becoming, which only emerge from permanence. The paradox he identifies is that the probabilistic laws of quantum theory specify the most primitive (being) forms of nature, yet the results of quantum theory show indisputably that the laws of nature, of the primacy of permanence and being, break down. In other words, extending Fraser’s argument to expertise built on the being and permanence view inherited from the sciences, the breakdown holds. Therefore, a desire for certainty and stability cannot depend on nature for its truthfulness, its inevitability. Hence, expertise grounded in a world view of being but deployed in conditions of uncertainty and change poses a puzzle about experts’ desire for certainty: maybe they have never been certain.<sup>3</sup> Maybe experts’ certainty (and all their expertise built on that) could well come down to their capacity to engage with the future.

Arguments for the important role of education in building human capacities are rehearsed often, not only in connection with children (see for instance, World Bank 2018) but also for adults and adults as professionals (see for instance, Australian Workforce and Productivity Agency 2013, Morin 1999, OECD 2017, and The LEAP National Leadership Council 2007). Education (including

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<sup>3</sup> That indeed there may be doubt is testified to by Verran (1999), who tells of the different truths which numbers created at a Nigerian school. Rather than length being an abstract notion of spatial extension of children’s ‘height’, it was understood as ‘multiplicity’ (the number of times that a string is wound around a card).

the quality of the education and learning) is important because of the benefits to society (Australian Workforce and Productivity Agency 2013), to the improved health and enrichment of individuals' lives (Morin 1999 and OECD 2017), and of the reduction of the injustices of unfulfilled potential, impoverished lives and a devalued world (World Bank 2018). However, professional education needs to deal with a challenge to professionalism and a crisis of confidence in professionalism (Dall'Alba 2009, Kaner 2011, Scanlon 2011). Part of the problem is that occupational practice continues to change, professionals transition more frequently in occupations, and the requirements for practice continues to change (Billett, Harteis and Gruber 2014) and workplaces now "requires workers who are able to respond appropriately to changing demands." (Su 2014, p. 1212) Thus, professional education needs to provide a thorough and robust initial preparation (usually in undergraduate degrees) for the increasingly complex and demanding requirements of professional practice, but they need to also provide for the, now essential, ongoing professional learning and development throughout professionals' working lives (Billett et al. 2014). There is also another side to the arguments to consider. Mintzberg and Azevedo (2012) "argue for the potency of social initiatives promoted by communities of engaged people" to resolve the many serious and difficult problems in the world, problems like poverty and climate change (p. 895). It implies that professionals, who want to step up to Mintzberg and Azevedo's challenge, may feel an extra obligation to consider advancing their capacities, and perhaps to go even beyond the boundaries set by their own professions.

Therefore, professional development is an important site where professionals develop their capacity to engage with the future and hence where professionals learn, for example, about the social and practical role of the different futures timeframes. Bussey, Inayatullah and Miljević (2008) identify three broad educational approaches (pedagogies) for futures education, each with its own priorities and orientations: "the future of education", "education for the future", and "alternative futures education" (pp. 3–5). First, the future of education approach teaches the official future. This future is obvious, it exists in the external world, the assumption is that this future can, to some extent, be predicted, and it is information about this future that is useful for strategic purposes. Knowing more about the official future helps to reduce risk and ensures success for one's organisation or nation. Second, the education for the future approach is a prophetic approach to futures education. The future serves as a warning of danger ahead, that there is no alternative but to change and therefore the future is seen as something to save. It often takes a social and environmental dimension, such as teaching for sustainability, and therefore focusses more on empowering and being sensitive to issues of diversity, equity and values. Third, the alternative futures of education approach is about learning and teaching with a central assumption that there is more than one possible future (alternative futures) which, given the uncertainty associated with an open future, cannot be predicted. The authors explain that this opens paradox and the possibility of agency as well as learning how our internal worlds are complicit in the world we are constructing; thinking about the future is a chance to think about ourselves and plans for the future. Gidley (2017, pp. 213–216) describes the alternative futures approach as a "postformal" pedagogy. Futures studies is important for imagination and promotes life

and vitality in people; an active imagination is a catalyst that "support the movement from *static* concepts to *living* thinking" (p. 209). She identifies that imagination, for example, involves the whole person, helps people renew their relationships with the world for a sense of connectedness and meaning, and helps people to hold contradictions in mind and weave together things that appear to be incompatible. For Dator (2002), this approach helps students "rise above their own narrow views of history" (p. 13), amongst his other observations from his experience teaching futures studies since 1967. The alternative futures approach also inspires educators to examine alternative pedagogies for transformative skills to deal with the huge practical and ethical problems of the twenty-first century (see for example, Inayatullah, Bussey and Milojević 2006).

In a context of professional development, alternative futures education is offered as masters programs, short courses, and seminars globally and some information is available on their common elements. There is growing demand for postgraduate training across the world and coursework masters courses continue to proliferate and grow extensively to the extent that they have surpassed research masters courses in scope and numbers, and at the same time the courses are changing and evolving as their role expands into professional and life-long education (Bamber 2015, Chapman and Chien 2014, Drennan and Clarke 2009, Kaur and Sidhu 2009, McInnis and Morris 1995, Sin 2012). Masters by coursework programs remain relatively unexplored in comparison to higher research degrees (Kiley and Cumming 2014), lacking in pedagogic literature (Mistry, White and Berardi 2009), the diversity between programs has meant that research in this area are subject to many difficulties (Reid, Rennie and Shortland-Jones 2005), and the available research tend to report on to what can be observed and aggregated about student experiences (e.g. student and staff interaction (Radloff, Coates, Taylor, James and Krause 2013)). A recent comparison of alternative futures masters programs found that the programs are similar in many respects but also have their differences (Bishop & Dator 2013). Important differences are, for example, in their differing faculties and structures (some programs are embedded in other degrees, some offer both a masters and doctoral degree, other degrees are standalone masters, some are offered full-time on campus while others are offered online). Bishop and Dator (2013) found striking commonalities in the course content of two courses. For example, in terms of theories, ideas, and concepts, both courses put significant emphasis on alternative futures theoretical orientations, systems thinking, theories of social change and stability, and on forecasting and planning methods, but they put differing emphasis cultural and language orientations compared to forecasting and planning. In terms of foresight frameworks, they teach generic foresight processes for conducting foresight projects, about developing scenarios, and about implementing foresight. In terms of methods, they found each course taught too many methods to list, although there was little overlap between the partial lists they compiled.

I claim that through their capacity to engage with the future, futurists (people like Frida) increase the intensity of becoming of situations or events. The aim of this research is to examine the connection between futurists' engagement with the future and dealing with situations and events of complexity, uncertainty and change. The research goes further, to probe into the relevance of

postgraduate education designed to develop futurists' capacity to engage with the future. The main research question guiding this thesis is: How do futurists engage with the future? The secondary research question looks for the relevance of postgraduate master's education to futurists' engagement with the future. The study has come together in tentative, hesitant moves of awkwardly selecting and arranging different elements from other methods, much like the method of assemblage described by (Law 2004). Nonetheless, there are important considerations that have recurred throughout the research process.

### 1.1.1 Research approach considerations

To start, three contrasts between Frida's previous and new businesses bring out the various important considerations that I refer to in the rest of this chapter. First, in Frida's new business there is a sense of movement and fluidity that contrasts with the structured nature of her previous work. In her previous work, she conducted detailed analyses and then wrote up the analyses and recommendations for action in reports to her clients. In her new business, she organises temporary events designed with processes and structures that transform meetings and conversations so that people leave equipped with actions to take. Her work has shifted from producing stabilised words on paper about situations that need stabilising to producing unstable events with unpredictable consequences. The focus of her work has shifted from writing detailed reports about making things more robust and longer lasting to facilitating events that are temporary and fluid moments of activity.

Second, in Frida's new business there is a sense of uncertainty that contrasts markedly with the sense of certainty she had in her previous work. For the events of her new business, she has to design open-ended yet structured processes taking into account the complexity of unpredictable responses from people. At these events, she has to deal with people's creative and surprising behaviour arising from their interactions, which she cannot foresee. This also applies to her clients who attend her events. Her clients have had to change from reading the structured words on paper produced by her previous business to attending events where surprising things might necessitate them to take action that is creative and generative in ways that reading reports does not require.

Third, in Frida's new business there is a sense in which she has to deal with complexity 'close up' that contrasts with dealing with complexity 'at a distance'. In her old business, to produce analysis reports she depended on her analytical skills and experience to determine the analysis parameters and criteria, over all of which she had direct control. As for the complex global challenges, they are 'further away' from her control. With the events of her new business, there is a greater distance from the control she exercises while the complex challenges she has to deal with are 'closer'. At an event, she has less control. Anything can go wrong in any moment. Anything could easily and surprisingly go more right than she has imagined. In writing her previous analysis reports, she was the one who made the recommendations about what actions to take to deal with the complex problems in the world. As such, she controlled the project outcomes and the actions to deal with complex challenges. In her new business, she has little control over the choices people come to make at the events about



the actions they want to take in the world. She has only indirect control and is thus ‘further away’ from the action to address the challenges she cares about. Instead of delivering more accurate forecasts and solutions designed to bring things under control, in her new business her engagement with the future requires that she attends to the conditions under which the future is constructed, the webs of relations that generate the future effects and consequences.

The first important consideration for this research concerns being and becoming. As Frida’s close encounter with complexity shows, she has to deal with both stability and instability, certainty and uncertainty. This is where Whitehead’s quote at the chapter opening deepens the discussion by giving another twist to the tale of being and becoming. Permanence and flux. Structure and process. Being and becoming. Three pairs of notions to express the same intuition.<sup>4</sup> Three pairs of words that designate two notions that are not polar opposites or antipodes, but rather are inextricably intermingled and entangled. It is an intuition conveyed by Whitehead’s quote. For Whitehead, it is clearly not a case of the pre-eminence of one ideal or the other. Rather, his intuition is that the two ideals are not independent. That is, structure can only be recognised given change, being can only be recognised given becoming, facts cannot be explained without resorting to change and, while process does not flow from structure, excerpts taken from process are needed in order to recognise permanence. Another way Whitehead phrases this is to say that an analysis of what something is amounts to an account of how it becomes, and that an account of how it becomes is an account of what it is (Whitehead 1979, p. 23). This is an important intuition for interpreting this research. It is particularly important because, as is evident from the previous discussions, it is possible to emphasise the one ideal to a greater or lesser extent or intensity relative to the other.

This research does not define, test or measure ‘becoming’. Nor ‘intensity’. Rather, different readers in different situations will have different interpretations of becoming and intensity. Some suggestions may nevertheless be helpful. In more metaphorical terms, perhaps becoming and intensity are reminiscent of the sidewalk café atmosphere. Depending on the particular morning, the strength of the aroma of percolating coffee wafting through the air, the clinking of cutlery and the conversations contribute to the vibrancy of the remainder of each patron’s day. Let’s playfully imagine Frida in her new business as the percolator from which the aroma streams. She designs the container that stimulates a complex brewing process and that enhances café circulations. Greater circulations increase the intensity of the atmosphere, expose patrons to higher temperatures and a mixture of aromas, and invite them into appealing environments where they interact with and absorb novel constituents. That’s enough of the flight of fancy. In more academic terms, the achievement of intensity is a central aim of entities in Whitehead’s metaphysical system, according to Jones (2010).

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<sup>4</sup> Knorr-Cetina (2014, p. 58) argues for a shift from conceiving of the theoriser as a “thinker” to seeing them as a “processor”. Thus, for her intuition does not refer to a rapid conclusion, gut feeling or impulsive unconscious behaviour. Likewise, I do not mean by ‘intuition’ a gut response, a superficial comparison of the two terms in a pair. Rather, I am referring to something both obvious and surprising about the connection between the two terms of the word pairs that requires careful comparison.

Citing Whitehead's *Process and Reality*, Jones (2010, p. 263) describes that "the 'subjective aim at intensity' ... is directive of creativity", which is the origination of patterns of assemblage in entities. That is, Jones is explaining that an entity's cumulative or successive emphasis (the aim at intensity) as it incorporates objects into its coming to be, provoke the reactive activity of its self-creation, and thus intensity is involved in Whitehead's metaphysics of creative advance. Ross (1983) argues that two major forms of intensity are possible. The first form is of intensities generated by endurance (that is, being) that aim at uniformity, security and stability. The second form is of intensities of experiences of complex organisms that aim at novelty. The first form of intensities, repetition of intensity from occasion to occasion, makes the second form detectable. Citing Whitehead's *Adventures of Ideas*, Jones (2010, p. 265) links intensity to provocation. She interprets Whitehead as meaning that "[i]ntensity is how the past is provoking a present that is aimed at provoking a future." (p. 265) Relevant for this research, from Ross's and Jones's descriptions, intensity corresponds to outcomes of contrasting experiences that are distinguishable from intensities aiming at stability (that is, intensities that repeat the same values from one pulsating moment to the next). All these descriptions give the distinct impression of a certain quality that is required to achieve provocation, generate novel experiences or produce contrasts. Yet, none of the discussion so far indicates what makes it possible for futurists engaging with the future to increase the intensity of becoming of situations or events. Nor does the discussion provide insights as to the connection between futurists' capacity to engage with the future and futurists being able to deal with complex situations characterised by uncertainty and change. Frida's two businesses provide the next important consideration.

The second important consideration concerns wholes. The comparisons of Frida in her two businesses rely on wholes to make sense. For example, it is not a part of Frida that engages with the future and it is more than her alone: it involves many other actors, entities and objects. Nor is Frida's engagement with the future something that can be separated or isolated from her engagement with the past or the present without affecting what she does. The descriptions of her work show that Frida's engagement with the future includes engagement with the past and the present. Thus, to investigate wholes in this research requires investigating *capacity*.

Capacity has a number of characteristics that distinguish it from other constructs like ability, capability, competency and skill. Capacity is the quality of containing, holding, doing or producing, a sort of spaciousness or breadth. Capacity is different from the other constructs since it is not about parts, components or properties. Capacity is a quality that one 'has', and at a particular (any) moment. It is about the whole person, or the accomplishment of the whole. Another difference of capacity is that it is not specific to, restricted to, directed at or relevant for a particular context. For example, the capacity to learn is an accomplishment of a whole person and not something that a person has in one setting and not in another. Another example is the capacity of a water pump. A pump may have a two-litre capacity but only be capable of pumping one litre per hour, thus not achieving capacity, because of an obstruction in the inlet pipe (a context). Another difference is that capacity does not refer to measurement scales for ranking or ordering (a five-litre pump may be pumping less water

than a two-litre pump). Instead, capacity refers to the effects achievable by a web of relations. It could be the capacity (for a particular intensity of becoming) achievable at that sidewalk café depending on its usual patrons; on any particular morning, it may or may not achieve capacity. Therefore, by capacity to engage with the future I mean a range of ways of engaging with the future, a range of generated effects of assembled webs of relations, and the spaciousness for holding and making happen the effects of engaging with the future.

When the claim is added that futurists increase the intensity of becoming, this implies the effects need to be detectable. For instance, to produce intensity of provocation that is different from intensity of stability requires that the difference is noticeable. Thus, to achieve an increase in intensity of becoming requires an appropriate or fitting capacity. Drawing on the intensity discussion, to increase the intensity of becoming implies futurists: generate movements or shifts from structure to process, from permanence to change, or from being to becoming; direct creativity in greater measures; originate finer patterns of assembly; aim at more degrees of complexity and novelty; or, more comparatively, concentrate, provoke and strengthen. This research does not aim to measure capacity to engage with the future, although it does involve identifying and characterising aspects of that capacity, as explained elsewhere in this chapter.

### 1.1.2 Methodological considerations

A third important consideration concerns the group from which to select suitable participants for this research. Since this research is concerned with engaging with the future, then futurists are an obvious choice. Futurists' work involves the future: they 'do' the future, the future is their speciality. Their work is dealing with a topic that involves uncertainty by definition. Frida is one of perhaps a thousand futures studies master's graduates and 32,000 futurists globally.<sup>5</sup> People can develop their capacity to engage with the future by undertaking futures studies education in university programs globally. A first view of futurists might group futurists as members of the futures studies (FS) field and futurists as trained in FS with practices to deal with the uncertainties and complexities inherent in the unknowns of the future. However, the unity and stability this implies gloss over a great deal of diversity between futurists. Futurists are debating the nature and boundaries of the field, the theoretical foundations that underpin their work, and they do not use a single disciplinary perspective with practices in their research or work. Indeed, the notion of a unified field itself is disputed and its very desirability is rejected by some futurists. The principle of wholes dictates, though, that this research must allow for this diversity by including all futurists in its scope. This can be done by noticing that futurists are united in their belief in the importance and benefits of FS. Many futurists see a connection between their work and people's ability to address major civilisational challenges and to enhance important national and strategic organisational decisions. Their diversity of perspectives and practices means that in attempting to identify what is unique about their capacity to

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<sup>5</sup> These are rough figures. See the sampling section in Chapter 4 for details of the estimate calculations.

engage with the future, if I select and privilege one of their many methodologies or perspectives for this research's methodology and theoretical framework, then the study's aim could not be achieved. This raises another important consideration that is discussed in connection with a further important consideration, the question of the future, or time.

To examine futurists' capacity to engage with the future raises a fourth important consideration: a suitable methodology for a study that has in 'the future', and thus an interest also in 'time'. Time presents a particularly difficult topic since all methodological and theoretical frameworks make certain assumptions about time in their philosophical foundations that are part and parcel of theorising change in the world. In other words, every set of philosophical foundations already specifies how time and future should be theorised, that is, they provide a metaphysical solution for what time is (Adam 2006; Poidevin 2009; Rescher 1996). Typically, the past, present and future are components of time and follow the same principles as time. Thus, to select an approach that already specifies what is time, and what is future, before the study has started, would not allow exploration of what it is to engage with the future with a group of people who have different ways of theorising time and future. Doing that would simply reproduce what has already been specified, thereby reducing all other approaches to the selected approach.

### 1.1.3 Theoretical and philosophical considerations

#### **Actor-network theory**

A combination of certain specific areas of actor–network theory and process philosophy provide a suitable methodological framework for this study that responds to the methodological considerations addressed in the previous section. Turning to actor–network theory (ANT) first, this research is inspired by it and in particular I concentrate on ANT principles concerned with time. At the heart of ANT are webs or networks of relations, attachments and associations. This relational approach provides an avenue for avoiding concerns of specifying time up front, except as noted later in this paragraph. Latour (2005) describes ANT as a “theory of action”, as mediators making other mediators do things (p. 217). In analysing the data, I make extensive reference to the laboratory studies of Karen Knorr-Cetina (KKC) and of Bruno Latour. According to Schmidgen and Culance (2014), KKC's sociological laboratory study published as *The Manufacture of Knowledge* in 1981 and the laboratory study of Latour and Woolgar published as *Laboratory Life* in 1986 are acknowledged for their trailblazing contribution to science and technology studies. These two studies provide detailed descriptions of the type of engagement with time performed by scientists, although engagement with time was not their specific aim. Thus, the laboratory studies, and their related publications, provide reliable, ANT-based cases of scientists' activities that have helped me identify, characterise and compare futurists' engagement with the future. The different approaches to ANT analysis taken by KKC and Latour mean that the capacity to engage with the future is analysed according to two aspects, a relational and a processual aspect. However, relations are not sufficient to avoid specifying

time. The analyses of the laboratory studies are compared to the data analyses of this project; however, the aim of this research is not to compare these two groups as such. Rather, the focus is on identifying and characterising aspects of futurists' capacity to engage with the future; the laboratory studies are helpful for this reason. Thus, other studies might find different results to this study if, for example, they collected data from futurists and scientists using the same approach. There is also a question of assumptions about the most basic make-up of reality: two established options are substances and processes.

### **Process philosophy metaphysics**

This thesis adopts a strong process metaphysics to complement the ANT approach (for more detailed reviews, see sections 3.2 and 4.1). A substance-based metaphysics, such as in scientific philosophical foundations, specifies stable entities that move through time. Two substances typically referred to in the sciences disciplines are physical matter and mind. A strong process-based metaphysics states that processes are more fundamental, or at least as fundamental, as things (substances) in this world (Rescher 1996). Time is relational and derived via processes. Therefore, process metaphysics has been chosen for this research. Processes form the basis for all interpretations of the data and for all aspects of this project. Processes take priority over things, and processes are not limited to material or physical arrangements but can include changes in nonsubstantial aspects such as mental, psychic, mathematical or cultural aspects or changes in activities such as those of agents, powers, forces, fields, conditions and circumstances. Processes are pervasive in this study and process metaphysics principles are referred to by ANT scholars as well. For example, Harman (2009, p.36) describes Latour as continuing the work of Whitehead. This thesis also relies heavily on the arguments made in important ANT studies.

Many futurists align the emergence of FS with the rise of modernity and so it is appropriate that Latour's argument about modernity, published as *We Have Never Been Modern* in 1993, provides a framework for analysis of the FS literature. There are a number of reasons that make this work highly appropriate for this research; I mention three. First, Latour's (1993) argument describes a "Modern Constitution" with "guarantees" that reinforce a separation of the two opposing poles of social and nature, or subjectivity and objectivity. These two polarities are also visible in FS and often identified as the cause of difficulties experienced in futurists' work. Second, being an ANT study Latour's argument bypasses the types of problems experienced in arguing against modernity yet ending up reinforcing modernity by applying the guarantees. ANT is adopted by very few FS studies while most respond to the problems of modernity with approaches that reinforce the guarantees rather than unsettling them. The third reason is that the book elucidates central themes of Latour's work, thereby providing examples of ANT. Brown and Reavey (2017, p. 3) describe Latour's argument as addressing modernity's "ongoing work of producing dualisms" emerging from networks of ongoing activity. Latour argues that modern intellectual life maintains three distinct spaces characterised by the work of purification and translation. The work of purification separates the social space from the nature

space, politics from science, or subjectivity from objectivity. The third space, which he calls networks (that is, actor networks), is where translation work creates hybrid entities of the social and nature. I take the three spaces and the translation and purification work as an analytic lens to the FS literature review. I find Latour's argument very convincing. One approach to the FS literature review could be to produce an ANT account as a case study of the FS literature to show similarities and differences to Latour's argument. However, my main focus with the FS literature review is on how futurists engage with the future. Therefore, I use the analytic lens for reviewing the FS literature. I am grateful for Latour's argument, but I certainly do not want to impose yet another argument on some futurists about what is wrong with their work or, for that matter, what is right.

The final important consideration in the list concerns the format of the interviews. As mentioned, and as I have tested out in informal interactions with futurists prior to starting this research, asking people about their theories of the future or time often discovers less about their ways of engaging with the future than about the theorists they are quoting. I have found that asking futurists to talk about the topic closest to them, themselves, allowed them the greatest opportunity to demonstrate how they engage with the future. I constructed the interview schedule from a few life course methods to get insights into how people's views of the future change over their lifetimes. The life course methods that inform the types of questions or topics covered in the interviews are: a) Urie Bronfenbrenner's ecology of human development model, the "person-process-context-time (PPCT) model", that according to Moen (1995, pp. 4-5) acknowledges the lifelong interaction between the characteristics of the person and that the context is shaping the development of the person; b) the life course path being shaped by many influences, according to Clausen (1998); c) individuals not being passive elements in an environment but interpreting and giving meaning to events and using this to guide their choices and behaviours (Moen 1995); d) the life review project that weaves into the life course psychological, sociological, historical and demographic concepts and methods (O'Rand 1998); and e) life stories based on the theory of human ecology developed by Bronfenbrenner (Moen, Elder Jr & Lüscher 1995).

## **1.2 Organisation of the thesis**

Chapter 2, 'Futurists caught between being and becoming?', is a review of the FS literature and presents an interpretation of this literature through the analytical lens of Latour's characterisation of modernity as being the ongoing separation of the social and nature through the work of purification and translation. The review identifies the work that creates and maintains two opposing ontological zones in the field that futurists attribute to problems being experiences. The two opposing zones are the social/human and the nature/non-human polar opposites. The review then identifies three areas in the FS literature that report on translation work. Those areas are in their practices for working with objects, integrating action into their work and constructing of futures and the future.

Chapter 3, 'Time of being and becoming', describes the theoretical approach, an eclectic selection of elements from science and technology studies (STS) and process philosophy literature.

The approach seeks a framework that does not single out a particular perspective on time as foundational and to which all realisations of time are reduced. Drawing on ANT and process philosophical principles, the chapter selects a becoming view of time that is not theorised structurally from either a subjective or an objective perspective but rather relationally.

Chapter 4, 'Participants' life times', presents the methodological elements of the research. Participants were recruited from individuals registered for, enrolled in or graduates of FS master's programs internationally. Through exploring their life experiences, by recalling details of past actual events and segments of their lives, and constructing details of their future lives through a prospective simulation, participants engaged with the past, present and future. The interviews also explored the impact of the participants' involvement in FS education on them personally and on their engagement with the future. The interviews produced unique sets of rich information about each individual's unique experiences. The data shows the importance of a very wide variety of actors and objects and webs of associations involved in their lifetime experiences and in their engagement with time. For this research and analysis, it is not participants' specific life experiences that have been examined or compared. Their engagement with the future was implicit in the ways they discussed their lives, the events of their lives, and in the webs of actors and relations they used to accomplish effects in the interview.

Chapters 5 and 6 relate the research data to existing ANT studies in connection with two aspects of capacity to engage with the future. Each data chapter focuses on a different aspect of actor-networks: relations and processes. The aim is not to test the STS conceptualisations, but to add to them the accounts of participants' capacities to engage with the future. Thus, these chapters include detailed and specific discussions of the respective constructivist theories that are not included in Chapter 3. According to the data analyses, participants' engagement with the future is characterised by relational and processual aspects. Capacity that demonstrates different relations and processes in engaging with the future produces detectable differences in the intensity of becoming of events or situations.

Chapter 5, 'Another relation to the future', presents the analysis of the data for objectual relations based on KKC's conception of epistemic objects. The chapter compares the two objectual relations identified for participants with the objectual relations that are identified for laboratory scientists in the STS background literature. The analysis of this chapter contributes a new case to studies of objectual relations. The relationships between participants and the 'objects' they develop add to the unfolding relations that KKC identifies for laboratory scientists. By establishing objectual relations that allow for the originating and self-actualising of actors and their mediations, futurists can enrich current situations by creatively bringing them into the present.

Chapter 6, 'Another process of engaging with the future', presents the analysis of the data for processes of engaging with the future. The chapter presents characterisations of processes to engage with the future and compares those with characterisations of processes identified in studies of laboratory scientists. The results of these analyses show that the participants' processes add to the

processes of laboratory scientists. By using processes that focus on memories and processes that examine and seek out conditions that generate futures, futurists can stimulate change in the present actuality as it becomes.

Chapter 7, 'Futurists re-turn becoming to being', concludes the thesis. Whitehead's intuition about being and becoming is important for realising that it is a matter of intensity, of relative emphasis, on whether being or becoming is given priority. Thus, by placing relative emphasis on becoming, futurists are 'returning', making known again, becoming to being. Furthermore, emphasising being requires work to stabilise conditions, that is, turning changing conditions into stable objects (e.g., through inscriptions). Through their turning to the conditions and their relation to the unknown, futurists are redoing the stabilising (establishing difference) and thus are re-turning becoming to being. The additional relations and processes identified for futurists, compared to those of laboratory scientists, expand futurists' capacity to engage with the future by including the entangled interplay between becoming and being in the accomplishment of effects. This means futurists and their assembled webs of relations can achieve a greater range of effects and generate more options for responding. The objects, approaches and practices used in FS work and taught in FS educational courses stimulate development of the additional relations and processes. The analyses and comparisons incorporating objectual relations and processes from laboratory studies contribute to ANT.



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## Chapter 2

# Futurists caught between being and becoming?

In this chapter inspired by Latour's *We Have Never Been Modern*, I present my review of the FS literature in three main sections. In the first section, I provide an introduction to the FS field. FS is a distinct field of activity as seen through the concerns of futurists and the distinctions they believe make their work and field important. Futurists advocate for a need for the field and their work, for others to join them in the field and for many to participate in implementing the outcomes produced by their work. In the second section, I review the effects of futurists' "purification work" (Latour 1993, p. 11), of separating practices, that create and maintain two opposing ontological zones, namely the polar zones of social/human and nature/non-human. I first briefly introduce the basic concepts of Latour's framework as it applies to FS, briefly outline two main ways (each with variations) in which the effects can be noticed, I review reports of problems that can be attributed to the purification work, and then I review in some depth four areas of discussion in connection with theoretical foundations where the effects of the purification work can be noticed. I argue that, although futurists identify the problems of the work of purification, their solutions tend to blame and then reinforce the purification work. I contend futurists are so involved in addressing the opposing effects of the purification work that it diverts them from recognising and seeing the relevance and significance of their "translation work" (Latour 1993, p. 11). Thus their solutions do not directly address the problems associated with the tendencies to opposing polar zones. In the third section, I identify three areas in the literature where futurists' translation work is recognised, yet seldom in connection with the purification work. I claim that recognising the translation work and connecting it to the purification work are necessary for recognising futurists' capacity to engage with the future and, furthermore, it is important for their search for theoretical foundations and overcoming the problems they identify with the purification work.

### 2.1 Futures Studies: An introduction

An early picture that emerges from the futures literature is of an unsettled field. Futurists refer to a great variety of ways for doing their work. Ahlqvist and Rhisiart (2015, p. 91) claim that the FS field is "an amalgam of different disciplinary domains, each with a particular epistemological position and theoretical insight". Futurists have not settled on the boundaries of the field, on how it differs from other fields, nor on how their work differs from the ordinary human capacity to engage with the future. Based on his extensive analyses of futurists' writings, Marien (2002) argues that it is not possible to distinguish from all the futures-thinking activity in the world a single and distinct FS field. The field is criticised, critiqued and compared along various dimensions and from different standpoints. To name just a few examples, Hines and Gold (2013) and Slaughter (1999) contribute to the debate about the professional status of the field and challenges experienced in integrating FS

work into organisations, and Bell (2009), Bussey (2002) and Marien (2010) review the state, status and futures of the field. Nandy (1993) and Sardar (1993, 1999b) warn that efforts to make the field more respectable and disciplinary will simply reinforce its transformation into a Western instrument for making non-Western societies into the image of the West. Marien (2002) finds it suggestive, given the long lists of purposes, methods and topics that he presents, that what counts as FS is “as broad as the world of knowledge itself” (p. 273).

Futurists report particular problems and challenges associated with the differences in the ways they do things. Marien (2002) notes that futurists often only work in one or two areas and often there is conflict between areas. Futurists are debating what should serve as the theoretical foundations of their work; not everyone believes this is possible or desirable. Marien, Nandy, Sardar and others who have weighed in on the debates, like Bell (2002), Hines and Gold (2013, 2015) and Slaughter (2002b), contribute to the discussion about how to and whether to set out the boundaries of FS as a field and identify theoretical foundations. That and more, futurists hope, will improve their professional status and locate the field’s disciplinary identity. Notwithstanding the differences, tensions and divisions, futurists are united in their belief of the necessity and importance of their work, if not the field. Thus, FS continues in spite of differences and problems. The following three sections review the justifications futurists give, in spite of the obstacles, for continuing their work, for continuing to distinguishing their work from the ordinary human experience of wanting to know about and deal with the future, and for continuing to describe the FS field as standing out from the way other fields engage with the future. Their justifications are reviewed according to three themes: the need to enrol, the need to mobilise or stimulate, and the need to disturb or contest.

### 2.1.1 Need to enrol others

Provided here are three examples of how futurists enrol others in their efforts and, by enrolling others, they expand the field. The first example is by providing a public face to the world and raising awareness of their work through four global organisations. Today futurists make their concerns and activities public through four main organising sites, some of which have their origins in the early years of FS. First, in no particular order, the futures researchers, such as Jim Dator, Eleonora Masini, Tony Stevenson, Jennifer M. Gidley, Richard Slaughter, Bertrand de Jouvenel and Fabienne Goux-Baudiment, at the World Futures Studies Federation (WFSF) have since 1973 been providing a global exchange network and forum for futurists interested in long-term, big-picture and radical-change alternative futures (World Futures Studies Federation 2016). Their aims include that alternative futures should embrace diversity and difference, and they raise awareness of the role of long-term thinking in resolving complex problems. Second, the futurists, such as R. Buckminster Fuller, Alvin Toffler, Ray Kurzweil, Herman Kahn, Carl Sagan, Margaret Mead, and Arthur C. Clarke, of the World Future Society (WFS) help people improve decision-making about the future by bringing together tools, ideas and opportunities for collaboration (World Future Society 2016). They seek to ignite dialogue between futurists so they become empowered to research, envision and create futures. Third,

the Millennium Project (MP) is an example of futures work in action on a global scale. The futurists, such as Jerome Glenn and Theodore Gordon, of MP has been distilling on behalf of humanity since 1996 the collective judgements from more than 3500 futurists around the world about the state of humanity “to improve humanity’s prospects for building a better future” (The Millennium Project 2014). Their aim is to improve today’s thinking, wisdom and decision-making. Fourth, the foresight professionals, such as Cindy Frewen, Jay Gary, Jennifer Jarratt, Andy Hines, Wendy Schulz, Peter Bishop, Maree Conway, Andrew Curry and Verne Wheelwright, of the Association of Professional Futurists (APF) support futurists in sharing, knowing about and doing excellent and innovative professional foresight work. Their aims include expanding the areas where foresight is used by making foresight professionals and the value of their work known to the world (Association of Professional Futurists 2015). Not only are futurists’ activities today clearly visible through these public sites (and many others of smaller organisations), it is also clear that they have particular purposes.

The second example of how futurists enrol others is by doing FS or futures research that looks to improve people’s futures, often expressed in terms of better welfare or greater freedom in relation to particular issues, sectors or groups. The first example is of the APF. The APF devote a special issue of their newsletter to the future of education. In that issue, they examine century-long trends relevant to understanding the future of universities and the future of learning. They show how practitioners work with theories of social change to create alternative futures of high-quality learning and they use the futures with a Hawaiian school. The APF states in another special-edition newsletter that futurists bring a wider set of perspectives for more considered analysis to an important public issue often portrayed in single-perspective discussions. The MP provides the second example. In 2009, the MP used a particular futures method to think ahead 20 years. They identified and evaluated, with input from leading experts, a list of future elements that would make up the next economic system. The list of elements had high agreement on the inclusion of ethics, more inclusive definitions of GNP/GDP and international agreements for taxes on global commons (like air and biodiversity). In doing the study, the MP identified a new set of concerns for an important sector. By making these concerns known to the public and important decision-makers, they are influencing the decision-making of those who read the report. Of course, many groups, disciplines and professions work to improve human lives and conditions, for instance, educators, environmentalists, economists, engineers and psychologists. However, futurists make a distinctive contribution.

A third example of how futurists enrol others is by introducing futures generations into their work as a concept. Introducing future generations creates a very different dynamic of becoming in decision-making compared to when it is absent. Bell (2009, p. 73) identifies the factor that distinguishes the contribution of futurists from other future-oriented practices. He explains that their aim is to contribute to more than the freedom and wellbeing of all living beings occupying Earth. Their unique contribution is to the wellbeing of the “as-yet-voiceless people of future generations”, which he calls “prospective thinking”. He suggests that common human practices look for benefits only to people presently alive and do not consider benefits for not-yet-living people. Masini (2009)

extends this debate about the need for FS to develop philosophical and ethical discussions. It is her assessment of the state of FS education that, “except for some few rare exceptions ... teaching in futures studies in general is not yet developed enough in philosophical and ethical terms, given the very great use made of them at present in various areas” (p. 7). In her view, people making decisions often do not realise that their decisions are not only for the present but “are actually what is wanted or not wanted for the future” (p. 9). These suggestions differ from the usual concerns of, let’s say, organisational change management. Prospective thinking might require that organisational changes benefit not only present organisational members but also future generation members, ones who are not alive yet. Masini (2001) cites Gaston Berger as stressing the importance of bringing our responsibility towards future generations into present-day decisions.

### 2.1.2 Need to mobilise or stimulate others

Futurists want to interest others in the future because they recognise a particular need which requires as part of the solution enrolling others into addressing the problem. Cornish (2007) describes how he became a futurist and took a leading role in the creation of the WFS. He experienced a personal crisis in the months and years before the 13-day Cuban nuclear crisis in 1962. Because of that experience, he became obsessed with making people aware of the possibilities of the future so they could perhaps do better at dealing with the problems. As a journalist, it occurred to him to start a newsletter and eventually he was involved in the creation of the society. Slaughter’s (2004) personal experiences woke him up to the realisation that there is too much at stake, that the complex organisms and organisations of this planet cannot afford to simply let the future take care of itself. Slaughter (2008) can see that there is not one universal destination for humanity, but there are many possible futures and some of those are not very desirable. He feels it imperative to respond to what he sees as an emerging unstable future and to consider the “profound ethical issues involved in passing on a compromised world to future generations” (p. 103).

Futurists also want particular futures not directly under their own control to come about and therefore they require others’ involvement. Dator (2002) explains that it is not enough for futurists to help construct futures. He puts it that even though dreams are important, to make the dreams come true requires appropriate action. And, as he describes, when you surf the tsunamis of change then some things are not under your control, so appropriate action depends on the situation (p. 8). Keenan et al. (2003, p. 20) state that foresight covers all kinds of activities with aims such as “bringing together key agents of change and sources of knowledge” and to “provide [for] new knowledge communities that can act to deal with long-term challenges”. For example, the MP is a globally recognised think tank producing ongoing primary products and special studies. The APF shares their views and held a gathering in 2016 in London where they discussed how to realise the notion of an economy with reduced environmental impact.

Futurists also want to get the attention of people using futures tools and techniques for problems or situations that affect many people but which are not producing quality results.

Forecasters like Coates et al. (2001) and Ayres (1989) call on futurists to use better methods of forecasting and planning to get clearer and more quantitative answers regarding technological progress. Rescher (1998, p. 2) states it somewhat differently. The point of forecasting is not to make more forecasts but “to elucidate the principles that are at work”, to focus on clarifying the successes and failures of the forecasting process itself. Coates et al. (2001) remind futurists that (p. 3) “society is now completely reliant on technology ... Nations are irretrievably enmeshed in a global economy fuelled by innovation and competition ... Therefore, technology is an increasingly important and challenging target for analyses to aid decision makers”. Coates et al. (2001) point to the need for governments and firms to cope with and anticipate both rates and directions of technological change.

Ayres (1989) wants futurists to shift gears away from methods that make the future out to be like the present, only more so. He argues for better theory of technological forecasting to deal with the failings of existing methods and models, since, as he claims, it is impossible to forecast breakthroughs at the detailed level of design and operation, as they are essentially surmises. Ayres (1989) outlines a number of failings of existing methods and models. A first complication comes from governments and firms that need knowledge to determine which technology factors are involved in declines or advances of industries and where to find efficiency improvements. Those managers, executives and leaders need to monitor how they are doing in relation to prior plans and expectations. However, according to Ayres (1989), not much is known about the factors in progress since technology has been treated as a black box by economists. In his view, economics is a discipline too narrow for such a problem; the idea of a static equilibrium optimisation of a technological production possibility frontier is not adequate for managers operating firms in the real world to think about technology. A further complication he describes is that technology itself is a main agent of change. Seemingly small factors can have large effects and some choices are effectively irreversible, even sub-optimal ones. A third complication is in the area of the data for forecasting. Ayres (1989) describes that research efforts tend to concentrate on areas where good time-series and cross-sectional data exists but not on areas where data is difficult to get or does not easily fit into statistical analysis.

Producers of particular futures also want to enrol and mobilise others into providing the resources and support to realise their particular aims and goals. In this case futures need to be performative if they are to be made real, according to Borup et al. (2006) and Brown (2003).

### **2.1.3 Need to disturb others or contest the future**

Futurists want to disturb others or contest the future because they realise the moral and ethical implications of current thinking or planning are not now being considered. Engaging with the future involves more than orienting to particular future concerns or issues. Criticality towards futures questions the various aspects of futures and is thus often directed at other futurists. However, criticality in futures research is not self-evident (Ahlqvist & Rhisiart 2015). For instance, critical futurists point out a type of failure associated with issues of power. Ahlqvist and Rhisiart (2015)

conclude from their study of the developments in futures research that those applying futures knowledge have a responsibility to explicitly uncover the choices and implications present, for instrumental as well as ethical reasons. Inayatullah (1999) asks why thinking about the future is essential and then proposes a few organising principles to which futurists are committed. For example, thinking of the future helps in considering the consequences of decisions. He states that most people would find such principles unproblematic. However, the problem is that so would political platforms (e.g., Nazi and Communist parties) whose supporters are notorious for their ethnic cleansing and social engineering atrocities. Inayatullah's (1999, p. 52) strategy is to disturb the reader to realise that "the future is not empty but full of politics and history, fear and loathing". Therefore, merely going through a process of thinking about the future, compared to not being future oriented, is not a sufficient criterion for good society and good leadership. Specifically, Inayatullah's (1999) point is that thinking about the future necessitates thinking of the frameworks and contents that condition the many meanings of the future.

Futurists want to critique and contest the futures that are being designed to serve the needs of the powerful of the present, rather than the needs of those in the actual future moment. Further, the powerful are often using futures tools and techniques to suit their own purposes and therefore futurists feel the futures so produced need to be critiqued. For example, Hideg (2007) compares critical futures studies (typically a practice only of futurists) with a participative, consensus-building process (which she names "practical foresight") that has developed but has limited theoretical bases and mainly creates information about the future. One response to this lack of feedback comes from futurists such as Inayatullah (2006) and Stevenson (2002) who propose a style of foresight called anticipatory action learning that involves interactive processes of questioning and conversing about the future. Hideg continues to explain that the main problem is that the future of society cannot be predicted because it is constantly being shaped by factors of chance. Moreover, a consensus future is produced at a given moment when particular political powers are prevalent that have the power to ensure the consensus future is carried out; therefore, the consensus future may rather be a future for the present that serves the particular time and politics. The result is that the actual outcome may not match the initial intentions of the consensus future, nor meet the needs at the actual future moment.

Without critical futures practices, there is no criticism of the discourses of the powerful prevalent at the time. Without feedback about the futures practice to the theory, it is not possible to improve practice in turn. Slaughter (2002a), for example, states that successful prediction "conveys power". Therefore, forecasting flourished in the 20th century because, after being successful with physical problems in the applied disciplines, forecasters provided, or attempted to provide, firms and governments with the tools and methodologies to answer questions about financial and economic matters. However, with critical theory Slaughter (2002a) realises that such forecasting work cannot deal with the structures, processes and factors behind the taken-for-granted, everyday surfaces that create cultural and human dilemmas, and those are what needs to be addressed.

Other futurists who want to disturb present categories include feminist futurists such as

Hurley et al. (2008) and Masini (1987). The futurists in Nandy (1999) concern themselves with the futures of cultures other than Western cultures. These futurists want to ensure the futures that are produced are sensitive to other values and ways of life.

It is not enough to disturb specific futures; methods also need to keep up with the action. As Sardar and Sweeney (2016) put it, futurists' activities generate actions that disturb the present (e.g., a scenario exercise generates actions that are different to presently planned actions). This requires then that futures methods need to keep up "with the forces and drivers that are actually disturbing the present and moving us toward Unthought Futures" (p. 2).

In summary, futurists want their work to stand out and they achieve this through the strategies of enrolling others into wiser futures and producing wiser futures, mobilising and stimulating others into implementing the results of FS, and disturbing the creation and implementation of unwise futures. The point is not that these strategies per se are different to any other future-oriented activity, such as a business wishing to enrol customers into their expansion plans, nor that futurists necessarily want knowledge of the future more than any other person. Rather, futurists include in their practices things that the everyday human practice of dealing with the future does not. The inclusion of future generations is an obvious example. Nor is it to argue that others could not do what futurists do. Furthermore, they argue for futurists to study futures activities and practices so as to contribute to the theoretical bases of FS. This, they claim, contributes to improved futures practice and the production of wiser futures.

The next section reviews the effects of the purification work evident in the FS literature.

## 2.2 Futures Studies: Purification work

This section reviews the effects of futurists' purification work that create and maintain two opposing polar zones in FS; that is, futurists do work that has the effect of separating FS into two opposing polar zones. Inspired by Latour's (1993) theory of "purification work", I propose that the work of futurists designates a set of practices that involves creating and maintaining two ontologically opposed zones. The two zones are the society/human pole and the nature/non-human pole. This is depicted on the horizontal axis in Figure 2.1. The two zones define a linear range along which the futurists' work, as seen in their objects, can be situated. The nature/non-human zone is maintained by purification work that makes sure that the future of the natural world entities remains predictable, while the society/human zone is maintained by purification work by selecting for entities that keep the future of human affairs open, to be created according to the desires of people. The work of purification could be explained in different ways. Here is one, some might say clumsy, example. Imagine a scientist and reporter, descending into the ocean depths in a small, high tech submarine that can dive to depths of 1,000 metres. Imagine the pair is on a ground-breaking multi-disciplinary exploration of a coral reef ecosystem facing potential extinction from human impact and climate change. In the documentary, both divers describe amazing technology and a magical experience. Three futurists are shown the documentary and asked to talk on the future. The first futurist talks

about the trends in submarine sales, energy and propulsion technology, features of submarines, and the implications for future space travel and living under water. To extrapolate the trends, the divers' experiences and educational backgrounds are incidental, excluded, 'purified'. The second futurist talks of how this event is a sign of expanding planetary consciousness and evolving values over generations. The submarine itself, its technological specifications and social media go unmentioned, 'purified' from affecting the future. The third futurist talks about the conversations surrounding the event, how the conversations (the discourses purified of material and social forces) influence people's visions for the future, their will to change, and their practices. In Figure 2.1, these futures accounts could thus be mapped along the horizontal dimension at positions F1', F2' and F3'. The vertical axis in Figure 2.1 corresponds to "translation work", according to Latour, the practices that work that create hybrid entities, mixtures of social/human and nature/non-human objects. It is the topic of the third section of this chapter. I argue that futurists only partially consider the translation work in connection with the purification work or in connection with theoretical and philosophical futures foundations.

This section focuses on the purification work. In their writings, futurists are ambivalent in their commitment to these opposing zones and their descriptions of what belongs to one zone or the other are ambiguous. Nonetheless, specific cases show the separating work systematically select for or emphasize one or the other polar zone. The review starts by describing different ways in which futurists obtain the opposing zones. Then the review covers the problems that futurists associate with the purification work. In the final four sections, the review identifies examples of purification work. Purification work can be seen at many levels in FS literature, but the review in this section focuses on the areas related to futurists' search for theoretical and philosophical foundations.

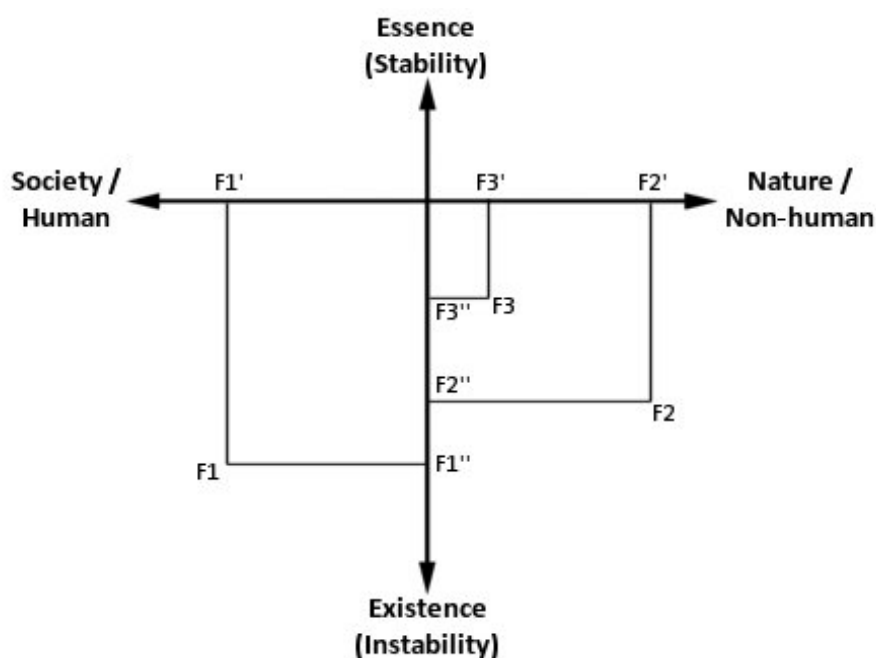


Figure 2.1 The Futures Studies field with opposing zones

Sources: Adapted from Latour (1993, p. 86, Figure 3.4).



### 2.2.1 Obtaining purified zones

I started the chapter by describing futurists as a group that adopts heterogeneous perspectives and approaches; this might give the impression that futurists adopt whatever mixture of approaches suits the requirements of their work. It may appear at first sight then that futurists simply choose from a list whatever methods seem to best fit the situation and simply use them together, or that they simply use whatever concepts, ideas or theories they can find to construct their arguments or develop their futures. However, the following sections on the effects of futurists' practices show that they must be selective in choosing their methods, concepts, ideas, theories or argument structures such that the social and human is separated from, purified of, the natural and non-human, and that the natural and non-human is separated from, purified of, the social and human. The aim is to keep the concepts, ideas and theories of each zone uncontaminated by the concepts, ideas and theories of the opposing zone. I next present two main strategies, each with specific variations, in which this can be noticed in the literature.

These separating strategies are relative to each author since they depend on the individual author's interpretations of where the boundaries are to be drawn between the two zones, of what concepts, ideas and so on fit into one or the other zone. For example, Jantsch's (1967) handbook only considers 'scientific' FS components, yet includes a 'social' component. Jantsch (1967, p. 15) states that "*Technological forecasting* [has two components:] *Exploratory technological forecasting* starts from today's assured basis of knowledge and is oriented towards the future, while *normative technological forecasting* first assesses future goals, needs, desires, missions, etc. and works backward to the present (Gabor). The subject of both types is a dynamic picture of a technology transfer process" (italics original). In this handbook, Jantsch (1967, p. 18) groups more than 100 techniques into "four broad areas: intuitive thinking and exploratory, normative, and feedback techniques". Jantsch (1967, p. 18) makes it clear that by "intuitive knowledge" he does not refer to knowledge obtained using a subjective perspective but, rather, that this roughly corresponds to Kuhn's reference to flashes of genius and scientific hunches; thus intuitive thinking is still scientific thinking, but not no-knowledge or the rational knowledge produced by normal science (citing Kuhn).

I group the strategies into two categories: first, the strategies that make the two polar zones more distinctly different and, second, the strategies that attempt to embrace the objects (e.g., the concepts) of the other pole from their own position, or embrace both polar zones from a position constructed right in the middle of the two poles.

#### **Category I: Reinforcing differences strategies**

Two approaches can be taken in these strategies: a process of inclusion and a process of exclusion. First, a process of inclusion re-creates the difference between objects of two poles. Brown (2003) provides an example of taking a social/human position and including technological (nature/non-human) objects. He situates his discussion against deterministic futures by elaborating a 'social' theory

of ‘dynamics of expectation’. In this way, details about biotechnology futures are stated in terms of social constructs such as the policing of boundaries and obligations that are binding, and ‘mind’ constructs such as hype, disappointment, awe, loathing, bewilderment, expectations, and imaginative speculation.

Another example from an objective stance is where Ayres (1989, p. 55) examines “a litany of problems and difficulties” associated with forecasting and suggests a new perspective that moves away from unsuitable forecasting approaches. The new perspective concerns recognising the principle that certain factors constrain and limit growth. This principle has been shown to work in modelling agriculture and mathematics, and Ayres proposes that it applies well to economic growth and demonstrates how it is applied to thinking about production in factories, using the principle to identify four bottlenecks currently constraining economic growth where each area is a problem experienced by humans. For instance, he identifies information overload as a bottleneck because there is too much to read. The solution is to have effective filters that screen out unwanted data. The second bottleneck is the lack of interoperability between computers that need error-prone humans between them. His proposed solution is translating standards. The third bottleneck is the complexity of machines and systems that can no longer be reliably operated by humans (he gives the Space Shuttle as an example) and thus breakthroughs are needed for these systems comparable to the advances in computer-integrated circuit chips. His fourth bottleneck is the ability to supply energy to a world addicted to fossil fuels while two-thirds of the world are living in poverty and wanting a higher standard of living. The solution is for more effective, non-polluting renewable energy to replace fossil fuels.

It is not the aim of this review to judge these bottlenecks or solutions as such, but to show that this is an example of making choices by isolating social characteristics and then including them in the domain of the natural, where functions and equations (simple or advanced) can be used to solve them; this implies that the principles that work for nature can be applied to social problems. It may be argued that technological advancement is a social domain issue and not a natural domain one. However, the point is the basis of the theoretical approach assumed in forecasting; that for example, problems related to human greed and addiction and mental overload can be addressed by applying a new technological forecasting perspective about bottlenecks. Ayres (1989) does not say he is limiting his solutions to technological ones, but he also does not say that other solutions of values or ethics may need to be applied. Ayres’s (1989) aim is to improve the results of technological forecasting. Thus, my reading of Ayres’s (1989) explanation is that he has extended the application of principles that are successfully applied to nature into the social domain.

The second approach that can be taken in these strategies is a process of reproducing the distinction and then excluding what does not fit. The exclusion process differentiates between objects ‘internally’ and then excludes them as not relevant. Technological foresight provides examples, some of which are discussed in other sections of this chapter. Technological foresight creates models of a social system and variables related to technology, economic and other social indicators. The only

acceptable indicators are those that can be measured reliably and thus have credibility: scientific measurements. Any variables that do not comply with the standards of reliability and validity are simply not allowed to be part of the definition of the social system, even if they are ‘visible’ measures.

### **Category 2: Transcending and including strategies**

Three approaches can be taken in these strategies: a process of transcending by layering, a process of transcending by abstracting common elements, and a process of transcending and relating. First, a process of transcending by layering, of refining the paradigm commitments, thereby claims to include the excluded conditions. An example is that of futurists adopting a scientific realist position. For instance, Bell (2009) advocates the scientific realist stance for futurists. For him, this means that anything can be (eventually) scientifically and thus objectively studied, including ‘human’ concepts such as conceptions, goals and beliefs, through their representations in the mind. Thus, with his strategy, the human transcends nature and eventually includes, through interpretation and a weak form of construction, all of nature.

Second, a process of transcending by abstracting common elements might, for instance, create a bare phenomenon with a future, but a phenomenon that is an indeterminate category neither nature nor social. The bare phenomenon may thereby be of pure language or pure abstraction of one concept. The critical and post-structuralist positions are examples. Fuller and Loogma (2009) describe social constructionism that focuses only on the words and symbols people use to refer to the objects in their social worlds. Those objects are literally constructed as meaningful social objects that people refer to in their actions. The explanations are those observations by people of everyday life and not taken from natural laws or social forces. Thus, they explain, the research focuses on the communication and interaction between people to make sense of the social world.

Third, an example of the process of abstracting and relating is provided by integral futures. Voros (2008, p. 199) uses a well-known integral model, the “AQAL” framework developed by Ken Wilber, to argue that all broad classes of futures inquiry can be integrated according to this integral framework. As Voros explains, a futures researcher can use the framework to integrate and relate “both the possible domains of inquiry as well as the structures of consciousness operating within inquirers” (p. 199). The inquiry framework transcends all forms of inquiry by not being limited to, rather it is free to make a considered choice, over which of their “particularising paradigmatic assumptions and paradigm-based perspectives” (p. 198) to use. The framework integrates all forms of inquiry by relating their different ways of knowing (e.g., their perspectives and forms of knowing) and their different domains of interest (p. 198).

However, in spite of all the developments and improvements in methodologies and research paradigms, futurists report problems and tensions in doing their work and in the difficulties they observe with creating futures that are not biased in some way (in spite of their sensitivity to bias). In the next section I review some of the problems that are associated with the purification work.

### 2.2.2 Problems associated with purification

At first sight it might appear that most of futurists' problems must be associated with 'getting the future right'. This is, after all, one of the main problems that is attributed to people's attempts to deal with the future – there is surely no one who has not heard impressively inaccurate statements about the future. Futurists' failures to predict too contributed to a loss of confidence in forecasting in the decades after WWII (as mentioned in the historical section in this chapter). However, concern about accurate prediction is probably only relevant to work concerned with developing nature/non-human type solutions. A failure to predict accurately may indeed be an excellent outcome for a futures project concerned with developing a social/human type solution; for example, the failure of the Year 2000 predictions (the Y2K problem or the Millennium bug) to come true was a good outcome, and not a failure. However, this section is about problems that are associated with the effects of the separating or purification work in achieving the opposing zones, not with failures associated with one or the other zone individually. Three problems are reviewed next.

The first problem concerns the power plays that can develop when commitments to different purposes lead to frustration that thwarts intentions. Futurists' work is often inter- or cross-disciplinary, or uses data from many different types of sources, and thus futurists develop practices and methods that combine, to lesser or greater extents, practices from the social and natural perspectives. However, tensions and contradictions arise when the two enquiry perspectives are treated separately. Tensions and contradictions in futurists' work have been observed and the effects have been attributed to the separate treatment of the social/human and nature/non-human perspectives. To the best of my knowledge, only the van Asselt et al. (2012) project has reported on this particular kind of problem in futures work. One of van Asselt et al.'s (2012) questions is about futurists' understanding of time. Their analysis identifies two competing and coexisting temporal repertoires employed by futurists: the deterministic and the difference repertoires. The historic, deterministic repertoire refers to reasoning by which the past and present of an entity determine the entity's future. Van Asselt et al. (2012) observed that in the course of the project, futurists increasingly emphasised continuity of the future with existing (present and past) knowledge and causal – often linear causal – reasoning increasingly dominated explorations of the future. Furthermore, the authors note a relationship between discontinuity and uncertainty in FS work, that both ideas are associated with the possibility of change and different futures. They conclude that “the deterministic temporal repertoire is very problematic: it supports uncertainty intolerance and assessment behaviour that contradicts the idea of exploration of possible futures.” (p. 134) In connection with the intolerance for uncertainty, they observed their participants actively 'black-boxing' models so that models provided a solid ground and a resistance to questioning, particularly when associated with expertise. Van Asselt et al. (2012) note the similarity of the black-boxing of models with Latour and Woolgar's (1986) description of the construction of facts in the laboratory. The difference repertoire refers to reasoning that holds that a less fixed and more discontinuous and non-linear connection exists

between the past and present on one hand and the future on the other. Arguably, these two repertoires mirror the separation between the two opposing zones on the horizontal axis in Figure 2.1; indeed, the authors associate scientific knowledge with the historic, deterministic repertoire and they associate creative thinking with the difference repertoire. They identify the principles that futurists hold for each repertoire and declare that the two repertoires are contradictory and hence cannot coexist in a foresight project and so conflicts will occur, either openly or masked. If futurists' intentions are to develop constructions of the future (e.g., alternative scenarios) then they should adopt the futuristic difference repertoire. Yet the authors' research shows that in practice futurists undermine and defeat their intended approach and retreat to the historic, deterministic repertoire, which means they construct futures that fit with positivistic or objectivist ideals that call for "solid and definite outlooks" (p. 141). They suggest, based on their literature review, that this is a severe and subtle challenge that has been recognised for more than 20 years and has no solution yet.

Van Asselt et al. (2012, pp. 142–143) also observe that foresight practice is at odds with the way foresight is portrayed in textbooks and academic writing. They point out a variety of tensions, frictions, conflicts and ambivalences related to relations between the constructivist thesis and the positivistic ideal (p. 140). Their view is that this problem is related to similar contradictions in the ideas of certainty and uncertainty in futurists' work: FS is presented as the art of dealing with uncertainty, yet in practice a more accurate description is that futurists wrestle with uncertainty (p. 139). Based on their observations, van Asselt et al. (2012) hypothesise that futurists' academic ambitions and their need to be seen as experts embody the positivistic ideals of value-free and objective enquiry and so sustain these observed contradictions and tensions.<sup>6</sup> van Asselt et al. (2012) did not expect that such effects would be part of the process of manufacturing their scenarios and it was not their intention to reach the more deterministic outcome. In their careful analysis they show the mediations and translations occurring. However, their explanation that it is the desire for academic authority that has won out is not convincing (not on the basis of what is presented in the book). After all, academia houses academics who conduct enquiry from perspectives other than that of science. The predominant choice of the deterministic repertoire (nature/non-human) underscores the problem; this seems an even more profound challenge than creativity (one of the authors' suggestions to resolve the problem) or academic desire would indicate.

The second problem is one reported by Roth and Kaivo-oja (2016). The issue of the biases of the futures researcher on the outcomes of futures projects is well documented and is a problem that futurists are well aware of. However, Roth and Kaivo-oja's (2016) study reports highly significant biases in futurists' selection of critical variables for theorising in FS research. Their results indicate considerable bias in reference to political, economic and scientific functions (of systems) in three

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<sup>6</sup> This experience is not unique to futurists. Fam and Sofoulis (2016) studied the experiences of members of a transdisciplinary team. The study analysed the challenges team members experienced in collaborating with researchers from different disciplines and attempting to integrate knowledge from various paradigms. Their results generally support van Asselt et al.'s (2012) observations.

major FS journals and a corresponding neglect of other functions such as religion. In relation to purporting to produce alternative futures, Roth and Kaivo-oja's (2016) results present a serious challenge to futurists in terms of their orientations to trends in society, the key variables of their models, their scanning for trends, their use of language and their methodologies. However, it is not clear that addressing the five issues they raise would be sufficient to 'correct' the issues. Rather, other practices that are not identified may have a role in these biases in the first place. In addition to the question of bias, they appeal to futurists to consider exploration of five more sets of questions (see pp. 21–22). Their questions are good questions but seem to address the nature/non-human function of FS, about method, theory, analysis and definitions. As with the first problem, the predominant choice of the nature/non-human polar condition underscores the problem.

The third problem has been identified as the problematic effects of a commitment to particular methodologies and theoretical frameworks, in particular the asymmetric effects of assuming one interpretation of the world is the only true and valid interpretation for all cultures; it is the problem of relativism that can be recognised in the split between the two zones of social and nature (as described by Latour 2003). These are problems usually only identified by a minority of futurists, and furthermore, the problems are rarely associated with the purification work that produces the two opposing zones. These futurists often report the problems as issues of cultural relativity (see for example, Dator 1975, Goonatilake 1993, Inayatullah 1993, Sardar 1993, and Slaughter 1993). The authors identifying the problem reflect on how FS is itself becoming a colonising actor of futures. They recognise the universalising of Western ways of engaging with the future, in particular how the facts constructed by deterministic enquiry are assumed to apply universally, even when they are only universal within the networks that construct and replicate these facts. They frame the problem often in terms of the West dominating the non-West and of a loss of cultural diversity in futures. Inayatullah (1996) introduces a special issue in response to Sardar's (1993) observation that FS is increasingly exclusively promoting futures in terms of contemporary frames of thinking and stands to lose the plurality of futures essential to FS. Inayatullah points out that Sardar tends to focus on the issue of power, on how the field is being "colonized by modernist-Western classifications of knowledge" (p. 296), as he does in Sardar (1999b). Sardar (1999b, p. 2), summarising the chapter by Inayatullah (1999), refers to four types of power by which the West retains control, namely, first by being able to define nature, truth, beauty and reality, second by determining time as linear and progressive, third by establishing the spatial as secular and urbanised, and fourth by making a strong distinction between the economic centre and the periphery. The severity of the problem is underscored in that, as Inayatullah (1999) argues, the non-West is colluding with the West to colonise their futures by importing from the West. That is, instead of using their own histories and categories, they borrow Western definitions of notions such as time and space. The effect of the universalising of scientific knowledge, that is, of assuming scientifically produced facts are universal, is related to the cultural relativity problem; for a detailed discussion see Latour (1993). Milojević (2008) is another author who describes in detail the severe effects of the universalising of Western notions of nature

and time.

I claim that futurists do not recognise the extent of these problems because, as Latour (1993) makes clear, the modern constitution eliminates the associations and mediation (the networks, the translation practices) from both opposing polar zones (on the horizon axis in Figure 2.1) by each declaring the opposite side irrelevant. In the next section I review examples from the FS literature according to four areas where the effects of the purification work can be noticed: the historical accounts of FS, examining foundational commitments to find solutions to problems, proposals for the different dimensions that should constitute FS foundations, and the FS enquiry paradigms.

### 2.2.3 Historical accounts of Futures Studies

Son (2015) provides an overview of futurists' historical accounts of FS. Son (2015) observes that FS historical accounts tend to be presented as chronologies and focus on FS intellectual traditions (that is, practices that futurists perform to know the future) or on specific topics such as FS paradigms, methods or geographical localities. I characterise the historical accounts according to three forms and review examples of each in the next three sections. First, according to many of the historical accounts and topographies of FS, it was the period around World War II (WWII) when a modern version of futures thinking emerged. Some identify the emergence of FS in multiple strands and streams globally, while others focus on the emergence of a single stream with little or no reference to other streams. It is in the accounts of strands and streams that the polar tendencies are most visible. Second, some authors begin their accounts with events or periods decades, even centuries before WWII. Third, other authors present accounts of the field developing and maturing by adopting new approaches to do the work of engaging with the future, perhaps to address a different set of needs to what had been addressed before. Such new approaches are sometimes seen as adding to, not replacing, existing approaches.

#### **History as (opposing) strands and streams**

Accounts differ in the number and nature of strands or streams that have contributed to the movements of the FS field. Bell's (2009) foundational overview of the FS field finds that the activities of modern futurists became clearly visible by the mid-1900s. Bell illustrates the early origins of modern FS by tracing at least four strands of its intellectual history. The first strand, in the social sciences, starts with sociologists' efforts in the 1920s and 30s to study and forecast social and technology trends and social indicators so that sound policy decisions could be made about the state of society. Bell also finds reports of early research into the social psychology of time from that era. Another strand, with social engineering goals, comes from planners' efforts to accomplish work such as mobilising large-scale and comprehensive movements of entire groups like armies to do social engineering of economic and other national systems and to seek to achieve goals at societal levels. Bell identifies a third strand of alternative national futures as new nation states formed towards the end of and after WWII. The questioning of colonial received truths that went along with that

demonstrate the possibilities for alternative national futures and that people could decide about their own distinctive values, identities and goals. The fourth strand identified by Bell, the precursor to the forecasting strand, is the emergence of futurists from operations-research think tanks after WWII. Those futurists brought the alternative futures and long-range thinking of the military to public attention, while a backlash against war sparked the adoption of FS for better and more peaceful human futures.

In contrast to historical accounts such as Bell's (2009) that identify multiple streams after WWII, some accounts only recognise the one stream emerging from military planning. Authors who mention only the strand of forecasting (known also technological forecasting and foresight) tend to place its origin in the natural and applied sciences, with its focus on technology originating in military applications. Technology is a broad term associated with many fields of scientific study, as can be seen in Jantsch's (1967, p. 15) definition of "purposeful application of the contents of the physical, life, and behavioural sciences ... as well as the medical, agricultural, management and other fields". Ayres (1989) and Coates et al. (2001) describe the development of forecasting in the USA. They both identify an account of perhaps the first serious attempt to develop a systematic outlook of scientific and technological inventions and to predict their social impacts. Ayres's (1989, p. 52) assessment is that the study was more about "[illuminating] the past rather than to forecast the future [and the] forecasting component of the study was entirely judgemental and qualitative". According to Ayres (1989), the military was still supporting most of the activity, from a 1967 survey report by Erich Jantsch sponsored by the OECD. Ayres (1989) mentions a number of forecasting achievements, including forecast reports of important military technologies, the pioneering of forecasting methods such as the Delphi method, and forecast reports of the availability and demand for natural resources.

The Air Force Office of Scientific Research helped to raise recognition of technological forecasting as a formal activity by the mid-1960s. Coates et al. (2001) put it that in the USA after WWII, innovation was modelled as technology originating in basic science and progressing to product development directly caused by investment and innovation. The Cold War competition needed anticipation of performance of weapons and components. By 1949 technology foresight (TF) was accepted in the USA as a systematic way to explore the future of technology, helping the military to deal with the long lead times and complexity of modern armaments and countermeasures. Quantitative methods such as trend and growth models and leading indicators work from the past to the future. There was also a role for starting forecasting with future needs (called normative forecasting) and using qualitative approaches such as relevance trees, scenarios and Delphi. Coates et al. (2001) mention the first textbooks describing these tools and their application in planning and decision-making (e.g., Jantsch 1967). Coates et al. (2001) state that at the same time, as an expansion beyond US defence was occurring in the 1960s, so there was growing environmental and social consciousness developing and pressure for early payoff from investments. Ayres (1989) states that by the end of the 1960s, books and journals on forecasting had appeared and 80 per cent of businesses surveyed were using forecasting for various planning purposes.



From the later 1970s, disillusionment with TF crept in, acknowledge Coates et al. (2001), as various failures to deal with ill-structured systems, geopolitical instability and the uncertainties of technology development prevented the development of unambiguous solutions. Coates et al.'s (2001, p. 3) view is "There was also growing realization that long accepted scientific paradigm procedures such as validation and replication could not be applied to confirm the forecasting tools beyond the near term". Coates et al. (2001) conclude this meant that, between 1975 and the early 1990s, few forecasts were produced and generally not very well (citing Coates, Mahaffie & Hines 1994) and thus TF shrank to simply a set of tools and methods. But from the late 1990s all forms of TF experienced a renewed surge with a shift in the concerns of nations and a diversity of agents from invention to the use of technology (e.g., see Johnson & Marcovitch 1994). In addition, the availability of new tools dealing with complex systems and chaotic behaviour, and an expanded range of applications in organisations fuelled the surge. Two other issues accompany this upsurge, according to Coates et al. (2001). First, technology development is no longer an orderly process because of its direct relation with scientific research. Second, technology assessment needs to accompany TF since social and political issues are involved with TF; examples are the inequities of the payoffs of technology and the ethics of bioengineering.

Rather than distinct streams, Gordin (2015) sees the history of the future as displaying a distributed and global structure, giving the social sciences a central role in bringing FS into all of its current application domains. He notes a rapid increase in similar practices to deal with the future in different parts of the world in the 1960s and 1970s. He dismisses this as mere coincidence or as having a single source, arguing it took place in many networks associated with structural changes. These structural changes included, he argues, the activism of a new generation that erupted across the world feeling discontent with their parents' aspirations, converging with the technological emergence of the personal computer and the realisation of the patterns of interconnected economies that prompted a diversity of intellectuals to reconceive the future. For him, the history of this particular moment is a global history because he finds traces of responses and protestations against the Cold War in the future scenarios of all the essays. Lastly, Gordin (2015) identifies the social sciences as the field that brought studies of the future to all other areas, that moved models between areas and that brought the sciences across the world together "with the global moment of the 1960s and 1970s" (p. xiv). The accounts by Bell (2009) and Gordin (2015) differ from the forecasting accounts in that they place emphasis on the social sciences streams.

Son's (2015) three-phase periodisation account of Western futures studies presents a somewhat different view of the strands of development. The three FS historical phases identified by Son (2015, p. 120) are: first, the era of scientific enquiry and rationalisation of futures, 1945 to the 1960s; second, creation of the global institution and industrialisation of futures, the 1970s and 1980s; and third, the neoliberal view and fragmentation of the futures, the 1990s to the present.

Another view is that the field could be converging on two streams. According to Lu, Hsieh and Liu (2016), there is convergence to two major streams visible within the citation networks of

scholarly futures literature. In the one path Lu, Hsieh and Liu (2016) see papers that discuss technology forecasting and foresight, and in the other path are papers that mainly investigate FS.

### **History from earlier origins**

Van Asselt et al. (2012) name HG Wells's article 'The discovery of the future' in *Nature* (1902) as an early reference. In that article, according to their summary, Wells "explored the possibilities of the study of the future as a scientific activity" (p. 1). Van Asselt et al. (2012) also briefly look at the origin of the word 'future' in the English language; it derives from a Latin notion of 'about to be'. Rescher (1998) argues that prediction has high importance in human affairs and thus is an activity practised by prophets, seers and oracles, people with psychic insight or prevision, throughout classical antiquity to the middle ages and today. However, it was during the 17th and 18th centuries that the primacy of scientific prediction was given greater importance following the developments related to science in the post-Renaissance period. During the era of the Enlightenment, successful prediction became a measure of a discipline's success; thinkers became convinced that successful prediction of the effects of phenomena in situations not previously experienced was a sign of scientifically adequate understanding of the phenomena. The success of classical physics in the 18th century strengthened this pivotal role given to prediction. However, when social scientists adopted the tools of prediction to bring an accurate view to the future of human affairs, confidence in prediction suffered severe knocks. The story continues, as Rescher (1998) tells it, since people's interest in the future remains, and since the 1950s, the modern version of prediction emerged with a focus on technological change.

Foresight University (2016) traces the oldest form in recorded history of foresight thinking to the Delphic oracle of Ancient Greece and to the prophets of religions at that time and of more recent religions. Foresight University (2016) finds the next oldest form of foresight in secular aspirational political philosophy. For example, it mentions Plato's *Republic* and Thomas More's *Utopia*. Foresight University (2016) describes that secular foresight began with the European Enlightenment of the 17th century and identifies the modern foresight field as starting in the 1950s.

### **History as developing and maturing**

Some authors of FS history recognise the different streams as stages of development in futures work. For them the separations between the streams tend to be indicative of different 'levels' of FS that are more or less useful or adequate in different situations and for specific needs. In terms of the categories of separating practices described in another section of the chapter, authors often present later levels as transcending and including previous levels of FS work. The separations between the streams are also linked to methodological and theoretical stances, that is, the research perspective adopted for a particular futures project, whether or not the futurist doing the work declares the position or not. Slaughter (2004, p. 217) discerns the development of three types of foresight to meet different needs. The first and the most common form, in his view, is "pragmatic foresight". This is about improving and advancing current practices in organisations and most organisations can benefit from it in a range

of ways. For example, Slaughter might consider Ayres's (1989) description of the forecasting stream as a type of pragmatic foresight. Following Slaughter's definition, the developers of the models in their organisations would be doing pragmatic foresight if, for instance, they introduced feedback loops and checked for analysts' biases in the selection of their trend indicators used in the models. Slaughter (2004, p. 217) names the second form of foresight that genuinely looks for systemic improvement "progressive foresight". This is where organisations are reformulating their practices in view of wider social and environmental issues and hence goes beyond day-to-day concerns of the business about products, services, finances and so on. Slaughter's (2004, p. 217) third form of foresight, and perhaps the most demanding according to him, is "civilizational foresight". FS of this type might be trying to clarify how to achieve shifts to more sustainable cultures or speculating about the world views and values of the present systems. Slaughter (2004) notes that while these forms of foresight are usually done as separate projects, people do also value linking them to consider the issues at the different levels.

Slaughter (2002a, 2004, pp. 152–166) and Inayatullah (2002) discern an evolution in futures research methods. Slaughter (2005, p. 350) describes a process of "methodological renewal". The process starts with "mono-cultural empirical FS" where external events are studied from within a presumed Western frame. The first shift is to "multicultural and critical FS" that embraces a range of internal cultural events. The second shift is to "integral perspectives and methods" where interior and exterior events of all cultures are balanced. The latter shift, according to Slaughter, greatly increases the influence and power of futures work. By renewal of methodologies, Slaughter means that new methods are created and new vitality is brought to the older ones.

Inayatullah (2002, pp. 295–296) refers to six phases of FS history identified by a number of different futurists. The six phases are ways, stages or typologies in which different futurists divide modern FS. The first authors he cites, Masini and Linstone, divide FS into "the technical (issues of nuclear war, technology and policy impact, and the details of forecasting methodology), the organizational (more effective, learning organizations) and the personal (inner transformation, the ecological movement)". He cites Amara as being the first to divide the nature of futures into the preferred, probable and possible, and he notes that Bezold adds the plausible. Citing himself, Inayatullah (1990, p. 296) "divided the field into three stages and approaches. The empirical–predictive (concerned with forecasting the future), the interpretive–cultural (concerned with the meanings we give to data and their cultural boundedness) and the critical–poststructural (concerned with what is missing in any nomination of the future)". Sardar (1999b) identifies another phase in the field as being "colonized by modernist-Western classifications of knowledge". Inayatullah (2002) credits Sardar (1999b) for placing "futures studies within the epistemological school of critical realism" (p. 296). Finally, Inayatullah (2002) recognises Slaughter, Inayatullah and Ramos's (2005) effort to create a knowledge base for FS as contributing to the evolution of the field. Inayatullah (2002) indicates that the evolution of FS as described by these shifts is similar to the conceptual challenges in social sciences; however, he believes that the FS field is perhaps leading other fields.

Voros (2007, p. 71) provides a brief overview of the history of futures research methods as seen through their paradigm commitments, that is, their theoretical and methodological commitments. The first point Voros (2007) makes is that any person examining the paradigmatic approaches used in FS will find examples of each of the stances found in contemporary (Western) research; thus the developments in research paradigms, starting with positivism, are found in futures research. In addition to Slaughter and Inayatullah as described in the previous paragraphs, Voros (2007) names three sources that describe progressions in futures research methods. First he names Bell (2009, chapter 6) as describing an evolution from the use of expert-based and quantitative methods to methods that are more qualitative and participatory. Second, the various FS methods and techniques discussed in Glenn and Gordon (2009) and Slaughter, Inayatullah and Ramos (2005) demonstrate a progression in FS methods. Voros (2007) explains that the post-positivist rational-quantitative commitments of the FS originators were recognised by authors of the 1970s and 1980s, but they also recognised the limitations of positivistic approaches to futures research and the crisis experienced with the recognition of the influence of the perceptions of the researcher. Voros identifies FS approaches that recognise the post-positivist evolution. For instance, he points out Gaston Berger's prospective approach for its recognition of discussion and dialogue. Voros recognises the interpretivist commitment in the idea of a socially constructed reality, as described by Berger and Luckmann (1975), in Bertrand de Jouvenel's approach to futures enquiry (de Jouvenel 1967). Voros identifies the central elements of criticalist and constructivist approaches (e.g., dissent and the use of dialectic) in the writing of Sardar (1999a) and the essays by numerous authors in Sardar (1999b). Voros also identifies the adoption of participatory and action research approaches in the work of the authors contributing to the special issue in Ramos (2006). Finally, Voros identifies an approach where FS is leading research enquiry, namely, in adapting integral frameworks for FS; these frameworks are ways to relate the structural perspectives of traditional research in comprehensive ways (Gidley 2010); see also for example, Hines (2004).

This summary of FS history shows that futurists' practices and theories have developed through their experience and along with certain developments in other disciplines. Some accounts are chronological descriptions, while other accounts interpret changes to new and different commitments and principles as historical development or maturing of the field. The developments show that different research perspectives and stances are taken in FS practices. Voros (2007, p. 71) states clearly that "foundational assumptions and fundamental presuppositions", or in short paradigm commitments, are included in futures research. Such commitments, he explains, "condition what are considered to be acceptable, appropriate or valid forms of methodology". Nevertheless, Voros is referring to research methodology specifically.

Son (2015, pp. 122–123) identifies five intellectual traditions that have influenced the philosophical and historical contexts of the foundations of FS: religions, utopias, historicism, science fiction, and systems thinking. Other authors might include other traditions. Given the post-positivists' realisation that the researcher's perceptions have at least some influence on research

methodology, that realisation applies also to futurists' presentations of the evolution of FS. That is to say, futurists' presentations of the evolution of the FS field include at least some measure of needs to enrol, mobilise and disrupt; this is a measure, therefore, of the writers' concerns for a particular group, including for the FS field being informed by foundational commitments. The identifications of methodological and theoretical connections of the different streams deepen the separation and increase the division between the separating practices, but do not identify the practices that maintain these separating tendencies. Thus, the next section reviews the search for FS foundations in the process of shedding light on tendencies in the field of FS.

#### 2.2.4 Examining foundational commitments

Futurists identify problematic conditions in the FS field which they examine in terms of foundational commitments and assumptions. The problematic conditions could be related to their practices, methodologies, subjects and objects. For example, Bishop and Morrow (2009) called for contributions to a special edition of the *Journal of Futures Studies*. They asked foresight practitioners to reflect on difficulties experienced in helping people see the world differently, to share information about foresight practices and methods, and to describe their experiences with empowering clients and communities to describe and create their aspirational futures. Futurists differ in the concerns they address and the types of solutions they propose to resolve these difficulties. Their examinations or solutions to the problematic conditions tend to emphasise or favour the one or the other opposing polar condition. This section identifies seven examples from the literature that illustrate some of the conditions that can generate a call for an examination of FS foundations and the differences in their responses.

First, some futurists identify different structures in futures work. For instance, Amara categorises the nature of futures produced into the preferred, probable and plausible. This in itself requires examination of the assumptions that make possible the differences between preferred, probable and plausible futures. The futurist might go on to identify problems, failures, issues or dissatisfactions and suggest solutions based on evaluation of the assumptions identified. Their solution might be to adopt a different perspective from which to study the future. Their solutions depend on the areas where they perceive the difficulties. For example, Wilson and Wilson's (1971) solution is to identify missing dimensions in existing models and suggest additional dimensions. Objective studies of nature tend to use models, and thus their solutions reinforce the use of the nature/non-human pole by overcoming the problems and failures that perhaps come from researcher subjectivity. Milojević (2008) identifies problems in the power of the analyst in defining futures in particular "linear, technocratic, economic, western and patriarchal" (the nature/non-human pole) ways through their assumptions about clocks and time, and she suggests solutions in relation to "awareness of feminist cognitive frames" of experienced time (the social/human pole).

Second, perceived differences in conditions of the world require appropriate ways to find solutions. Wilson and Wilson (1971) note problems with the rapidity of change causing imbalances

in society and they propose a solution based on dynamic stability. By dynamic stability, they mean analysts can no longer assume that social systems change in discrete steps from one stable state to the next stable state. They are also concerned to make sure that those who live in the future can participate in the choices about that future. They note that dependable methods and basic principles are available to produce systematic knowledge of deterministic physical processes. However, not for complex human systems. They examine therefore the foundational commitments of the model of change “implicit in every forecasting technique” and suggest that a “comprehensive model of change should allow for determinative, normative, and random processes” (p. 87).

Third, the futurist notes a problem with the results of a futures technique or method, calls for examination of assumptions and proposes improvements to the techniques or developments to the methodology. For example, Ayres (1989) mentions a 1981 study that compares 2000 technological forecasts and identifies four types of forecasting methods. Ayres (1989, p. 53) notes, “In practice, such models are invariably linearized [and] omission of feedback loops that introduce nonlinearities to the system is probably a fatal defect”. Therefore, he suggests feedback loops as a way to improve these “deterministic extrapolation” forecasts. An example that looks for development of methodology is from Ahlqvist and Rhisiart (2015). Ahlqvist and Rhisiart (2015, p. 92) take the view that most futurists “are, on the whole, less reflective of the implications of [their] methodological choices”. They are sceptical about “whether the critical realist perspective has supplanted (neo-)positivist principles in much of the future oriented work conducted by corporations and governments” (p. 92). The problem they identify is that under those conditions, the construction of futures is not serving the multiplicity of world views and interests of the genuine stakeholders. They recognise a somewhat antagonistic dichotomy between instrumentalist futures work and critical futures work. They propose three ways to renew critical futures research to integrate and overcome this division: seeing that futures are defined by everyday, behind-the-scenes, “socio-technical practices” (p. 97); seeing futures as revealing the alternative embedded in every event, a “future-oriented dialectics” (p. 99); and seeing that futures are partial views translated into total perspectives for management purposes and control, the “socio-economic imaginaries” (p. 101).

A fourth area where futurists examine assumptions is in the requirement to develop relevant yet alternative futures in the face of uncertainty and incomplete knowledge. This draws some futurists’ attention to their assumptions and theories in the conduct of their work. For instance, Bell (2009) examines the questions of how the field knows what it claims to know and how it justifies its epistemological foundations to provide philosophical justifications for the knowledge produced. However, Bell asserts that the knowledge foundations of FS have received relatively little sustained attention and critical thought. In relation to this topic, Bell (2009) examines futurists’ assumptions about time and knowledge. Moreover, some futurists may recognise that being involved in decision-making about which alternative futures should be developed, deciding who is free to have a say about them and knowing that futures images are guided by values and power and can be a form of manipulation all raise ethical and moral issues that cannot be avoided. This goes well beyond clarifying

values and goals; “the study and fostering of deep caring about the freedom and welfare of future generations are among the most important purposes of futures studies” (p. 88). It follows, claims Bell, that futurists also have to study the ethical foundations of FS. Bell’s (2009) view is that futurists have to own up to the dilemmas and bring more futures thinking to the challenges, which also necessitates that they consider the theories on which those assumptions are based.

The fifth example is when futurists suggest new methodologies. Some futurists note the different outcomes of futures work because of their methodological foundations and support new methodologies and new perspectives from which to study the future. For example, Slaughter (2002a) writes of four major phases, with the first three operating over three decades each in their distinctly different methodological paradigms, in the evolution of futures methods, namely, forecasting, scenarios, social construction and, most recently, integral methods. Slaughter states that:

Forecasting was an attempt to assert control and a measure of certainty over an unknown future. Scenarios are an attempt to explore diversity within the forward view. The social construction of reality is an attempt to operationalise the deepest purposes of critical futures work in ways that consciously and deliberately lead toward more humanly viable futures than those currently in prospect.

Slaughter (2002a, p. 31)

Sixth, some futurists classify different methodological approaches and order them according to their philosophical and ethical foundations. They then situate their endorsed approach in relation to those. For example, Masini (2006, p. 1162) identifies three different philosophical approaches to the future: the “prognosis” approach, the “visions” approach and the “projects” approach. The approach Masini (2006) endorses is the projects approach. However, the projects approach is itself a synthesis of the other two approaches. Some futurists note and describe shifts and developments in futures work and they research the differences and the implications of those differences for the types of futures work and the outcomes of particular methodologies. For instance, this can be seen in the work of Slaughter and Inayatullah (mentioned in the historical sections of this chapter). Some futurists develop methodologies that layer the different perspectives of other methodologies into one common approach and then structure the layers according to their own methodological principles. Some futurists relate these layered methodologies to different research paradigms.

Voros (2007) draws parallels between the evolutions in the traditional research paradigms and the evolutionary phases and shifts in futures research. He also establishes parallels between the paradigms and the purposes of futurists. Voros (2007, p. 82) lists the four main purposes for the five main classes of enquiry paradigms as: “prediction and control; critique and transformation (leading to emancipation); understanding and insight (leading to re-construction of prior constructions); and human flourishing (through political participation)”. Voros (2007) points out the strong similarity between these four main paradigm-related purposes and the four types of futures approaches identified by Inayatullah (2005, 2006): predictive; critical; interpretive; and anticipatory action learning. Voros (2007) adds to the list the integral approach, which integrates the many competing, even opposing, approaches into a single framework. The integral approach is not tied to one particular

paradigm or perspective; the aim is that the futurist can choose from the many approaches the one that is most appropriate for the particular study.

Lastly, futurists ask questions about the foundations of FS, propose possible dimensions needed to describe these foundations and suggest ways to go about getting these foundations formulated. FS can lead other disciplines in terms of methodology, in Voros's view, because futurists' interests in disciplinary commitments are less strict and futurists have fewer territorial disputes. However, being ahead of other fields makes it difficult for FS to gain legitimacy in the eyes of broader academia. It is in the developments related to the previously identified strands in FS, and in these historical shifts and developments of the field, of phases, stages, layers or levels of futures work, that the tendencies relevant to this review are noticeable. For example, Fuller and Loogma identify a duality deep in Western metaphysics:

The very idea of 'knowledge' about an empirically non-existent/'yet to exist' space implies a dialectic with the empirical real. This could be read as 'subjective' knowledge versus 'objective' knowledge with a distinct sense that subjective knowledge is unscientific, unproven and 'made up', and therefore of little use and/or dangerous to the status quo.  
Fuller and Loogma (2009, p. 73)

The next section reviews the effects of purification work in futurists' proposals for the theoretical dimensions needed to describe FS foundations.

### 2.2.5 The dimensions constituting FS foundations

For more than 50 years, futurists have been searching for philosophical and theoretical foundations for what they do. This section reviews the dimensions of their search and the specific issues and topics that they consider relevant to addressing the search for foundations. They identify different topics that should be considered in a discussion about foundations. Some authors order the different topics and dimensions in ways that maintain movements to the two opposing poles. They identify and propose various generic features of stable disciplines (e.g., knowledge creation paradigms, practice versus theoretical topologies or methodological characteristics) that an FS field could emulate and develop according to its own principles.

With a focus on the aspects that define a field, Öner's (2010, p. 1019) literature review confirms that, as of the first half of 2010, there is no "Grand theory of Foresight and Futures Studies". With a focus on knowledge enquiry processes, Voros (2007, p. 72) relates the traditions of generating knowledge in futures research with the paradigmatic research paradigms of scientific knowledge enquiry. Öner (2010, p. 1019) takes the dimensions of other fields as the starting measure for a futures field, while Voros (2007, p. 72) relates FS enquiry to other fields but adds that FS is and cannot be the same as other traditional fields. Some authors focus their attention on epistemology (the social/human pole) while a few authors include ontology as a topic (which tends to refer to realism and thus the nature/non-human pole).

Öner (2010) presents a literature review on this topic sufficient for her purpose of provoking thought for discussion at an international conference on building theory for FS. She approaches the



question of forming a field and in particular the question of theory building by laying out a wide variety of dimensions and measures of academic fields and inviting participants to complete a survey instrument prior to the conference. Her review of journals identifies a tension in the relationship between foresight and FS theory and practice. Under the heading of theory and theorising, she lists six topics: epistemological concerns; theory as either product or process; a framework for research methods that she discusses according to the rational/existential dimension and the natural/artificial dimension; the definitions, terms and constructs; the research questions and research strategies; and specifically for FS the need for the foundations to take into account the ‘not yet in existence, still to come’ issue. While not finding a grand theory, she does find sufficient evidence of building blocks of theory already available in the literature and strengths in FS epistemological pluralism. She also identifies three specific issues to consider regarding theories. These are: similarities in theories; the compatibility and language and terms of theories; and the possibility of groupings of theories according to a variety of indexes such as schools or perspectives. She notes that, as expected, theorists from similar FS schools cite each other but ignore the theorists and theories of other schools (for reasons she cannot determine) or refer to them only negatively.

Slaughter (2002a) directs attention to methodological concerns. He states, “all fields provide practitioners with the types of questions to ask and the ways of studying that can be used” (p. 26). Voros (2007) takes the view that all the paradigmatic research approaches of the traditional sciences can be found in futures research and he provides examples to support his claim. Thus, Voros (2007) describes the philosophical foundations of ways that futures researchers generate futures-relevant knowledge by describing the philosophical positions of traditional scientific knowledge enquiry. He locates the knowledge enquiry of futures researchers with the study of the wide variety of images of the future that people have in the present. ‘Futures image’ is a key defining term in futures research and refers to the plurality of ideas and images of the future. The aspects of a futures image that a researcher might study include the consequences of images or the ways images are used in decision-making. The futures researcher chooses from the same selection of enquiry approaches as any other traditional researcher.

Voros (2007) uses the well-known topology developed by Guba and Lincoln (1994) to classify the enquiry paradigms. Their topology is developed and refined over a number of iterations and extended by feedback from Heron and Reason (1997) regarding a fifth paradigm. The topology addresses four central questions that specify the basic beliefs of each enquiry paradigm: ontology, epistemology, methodology and axiology. The seeming simplicity of the definitions of these central questions, when expanded on, highlight many intricacies that need more extensive space to be clarified than is possible in this thesis. According to the topology, research paradigms are summarised into five main classes: positivism, post-positivism; critical theory (which, according to Guba and Lincoln 1994, p. 109, are divided into poststructuralism, postmodernism – also labelled critical realism – and a blend of these two); constructivism; and the participatory paradigm. Post-positivism addresses some of the key weaknesses of positivism, while critical theory is to varying degree in

opposition to the positivistic paradigms. In other words, in these paradigmatic and foundational issues there are tendencies to opposed conditions, where the conditions are either dealing with the future as natural, and thus the behaviour of phenomena is continuous, or dealing with the future as human cultural constructions dependent on notions such as values or visions, and thus that it is subjectively determined. The premises and assumptions of these paradigms spell out specific consequences for what is being researched and the sorts of questions that can be asked.

Fuller and Loogma (2009) concentrate on social constructionism because for them foresight is intended to be an important precursor to action, it relies on the relationship between knowledge and action, and hence the social processes that produce knowledge are more important. Fuller and Loogma explain that there is a range of perspectives on social constructionism/constructivism but that the central idea is that the social objects people refer to in their accounts of their social world are literally constructed in the interaction processes between the people. Further, a common thread between the variants of constructivism according to the authors is the focus on constructed reality, not on ontological reality. Knorr Cetina (1993) objects to a conflation of the variants of constructivism and argues that the constructivism reinvented in STS “in many ways constitutes a different doctrine altogether.” (p. 555) For Knorr Cetina, constructivism raises issues (about science in particular) that need philosophical rethinking, such as questions of ontology, of the pre-existence of scientific objects and the material forces in the world that make their presence felt. Fenwick and Edwards (2013) also refer to this difference between variants of constructivism in the context of education. Fenwick and Edwards identify influential researchers, Dewey, Piaget and Vygotsky, who developed constructivist theories of “human learning in a material world”. However, Fenwick and Edwards contend that, in contrast to the STS scholar who explores “the material and human as mutual constituent enactments of the social”, the approach of the social constructivist scholar takes material “to be the background context against which human educational practice takes place or within which it sits, and material artefacts are often taken to be simply tools that humans use or objects they investigate.” (p. 50) Fuller and Loogma (2009) suggest social constructionism as a fitting method for knowledge creation in FS. Fuller and Loogma (2009) argue that a weak form of social constructionism is implicit in many FS epistemological assumptions as it seems to them that many futures studies assume the socially constructed nature of their processes and outcomes. FS activities produce knowledge and such knowledge is generated by social action (e.g., discourse and language), which makes social constructionism highly resonant with the production of foresight knowledge. One explanation for the unpredictability of futures is creative social processes in which people interact to produce knowledge, meaning and relevant actions. This is strengthened when taken together with the idea that the knowledge production process is more significant in FS than the accuracy of the knowledge. They identify specific characteristics of foresight methodology that should be explicitly be considered: the construction of time, power and performative power; the production of knowledge; the meanings generated; the responsibility taken; dominant discourses and languages; the interaction between knowledge and action; and the values inherent in interpretations.

Fuller and Loogma (2009) mention three authors' works that explicitly declare research positions that are more or less consistent with social constructionism. The first futurist's text is Bell (2003). Fuller and Loogma (2009, p. 73) determine that Bell's position (a critical realist theory of knowledge, more essentialist than relativist and that admits conjectural knowledge) resembles weak constructionism. The second futurist's text is Slaughter (2004). Fuller and Loogma (2009) detect in Slaughter's more recent writings a much stronger constructionist position than in his earlier writings. Fuller and Loogma (2009, p. 73) describe Slaughter's methods as part of the integral futures approach for promoting social constructionism as a powerful means for "elaborating the power of the inner self in society", for change for the better. Fuller and Loogma (2009, pp. 73–74) declare Inayatullah (1998)'s work, the third text they identify, as definitely consistent with social constructionism, particularly Inayatullah's method of causal layered analysis (CLA), a form of postmodern deconstruction adapted for FS. The aim of CLA is to deconstruct socially constructed categories (Inayatullah 2004, Inayatullah and Milojević 2015). The deconstruction identifies what could or needs to change to produce alternative futures. Fuller and Loogma state:

Critical social theory relies on an assumption that language is constitutive of reality, and that the social construction, in language and in everyday practices of a particular event or category, privileges certain interests. The use of deconstruction to detect hidden or implicit meanings embedded in texts, and the interests that such meanings privilege, is an important methodology in critical theory.

Fuller and Loogma (2009, pp. 73–74)

Fuller and Loogma's (2009, p. 72) conclusion is that "foresight is both a social construction, and a mechanism for social construction". Fuller and Loogma (2009, p. 72) state that social constructionism is specifically about meaning in "that whenever we employ words or other symbols to refer to objects in our social world, we are constructing them, quite literally, as meaningful social objects that we can take account of in our actions". Fuller and Loogma describe that all forms of constructivism focus on constructed reality and not ontological reality. According to them, it "is part of a wider framework of symbolic interaction theory" (p. 72) and the notion asserts that "meaning and understandings emerge from the interactions between people", in other words, "neither objectively nor subjectively, but inter-subjectively" (p. 72).

Individual capacity to engage with the future is important for the professional debate (Hines 2002, 2003; Hines & Gold 2015), yet few authors call for it to be considered in the theoretical and philosophical foundations, possibly because as Hideg (2007) says, the individual is subsumed under the social and hence is not considered relevant to the foundations. Slaughter (2004, pp. 171–185) proposes how social foresight could emerge from individual human capacity in five stages of development to social systems with a norm of long-term thinking. At the first level are the individual human capacities for understanding and dealing with time, their bare innate functioning to speculate about the future, make plans and choose between options for action. At the second level, the simple concepts and ideas of the FS discourse are more widely used in the day-to-day social practices. At the third level, the tools and methodologies (such as the futures wheel and scenarios) are used extensively

in social practices, going beyond talking about problems using the concepts and ideas of FS. At the fourth level, FS processes, methods and tools are routinely used in social institutions, organisations, structures and applications. Finally, at the fifth level, foresight and long-term thinking about the future is a social norm.

Mermet, Fuller and van der Helm (2009) pose that futurists' special challenge is that they work with statements about future states of affairs for which they do not have valid data, direct observation or experiments they can perform to help them with robust reasoning. This, according to Mermet, Fuller and van der Helm (2009), highlights the need for theoretical justification, which has urged development of FS. It also means that methodology is a central concern for FS. These challenges have only increased with time, according to Mermet, Fuller and van der Helm (2009), and therefore they sketch out three important characteristics of the FS field to justify why renewed effort should be put into renewing FS theoretical underpinnings. The first and most decisive characteristic is the strong emphasis on action that necessitates studying future possibilities to inform action and decision-making. However, they suggest that other bases than decision-making for the evaluation of methods should also be explored. The second characteristic is the strong practical orientation of the field, which creates rigidity and vulnerability because it leaves the field relatively autonomous within the academy but also isolated on its own island. As a result, the third characteristic of FS that Mermet, Fuller and van der Helm (2009) identify is that futures work is mainly focused on well-known successful methodologies, which tend to be codified and proliferate, while relatively devaluing critique and theoretical work. The problems with these tendencies are that practice is evolving faster than theory and standardised approaches offer little scope for innovation and critical discussion of practice or its results and theoretical bases. One of the actions Mermet, Fuller and van der Helm (2009) suggest is to call attention to new theoretical approaches developed by futurists, such as the examination of constructionism and constructivism in FS by Fuller and Loogma (2009), the methodological development of the Social Shaping of Technology approach explained by Jørgensen, Jørgensen and Clausen's (2009), and the examination of the theoretical foundations of scenario methodology by Booth, Rowlinson, Clark, Delahaye and Procter (2009). Mermet, Fuller and van der Helm (2009) also identify language as an important tool of doing futures work, if not the only one.

Mermet (2009) distils a set of the most basic choices a futures researcher makes from experience in working across the two fields of environmental sciences and FS. Mermet (2009, p. 105) finds that set patterns of theoretical and methodological thought have to be re-examined in both fields; this means that in debating foundations, FS has to go beyond standardisation of FS methods to prevent the "metonymical hustle" whereby one field tries to impose its own purposes and concepts and methods onto another field to redefine the other field. Mermet's (2009) solution is to suggest a framework of organised set of concepts and orientations that acts as a guide for researchers to make explicit their fundamental choices in futures research. This broad framework consists of the most basic four choices FS studies make that are present on all maps (pp. 110–112): the conjecture/forum dialectique; the productive and transformative activity; operations in a wider field; and encouraging

discussion of the theoretical and methodological aspects of an operation.

In light of philosophical FS foundations, Piirainen and Gonzalez (2015) contribute to the discussion about foresight theory with strong tendencies to the nature/non-human conditions. Compared to Voros, who considers the philosophical and methodological commitments in FS, Piirainen and Gonzalez (2015) consider FS theory by reference to existing knowledge of theory building in the social sciences. They consider theory building in relation to three perspectives on FS work: foresight as knowledge creating; as process or intervention; and as theorising about the future of a particular domain or system. They adopt theory as their starting point to develop a general framework of theory development. Their definition of theory refers to the systematic structure of theory as conceived according to an objective perspective, and thus excludes the participatory paradigm described by Voros. Thus, theory concerns laws regarding regularities in objects and events (phenomena), and theory links constructs in terms of causal links that explain the regularities of the phenomena and hence can predict the interdependent behaviours of the constructs (Piirainen & Gonzalez 2015, p. 192). According to the framework, these three perspectives are hierarchically structured, with the activity of knowledge building as the foundation-level organising principle.

Developing knowledge of the future involves ontological and epistemological commitments that support the claims to scientific knowledge obtained through foresight (although they do not further consider the ontological commitments). They discuss the post-positivist (empirical realist) epistemology of foresight, the interpretive and critical epistemology of foresight and the pragmatist epistemology. On the latter epistemology of foresight they differ from Voros, although both the participatory paradigm (Voros) and the pragmatist epistemology (Piirainen & Gonzalez 2015) deal with action orientation of foresight: “For pragmatism, it is action that enables change and action is inextricably linked to purpose and knowledge” (p. 195). They are particularly critical of foresight activities that turn foresight into political debate and do not create knowledge; foresight that emphasises discourse and emancipation may be well-meaning but, “Unless foresight results in fact-based and actionable conclusions and enables forming a consensus and commitment to action, it is of little consequence in decision-making” (p. 196). At the second level is the activity of theory of foresight as a process and intervention. This is therefore concerned with methodology and conceiving of foresight as practice. At the third level, theorising is relevant to domain-specific theory needed to explain and predict the futures of the systems of interest.

This section shows that futurists’ different foundational assumptions and beliefs about the approaches and positions that can be taken for engagement with the future (e.g., which perspective to take in research of the future) reinforce the purification that creates and maintains the two ontological zones of social/human and nature/non-human.

### 2.2.6 FS enquiry paradigms

After the failure of attempts after WWII to socially engineer societies, many forecasting futurists began to admit that exploring the future as it would be cannot be done since it remained more or less

unknown, that some things can be anticipated relatively exactly while other things remain surprises (see for example Cuhls 2003). People began to realise that several different futures are possible and the idea of exploring diverging futures and to prepare for change stimulated futurists into trying to find appropriate enquiry positions to do research and studies into futures (Slaughter 2002a, 2008). Two main enquiry perspectives are taken to studying the future: the objective perspective, which inherits theory from the natural sciences like physics and biology; and the subjective/intersubjective perspective, which inherits theory from the social sciences. These two perspectives are dominant among futures researchers and can be seen in the two opposite ontological conditions, even though they both address 'social' futures. This is commented on and researched by futurists. Öner (2010) observes two related groupings or theoretical schools (identified as foresight and FS) that cite the work of authors of their own schools while either ignoring or acknowledging negatively the other school. Through their systematic and comprehensive examination using a new method, Lu, Hsieh and Liu (2016) reveal the same structuring of the two schools (two major streams in the overall knowledge diffusion trajectory) in the FS literature. Their approach thus has similarities with the developments of the two perspectives (objective and subjective, external and internal) as summarised by authors such as Voros. Voros (2007) combines the shifts in the four paradigms into two movements (that are similar for the questions of ontology and epistemology). He notes that for "the two positivistic paradigms, reality remains external to the subjectivity of the inquirer but, in the other three, reality becomes increasingly contingent upon inquirer subjectivity so that, ultimately, in the participatory paradigm, the inquirer's own subjectivity is considered to be literally formative of it." (p. 77) The differences between these perspectives about how to approach engagement with the future are here illustrated with examples specific to the concept of prediction.

Authors explain the concept of prediction differently – in connection to methodology, assumptions or interpretations – depending on the paradigmatic approach adopted. Thus, in explaining prediction authors also demonstrate purification work. The purification work can be observed for instance in the objects the authors refer to. For example, authors using objectivist approaches might explain prediction in terms of objects like variables, indicators, points, facts, targets and so on, whereas authors using a subjectivist approach might refer to objects such as power, (human) agency, freedom, emancipation, and so on. Some authors, such as Bell (2003), identify the paradigmatic approach adopted. For Bell the approach is a realism that assumes a reality exists independently from human knowing and that humans can, in principle, know that reality objectively (p. 161). Knowing the author's paradigm commitments makes inferences about the purification work possible, including in the more comprehensive explanations of FS work, such as that of Bell (2003).

First are examples tending to the nature/non-human pole. An example of the deterministic approach is provided by Cuhls (2003). The author explains the difference between forecasting and foresight (both adopt objective perspectives). Forecasting focuses on the developments in science and technology. The aim of foresight is to identify areas of strategic research (to decide on research priorities) or to identify emerging technology likely to yield benefits, by looking systematically (with

clues and indicators of trends and developments) into the future of science, technology, the economy and society. Cuhls (2003) describes and provides diagrams to explain the difference between forecasting and foresight. In the diagrams, the present is a single point or dot (that is, it is a given fact). Forecasting is illustrated as different future options developing from this single point, with lines drawn coming out of the single point. Those future options (or futures) may be used to draw conclusions for the present and to make decisions. Cuhls (2003) shows that foresight is when a future result is used to examine implications for the present to identify what would need to change in the present, and then the procedure is repeated to re-examine the effect on the future from that choice. Cuhls (2003) also explains that the predefined version of the future as a linear continuation of present trends has not been successful and is too simplified and usually assessed on whether the prediction was right or wrong. She explains that even though new methods brought in more variables to match the complexity and dynamics of actual world developments, the approaches were still not sufficient. Furthermore, she explains that, since foresight develops views of the future as sets of objectives or targets, the complexity and number of underlying mutually interacting influences on future developments can only partially be assessed and estimated. This explanation of foresight shows that the future result is used to examine implications for the present, identifying what would need to change in the present and then re-examining what the effect on the future would be. However, the issues of the different commitments that are involved in the decisions about the objectives and targets themselves are not examined. Yet the author mentions that a challenge with their real-world project is to interrelate the different future images of actors with different value orientations.

Bell (2002, 2009) wants futurists to also consider prediction (by whatever term it is described). For Bell, citing Henshel (1976), prediction refers to the relationships of things at a given time that incorporate the future: “things that, under certain circumstances, will, could, or would happen, exist, or change in the future” (Bell 2009, p. 97). Prediction is known by many terms, such as ‘forecasting’, ‘projection’ and ‘prophecy’. Bell states that many futurists agree prediction is not a major purpose of FS; nonetheless he argues that prediction (as in anticipation) has a role in everyday life such as in decision-making generally, it is in fact an inevitable part of futures thinking, it has a role in science and in social science, and thus prediction should be one of futurists’ goals. However, he recognises there is disagreement and many futurists make specific distinctions, some saying the future is not predictable and some calling it an alternative future. He recognises that this depends on how the futurist defines prediction and whether they are anti-science and anti-technology. Bell too makes a distinction for FS: he finds predictions about routine, obvious and reasonably certain events not very interesting. Rather, he finds predictions about events that are uncertain, chancy and least obvious the most interesting (Bell 2009, p. 106).

Second, Ahlqvist and Rhisiart (2015), Inayatullah (1990) and Slaughter (2002a) provide examples tending to emphasise movement to the social/human pole. Slaughter (2002a, p. 27) takes the view that not only can social systems not be predicted, it is not a desirable aim. He thus limits his discussion to the broad domain of social systems. According to him, you can only understand a

system at a macro level, sufficient for prediction up to a point and no further. Furthermore, he objects to prediction of social systems because successful prediction conveys power. The problem is that, once you have mastered prediction, human agency connected with complex social and human issues returns to upset the prediction. He provides an example of the development of 20th-century physical infrastructure to illustrate his point about the need for foresight. For these purposes, there are many interests that require foreknowledge, and foresight has helped engineering and the applied disciplines to understand the physical problems well. Then foresight practice developed more tools to include financial, economic and other matters to help investors, corporation and governments to make decisions. However, the dilemma between prediction and freedom of action returned, and could not be resolved. Slaughter (2002a, p. 27) concludes that the notion that “forecasting can tell us much of value about how we should operate in the world and, more particularly, how we should solve some of the very serious problems facing humankind” has been lost. Thus his example redirects the difficult work of foresight away from physical systems that can generally be well understood and reinforces the social approach to futures work.

Ahlqvist and Rhisiart (2015) take a similar position, a Habermasian criticalist position, to that of Slaughter (2002a). Ahlqvist and Rhisiart (2015, p. 97) believe the utilitarian (the predictive) and emancipatory dimensions can coexist since different functional parts of society coexist within the ‘system’ and ‘lifeworld’. Their focus is on communicative action to achieve legitimacy and common understanding for the colonised lifeworld (Habermas 1986, 1989, cited in Ahlqvist and Rhisiart 2015, p. 96). Thus the authors highlight that FS is a way for researchers to better understand the contradictions and opposites in the objects they research, which helps to expand their futures perspective.

Inayatullah (1990) describes a very different approach. He describes the assumptions of three approaches that are very similar to Voros’s list of paradigm commitments. Inayatullah (1990, p. 136) argues from a post-structuralist position. For the predictive and cultural (epistemological) approaches, there is a world about which knowledge can be discovered or found (whether it is through interacting with the world itself or through interpretation of the meanings of the world represented in consciousness) and thus the future can be predicted (the truth) or good can triumph over evil (the Truth). In contrast, the post-structuralist futurist is interested in “future talk”, in the language, the discourse, the institutional practices and structures that socially construct and design the future. Thus, this example demonstrates a position that stands back from either of the poles by considering only language-related practices (specific to people and social phenomena) and thus “by historicizing and deconstructing the future, creates new epistemological spaces that enable the formation of alternative futures” (Inayatullah 1990, p. 115).

In summary, this section reviewed the problems futurists’ attribute to purification work and four areas in FS, related to their search for FS theoretical foundations, where purification work is visible. I contend that futurists are being distracted by the work of purification from recognising the work of translation. The next section identifies three areas where the work of translation is visible.



### 2.3 Futures Studies: Translating work

The previous section deals with the purification work that creates and maintains opposing polar zones. This section focuses on what Latour (1993) refers to as “translating work” and is presented as the vertical axis in Figure 2.1. Latour's suggestion for resolving the problems of the Modern Constitution is not to deconstruct the problem or to critique, but to establish the connection between the translation work (on the vertical axis in Figure 2.1) with the purification work (on the horizontal axis of Figure 2.1). Returning to the submarine example in section 2.2. To depict the future, the first futurist draws futuristic underwater and Jupiter landscapes, populated by people wearing space-age garments, soldiers fighting terrifying aliens and underwater monsters with ray-guns, biologists working in submerged spheres with bacteria producing meat, and a ruling class of the powerful and rich preoccupied with trade along trade routes between planets and oceanic communities. The futurist further explains that this particular future came about because at particular moments, certain decisions were made about research priorities and certain policies were implemented that led to funding for some projects and not others, and so on. That is to say, the futurist links together a web of human desires, social practices, and cultural values, power differences, desires, fears and so on, with technological objects, to 'translate' the submarines sales and features into humans living in space and in underwater domes, with all the technological developments and movements of people that go into achieving that. Indeed, this futurist is one actor in a web of actor networks (e.g., divers, documentaries, aliens, soldiers, desires, traders, fears, submersible spheres, bacteria, and more) mediating this future. This is an example of the work of translation. The more this future is repeated (told, performed, enacted, implemented, copied, practiced, taught, learned, lived, and so on), the greater its stability and the further up the vertical dimension of Figure 2.1 it could be mapped, at F1" perhaps. The bacterial meat future and ray guns could themselves be mapped on the vertical dimension (perhaps at more stable positions than F1"). Latour (2005) describes that the actors of actor networks are not mere intermediaries but mediators; intermediaries “[transport] meaning or force without transformation” whereas “[m]ediators transform, translate, distort, and modify the meaning or the elements they are supposed to carry.” (p.39). I argue that the translation work (the work of mediation) is seldom brought into connection with the purification work, as suggested by Latour. Inspired by ANT-type analysis of futures literature, I identify three areas in the FS literature that are relevant to the translating work: the use of heterogeneous objects, action orientation and futures construction. However, futurists do not often recognise the human and non-human actors as mediators in their work. But they do advocate an action orientation or a practical dimension to their work and often recognise that action can be known (thus ‘done’) differently (for example, Wildman and Inayatullah 1996 give an account of how individuals teach and learn differently). Furthermore, while futurists recognise the construction of futures and the future, they mainly see it as socially constructed and do not recognise the role of non-human actors in the construction work.

### 2.3.1 Human and non-human actors

Futurists are beginning to do ANT-type studies. For instance, this can be seen in the writing of Rowland and Spaniol (2015) and van Asselt et al. (2012). Both these studies demonstrate the approach of ANT in considering the mediations and associations between the human and non-human actors in the actor-networks. For instance, Rowland and Spaniol (2015) demonstrate that futurists have practices that rely on both ‘the future’ and ‘futures’ in spite of futurists’ seeming preference for ‘futures’. Rowland and Spaniol (2015) refer to the scenario framework mentioned by van Asselt et al.’s (2012) study as a mediating object in scenario work. That is, as Rowland and Spaniol (2015) explain, van Asselt et al. (2012) focus on the different types of work done by the multiplicity of the scenario framework device. For example, the “backbone” function of the device “supports and brings into being the planning process, or, as a practitioner might say, it brings the future into the present.” (Rowland and Spaniol 2015, p. 561). Rowland and Spaniol (2015), for their part, focus on the work done by the multiplicity of two objects: plural futures and singular future. For instance, the singular future formulates what is about to happen, how it unfolds, and its inevitability compels planning in order to survive (p. 563). To the best of my knowledge, these are the only studies focusing on the work being done by objects in FS. Therefore, the scope is very large for STS studies such as these in FS, for instance to examine the work done by even the simple objects such as trend graphs and numbers.

For example, in a simple way perhaps, the work of the S-curves and envelope and growth curves in the following study turns abrupt changes into evolutionary changes. du Preez and Pistorius (1999, p. 215) declare that to obtain technology foresight that is practical and useful is challenging, because technological innovation is not a static problem, “since technology is a dynamic entity, i.e, it changes with time”. The primary driver of technological innovation is technological change, which is both creative and destructive. Thus, the question of how to anticipate future technological developments and emerging technologies is very significant for competitive advantage. The degree of advance can be abrupt and drastic, although it is not a completely random process. du Preez and Pistorius (1999) set out that technological change follows the typical S-shaped curve and thus can be seen as an evolutionary process. When the changes in successive technologies are viewed together, then the evolutionary process can be described as being punctuated by discontinuous change. Technological change also responds to driving various driving forces that may be of a political, social or economic nature. In other words, it is necessary and possible to anticipate technological change, and du Preez and Pistorius (1999) set out a structured framework for doing this. They describe that various envelope and growth curves are available, with indicators of behaviour in the evolutionary curves available to do the forecasting.

A more complex and potentially dynamic object is Aaltonen and Holmström’s (2010) chronotope. By ‘dynamic objects’ I mean objects that specifically highlight changes in the relations between the elements of their internal structures. Aaltonen and Holmström (2010) compile a sense-

making topology of three types of realities (linear, disruptive and visionary systems; different cause-and-effect assumptions apply to each) in a chronotope representation. One way Aaltonen and Holmström (2010) use the chronotope is for the specific client to ‘fit’ the three subjectivities of reality in such a way that the further away, the more a linear type of reality might ‘bend’ to the chaotic reality. It is a way of getting managers to think of more or less stable entities, a way to pass futurists’ understanding onto the managers so they also learn to recognise how their assumptions about cause-and-effect influence their decision-making. Where the three axes of the realities meet in the centre is the nearest term and the most certain.

Futurists work with many ‘invisible’ objects too (such as in the work on utopias) and, rather than rejecting those as irrelevant or biases needing to be eliminated, I suggest that while the actors involved may be more difficult to trace in those cases, the results may well offer insights for the problems reviewed in the previous section.

### 2.3.2 Action orientation

The importance of action to futurists is highlighted in other sections of this chapter; the need to deal with the future and with the feedback loops draws attention to the ‘networks’, the third space identified by Latour (1993). This has implications for their theoretical foundations, which Piirainen and Gonzalez (2015) and Voros (2007) note. While Piirainen and Gonzalez (2015) place practice/action in a lower position than theory, Voros (2007) tends to bring action into theory. The collapse between action and theory seems to me to be in line with the mediation work in ANT and the process in process philosophy. However, in ANT mediation is not separated into nature and social, since objects also ‘act’ and have ‘structure’.

There is also the other side of action orientation. Futurists are not only interested in stable objects, but also in objects that are unstable and emerging. For instance, Holopainen and Toivonen (2012) examine the original idea of weak signals put forward by Igor Ansoff (Ansoff 1975, 1979, 1980, 1984, 1985, 2007, cited in Holopainen and Toivonen 2012). They present the theoretical developments of weak signals and suggest ideas for further development. Ansoff presented the basic idea of weak signals for strategic planning and it naturally became popular in FS for practical application in social issues.

Another issue related to mediation and the instability of objects is discussed by Cole (1994), who argues for differences in the development of core knowledge in the social and natural sciences. He argues that change in a field’s core knowledge is a sign of the progress the field is making. His research indicates that the core knowledge of sociology changes more slowly than the core knowledge of fields such as physics and other natural sciences. One of the two reasons he advances for this difference is the stability of the structures of the phenomena that are studied. For example, in physics the structures of atoms remain stable, while the interesting phenomena studied in the social sciences are “mutable” (p. 134). By this he means these phenomena are changing and dynamic and culturally specific, they are a “moving target”, they “frequently change faster than we are able to adequately

describe them” (p. 138). Therefore, it is not possible as in the natural sciences to develop generalised statements about the phenomena. As Cole adds, the issue is not about the stability of the explanations of the phenomena, which can change dramatically in some case, but with the stability of the phenomena themselves.

I suggest that Cole is pointing out an important issue for FS foundations that is recognised to some extent by futurists. For example, Ayres (1989) identifies that forecasting models incorporating dynamic feedback loops are improvements over deterministic, linearised models. However, as Ayres also notes, models that assume the future is like the present are the least interesting forecasts since important events are essentially surprises, which by definition are something which has not been invented and thus cannot yet be fully described or modelled. It falls then to the analyst, as is clear from Ayres’s descriptions, to predict possible solutions and any potential structural changes that go along with those solutions. In other words, I suggest that this indicates the analysts do not have tools that model mutable phenomena, but instead have tools with which to create models of static phenomena where the phenomena have properties (model variables) that can change.

The issue of action or the stability/instability of objects or things (actor-networks) highlights the second dimension of entities (the vertical axis of Figure 2.1) for the entities that futurists work with. It helps to distinguish the cases where accuracy or dependability of statements about the future goes with stable objects but not unstable objects. Futurists do not work only with stable objects. For example, in scanning work, their focus and aim are on noticing unstable, developing, decaying and emerging objects, and it would be contrary to their aim to look for stable objects.

Another topic for futurists is that the more deeply they process a category, the less stable an object will appear to them, since knowledge and meaning, and hence the ‘stability’ of the meaning of the object, are immanent in the object. This is a different dimension of stability and instability than that of the networks’ stability (actuality). It is the stability of the meaning of, let’s say, a particular word. In other words, futurists can ‘see’ more possibilities in a category than others, they can discharge a category more fully, and this means they can ‘open’ up, challenge and deconstruct the meaning of a word or discourse, and also open out the ‘timing’ of a term. Part of their practices and methods is also to encourage and develop this in other people, often under the labels of innovation and creativity.

### 2.3.3 Construction of futures and the future

While futurists (such as Barbara Adam and Sohail Inayatullah, to name just two) have contributed analyses and studies on the ‘construction of time’ or the ‘construction of futures’, they have done so mainly in a sociological / cultural or discourse idiom; a few futurists have contributed studies on the construction of time or futures in a post-social relational or post-actor-network theory idiom (Knorr-Cetina 1997, 2001b, and Rowland and Spaniol 2015). Elsewhere in this chapter, I refer to futurists whose work is consistent with or who point out the resonance between the social constructionism approach and the social construction of futures, for example, Fuller and Loogma (2009) and

Inayatullah (1990). Barbara Adam has written extensive social / cultural analyses of time in connection with themes such as cultural practices and the environment (see for example Adam 1995, 2004, 2007). Inayatullah (1990) also examines the social construction of time. Studies like that of Brown and Michael (2003), inspired by STS in the sociology of science, report on the discursive construction of science and technology futures. Moving to studies motivated by a postsocial relational or post-actor-network theory sensibility, the futurists who are doing ANT-inspired research, such as Rowland and Spaniol (2015) and van Asselt et al. (2012), recognise the mediation work of non-human actors, of objects such as scenario matrices, in constructing futures and the future. The anthropological study by Postill (2002) considers the material supports like clocks, radios and diaries in the spread of Western clock time and the Western calendar to Saribas Iban (Malaysian Borneo) and the effects of this, including on their beliefs about the future. As a futurist writer, Milojević (2008) comes closest to recognising the mediation work of non-human actors, such as clocks, in the construction of time as well as futures. Scholars in other disciplines also write on the construction of time (for example, Fabian and Bunzl (2014) in anthropology, Greenhouse (1996) in anthropology with a focus on law, and Latour (1997) in science and technology studies). However, they tend not to include futures or the future. It is possible to consider the construction of futures or time not only as statements about how a 'real' world is *for* humans, but as statements about how humans are constructing futures *as such*, or time *as such*. To the best of my knowledge, there are not yet any written works by futurists on the construction of the future or time as such; that is, analyses written with a more postsocial relational or post-actor-network theory sensibility.

According to the analysis of the futures literature as covered in this chapter, futurists are constantly distinguishing their work from the human ability to engage with the future in general, to the extent that merely thinking about the future or merely having concerns about the future is not a sufficient criterion for doing good futures work. Furthermore, futurists' purification work creates and maintains two opposing polar ontological zones. Futurists associate the work of purification with the problems of purification that they would like to resolve. However, their practices and solution reinforce these separations. The review in this chapter classifies the effects of the purification work according to two versions with two and three variants respectively. The review identifies examples of translation work in futurists' writing. Latour suggests that the work of purification should be connected to the work of translation to overcome the problems. Yet, futurists do not consider the translation work with the opposing polar zones created by purification work, nor with FS foundations. It is now evident that the construction of the future and futures, the action dimension and the stability–instability of objects are important elements of FS work.

The review presents unresolved dilemmas and problems in futures literature that suggest the state of knowledge about the theory and the practice of engagement with the future is currently separated into two polar opposing zones. This has implications for researching engagement with the future. To research engagement with the future based on one of the opposing polar zones would merely contribute to the practices that reinforce the purification work. Potentially some futurists have

capacity for dealing with the dilemmas of FS and the aim of this research is indeed to account for such capacity. The minimum criterion for an approach to studying engagement with the future is consideration of the issue of time. The next chapter reviews the literature further in order to develop a suitable approach to address the research questions.

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## Chapter 3

# Time of being and becoming

The review of the FS literature in the previous chapter shows that futurists adopt many perspectives in their engagement with the future, they adopt many approaches to studying the future, and they theorise about time and the future in a variety of ways, sometimes contradictory ways. This chapter develops a theoretical framework for researching futurists' capacities to engage with the future that can accommodate their differences without reducing the variety of ways of realising time or the future to one foundational perspective or theory. The first section introduces and reviews science and technology studies (STS), an area of study in sociology from which ANT developed, as the main inspiration for this research. STS researchers adopt a number of types of research approaches and, of those, the extended translation approach has been selected as the most suitable for this research project. Specifically, two STS scholars within the extended translation range of studies provide examples of two analytical perspectives which could be used for the data analyses stage of this research.

However, STS scholars focus on one group, scientists, as their research interest. Therefore, they typically do not need to take account of a variety of ways their research participants theorise about or realise time in their research methodologies; a review of various STS studies shows that this leaves unanswered questions that futurists have to address. Therefore, further methodological and theoretical principles had to be sought for this research. The second section introduces two opposed views of time and identifies implications of each for studying engagement with the future. The overriding conclusion is that a structural view of time (e.g., time according to substance metaphysics) does not allow for studying a wide variety of futurists' conceptualisations and realisations of time, whereas a relational view (e.g., time according to a strong process metaphysics) does. Since researchers within the extended translation approach express process philosophy in their work, a combination of principles from process philosophy and extended translation studies has been taken as the theoretical approach for this study.

### 3.1 Science and technology studies (STS)

STS emerged during the 1960s from different streams of studies of science and technology activity, streams like history, philosophy, sociology, anthropology, economics and political and legal sciences (Jasanoff et al. 1995). Shapin (1995) also provides a historical overview and identifies strands of criticism. Numerous STS scholars soon realised methods for the social investigation of science need not be and could not be restricted to the traditional tools and conceptions of the scientific method (Woolgar 1983, p. 239). For example, Latour (2005) declares that, after more than thirty years of trying to give a social explanation of science, the ANT branch of social science came to the conclusion that traditional social theory does not work for science and therefore to study science requires a

different approach, which developed into ANT. Callon (1995) finds overall coherence in the social studies of science, but he also acknowledges distinct differences in their perspectives. Among the STS studies in the different streams, he distinguishes four approaches to the study of scientists around shared agreements and common assumptions. That is, the STS researchers approach their research of scientists with their own particular reasoning logics on the ideal way to describe and explain the whole of the scientific endeavour. These four ideal types are summarised next. It is only the fourth approach that is suitable for this research.

The first ideal type described by Callon (1995) views science as the production of rational knowledge. According to this type, statements describing the activities and observations of the scientists working at their workbenches are taken as the theoretical statements that justify the knowledge produced. The concern is with codified knowledge and the goal is to study scientific discourse and to explore how science establishes links between the statements it makes (e.g., theoretical statements) with the reality that the statements speak about (e.g., observational or empirical statements). Thus, the STS researcher using this ideal type produces statements and networks of statements. The networks show the translation movements actors make that permit each statement to be related to the next; these translations need not be obvious. For example, a statement may be related to the next through an abstract calculation or a set of translations that consists of both theoretical and observational statements. Knowledge is produced by the actor who makes the translations between the statements, relying on her senses, cognitive ability and capacity to assess whether the translation has been completed according to the experimental instructions. Science advances in that the translation statements are being added to by researchers who are committed to critical and moral conduct in their work. The researchers are working in institutional reward systems and are motivated to do ongoing work to test and expand on the statements to resolve problems that amend, invalidate or transform the statements. Solutions to how agreement about the translations is to be obtained are many, and include shared standards and conventions.

The second ideal type described by Callon (1995) takes the view that science is a process of competition or even more generally a struggle. There are many variations on this theme, but they all hold that appropriate methods are necessary to produce valid statements and it is the process of competition that leads to the validation and eventual certification of knowledge. According to Callon (1995), the main concern is with the organisational forms of the scientific enterprise.

The third type described by Callon (1995) takes the view that science is much more than simply translations between statements and that, as a practice like other activities, its sociocultural components are equally important. In other words, statements are not independent of contexts and tacit skills are also involved in the research process. For instance, groups of actors outside the scientific community may be involved in the production of knowledge. Thus analysts who adopt this ideal type extend their field of analysis to all the social groups involved in the knowledge production process.

The fourth type described by Callon (1995), extended translation, is concerned with the



generation of scientific statements and the expansion of the space of their circulation. Callon (1995) extends the first ideal type's concern with codified knowledge "to all the operations that link technical devices, statements, and human beings" (p. 50). This ideal type, writes Callon (1995, p. 50), "calls for a deep reformulation of social theory". He explains that science is viewed as a heterogeneous sociocultural practice and develops "translation networks" which are both the process of producing scientific statements and the temporary result of stabilised relations (p. 50). Translation networks are compound realities that incorporate relations between actants. Actants are any entities able to act. For example, human beings, proteins, "Roosevelt-who-wants-the-atom-bomb to combat the powers menacing the free world" and electron microscopes (p. 54) can all be actors. On the underlying dynamic of science, the notion of translation is extended "to organize a whole world filled with entities (actants) whose identities and interactions are thereby defined" (p. 55).

Further, according to Callon (1995, p. 55), the extended translation type does not privilege discursive dimensions like consensus or a closure of debates; rather, it "assigns great importance to the hidden side of debates – to all that is not discussed – but the presence of which allows dialogue to be established". Callon (1995) explains that the emphasis is not simply on the translations between statements but on the network of other statements and objects which may be referenced at other times and spaces that provide the support for those statements. He continues that this type makes it possible to very closely link the contexts of science with the content produced. The extended translation type thus brings together a broad definition of actants (human and nonhuman, specialist and nonspecialist) mobilised within a broad definition of action (translation, representation, transformation) to stabilise or modify the actants' universe. This makes it possible to bring together the translations of the communities of scientific specialists and nonspecialists and the representations of the countless actors that have become the contexts of the scientific activities. It is on the work of scholars who adopt this ideal type approach, the extended translation type, that I draw for my research framework.

While each approach may present particular benefits in studying futurists, it is only the extended translation type that is suitable for dealing with the diversity in futurists' approaches and perspectives, and for considering the time dimension of scientists' work. The first ideal type relies on shared assumptions and agreement on the rules of practices and reasoning to produce validated knowledge. Many futurists adopt social participatory approaches in their work, which means the second ideal type is too limiting a view. While the third type extends to the social groups, it does not consider the time dimension. The particular benefits of the extended translation type for this research are the relational view of heterogeneous actors, considering the presence of all things (material or otherwise) that are involved in activities and not only what is talked about, taking notice of the processes by which the activities are conducted, and taking into account the effects time has for what is being produced by the activities.

While there are these differences in methodologies and approaches that STS scholars take to their research, this differs from the views and approaches of (positivistic and postpositivistic)

science and the sociology of science researchers in important ways that start to lay out the theoretical framework principles for this research. Restivo (1981, p. 25) describes that, in spite of their differences, STS research differs from “orthodox research in the sociology of science” in three main ways. First, it sees scientific activity as being constructive and typically does not separate the social and cognitive aspects of science. Second, it sees science as influenced by the social context, not only or necessarily by scientific communities, and the construction of facts is dependent on contingent events. Third, it focuses on the role of objects in the discourses by which scientific facts are achieved. These different views have particularly been adopted by laboratory investigations that take the extended translation type approach.

Laboratory studies, a program of STS studies, show that to get access to the production of knowledge itself and the technical content, the “hard core” of science as KKC (1995, p. 140) puts it, or the “hard facts of science” as Latour (2005, p. 94) puts it, we cannot use those same established scientific facts and theories. KKC (1995) views the study of laboratories as quite different to the study of experiments or the sociology of organisations. By studying the methodological aspects of experiments, she writes, the study of the real-time processes of experiments remained largely unstudied. By studying the sociology of laboratories, she continues, the technical content remained largely unstudied. However, when the attention turned to studying laboratories, the focus shifted to the cultural activity of science. KKC (1995, pp. 140–141) writes that STS researchers take two perspectives in their laboratory studies: “scientific controversies” (e.g., that social contexts influence scientists’ beliefs and knowledge claims) and “unfinished knowledge” (e.g., that knowledge is unfinished and in the process of being established). Investigations of “unfinished knowledge” started in the 1970s through reviving the sociology of knowledge which studies scientific knowledge. With the sociology of knowledge, the unfinished knowledge investigations are concerned with the social conditioning of thought (Mannheim 1954, cited by Knorr-Cetina 1983).

For KKC (1983), the laboratory STS researchers share an interest in the technical objects produced by scientific activity. KKC (1983) differentiates between macroscopically oriented approaches (like the congruence ideal type of the classical sociology-of-knowledge approach, which aims at establishing the objective social causal relationships between collective goals and the beliefs of individuals) and microscopically oriented approaches (the genetic ideal type, which aims at the subjectively acknowledged social conditions). With the macroscopically oriented approach, scientific controversies provide the focus for the study to examine how knowledge claims become accepted. With the microscopically oriented approach, the study makes direct observations of the actual scientific activity at the actual site to examine the interactive processes between the participants at the site and how the objects of knowledge, the scientific beliefs, take shape. KKC (1993) explains that these studies have reinvented in STS a constructivist perspective that differs in many ways from traditional versions of constructivism and constructionism.

The STS constructivist perspective differs from other perspectives in that it studies the actual activities of scientists in their actual situations, including bringing in other nonhuman entities. Latour

(2005, p. 88) describes that “In plain English, to say something is constructed means that it’s not a mystery that has popped out of nowhere, or that it has a more humble but also more visible and more interesting origin”. Studying a construction site from that perspective, he explains, means you go backstage to see what it means for something to “emerge out of inexistence by adding to any existing entity its time dimension” (p. 89). A focus on scientists’ actual practices and actual situations, according to Lynch, Livingston and Garfinkel (1983, pp. 224–225), means that STS researchers need not impose the theoretical assumptions of a philosophy of science “that remains endlessly embedded in academic arguments about science with no attention being paid to the endogenously produced variants of argument and practice that constitute the technical development of ordinary scientific inquiry”.

In the words of KKC (1993, p. 558), as a STS “constructivist, one subscribes to an ontology that anchors existence in the world, not outside it”. She is referring to the substance view of the philosophy of science that separates mind and material, to which the constructivist STS scholar does not subscribe. To illustrate the difference with an example, KKC (1993, p. 558) observes that “specific scientific entities like subatomic particles begin to ‘pre-exist’ precisely when science has made up its mind about them and succeeds in bringing them forth in the laboratory”. In other words, one of the benefits of adopting the STS constructivist perspective is that the researcher avoids the paradoxical theoretical arguments that come with the substance based view. Another benefit she points to with her example is being able to recognise all the material and cultural work that has to go into translating the laboratory-specific work into stabilised objects that come to exist outside the laboratory.

If constructivism is a common thread between the laboratory studies, then there are also certain distinctions between their approaches. Some of those distinctions mean that different analytical perspectives can be brought to this research on futurists. For KKC (1983), the laboratory STS researchers differ in respect of the analytical perspective they bring to their studies. For example, KKC (1995, p. 147) identifies four major viewpoints of laboratory studies: a semiotically inspired ANT approach; her own constructivist approach in the sociology of knowledge; an ethnomethodological approach; and a symbolic anthropological approach. KKC (1995, p. 151) emphasises that the sociology-of-knowledge approach to studying the bounded microsites of laboratory spaces is different to the ANT approach, which follows actors across boundaries. She maintains that “If construction is wrapped up in bounded locales, the ethnographer needs to ‘penetrate the spaces’ and the stream of practices from which fact construction arises”. In the ANT viewpoint KKC (1993, p. 561) finds something positive and negative, that “Callon and Latour have opened the gates to other entities such as non-human beings, but in conceiving of these as actors (or actants), they close them again on a world locked into strategic action”. What they are missing with their historically oriented networks, she maintains, is the layers of interactions between individuals that the STS researcher needs to penetrate, the relationships between the knower and the known and between the knower and environments.

Thus, for this research theoretical framework, these two analytical perspectives can provide two interrelated views on futurists' capacity to engage with the future; therefore these two analytical perspectives, namely ANT and the sociology of knowledge, have been adopted for this research. The other two perspectives mentioned by KKC are not adopted due to practical restrictions, as covered in Chapter 4. The differences between the two analytical perspectives means that adopting both perspectives for this research allows identifying and characterising different aspects of futurists' capacity to engage with the future: a relational and a processual aspect. A closer look at how these STS scholars specifically deal with the time dimension in their research draws attention to areas that require additional principles from other theoretical frameworks.

The next two sections review: a) two studies in the sociology-of-knowledge area; and b) two ANT-related studies, for their suitability for this research.

### 3.1.1 Sociology-of-knowledge studies

This section introduces concepts developed from a program of laboratory research begun by KKC in the 1970s (Knorr-Cetina 1981, p. 152). The aim is to examine in more detail how sociology-of-knowledge studies address time. The introduction starts with two of KKC's investigations grounded in the laboratory sites of scientists' work for some of her observations that informed her concepts. The section ends with a comparison between the concepts identified in KKC's studies and futurists' engagement with the future.

The laboratory studies examined here are those made by KKC at a major research institution in Berkeley, California, in 1976–77 (Knorr-Cetina 1981; Knorr 1977, 1979). In her first analysis KKC focuses on how scientific knowledge is produced by scientists and produced five major theses for an empirical theory of knowledge production. In her second analysis KKC describes epistemic cultures, “those amalgams of arrangements and mechanisms ... which, in a given field, make up *how we know what we know*” (Knorr-Cetina 1991, p. 1). In KKC (1997, 2001b; Knorr-Cetina & Bruegger 2000; Schatzki, Knorr-Cetina & Von Savigny 2001) she translates her descriptions and concepts from the laboratory studies to the knowledge-centred activities of the knowledge society. She proposes that the structures she described for the laboratory processes are suited to information age practices, practices that “would seem to take on a wholly different set of meanings and raise a different set of questions from the ones raised by habitual activities” (Knorr-Cetina 2001a, p. 175). The first impression is that it is suited for this research with futurists.

#### First laboratory study

Knorr (1977) modelled her first analysis on scientific enquiry as a practice carried out by agents in a field where the field is formed by the agents collectively and, as the field, they determine the practices of the field. In other words, she is focusing on the relations between the scientists and the field, where the field includes humans and objects. Then, based on her anthropological study of laboratory work (Knorr-Cetina 1981), she challenges the notion that a distinction can be “drawn between the sciences

of man and those of the natural world” (p. 152). From this study she puts forward five theses. According to her first thesis, she finds that scientific investigation, as described by words such as ‘truth’, ‘hypothesis testing’ and ‘reality’, cannot easily be identified in laboratory work. For instance, the nature or reality that experiments as supposed to work with is “highly preconstructed, if not wholly artificial” (p. 3). Therefore, rather than assuming that science can be found in the relationships between science and nature, the laboratory work is viewed as a process of constructing scientific products. Based on this, she argues for an empirical theory of knowledge for science.

According to her second thesis, KKC finds that decision-making in the laboratory is contingent on the situations and the location, given that the scientist faces an open field of possibilities from which to crystallise selections. For example, variation in interpretations of standards, of available materials and instruments and organisational procedures leads to differences in decision criteria and opportunism, which leads to different selections.

According to her third thesis, she finds that the production of scientific knowledge includes an element of creativity. For example, KKC observed a scientist imaginatively relating two previously unrelated ideas and after some testing “brings about the creative extension of knowledge” (p. 50). Such a view does not account for the rationalistic view of scientific innovation as new knowledge production proceeding by hypothesis testing. Knorr (1979, p. 674) brings in the notion of “success” as an orienting and constructing relation in the knowledge-production process, rather than the relation of “truth”; she proposes that it is success that marks the individual scientist’s and the field’s change, since it can be progressively reconstructed as successes accumulate.

According to her fourth thesis, KKC finds that the laboratory is a space where closure of possibilities has to be reached but that at the same time it is situated in a field of social relations. She observes that the opportunities and contingent selections in the laboratory space are situated in and oriented to the social relations that transcend the research site. She postulates that, in contrast to a view that places scientific work in a historical descent of scientific knowledge communities, “variable transscientific fields” make up the fields of relations that sustain the scientists in their laboratories (p. 82).

According to her fifth thesis, she finds that the products of science such as scientific papers are products of conversion; the reality of the laboratory is changed in the process of being written up. She observes that the process of transmutation of the laboratory work into a totally different language game starts long before the work is completed (Knorr-Cetina 1981).

### **Second laboratory study**

KKC (2003) examines epistemic cultures from two perspectives: the laboratory-level processes and practices and the organisational level. For laboratory processes, she looks to describe “the ways different sciences understand and enact empirical research” (p. 46). For example, she conceives of the high-energy particle (HEP) physics laboratory as a self-enclosed system separated from the environment from which the “meaningless” signs of the detector have to be molded into stable

outcomes (p. 47). Also, the scientists have no direct access to the particles, so they have a preoccupation with their own internal processing for observing, interpreting and understanding the energy and tracks left by the particles on the detector. KKC borrows a phrase from Foucault, “the care of the self”, to label this preoccupation. She observes a three-fold structure to the care of self-process: self-understanding, self-observation and self-description. To help them with this care of self, the physicists keep track of the history for future reference; this practice “serves the purpose of re-entering the self-understanding gained through tests, studies, checks, cross-checks, and continuous self-observations into experimental analyses” (p. 63). To recognise the particle objects, the HEP scientists study also phenomena that are at the limits of the particles. For example, they make note of distortions, which promotes a kind of negative knowledge.

Finally, KKC describes how, in this closed system, the physicists’ practices can be conceived of as “unfolding ... the continuing unraveling of the features of physical and technical objects, of their details, composition, hidden sequences” (p. 71); “framing ... to consider objects or pieces of information in the light of other such components, which serve to check, control, extend, or compensate the former” (p. 73); and “convolution ... the general strategy of mixing together resources and quantities that come from very different origins in an attempt to come to grips with the limitations of specific data or approaches” (p. 76). KKC observes that the practices of the physicists are very different to those of the molecular biologists, who have a system that is open to small natural objects towards which the biologists direct themselves in a mode of care-taking. The biologists preserve their experiences in stories, which may later serve as scenarios for comparison with current results, to envisage invisible experimental reactions or to plan the future (p. 108).

KKC (2003) also discusses the organisational practices and other social dimensions such as the time formats reflected in the two laboratories. The reliance in HEP on a central machine that necessitates human coordination has meant collaboration. At the organisational level, experiments are extended in time to time frames of about 20 years. KKC describes the HEP experiments as having a “communitarian order” that orients to “the “life (time) of an experiment and simultaneously toward future generations [of experiments], especially the one succeeding a currently planned, constructed, or running experiment” (pp. 186–187). This requires that the participants organise activities for the current and the next experiments, which may overlap with the current. In contrast, molecular biology laboratories are set up for single researchers with projects and the laboratory itself is a single unit focused on the laboratory leader, which contributes to fragmentation in terms of projects and experiments.

In other words, KKC (1995) summarises, laboratories as knowledge production and constructive processes can be seen as important agents in the success of science and do not seem to have much to do with scientific methodology, validation or rationality. Referring to Merleau-Ponty’s “phenomenal field” KKC (1995) suggests that the processes she observes imply a reconfiguration of the “self–other–things” system such that it benefits science. Merleau-Ponty’s “self–other–things” system, she claims, is neither an objective, independent, external world, nor a subjective, inner world;

it is a “world-related-to agents” (p. 145). Her laboratory studies suggest that laboratories do not need to accommodate and work with an object as it is, where it is, nor when it happens. It is not only objects that are reconfigured; the laboratory processes can also reconfigure scientists behaviourally to be agents to fit a particular phenomenal field.

KKC (1997) argues for a post-sociality based on objectual relations as the type of relationships that define epistemic practices. The objects that are relevant to such relations are based on the types of experts’ objects that she found in the laboratory work. She extends Rheinberger’s (1992a, 1992b) description of scientific objects as open, question-generating and complex, as distinct from technological objects, to all objects of knowledge. KKC (1997, p. 12) describes “Objects of knowledge [as] the goal of expert work” although the relation should not be taken as simply a positive one. Objects of knowledge in her terms need also to be able to “unfold indefinitely” (p. 12). She also characterises on the subject side the knowledge object as matching “a structure of wanting, a continually renewed interest in knowing that appears to be never fulfilled by final knowledge” (p. 13).

In summary, the focus on time aspects and the characterisation of relations makes KKC’s sociology-of-knowledge approach appealing for describing futurists’ capacity to engage with the future.

### 3.1.2 Time-related ANT studies

STS scholars study the temporal organisation of scientists at work and of objects such as markets. This section reviews two of these studies for the approaches they take and their ways of dealing with assumptions about change and time. The review mobilises futurists including Michel Serres, in particular what they say about time and the future, to highlight particular issues about the analytical perspective to consider for the theoretical framework. In interviews between Latour and Serres published in *Conversations on Science, Culture, and Time* (Serres & Latour 1995), Serres expresses views about time that are not views typically expected of scientists, but which a futurist and a potential participant in this research might have. For instance, Serres says about time:

Time is paradoxical; it folds or twists; it is as various as the dance of flames in a brazier – here interrupted, there vertical, mobile, and unexpected ... Time doesn’t flow; it percolates. Time does not always flow according to a line ... nor according to a plan but, rather, according to an extraordinarily complex mixture ... Thus, the development of history truly resembles what chaos theory describes. Once you understand this, it’s not hard to accept the fact that ... things that are very close can exist in culture, but the line makes them appear very distant from one another. Or, on the other hand, that there are things that seem very close that, in fact, are very distant from one another.  
(Serres & Latour 1995, p. 57)

Thus Serres’ views provide a way to ‘test’ the studies and their approach taken for suitability for this research. The review also draws on topics identified in the review of FS in Chapter 2 to ‘test’ the studies and their approach. What these studies demonstrate is that laboratory studies with their constructivist approach can enquire into time and change.

The first study offers a glimpse into the early results obtained by laboratory studies about

the effects of time in the scientific process. The second study demonstrates the results of more current STS studies inspired by ANT and extends ANT into other areas.

### **First study: Temporal order in laboratory studies**

Lynch, Livingston and Garfinkel (1983) analyse laboratory studies of the 1970s and 80s for their detailed findings on temporal order in those settings. The authors organise their analysis around four themes. Lynch, Livingston and Garfinkel (1983) note that they do not abstract a theory of temporal social order from the studies; rather, the laboratory study approach is about opening up a situation and not looking for closure on some theoretically relevant scientific issue. The laboratory studies the authors analyse are ethnomethodological studies investigating “social order in and as the real-world detail of scientific praxis” viewing scientists’ work “as a naturally organised activity” (p. 205). These ethnomethodological studies focus on the detailed and observable activities of the scientists; activities such as the order taken in conversations, the order or stages in states of reasoning, and the layouts of materials that are eventually used. To capture these details, ethnomethodological studies usually record videos, make audio-recordings and journal entries, and painstakingly give attention to details.

From these laboratory studies, Lynch, Livingston and Garfinkel (1983) identify four themes related to order in the scientists’ work. The first theme is around the differences between descriptions of laboratory methods and the situated actions scientists actually take. Numerous differences are reported and are summarised into three areas: the order given in written instructions compared to the actual event; the writing-up of activities into reports compared to the actual event; and the way educational materials are written. For example, introductory educational textbooks pose questions and problems with the correct answer already implicated in the statement of the problem (that is, it is prefigured) while the solution is withheld; this closed situation of enquiry differs from the ordinary research discovery, where enquirers search an open horizon of possibilities. The studies also observe the contingent nature of the situated enquiry.

The second theme is around unforeseen circumstances during the conduct of the enquiry that require retrospectively and prospectively adjusting the procedure depending on the results already obtained. Unforeseen circumstances are regular occurrences in a laboratory and a solution to what to do has to be worked out, because these are typically not covered in the laboratory instructions; instructions tend to assume stability and that all else remains fixed. The study observes that experiments are often suspended and taken back to prior steps in the sequence.

The third theme is around the observation that the production of scientific ‘inscriptions’ (like documents or factual statements) becomes separated from the actual activity that produces it. These accounts go further than the first two themes, beyond the reporting of the order, to the embodied production of the objects. The example given is of the difference between finally reporting that a new astronomical object, a pulsar, has been discovered and the activity of the two astronomers over the two nights’ work that went in to “attach the pulsar to nature” (p. 221). Sound recordings of



the astronomers' conversations were made and analysis of the sequences of runs and checks and observations showed that the object became progressively more concrete and detached from other features.

The fourth theme is around the topic of transivity. The authors try to combine results corresponding to two meanings of the word 'transitivity'. The first sense of transitivity refers to things transitioning sequentially. The second sense of transitivity they call "getting through to the object" (p. 223). This theme focuses on the difficulties ethnomethodologists face in naturalistic enquiry when observing practice that is proceeding effectively: the practice becomes visible through its contents and products (what it is achieving), but it is the order producing activities that need to be attended to. An example is of a video-tape analysis of how the arrangement of experimental equipment on the workbench and the position of the body of the experimenter during the experiment have consequences for the way in which the experiment proceeds.

In connection with the suitability of ANT studies for this research, these studies can be reviewed for the responses of futurists and of Serres. Futurists might be asking themselves where the future or images of the future and the alternative futures are in those situations. The ethnomethodologists do find 'time' in the way experimenters go back to previous steps in an experiment. The authors note the openness of scientific practice: "It has frequently been noted by practising scientists as well as by sociologists of science that doing technical work in science entails a kind of craft, or embodied expertise, which is not incorporated into the mode of methods reporting that is characteristic of scientific literatures" (p. 209). The authors also note this openness on another occasion:

The problem is not merely a matter of reducing action to a finite descriptive account, since, as Feyerabend (1975) argues, there is an essential openness in scientific practice that is betrayed by the very notion of scientific method when method is construed as a rationally secured foundation for action which relieves situated praxis of its burden of finding a way through an unscheduled future while making a convincing case for what is 'somehow' extracted from that future.

(Lynch, Livingston & Garfinkel 1983, p. 233)

Futurists might have found the future in other areas too. The future is not visible and, by restricting observations to observable order, the future becomes invisible and then is translated into order by the analysts. Even though there are no future facts available, futurists would likely identify the future as having an influence on the present (expectations of future outcomes have been found to have an impact on motivation). Futurists might have identified the future in the way the educational material is formulated and in the way the workbench is prepared for the experiment. Futurists might also be wondering which futures images are influencing those situations and whether the STS ethnomethodologist (assuming a naturalistic enquiry) has enquired about the future. A futurist might ask further about the values that influence a naturalistic enquirer to not enquire about the future. The future seems implicated in finding that unforeseen events interrupt the experiments and the future might also be in the 'what-if' or 'if-then' questions the scientists are asking when experiments do not

go as planned. A futurist might ask about not only how the astronomers' conversation has constructed a pulsar, but also how their conversation has constructed the present, the past and the future. Futurists might be wondering what futures image went along with the waste chemicals that were being poured down the drain.

Serres might be asking about how the scientists and the STS researchers are conceiving of time and how that affects what they observe and how they conduct themselves. Serres might be wondering about the linear unfolding of the experiments and objects in the laboratories, and may be identifying different patterns. Futurists would also be wondering about the linear unfolding of objects, and might be imagining different patterns of unfolding and different future objects. Serres and futurists might be seeing change in the static moments in the laboratory, at times when little seems to be visibly happening.

Lynch, Livingston and Garfinkel (1983) demonstrate that examining time is possible, although they retain a theory of temporal order in their own observations and in what scientists mean by words that indicate time order. Thus additional principles need to be adopted for this research framework.

### **Second study: Cultures of using economic models**

Wansleben (2014) finds two quite different cultures of economics models being used at a large German commercial bank involved in foreign exchange currency markets. The two cultures are distinctly different from the model practices of academic economics, which values theoretical rigorous modelling more highly than applied modelling. The author observes and interviews participants of the economics division. The two cultures identified are that of the economists and that of the foreign exchange analysts, and are studied for their different cultural values and practices. For the economists, the models are essential and they are not interested in short-term dynamics. The analysts are interested in the real-time, short-term dynamics, which develop views of possible scenarios about changes in market expectations (which are essentially unknown). The forecasting process of the bank provides a way to study this tension between the analysts and the economists. The study also provides explanations for the relations between the two cultures.

The author describes the two model-using cultures in some detail and finds not only a difference in use, but also a change in the order of use. The economists try to model foreign exchange movements according to macroeconomic variables and use the models for consistent forecasting and to observe data. The analysts prefer a thematic approach and appear to be ignorant of modelling. They acquire their foreign exchange skills through actual experience and through building up views, stories and big pictures from market news that appears on their screens. The analysts develop, through experience, dispositional and emotional competences. They have a dominant role in the forecasting process, which can be explained by a rise in institutional investors who require genuine market knowledge.

This study identifies and describes numerous situations of time. Futurists might want to ask

further questions about the futures images of the economists and analysts, about what is contained in those futures and how those images have come to be as they are. For example, the author notes that the analysts' profit maximisation guides the development of their views. Futurists might point out that the futures that these analysts and economists are 'predicting' are connected to real people's lives and their futures, and that there is an assumption of no alternatives to the future. Serres might ask whether there are non-linear markets where the products of the market are suited to assumptions about a complex time. As for the previous study, the conclusion is that additional principles need to be adopted for this research framework.

### 3.1.3 Potential of STS to frame futurists' work

The reviews above highlight that there is potential that the STS extended translation approach is suitable for this research, but they also indicate that issues of the theoretical framework need to be extended to deal with time. A plausible implication of the analyses of the scientists' and the futurists' work sites will deliver similar results: an open field of possibilities in a world of transdisciplinary fields. Laboratory studies investigate the practices and situations of *scientific* knowledge production. Furthermore, according to KKC, the scientists' scientific work of knowledge production is constructed and preconstructed. This suggests that an analysis of the relations between the laboratory scientist and their field will find the same or very similar elements that an analysis by the futurist working in his field will find. Both of their work sites are, according to the STS approach, anchored in the existence of the world in transdisciplinary fields and facing an open field of possibilities.

The futurists include a wider range of criteria than 'truth' in the assessment of their results. KKC (1995, p. 165) states that scientists promote the "truth" of results in the eyes of the participants. Given the constructivist approach, perhaps this also includes the authenticity, beauty or fairness of results in the eyes of the participants. However, the role of the futurist is also often to be the provocateur. Therefore, the difference for the futurist is that, while they might be drawing on or producing scientific knowledge, they are also deliberately bringing into play the open field of possibilities in order to construct novel facts and objects, and using facts and objects that are not designated as 'true' knowledge or facts (albeit constructed as such). This suggests that the futurist will continue to develop practices for generating and selecting for novelty, which may even be facilitated by the contingency of the situations, locations and steps in the product production process (cf. KKC's fifth thesis). However, the futurist is not simply generating novelty for the sake of novelty; rather, it is novelty designed for change (to present, investigate and motivate) and hence the futurist is likely to be developing their practice for recognising and imagining change. The practices of the HEP scientists may be partially helpful; however, KKC describes them as operating in a closed system.

Although KKC describes the time formats for the laboratories, she recognises the structures of objects as unfolding and as having intermediate objects, and that scientists work in a field of open possibilities; however, these topics are not mentioned as things that the scientists themselves are explicitly working with. It is highly likely that the futurist explicitly works with translating objects into

other objects, aiming to find the relations for ways of unfolding objects and for unfolding the same objects in multiple ways for different outcomes. The futurist has to account for the becoming of objects but do so with limited knowledge of the objects and under conditions of transformed histories. It is noted that KKC's concepts have been enriched by a study of the use of models in the financial sector (as reviewed in this chapter); however, there too the emphasis is on true knowledge. By bringing the future explicitly into their work, the futurist is likely to recognise and deliberately factor in and bring to bear on the situation the relations between objects (including the novel objects), time and their change and transformation.

The assessment of a scientists' work lies in the present and the past, while for the futurist this is in the future. Bringing the future into their work means the products and the assessment of futurists' work lies in the future, not the present. Futurists are also likely to realise connections between their current actions and their own future, while for the scientist their future is projected onto an object without a mind of its own. By considering future generations in their work, the notion of success becomes more broadly defined and more uncertain for futurists, because it depends not on established facts of success and a progressive reconstruction of the past (cf. KKC's third thesis). To characterise the relation on the subject side as wanting may similarly not be sufficient to frame futurists' engagement with the future.

Principles from process philosophy could be suitable to extend the STS extended relational approach. Conceptual similarities between the extended translation approach and strong process philosophy approaches, specifically on the issue of time, provide the final principles needed for the theoretical framing of this research. In recent years, scholars have found parallels between STS scholars' perspectives and those of the strong process philosophy view. For instance, Harman (2009, 2011, p. 156) identifies Latour<sup>7</sup> as an "ideal object-oriented hero" and links Latour and Whitehead (a process philosopher) as both denying the split between objects and relations. Latour (2004) establishes the similarity between his objects, as matters of concern, and the objects that Whitehead calls actual occasions and communities (citing Whitehead 1979). Latour (2004, p. 246) goes on to describe his objects as "gatherings" where many participants are gathered to make a thing exist and to maintain its existence. According to Latour (2004, p. 233), "A thing is, in one sense, an object out there and, in another sense, an *issue* very much *in* there, at any rate, a *gathering*". Although Latour does not say so directly, he appears to be linking Heidegger's concept of gathering, Whitehead's concepts of communities and actual entities, and his own concept of associations. Latour is alluding to the similarity of the process philosophy concept of duration and the way that the actants of ANT are gathered together within the simultaneity of experience. In other words, these conceptual similarities deal with issues of change, process and thus time.

To say there are similarities between these scholars is not to claim that all STS studies have (explicitly or implicitly) adopted process philosophy concepts in their approaches. Nor is it to suggest

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<sup>7</sup> Latour himself has come out as a philosopher (Latour 2010).

that concepts from process philosophy imply that a STS researcher will therefore follow an approach that “anchors existence in the world, not outside it”, as KKC (1993, p. 558) puts it. Rather, it is to suggest that concepts in connection with time from process philosophy can complement the concepts and principles of the extended translation approach (and the two analytical perspectives) for analysing and exploring futurists’ capacity to engage with the future. For example, through assuming a view of process philosophy concepts, a researcher adopting a sociology-of-knowledge perspective investigating the relation between a scientist and their knowledge objects and environment could also conceptualise of them like an ANT researcher developing actor-networks. In other words, the difference between ANT and the sociology-of-knowledge analytical perspective could be viewed as different perspectives within an overall common framework of aspects of capacity to engage with the future.

The next section reviews two approaches to time in order to lend support to adopting principles of time from process philosophy for inclusion in the theoretical framework for this research.

### **3.2 Overview of time and change**

This section introduces two views of time that are often set in opposition, reviews what each view assumes about how change happens and how each explains the future. Fraser (2007) names these two views as choosing to view the essence of the world as “being and permanence” or “becoming and change”. An approach that sets ‘being’ against ‘becoming’, as polar ideals, as one’s pre-eminence over the other, is a very different approach to Whitehead’s intuition about their inextricable entanglement (see Chapter 1). These two views have defined a prominent controversy since the early Greek philosophers (see Fraser 2007, p. 77). The previous chapter shows that futurists conceive of time from different perspectives and in different ways. With reference to studying engagement with the future, this section identifies which of these two views best accommodates the variety of futurists’ conceptions and realisations of time. The review explains how using the ‘becoming and change’ view of time, rather than the ‘being and permanence’ view of time, can aid studying engagement with the future.

#### **3.2.1 Time of ‘being and permanence’**

This review in this section identifies a number of limitations of the ‘being and permanence’ view of time for this research. As the next short introduction explains, this view of time rose to prominence with the notable success of the atomic theory in explaining change and experience. According to Simons (2009a), the ancient Greek philosophers attempted natural explanations for the world, rather than supernatural explanations, because contradictions were created when explanations about the physical or natural world were compared with the eternal or unchanging realms of gods. The thinkers of ancient Greece proposed quite different theories to the question about what something is, and some theories are rediscovered and enthusiastically supported centuries later (see for example Sedley

2009 and Simons 2009a). Leclerc (1986) provides a detailed account of how during the seventeenth century support for Aristotle's conception of the nature of beings shifted to the atomist theories of Plato and Democritus. Throughout the sixteenth century, thinkers agreed with Aristotle's theory that the nature of beings (primary physical existents like a horse or tree) involved an inner process of change that can be analysed in terms of form and matter, where form and matter were not themselves physical existents but the sources of being. However, in the early seventeenth century, medical physicians, who were also chemists and physicists, realised that the bodies of beings were composites and, from the findings of their chemistry experiments, concluded that change is not internal to beings or elements but rather that elements only change place. To explain their thinking and findings, medical thinkers like Basso enthusiastically seized on the atomist theories of Plato and Democritus with the difference that "in the modern position these atoms were conceived as 'material.'" (p. 22) Thus, as Poidevin (2009) explains, the theory that developed out of the early Greek philosophers' discussions and debates that could account for change was that of atoms in a void. This theory could explain experience because, as Poidevin (2009) illustrates, atoms in a void can be arranged in different ways without affecting the properties of the atoms themselves. The atomic theory and the associated concepts now underpin contemporary scientific research practices and theories in general. Stroll (2009) notes that the practical implications have been impressive for the modern world, with the success of science over the last four hundred years in producing a clearer and truer picture of the natural world than any explanation prior to it. Poidevin (2009) confirms that with the rise of science, this view now largely dominates modern philosophy and most modern academic disciplines.

The diversity of futurists' views cannot be captured by passivity, fixity or uniformity. However, a 'being and permanence' view of the world gives primacy to substances (like atoms) of enduring and fixed nature, and subordinates processes to substances. Rescher (1996) characterises substance philosophers as stressing the discrete individuality, fixity, uniformity, individualised unity, stability and passivity characteristics of substances, which remain "self-identical through time on the basis of their possession of certain essential features or properties that remain changelessly intact across temporal changes" (p. 35). Rescher (1996, p. 34) describes that the only sort of change allowed is in the motion of the substances, which implies that "the rearrangement of atoms is all there is, the world's overall condition is at bottom always uniformly the same".

This research needs to be able to distinguish a range of ways in which futurists engage with the future as distinct from the present and past. However, the objective perspective of the being view of the world is exemplified in the way it is for physics. Griffin (1986, p. 4) quotes Albert Einstein as declaring, "For us believing physicists, the distinction between past, present and future is only an illusion, even if a stubborn one" (cited in Hoffman 1972, p. 258). Griffin (1986, p. 4) also quotes Bertrand Russell as saying, "It is a mere accident that we have no memory of the future" (Russell 1921, p. 234). For Price (1996), the conception of time is stripped of all subjectivity and anthropomorphism; time is not an objective feature of reality and there is no past–present–future distinction or an objective now. Further, Price (1996) states that physics does not have anything to

say about how the present comes about; even though it plots time on the undifferentiated t-coordinate, any direction along the t-axis is equally real and “temporal asymmetry is cosmological in nature” (p. 78). Griffin (1986, pp. 2–3) explains that “Physical theory is usually said to be indifferent to any idea of becoming, of events previously ‘in the future’ coming into present existence”. In 1908 JME McTaggart argued that time does not exist and based his argument on two series, an A and a B series, both of which he found unreal (Denbigh 1981, p. 51; Mellor 1998, p. 2; Price 2011). McTaggart’s paper has been influential, while the debate about whether it fails or not continues, as can be witnessed in Bardon (2013), Deng (2010) and Price (2011).

Futurists adopt both objective and subjective views of the future, so the framework cannot be limited to subjective approaches. However, Griffin (1986) reports that another major group agrees that time must be defined by science, but not that it is unreal. This group holds that the concept of time is not grounded in physics, but it is grounded in another feature of the world which is amenable to science, such as thermodynamics and a universal entropic process, or through biological processes, or a mind-dependent property. However, the group does regard time as something that depends on particular features of reality, in other words, on its own positions on other interests. This group’s position can be approximated, Griffin (1986) explains, by the conception of time, as it is conscious awareness by which we are oriented and immersed in time.

Futurists state that there is not only one future, but many. However, according to a ‘being and permanence’ view of the world, there is a single future, which can be predicted, and any future effects are excluded during the research phase. Howe and Wain (1993) believe that the role for accurate prediction is even more necessary than ever, but warn that foretelling the future is a risky business because of issues such as complexity, precision, how far into the future our extrapolations are to predict and the range of variables being considered. The future can be predicted but, as Rescher (1996, p. 34) points out, “Progress, advance, development – in short, teleology in all its forms – have no place in nature’s scheme of things”. This is the case in other scientific theories as well, as Seligman et al. (2013) identify for psychological theory and practice, which maintain that the past determines human actions and consideration of the future is a violation of natural laws.

In short, this section highlights the limitations of the substance-based view of time, and this has inspired other scholars to develop a different theoretical view of time and change.

### 3.2.2 Time of “becoming and change”

This section describes a theoretical approach for this study that does not transfer the dilemmas and problems experienced by futurists to the study of their engagement with the future. According to Mellor (1998), the essence of time is about change. In his view, time is the concept needed to account fully for the fact that things in this world are changing and to describe and explain how and why these changes are temporally ordered the way they are. To account fully, Mellor (1998) writes, is also to account for lived temporal experience of time and to account for changes in the real world. A particular group of philosophers who protested against the being view of time and change and

proposed a radical view of time that makes it possible to investigate the temporal features of reality and hence change. Griffin (1986) identifies process<sup>8</sup> philosophers as holding the position that it is not the task of special sciences, like physics, to define and account for the reality of time. He adds that process philosophers maintain that the methods adopted by the sciences preclude investigating the temporal features of reality. Simons (2009b, p. 183) summarises that Whitehead criticised Newton's fallacy that material stuff is passively located in time and space (and hence could be separated) when, "[l]ike Leibniz, Whitehead regarded matter as active and inseparable in reality from its spatiotemporal location." Brown (2002, p. xli) criticises physics for stripping objects of time, making them essentially changeless and then reintroducing change between the entities to explain their interactions. Rescher (1996, p. 34) puts it that "Greek atomism ... is the quintessence of everything to which process philosophy is opposed". Rescher (1996) distinguishes a weak and a strong version of process metaphysics. According to the weak version, process has priority over substance – that is substances are subordinate to processes – but processes can also be detached from substances and thus do not depend on substance. According to the strong process version, process has primacy over substance – that is, substances or things are subordinate to processes and reduces to processes, "[t]hings are simply constellations of processes." (p. 2) Rescher (1996) identifies Empedoclean philosophy as an example of the weak process version and Heraclitean philosophy as an example of the strong process version. Fittingly, Gutting (2008) very briefly notes that process philosophy is a highly marginalised enterprise. One reason why it is important to study time, writes Griffin (1986), is that if the laws of nature cannot evolve, then nature and the behaviour of entities described by those laws cannot evolve either.

A strong process philosophy view treats time (and space) as a *derived* abstraction, or a procedure<sup>9</sup>, from the relatedness of entities which makes it possible to conceive of a creative and evolving universe. According to process philosophy, writes Griffin (1986, p. 6), time is therefore "not itself an actual or concrete entity". He refers to Whitehead's explanation of this view as stating that the momentary events in the actual world include aspects of preceding events and that successive events do not occur independently of previous events. Latour (1997, p. 174) puts it this way: "Time and space are not the Newtonian *sensoria* in which events occur and planets fall along ellipses. But neither are they forms of our perception, the universal a prioris that our mind has to use in order to frame or accommodate the multiplicity of beings and entities. Far from being primitive terms, they are, on the contrary, *consequences* of the ways in which bodies relate to one another." Brown (2002, p. xli) describes that "time cannot be added to an object after its temporal relations are mutilated [stripped off], since the object results from a process that is time-creating." When the measurable time of science and social life are no longer fundamental, then other concepts are needed, and

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<sup>8</sup> Simons (2009) points out that the word "process" unfortunately has two meanings that can be confused and lead to misunderstanding. Process, as understood by process philosophers like Whitehead is not the same process as understood by substance philosophers. For the former, all entities are processes. For the latter, entities are moving along in process.

<sup>9</sup> see Fraser (1982) for a procedure and explanation.



duration is a central one (Stengers 2011). Duration for Whitehead takes the place of time, as Stengers (2011, pp. 54–55) puts it, the concrete fact of duration that limits the simultaneity of experience “has a thickness and which exhibits the passage of nature, insofar as it happens and passes, and nature, as that which is always passing (always moving on): these are what Whitehead limits himself to.” Also, Whitehead (1979, p. 321) describes that enduring physical entities depend on a “presented duration” in the character of the entity to momentarily be at rest in. Bergson (2015) describes the relatedness by an example of how the duration of the whole of the universe is transmitted to the smallest particle of the world in which we live and consequently “[t]he more we study the nature of time, the more we shall comprehend that duration means invention, the creation of forms, the continual elaboration of the absolutely new.” (p. 48)

Therefore, my view is that a process philosophy of time and change builds in some of the more fundamental elements that futurists find lacking in a being view of time. However, the more challenging interests of futurists may need to be included. Drawing on Whitehead (1979, pp. 211–214)’s description, the future, the conditions to which the future must conform, the reasons for those conditions and the past (as a particular fact of the unity of the real internal constitution of many actual entities) are in the present constitution of the actual entity (or equivalently the actual occasion). There is a definiteness about the future (the future is real but not actual) yet the entity experiences an actual future though the completed actualities of that future are undetermined. Furthermore, because of the fundamental inescapable fact of creativity, actual entities are not complete since they are in process, where process involves transition and conversion processes. This seems to cover elements such as futures images, values, action orientation, interpretation, future generations, past choices and decisions, and possibilities could be accommodated by this description or by expanding some the description. Whitehead’s distinction between the experience of an actual future and a future which is not actual but real, is an aspect which is not explicitly addressed in futurists work. The description of process philosophy’s view of time does not call out the idea of alternative futures nor address how the more challenging notions used by futurists such as the involvement of the knowing self in constructing the future, or dissenting with the future can be accommodated, although the notion of a real but not actual future seems to leave the possibility for expansion open.

I have shown that the approach STS analysts take to their studies allows them to examine time and change. However, that does not mean the assumptions they have of time is an object that is explicitly studied in their own work and sometimes their conceptions of time is pre-configured according to a scientific conception of time. The main question this study seeks to answer is: How do futurists engage with the future? The secondary research question looks for the relevance of postgraduate master’s education to futurists’ engagement with the future. To answer these questions, I have argued that the concepts from process philosophy in combination with the post social object relationships strand of STS, provide a suitable theoretical framework for this study of futurists’ capacities to engage with the future. The next chapter describes the methodological steps taken to generate answers to the questions.



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## Chapter 4

### Participants' life times

Theories about time are embedded as the metaphysical traces within research paradigms and are passed on to the research methodology itself where they are enacted; these traces are often entirely unnoticed by the researcher unless specifically identified. Different research paradigms have different beliefs about the nature of the world and hence adopt different theories of time and different approaches to research. A strong version of process philosophy and particular versions of ANT view time not as an independent structure external to processes but as an aspect of processes derived from the interrelations of processes. Thus, it is more accurate to say that these approaches adopt a view rather than a particular perspective on the research topic. The combination of a process view and the particular constructivist view of ANT has implications for this study in terms of the roles and modes of co-participation and co-creation of the research participants in constructing this research account, the accounting for the precarious traces of time and future constructions, and the writing of good accounts. All these elements contribute to the clarity in distinguishing between different aspects of different ways of constructing time and the different effects these have in different situations.

Waller, Farquharson and Dempsey (2016, p. 8) suggest that a comprehensive yet simple way of identifying the methodological characteristics of any research project (the characteristics of the research approach) is to address:

1. Beliefs about what exists and what can be known
2. The relationship of the knower to the known (beliefs about the purpose of the research as well as values)
3. How to find out things (methodology and method)

This set of items is based on the typology of paradigms examined in the series of writings starting with Guba and Lincoln (1994). Law (2004) points out that the assembling of methods also enacts and crafts boundaries, but that those boundaries are necessary. The processes of crafting and enacting this research have responded to encountered boundaries and enacted boundaries in various ways. For example, as will be shown, the boundaries participants encountered with the Life Chart have shaped their interactions in obvious and surprising ways, by presenting boundaries but also revealing something when those boundaries were not honoured by the participants.

#### **4.1 Beliefs about what exists and what can be known**

Beliefs about what exists and beliefs about what can be known are interdependent. Reasoning about what exists is concerned with more than making inventories and lists of what exists. This also concerns what it is to be real and the categories (e.g., laws) that are not items which are themselves studied. The problem is that it is difficult to make a nontrivial claim about what exists such that ontologists would agree and it is equally difficult to make a statement that would be accepted by all

ontologists (Cameron 2009). Scientists in traditional scientific areas adhere to a substance metaphysics of particles that are acted on by external forces, and time and space are seen as cosmological properties. ANT theorists like Latour propose another ontological scheme with four central concepts or principles, summarised by Harman (2011, p. 32): actors and actants are everything that exists; actants are autonomous and influence each other; translation and negotiation are the work needed to show the relations of influence between actants; and actants are strong or weak depending on their associations. In process philosophy, Whitehead proposes that events or actual occasions come into existence and cease to exist, they become concrete and they die (see Simons 2009b). The similarities between ANT and process philosophy has inspired the approach for this study to combine their principles. According to the constructivist view, multiple realities are constructed and they are constructed according to the metaphysical scheme.

The main principle for the purposes of this research that draws ANT and process philosophy together is the interrelated notions of time (and space) as coming into existence with an event. Becoming is not a serial extensive advancement. In Whitehead's (1979, p. 35) words: "There is a becoming of continuity, but no continuity of becoming. The actual occasions are the creatures which become, and they constitute a continuously extensive world." There is a similar intuition in Latour's writings about existence and the durability of a network. Latour (2005) describes going backstage to observe the construction, the making of a specific enterprise, as getting a glimpse of the time dimension of an existing entity and experiencing a feeling that "things *could be different* ... that *they could still fail*" (p. 89; italics original). In describing networks, Latour (2005) is clear that an actor-network is not a durable substance like a nylon thread. Rather, the network is the tracing done by a vehicle, the network exists when an entity traverses it, and when it is traced it is done so anew; in his words (p. 132) "You can hang your fish nets to dry, but you can't hang an actor-network: it has to be traced anew by the passage of another vehicle, another circulating entity." In summary, an entity becomes a stable entity when new pathways for transported entities are laid down (there is activity that does this) and these pathways go on acting so that the connections are durable (without activity the entity fails). Latour (2005) gives the example of an anatomist who sees the interconnected pathways and tracks of an organism's body along which activity keeps the organism in existence. Thus, time is not an external background within which the activity happens. Rather, the activity derives time through practices and processes.

There are two main reasons for considering the metaphysical foundations of this study. The first reason concerns needing to include the two dominant and opposing perspectives of the field (see the FS review chapter). The second reason has to do with the difference between considering a world of change in all respects and considering a world that is only partly of change. For the first reason, to recap the FS review, FS is a relatively new field established in the mid-20th century (Bundy 1976, cited in Son 2015) structured around an alternative approach for engaging with the future compared to the dominant scientific predictive approach for engaging with the future. The field was established by people who were initially drawn to science in the hope, and for some the firm belief,

that it would be possible to predict the future so as to improve human freedom and welfare. However, they eventually realised the limitations of scientific prediction and began to develop alternative methods to engage with the future (Bell 2009; Dator 2002). The status of the field is not settled, nor its foundations, which would include a metaphysics; currently futurists adopt all major research methodologies and perspectives. Therefore, I conclude that for this study to explore the way in which futurists engage with the future, the study's foundational assumptions itself cannot assume a particular theory of time.

The second reason concerns the foundational assumptions of science. Contemporary scientific research practices and theories are underpinned by the view that the world is made of changeless, enduring and interacting substances (e.g., physical bodies, minds and souls are different substances) with space and time as intrinsic properties of every object (Hanna 2008; Rescher 1996, p. 35).<sup>10</sup> Therefore, the foundational assumptions of scientific metaphysics limit the ways in which change can be studied. To the best of my knowledge, the only metaphysics providing an alternative suitable for this project is process metaphysics and particular variants of ANT. Hansen (2004, p. 769) writes that the metaphysical concept of process, particularly that of Whitehead, "has been working systematically towards replacing the traditional metaphysical framework of time and substance with one of process".

There are weak and strong versions of process thought. Therefore, unlike Rescher (1996), this project adopts the more daring ideas of process philosophers who emphasise becoming as an aspect of reality. The position of this project agrees with that of Weekes (2004), who questions whether Rescher's (1996) explanation of and approach to process philosophy does justice to the process ideas of philosophers like Bergson, James and Whitehead. These philosophers "envisioned the primordial reality of process in a radical ontology of becoming" (Weekes 2004, p. 223). By this he means that these thinkers are serious about ensuring the features or characteristics associated with time, like passage and inheritance, get primary focus as aspects of reality. A focus for this project is the study of specific temporal features of reality and, as Griffin (1986) explains, it is only the process metaphysics position that does not assume the nature of time in its definitions and methods. This stronger view of process metaphysics is suitable for this project because it is an approach "that does not limit itself to the methods and abstractions of any of the special sciences" (Griffin 1986, p. 5). Instead, it fits a study of human experience that presuppose as little as possible, particularly about time.

Process and ANT theory have been adopted for all aspects of this project. As with the process philosopher Rescher (1996), who introduced process philosophy, the main idea that guides this project is that all sorts of changes are a basic feature of the world and of all being in the world.

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<sup>10</sup> Baaquie (2013) explains that the entity in quantum mechanics differs from the completely determinate entity of classical physics: all the properties of a quantum entity are encoded by a pair of vectors (namely, the degrees of freedom and state). The state vector is a superstructure on physical spacetime and the measurement process mediates between the degrees of freedom and the observable and measurable properties.

As Rescher (1996) explains, in contrast to a view that static entities (substances) are predominant in the world, there are a variety of features that a process view stresses. Therefore, some of the features supported by this project are as follows. Processes are more fundamental, or at least as fundamental, as static entities in this world, which means processes take priority over entities. Processes are not limited to material or physical objects or things, but also apply to nonsubstantial things like psychological, mathematical, symbolic or cultural arrangements. Processes are not limited to arrangements of things or objects, but also apply to activities of agents, powers, forces, fields, conditions and circumstances. In short, processes pervade this study.

On the further question of what it is for processes to be real is the issue of view (rather than structural perspectives, as explained by Roy 2006). My interpretation of Roy (2006), is that two specific metaphysical points contribute to forming a view: the collapse of subjective and objective perspectives, and the relational aspect of time. Process metaphysics such as Whitehead's collapses the subjective and objective perspectives; according to Rescher (1996, p. 59) "Whitehead's Reformed Subjectivist Principle ... makes experiencing/experienced and subjective/objective indicative of different phases or aspects of everything that exists". Latour (2005) describes a similar intuition for ANT; for example, Latour's (2005, p. 212) "'ego' is not found in his heart, brain or soul, but all over the place: floods, rains ...". Therefore, it applies also to epistemology and other such subjectivities.

Furthermore, for Whitehead time comes into existence with the event occurring (Simons 2009b, p. 185). Latour (1997) provides his own version of how time is constructed, that is, not as a property of the cosmos or universe (see the summaries of this article by Dobers & Strannegård 2004; Hansen 2004). Dobers and Strannegård (2004, p. 829) conclude that "Time and space do not exist a priori, but are consequences of how different bodies relate to each other. With this relational perspective, Latour argues for the necessity to recognize that there are as many spaces and times as there are relations." Latour demonstrates the relational perspective with an analysis of the description of the theory of relativity written by Einstein, namely *Relativity: The Special and General Theory*. Latour (1988) shows how Einstein's quite abstract "reformulation of space and time" is a social narration achieved by relating bodies like watches, trains, rulers and observers to each other (p. 4). As for the participants of this study, even though they were talking of past or future experiences, they are the informants of the traces of the networks of their lives being reassembled in the interviews; those networks influence their engagement with the future. Furthermore, it is their way of realising time that is being investigated, whatever this might be.

This project acknowledges the critical, generative and creative character of some futurists' practices. FS practices suggest instability, dynamic and shifting boundaries, and identity impermanence. KKC (2001a) describes epistemic objects as always in the process of being materially defined and continually acquiring new properties while changing the ones they have. Therefore, like KKC (2001a) this project studies the unfolding of processes. However, this project cannot presuppose the temporal nature of that unfolding and needs to allow for all manner of unfolding. Process metaphysics is believed to be suitable for research in the area of FS.

This project also acknowledges that many futurists view themselves as working with the future yet recognising that the future does not exist. Rescher (1996) explains that a process metaphysics sidesteps the philosophical problems of scholars who view reality as made up of solid things. One of the problems is the mind–body problem, also known as Cartesian dualism (see Griffin 1986, p. 9 and Rescher 1996, p. 114). The difficulty is to explain how two different types of substances, mind and material, can interact. The stronger view of process metaphysics avoids this problem, which, for a study in the area of futurists' practices, is a key consideration.

Finally, ongoing process is not, as Whitehead's intuition in the introduction chapter shows, all that there is. If all there is is flux, then it would be impossible to make out what there is. The word 'is' takes on a very different meaning; it includes being and becoming. This research project involves letting some things 'be' in order to explore what is going on with other things. For example, to produce this document that the reader is reading involves both a stationary element (the paper and fixed letters) and an activity (writing and reading). Being and becoming as we know them (currently) are intertwined in an inseparable way. I see this intuition reflected in what Thrift (2004, p. 875) writes of Tardé: "Finally, I therefore assume that time has to be seen as composed in and of a set of practices (often crystallized in objects) that limit difference and so allow directed action to take place. These practices must not be seen as in some sense reductive, just because they limit action in particular planes. Instead, they must be seen as productive variations, allowing new things to come into the world that add new kinds of weight and energy".

## **4.2 The relationship of the knower to the known**

My beliefs about the methodology and theoretical framework impact in subtle ways the purpose and aims of this research and how I go about the different tasks in the research process. The first item is concerned with what I know and believe about ANT and how it is 'done'. Gad and Jensen (2010) describe ANT "as a postplural attitude ... or a nonhumanist disposition" (p. 56) to characterise ANT drawing on concepts and themes in the post-ANT literature (the ANT literature that reflects on ANT). They identify three concepts (multiplicity, complexity and fractality) and the critique on pluralism and perspectivism that I consider as important for my understanding of how to do this research that are part and parcel of why I chose ANT. Mol (1999) describes perspectivism as the idea that different people view the world differently from different perspectives that implies that there is a single world onto which different actors can gaze in a plurality of ways. This is certainly the case for most other observational and interpretative approaches. For example, in grounded theory, Glaser (1978) advises the analyst to "generate good ideas [by being] a non-citizen" and "letting the data speak for itself" (p. 8). Thus he is advancing an objective perspective, or at least, that the analyst can approach a (one) perspective on reality, or one interpretation can be obtained from the data. Rather, as Mol explains, a consequence of ontological multiplicity in ANT means that reality is performed, manipulated and produced through different practices and thus that different realities appear through those practices. For example, my description of the FS field 'reality' is not one taken from a particular

perspective (e.g., subjective, cultural or macro perspective) but is one of the multiple FS 'realities' that I am deliberately *making* it for this research. I believe this is necessary and useful for achieving the aims of this research. However, in doing this, I assume that I am an actor (temporarily) who can actively choose between different versions of FS and that there is something definite about FS. Choosing this particular version is a question of doing politics (I sometimes imagine that I am a marginalised actor opposing privileged actors, a view I can justify by noticing that an actor is also a network effect – see Law 1999, p. 5). This raises ethical question, because, as (Law and Mol 2002) point out, a simplification may well “generate[s] methodologically sound results, but these results are not very useful when decisions are needed” for specific situations that I cannot anticipate (p. 3). The concerns around multiplicity and perspectivism are ones that applies to other objects, entities and actors in this study; specifically, I take the idea of multiplicity and postpluralism seriously as the way to do ANT (for example, in the main concept of ‘engaging with the future’). Multiplicity raises a further concern about “complex interferences” as the different objects are made in practice; things become more and more complex (Mol 1999, p. 82). Gad and Jensen (2010) name it fractality, that different versions of an object may be partially connected and increases complexity of the object. This is particularly an issue for analysing participants’ data since I may not find stable, ‘completed’ or ‘closed’ interpretations. Alternatively, ontological politics means I may close or stabilise an interpretation because it suits my imagined role as a marginalised actor. Uncompleted and open interpretations make it difficult to use qualitative coding methods that assume codes can be assigned to selections of texts.

My knowing and interacting with the world is ongoing activity with the past and future active in the ongoing activity of the present. My interactions with my world are dependent on my past development and my future (however the past, present and future are thought of) and also presupposes them. More than that, I cannot fully come to understand reality and myself as part of reality in some separate way from my own personal processes or from world processes. We are embodied beings; I understand by this that the way humans are is implicated in how we see, view, experience, live and hence know the world, and that the mind is not separated from the body or the world. Furthermore, although I cannot overcome my embodied condition, mindfulness practice increases my awareness of the effects so that I can interrupt embodied habits to bring about change in spite of my embodied nature; mindfulness is a way to carry me through the spaces in between the end and the beginning of moment-to-moment processes, the space between the dissolution of one momentary process and the concretion of the next momentary process.

Four writers provide examples of this. The first example is Lakoff and Johnson (1999), who argue that the nature of our concepts is metaphorical and these structure our thoughts and actions. An example from Lakoff and Johnson (1999, p. 140) is that time in English is structured with an observer at a location (the present), the future in the space in front of the observer and the past in the space behind the observer. Danesi (2007, pp. 30–31) is the second example; he explains how even though the connection between the physical structure of a sign (e.g., the word ‘bow-wow’) and its



meaning (the barking of a dog) is an arbitrary one, there are words that suggest actual physical phenomena ('bow-wow' is very suggestive of the actual barking of a dog). The third scholar is Brown (1991), who from a different perspective elaborates a model of mind (with process metaphysics as the philosophical basis) that does not separate mind from world, but locates mind within the objects it creates. Brown (1991, p. 21) mentions the example of listening for the faint sound of a train whistle and thinking we hear it many times before we actually do. The fourth example is from Corfield (2007, pp. 26–27), who identifies the common principles involved in a display of fingers as a way to indicate quantity and numbering systems and mathematics.

The examples of embodied practices provided in the previous paragraph do not suggest there is a singular universal and embodied practice to discover (as is explained by Lynch 2001). In other words, I oriented to the interviews and their analyses not as theoretical items of processes or actants, or structural or logical parts of a generic practice of engagement with the future, but as the construction and realisation of some kind of order in the act of interviewing, "as situated accomplishments by the parties whose local practices 'assemble' the recurrent scenes of action that make up a stable society" (Lynch 2001, p. 131). For example, some participants did not 'fit' their responses to the researcher's questioning (e.g., they questioned the assumptions of time order evident in the questions), while other participants did 'fit' their answers to my questions without any dispute over the issue of time. I take the former participants' objections as indicative of the capacity for assembling surprising deviations in the interview, and not as elaborating a unitary practice for engagement with the future.

The constructivist beliefs about what is real and what can be known mean that researcher and researched are not independent observers or subjects, and continue to have effects each time the thesis document is read. This means the researcher is a participant in the research along with the research participants; we have co-constructed a particular reality about engagement with the future during the interviews and, each time it was read during analysis, this has influenced the research. The research participants (and the researcher) are also informants in relation to their lives' actor-networks (in which they are also participants). This means that during the interviews they were informants about the circulating entities that are maintaining (making durable) their ways of engaging with the future. There is probably some overlap between these realities, as Law (2004) indicates. It is unavoidable that as researcher I have had an effect in each interview, its interpretation and the presentation of the results, and it is unavoidable that the participants have had an effect on the final thesis and beyond that on the readers' readings.

I am also a graduate of an FS postgraduate master's course and an active member of the futures community. This has certainly influenced the relationship I had with participants and I have needed to be reflexive about how that might impact on the interviews and also on the interpretations of the interviews during analysis. My interpretations and reactions in an interview with participants were not independent of how I have developed, what I have learnt and already know of the world, and the ways that I engage with the future. As a result, I have influenced the activities and responses

of the participants, and their responses have influenced how I responded in turn, for example, by the questions I asked. This applies not only to the immediate interview but also to subsequent interviews. In the immediate interview, my questioning may have led the participant into awareness of things they had not previously recognised or thought of. For subsequent interviews, a participant may have taken action that they would not have taken otherwise, which has then become part of the next interview through their experience. This happened for more than one participant: Robert prepared something specific in relation to one of the questions which he felt he needed to think about more. It has also affected in the analysis what I have focused on and identified in the interviews as important or significant for developing knowledge. Furthermore, it applies to the whole study as well; whatever I say of futurists applies to me too. For example, in the FS literature review I identify needs in the literature, and so this project and my intentions are mapped there as well. As Brown (1991, p. 16) writes, "A theory is not an outcome but an intuition about the concepts that are quietly guiding the research". All of these are naturally part of being human, that it is not possible to establish a single truth from something as complex as a human life, and this is not something that ought to be avoided but seen as opportunity for discovery. I have developed some guidelines (described next) to help me monitor and question my position in the foresight community.

There is another relation to consider that affects the contingent nature of the knowledge claims of this research. This is the relationships between the participants as informers and what they 'know' of their past lives. McLeod and Thomson (2009) discuss numerous issues of the remembering, forgetting and constructing that go with oral histories (the life course interviewing method of this study is also a form of oral history). They point out that different methodologies tend to prioritise different time frames, yet the interrelating of the past, present and future is always happening. Their first case study demonstrates that historical narratives are about the past, present and future; they are fashioned by the present time and place where they circulate, and they are linked to decisions about appropriate future knowledge and values. In life history projects, write McLeod and Thomson (2009), present events and social circumstances mould the past, and past memories are present constructions (and future pasts) and respond to multiple factors like moods and concerns. The central issue about life histories, according to McLeod and Thomson (2009), is not whether memories are true or verifiable, but what the memories show about experiences. It is in this manner that I have adopted the life course interview method with the participants, as more about the form of what they reveal about the actors and processes than about the specific content and details of the memories. McLeod and Thomson (2009) cite Samuel and Thompson (1990) that interviews which focus on the contents of memories are characterised as "naïve realism" (p. 2).

The study has required interpretation involving transforming the participants' experiences into the researcher's (my) version of what is going on, in an effort to generate a deeper (different) version of the forces at work: as the researcher I have this power and I have undertaken to be conscious of not abusing my power. Willig (2012, pp. 45–61) introduces the notion of "interpretive violence" and suggests the consequences could be to disempower the participants. She means my

interpretations could, perhaps simply by my choices of words, produce consequences for the participants that are difficult to see now but later could be used to judge them. Early on in the research I developed four ethical guidelines which I have referred to throughout the the recruitment, interview and following analysis processes to gauge my actions. The purpose was to be transparent about the purposes to which the data was being put and at various times gauging my intentions and actions so that I did not become complacent with existing processes. The first three are based on strategies from Willig (2012) and the fourth I added after reading many other sources:

- Keep the research question in mind and be modest about what the research can reveal.
- Ensure participants' voices are not lost.
- Remain open to alternative interpretations and question why I want a particular interpretation.
- The act of interpretation should not reduce meaning to simple rules or static laws. For example, reduction can happen when a 'rich' expression is turned into a calculable amount, a message becomes simply a signal of stimulus/response parts or one meaning simply becomes decipherable using coding rules while other meanings are forbidden.

### **4.3 How to find out things**

#### **4.3.1 Data gathering**

This section discusses the theoretical principles and the specific methods used to gather and analyse the data. Gathering data involves making decisions about sampling and the practicalities of producing the data. Analysing data involves coding in the first phase of analysis and then processing those results further alongside theory. Briefly, the first phase coding showed that each participant has their own set of processes and relations for engaging with the future that forms their core approach for interpreting events in relation to time. Another way of putting it is to say their core approach provides them with a set of machinery (e.g., concepts, metaphors, or practices) to transform and translate life events. Drawing brief examples from the data: a) Julii engages with the future as "Chipping out of a shell" to "let light in"; b) Tyler engages with the future as "Wind the clock forward" being "empathetic" and with "open mind"; and c) Cloey engages with the future as "Wending our way forward" by "apply[ing] our learning forward" to "know how the story ends". The first phase coding results are not directly reported as findings in this thesis, since the thesis does not simply describe the data collected but analyses it alongside current conceptualisations in the STS field. The reason for this is that the patterns of time and the future that constitute the capacity to engage with the future are implicit in how the participants conducted the interviews and in what they said.

This research seeks to find out about capacities to engage with the future. It is here understood that capacity is a kind of structured activity that applies to a whole person and that differently structured activity is suggestive of different capacities. When I started this research, I defined the aim in terms of 'individual capacities to engage with the future'. However, on taking an ANT approach, it has become clear that I cannot take for granted terms like 'individual' and 'I' (for

example, see Mol 2010). Law (1992, p. 383) declares that ANT raises a basic question about “what we *mean* when we talk of people”; indeed, he suggests that, for ANT analytically, “what counts as a person is an *effect generated by a network of heterogeneous, interacting, materials*” (italics original). Continuing with the research aim, based on my experience with FS master’s courses, capacities to engage with the future could be developed, as I believe it can be developed through education; it could be developed through life experiences as well, quite possibly. I conclude then that studying capacities to engage with the future is studying the structuring of different activities or processes of engaging with the future. Thus activity can be linked to dynamic practices and the element of engaging with an unknown future can be linked to the creative and constructive practices in the theoretical work of KKC; for example, see KKC (2001a).

FS master’s courses provide a site for finding potential participants who are developing or have developed their capacities to engage with the future and thus a site for finding the most informed participants. The main question this study aims to answer is: How do futurists engage with the future? The secondary research question looks for the relevance of postgraduate master’s education to futurists’ engagement with the future. A constructivist approach to the study does not assume that one single truth about engagement with the future can be found or that a more politically relevant answer needs to be found (see Law 2004). This aligns with the aim of this study to account for a range of approaches and hence a pragmatic decision was to sample participants from a pool of diversely informed futurists. There were two reasons for choosing the FS master’s course site in preference to another site. First, FS as a field draws together people with a plurality of ways of engaging with the future and all the master’s courses curricula reflect and encourage that diversity. Second, learning about FS is not an extension of one particular discipline. The people who are attracted to the courses perhaps perceive something about the course that they do not perceive in education focused on their discipline area. To put it another way, not everyone wants to pursue postgraduate education in their discipline and some will find the FS course an attractive option. It was observed during informal piloting interviews with FS master’s students that the small details of an influence of the FS education on their developing a capacity to engage with the future were quickly integrated into longer term changes. Thus, the study could have been approached in two ways: intensive study with students while they were undertaking their studies, or interviews about the changes over a person’s life course.

The data collection was based on conducting in-depth interviews (Minichiello et al. 1992) of students at various stages of FS coursework master’s education (and thus also graduates and those who had registered but not yet started the course). The study draws on principles obtained from life course research (Giele & Elder 1998; Moen, Elder Jr & Lüscher 1995) and life review and life story (Clausen 1998) literature to create an interview guide. The difference between this research and the typical aim of life course methods is that, instead of focusing on individual people or social developments in the content of the interviews as life course methods do, this research has looked for patterns in the interviews as an enacted process and in the ways participants described their

engagement with time or the future. If patterns can be identified and if analysis shows that the patterns correspond to elements of the FS master's course, then the patterns may be comprehensible in terms of a more general theory of developing processes of engaging with the future. Using interviews is also a departure from some ANT studies that deploy ethnomethodology to study participants in situ doing their work. I chose life course interviews as a guide for the interviews before I knew of ANT and that ANT studies typically involve ethnographic or grounded theory approaches to gather data. I felt it important to design an explicit way for participants to demonstrate their engagement with time and the future (to bring that to the fore) so, even if I had known of ANT before choosing life course interviews, I probably would have structured the questioning in a similar way. The life course interviews have nonetheless had benefits compared to observation of futurists at work. Futurists busy at their work, let's say working for a client, might have enacted only part of their capacities in order to suit the client or the project requirements. It has already been noted in the review of FS literature that futurists experience unresolvable dilemmas in their work. Connecting to their lives, they need only account for themselves and their own life networks. During the interviews, I generally encouraged them to do their best in this regard.

The topics for the interview guide have been developed based on a number of definitions of the life course and a variety of other resources. For instance, O'Rand (1998) sees the life course review project as weaving psychological, sociological, historical and demographic concepts and methods into the project. For Elder Jr (1994), four themes are central to the life course theory: the interplay of human lives and historical times; the timing of lives; linked or interdependent lives; and human agency in choice-making. In a social psychological frame, individuals are not passive elements in an environment, but they comprehend events, give meaning to the events and use the resulting interpretive accounts to guide their choices and behaviours (Moen 1995). Life stories are based on the theory of human ecology developed by Urie Bronfenbrenner (Moen, Elder Jr & Lüscher 1995). Bronfenbrenner's ecology of human development model, the "person-process-context-time (PPCT)" model, acknowledges the lifelong interactions between person and context and "attends to the interplay between (a) characteristics of the person and (b) the social context in affecting (c) developmental processes (d) over time" (Moen 1995, pp. 4-5). All the factors and elements mentioned by these scholars have been used to construct the interview guide.

The research has used interviews that were structured along life course methodology principles; the structuring of the interviews is not the substantive aspect of the methodology. Rather, the structuring along the life course method has provided rich data, given an opportunity for the participants to talk 'time' and is one of the areas where it 'constructed' time. This has made it possible for the interviewees to demonstrate their engagement with the future rather than talking about it. In other words, the content of the conversations, as such, are of little concern to this study. Cooren et al. (2005) show how even in the most unremarkable and banal discursive event, the analyst can identify the past, present and future embedded within it. Cooren et al. (2005, p. 269) demonstrate with examples how "discourse seems, by definition, the means by which the shifting of space and

time ... takes place. By projecting something to come – the birth of his grandchild – Denis is literally making this future event present to Andrea ... The 'here and now' of the discussion can thus be said to be contaminated by the 'there and then.'" In the spirit of ANT, Cooren et al. (2005, pp. 270–271) show that "the extension of the immediate present does not rely only on the imaginative ability of human agency, or even for that matter, on language, but on the constitutive intertwining of human and material agency (Pickering, 1995) or, as Latour (1996b) puts it, in the 'sharing' of action with non-humans." They are doing very much what I am doing in this thesis; however, I did not know about this until after my data collection.

For example, with this project let's say a participant described a particular happy occasion; it is not the occasion as an event in this person's life that is important or whether it came before or after some other event or was influenced by something. Rather, it is the way the interviewee 'timed' the occasion, the actors referred to in the event, and the relations between the actors and their mediations that are in focus in this study. The interviews have explored participants' life course development and how their life experiences affected their capacity to engage with the future. It could not be assumed that participants would characterise their life courses as narratives, nor that they would see them as developing along linear time lines. It was more likely that their stories would be complex and nonlinear. The interviews have specifically also explored the impact of the participants' foresight education on them personally and in the different contexts relevant to their lives. The interviews have created rich, descriptive texts of experiences, interpretations and activities in different contexts relevant to the participants.

### 4.3.2 Sampling

Globally there are about fifteen FS master's courses. In the initial proposal, four participants were to be recruited from courses in five international regions. However, the recruitment did not fulfil this expectation. Time restrictions meant that interviews were conducted with nine participants. With the small number of recruited participants, their international distribution cannot be reported in order to protect their anonymity as required by the ethics approval.

Internationally, I estimate there are about one thousand graduates of FS master's courses. This estimate is based on the following details. According to the lists on Global Foresight (2013), the four main organisations involved with futures (those listed by the Association of Professional Futurists 2015) have more than 32,000 members. According to the two oldest graduate FS programs (Hawaii Research Center for Futures Studies 2011 and University of Houston College of Technology Foresight 2017), established in 1971 and 1976 respectively, more than 510 students have graduated from their FS master's programs. In addition, it is estimated that about two hundred have graduated from the Swinburne course, roughly ten graduates per year. That accounts for three of the 23 primary foresight and PhD programs listed on Global Foresight (2013) or about fifteen master's by coursework programs. If a figure of five to ten graduates per year is used for the 12 master's degree courses each in operation for five years, then potentially the total number of graduates is about double

the number of graduates from the Hawaiian and Houston courses, rounded to one thousand.

### 4.3.3 Recruitment and selection

Participants had to be students at various stages of FS coursework master's education, that is, they had to be registered to start the course, currently studying or graduated from their course. A contingency selection plan was formulated in case more expressions of interest for participation were received than the total number of participants needed to complete the study. In that case, selection of participants from the expressions of interest would be based on the characteristics of their FS course and on a set of demographic variables. There was no need to implement the contingency plan. The aims of the contingency plan were:

(\*) to interview at least four participants from each of the five world regions where foresight master's courses are delivered, two participants who were currently enrolled and studying the course and two participants who had completed their studies

(\*) to select within each region a diversity of experiences between participants according to gender, age, age at the time of doing the FS course, duration since starting the course, background (e.g., locality), past education and occupation. This did not mean a statistically determined diversity; the aim was to seek out diversity within a small sample, not to determine the sample size from the diversity of dimensions (Miles, Huberman & Saldana 2013).

#### **The selection process**

The aim was to start analysis of interview data from the first interview. Analyses would influence the selection of following participants, with the overall aim of obtaining a diversity of important common patterns and exceptions (cf. Miles, Huberman & Saldana 2013). The reality was that time restrictions meant participants had to be recruited and interviewed as early as possible without waiting for analyses of prior interviews.

#### **Participants**

In total 28 hours of interviews were conducted with 9 participants of 18 potential participants who were approached. See Appendix III for de-identified information on the participants and their interviews. All participants who expressed interest were interviewed. Not all persons approached replied about why they did not want to participate; of those who did reply, it was due to having stopped their studies, lack of interest to commit to the interview process or being too busy with other commitments.

All participants completed all phases of the interview process; the longest interview took 3 hours 46 minutes (a set of three interviews), while the shortest took 2 hours (a set of three interviews). The students who had enrolled but not yet started their courses could not supply information about the impact of their course; they were instead asked to suggest their expectations of the impact of the course. This does not present a problem because analyses have not focused on interview content per

se. No participants were eliminated from the study once their interviews had been completed. All participants agreed to have their interviews recorded, to receive (via email or CD) and check the transcripts, and to be contacted for future research. All participants were contacted to review their transcriptions and only one participant asked for some modifications and added further text to the transcriptions. Only one participant asked (voluntarily) to also receive the interview recording.

The decision to stop enrolling participants was to be determined by:

- theoretical saturation (Glaser 1992)
- setting a maximum goal of four students per five regions subject to meeting a personally imposed deadline of six to at most eight months of a data creation phase in the research process, to account for the time limit of my PhD scholarship and candidature.

In actuality, time restrictions limited the number of participants before any of the other criteria were met.

### **Recruitment method**

As an active member of the futures field and given the aims of selection, I recruited participants from my own networks. Since the aim was for a diversity of patterns, it was not necessary to draw a representative sample from the population. Therefore, I decided to recruit participants in my professional and personal networks via a networking and snowball process. I further asked representatives in my networks and enrolled participants to put me in contact with other potential candidates.

I used the social media application LinkedIn as a way to identify and establish first contact with potential participants directly and with contacts in my professional networks who might be able to identify potential participants. I maintained a spreadsheet of potential and enrolled participants with a list of selection variables so that, over time, as the list of enrolled participants emerged I could dynamically achieve a diverse sample. This did not work in detail as I had imagined, because not everyone I contacted agreed to participate and not all criteria for a person were available to me until they had enrolled. In actuality this did not matter. I managed the enrolment and rapport-building processes predominantly by email, having first established contact through LinkedIn or direct email addresses obtained via snowballing or other contacts. A fallback position in case I could not obtain potential participants was to advertise via two global FS list servers (e.g., the APF list server); this turned out not to be necessary. The process used a snowballing approach at the end of interviews to request participants to put me in touch with other potentially interested participants.

### **About choosing participants from the futures studies field**

The FS field is a group of people with a distinct claim to expertise for engaging with the future, and most accept and encourage a wide variety of approaches. Furthermore, it is a group that includes practitioners and academics. It is the only group I know of that takes the future as its particular area of study and whose group members do not adopt a single approach to engaging with the future.



#### 4.3.4 Consent and confidentiality

Persons who expressed interest in participating in the research, by contacting me, were provided with a Consent Information Statement and an Informed Consent Form to read prior to deciding whether to participate. Either prior to or at the start of the first interview, participants were also asked to complete a short demographic survey and 'As-it-was Life Chart' (see Appendix II) for the purposes of sample description (aggregates of this information may be used for publication purposes). All participants completed and returned their demographic surveys. At least two participants did not provide me with their charts.

The aim of the 'As-it-was Life Chart' was to assist participants in reviving their past experiences. Life charts have been found to be a helpful approach for thinking about past periods (Clausen 1998) and since many biases affect people's thinking about the past, the chart was used to help the participants remember the past as it was experienced (cf. Sanna & Chang 2006). If the interview was conducted via the internet or telephone, these questions could be read to the participant, the chart could be shared via the software interface and responses could be recorded by the researcher.

All project information materials including the Informed Consent Form carried advice regarding the voluntary nature of participation and the possibility of withdrawal from participation at any time. All participants gave consent to have the interviews audio-recorded and to be interviewed at a time and place that suited them.

#### 4.3.5 Interviewing

Nine students at various stages of FS coursework master's education were interviewed. They were asked to describe their lives and in particular to talk and expand on those times, moments or events when they could identify an influence on their engagement with the future.

Participants were guided during a series of in-depth semi-structured interviews (Minichiello et al. 1992) to review their life courses (Clausen 1998), specifically focusing on their experiences related to their development of foresight. I tried to keep the interviews conversational. The interviews involved two phases. The first phase (expected to be one or two interviews of up to 90 minutes) consisted of guiding the participant to remember the details of important events or segments of their lives (in two modes: as they were experienced at the time and as currently interpreted) in relation to their emerging foresight. The second phase (expected to be one interview of up to 60 minutes) consisted of guiding the participant through a prospective mental simulation of imagining themselves in the future and then re-interpreting the details shared in phase one into an account of their developing foresight.

The actual interviews varied between two and three rounds of approximately sixty to ninety minute interviews and a final interview of between fifteen and thirty minutes; for twenty eight hours of interview recording in total. Some participants preferred three rounds of sixty minutes to two

rounds of ninety minutes due to time limitations. Interviews were on average spread out over one to two weeks. I also drew on my written notes made during the literature review phases of the project, an analysis auditing journal kept during the data creation and analysis phases of the project, and my written notes taken during reflections on each interview.

All interviews were conducted from Australia. A mix of 9 international participants were interviewed. Participants were interviewed either face to face, via telephone call or online via Skype. No participant has withdrawn from the study.

### **The experience of conducting the interviews**

Interviewing enthusiastic informants willing to share their life experiences is a highly invigorating experience. My impression is that at times it was quite hard work for them. No two persons' interview processes were alike. Most participants reported that they had prepared for the first interview at least. I have the impression that the Life Chart enacted a boundary. The task of completing (and sometimes going the extra mile with it) or attempting to complete (sometimes finding various difficulties with or objections to the idea) the Life Chart influenced participants' responses. The chart served as a starting point for most interviews, helping to launch the interview. By the end of the first interview, I was swimming in a sea of another person's experiences and impressions, a whole lifetime of experiences heard for the first time over about 90 minutes. Generally by the end of the second interview, I felt more comfortable that I had asked for sufficient detail about how their engagement with the future had evolved. The last (generally the third) interview turned out to be more significant than I had initially thought because all participants, to greater or lesser extents, captured what they had been trying to say in a succinct or summary way as applied to their own lives. I believe that life course interviewing has made an important difference to this study. Rather than answering questions about what they thought about the future or theorised time, or questions that called for a retelling of learned knowledge, by focusing on their own lives participants 'demonstrated' how they engage with the future.

#### **4.3.6 Ethical considerations**

Ethics clearance was sought and granted by Swinburne's Human Research Ethics Committee (see Appendix I for the latest progress report confirmation). The ethics approval includes details of how recordings of interviews were to be processed, stored and retained so that anonymity and confidentiality would be ensured. All participants agreed for the interviews to be recorded. Transcripts were made of the audio-recordings and the transcripts were stored in files with coded filenames. To protect the anonymity of participants, an anonymity log was kept about how transcripts had been modified in various ways. For instance, participant names were replaced with pseudonyms, names of workplaces were replaced by generic descriptors (e.g., first workplace) and names of family members were replaced by generic words (e.g., 'brother'). Since the interviews included life stories, it

was impossible to disguise all identifying information. However, all recordings and files have been kept behind locked doors, behind password protection or for short periods of time carried by me. Published materials will be reported in such a way that does not reveal participants' identities.

The wellbeing of participants was also considered. As a precautionary measure, should a participant have wished to discuss any issues raised during the interview, the Consent Information Statement listed the contact details of counselling services provided in the participant's home city or local regions and, if they were a currently enrolled student, the details of counselling services offered by their university.

Since it was anticipated that this project would be extended in the future into longitudinal research, participants were asked to consent to be contacted in the future should the research be extended. All participants agreed.

The scenarios presented in this thesis are also futures that will circulate and hence they present ethical issues. The scenarios are not simply creative pieces but must be considered for their implications. The research work by Wilkie and Michael (2009) and perhaps also Brown and Michael (2003) are examples that demonstrate that expectations (futures) are enacted and certain ones are bracketed off.

#### **Presentation of interview extracts**

All the main identifying information of participants, including gender information, has been removed or changed to preserve their anonymity. Where any details in the extracts of events or experiences presented in the thesis are likely to cause social or political repercussions or to identify the participant or those involved, the extracts are disguised, sometimes disguised extensively. The thesis does not attempt precise chronological accounts of events or experiences, nor does it attempt to present how things 'really happened'. Instead, my concern is to demonstrate using extracts the claims made and analyses reported in the thesis.

#### **4.3.7 Data analysis**

A critical component of analysis is coding. Saldana (2013) describes a variety of coding methods and gives advice on selection of appropriate methods. From those the following methods were selected as most appropriate for this project as guidelines for coding: attribute coding, in vivo coding and process coding. Applying Saldana's (2013) description of these coding methods to this project, attribute coding coded basic descriptive information about the participants such as the life stages they mentioned, critical events, turning points or activities, and contexts such as work, job, schooling and so on. In vivo coding coded the literal or verbatim words or short phrases actually used by participants. In vivo codes help to explain how participants resolved or processed their situations while preserving their meanings and attributions of the situations such as describing particular events, situations or conditions. Process coding identifies action from simple observable activity to more

conceptual action. Processes are implied even in concepts such as trust, since this refers to interaction with other people. Attribute and in vivo coding refer mainly to how people or things are, similar to what Cunliffe, Luhman and Boje (2004) refer to as the mimetic content, while process codes refer to what is happening and what is being done by the participant, similar to what Cunliffe, Luhman and Boje (2004) refer to as diegetic content, in particular the ways in which participants constructed or resisted the construction of the interview; however the interview process itself was of less importance. Process coding is particularly important for this project because it has involved interpretation of the data.

The fact that I am not investigating my participants' lives in situ is not problematic. The interviews gave them opportunity to enact their theories of time using the contents of their lives to 'illustrate' their theory. Indeed, the last thing I wanted was to ask them for their theoretical views of time. In another way, it is an in situ study because participants provided an interpretation of the past through the present, each memory transitioning through a multitude of present competing configurations.

The process of interpretation of data is a reflective one, and reflections in the process of analysis act like interruptions, leading to establishing other meanings, connections or relationships. This meant that as analysis proceeded, both for the data of a specific participant and as I worked through the whole set of participants, I learnt about additional important aspects and ways of interpreting the data not previously captured. In terms of interpretive research, I did not restrict myself to studying things in their natural environments, nor did I restrict myself to the meanings that the participants brought to their interpretations of their lives since, as Willig (2012) points out, the researcher can make further interpretations of what they say.

Given the rich data and limitations on time for coding, it was not possible to code every possible word and sentence for every possible interpretation. The actual task of coding therefore was selective and had to remain focused on developing answers to the research questions. In that sense, and applying the definition of interpretation from Willig (2012), interpretation in this project is about clarifying, explaining and constructing accounts of participants' engagement with the future, with the ultimate goal of better understanding the relevance and implications of different ways of engaging with the future for the futures field and for other groups and disciplines in general.

Memos helped me as the researcher to clarify, explain and construct what participants meant by what they said, and not to simply record the analysis activity. Hesse-Biber and Leavy (2011) suggest for the second step to write down (as a memo) a summary of the data as an initial step. I compiled these memos using speech-recognition software and this became a way of generating a second-person version of a first-person account. This helped quickly draw my attention to what I thought was important for the participant. Talking aloud also helped to bring out the processes implied within the data. During analysis I tried to be mindful (appreciative and critical) of what and how I was doing, and how my intentions, knowledge, standards and codes were shaping the research. I used a reflection journal and a researcher identity journal to maintain a "continuous examination of self, practice and

learning” (Cherry 2012, p. 12).

### **My experience of data analysis**

Hesse-Biber and Leavy (2011, pp. 302–307) describe three generic phases in the qualitative data analysis process: data preparation, data exploration and data reduction. Very little preparation was needed to start the transcriptions. I transcribed all the interviews from the recordings; the majority of the interviews were transcribed with the help of speech-recognition software. The speech-recognition software was of great assistance with the speed of transcription. Although tiring, transcription was an enjoyable event of recollecting the interviews and an opportunity for hearing additional things not noted during the interviews. The NVivo computer-assisted qualitative-analysis tool was used for data exploration and reduction (coding of themes during the first analysis phase). Initial experimentation with the data and NVivo was required to establish a comfortable working configuration of memos, file structures and coding arrangements that suited the way I performed the analysis. Exploration and coding of the transcribed interviews were another very enjoyable and creative task. I found the NVivo software of great assistance for managing the coding.

A final warning about ANT as (not) method by Law (2004), citing Mol (2010), is worth keeping in mind. The process and ANT theory foundations do not causally explain realities. That is, the realities are produced in these practices. The realities produced by this research cannot be seen as floating free from the research that produced them, but are re-produced anew in each reading. The extent to which the reader's own engagement with the future is influenced in relating to and reading this thesis reflects in a small way the main thesis argument. Relations and processes are also important aspects mentioned in ANT and process philosophy. Therefore, these two aspects of participants' capacities to engage with the future, relations and processes, provide insights into what it is about certain actors' (in this case the participants') capacities to engage with the future that increases the intensity of becoming. Mol (2010, p. 254) advises that ANT is a “a wild and creative theoretical tradition”. In joining with ANT, Mol (2010, p. 261) states, there are no examples to repeat or to confirm, only cases to contrast with other cases.

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## Chapter 5

### A new relation to the future

In this and the next chapter, I identify and characterise, from the interview data, two aspects of capacity to engage with the future: objectual relations and processes. My review and analyses of the STS laboratory studies literature show that the scientists and social scientists who study them demonstrate objectual relations and are engaged in processes associated with time. STS scholars characterise the relations as unfolding and wanting, and the processes as reflective through time; that is, the scientific or knowledge object is unfinished, facts about it are being obtained by controlling the conditions that reveal the facts and, once determined, the facts are declared independent of the revealing process. The research participants also demonstrate relations characterised as the unfolding and revealing of the future as an epistemological object, and reflection processes that are similar to the laboratory scientists' factual knowledge construction process. However, the participants demonstrate a wider, more complete range of ways of unfolding objects and performing reflection processes. I identify and characterise a new relation and a new process in the data, not previously identified, that speak to greater awareness of and involvement in creative processes: a co-creating relation with the unknown that is emerging and a process of turning to the conditions that involves attending to and transforming the activity that is producing the future. With these additions to their repertoire, participants widen their capacities to engage with the future. Given the nature of these additions, participants have not simply a greater number, but a more complete set of relational and process options in order to deal with complex, changing and uncertain conditions.

This chapter relates results of analyses of the data to key STS conceptualisations. The chapter draws on the data to identify and characterise two object-centred relations of engagement with the future. KKC's identification and characterisation of objectual relations as unfolding is complemented with what I characterise as a co-creating objectual relation. The first section introduces KKC's notion of epistemics and the related notion of objectual relations that draw attention to "the practices, relational issues and structures attending to knowledge" (Knorr-Cetina 1996, p. 56). The second section characterises two objectual relations identified in the data. The first relates to and adds to the unfolding relationship described by KKC and Rheinberger. The second I characterise as a co-creating relation. Although different from each other, these relations are not fixed and stable. The differences in complexity of the relations observed in the data approximately correspond with participants' progress through their FS master's courses. The third section examines these differences. The last section discusses the contribution of the two relations to dealing with situations of complexity, uncertainty and change.

#### 5.1 Introducing epistemic objects and objectual relations

One of the main tasks of futurists is to produce futures knowledge or to develop expert systems or processes to produce futures knowledge (see the FS review chapter). Object-centred sociality as conceived by STS scholars, and in particular for this chapter the perspective described by KKC (1996), allows a way of identifying object-centred relations. KKC (1996) argues for how she conceives of the term ‘epistemics’. She wants this term to indicate a turning away from a design stance that views knowledge as a product or blackbox when studying and theorising about the impact of knowledge on society. Instead, with the term ‘epistemics’ she wants to draw attention to the practices, structures and relations responsible for producing knowledge and for its effect on society and its performance in society. KKC (1997) argues that the increasing role of experts in the knowledge society has implications for social theory. KKC (1997) takes a different position to the tendency of social theory of expertise and science to take external perspectives on knowledge and technology, theorise knowledge as cognitive products or base their theories on principles of machines or system abstractions. In particular, her argument is that the self, when it is included in social theories, is usually theorised as alienated, estranged or negatively affected. Rather, she wants to bring into focus the characteristics of objectual relationships such as relational intimacy, shared subjectivity and social integration (Knorr-Cetina 1997, p. 23). She also argues that specialist knowledge cultures centred on relations with knowledge objects and practices have “spilled and woven their tissue into society” to the extent that social processes ought now to be viewed as knowledge processes (Knorr-Cetina 1997, p. 8). KKC (1996) identifies one of the notions consistent with epistemics as object-centred sociality, which points to a transition from a social order where only human relations matter to a social order where objectual relations also matter. She is suggesting that objectual relations do matter and are affecting the formats of social order. Latour (1996) argues for the reintroduction of objects in determination of the social, for giving back the role to things in sociality, and hence this would identify objectual relations and practices. The issue of knowledge in society is relevant to this study as a whole too, but for this chapter it is the conceptions of epistemic objects and objectual relations that are in focus.

KKC characterises epistemic objects as processes and projections that unfold or are revealed. These objects unfold because the relationships that the persons who work with the objects have with them are grounded in structures of care and desire. Based on her detailed study of particle physicists’ laboratory processes, KKC (2003, pp. 71–72) characterises unfolding practices as the continuous unravelling of the various features and properties of objects via “reflexive redeployment” of the data points generated. To explain this term, she provides an example of a scientist who needs a curve of the deterioration of a computer to decide on its replacement. The scientist envisages a chart of the up-time probability over time. I interpret this to be the projection. However, on going through the process of preparing the chart, the scientist finds that the curve provides insufficient information for the replacement decision. The scientist repeats the process of setting up the chart by making further calculations about error rates and data losses. The projection has changed. This is still not sufficient and the scientist goes through the process again by exploring the replacement computer

costs and training costs versus repair costs. A new projection is generated and the process is redeployed. This then is a problem that unfolds as the procedure is deployed again, adding more loops and generating more information about the computer necessary for the decision about its replacement.

KKC (2003) not only characterises practices as unfolding; she also characterises other practices of the particle physicists as “framing” and “convolution”. Framing involves relating different elements, whether from the field or from experiments, to each other; framing involves, for instance, verifying whether one element is a fake signal by comparing it to other elements from another experiment. For this example, the object’s characteristics unfold. Convolution is a special case of framing; it involves specialised processes for relating elements from very different sources to fit the data of one experiment with another. In other words, it is not only scientific objects that unfold; her study of molecular biologists shows that they also unfolded variables through variation practices in the laboratory. KKC (2001a, p. 181) uses the metaphor of open drawers extending indefinitely into a deep, dark closet to describe the unfolding of scientific objects of knowledge; the epistemic objects are always in a process of being materially defined, being given new properties and changing the properties they already have. The metaphor suggests a linear, before and after, spatial version of time, with each object connected as a discrete file hanging in front of another file and connected to one or more files in front of it as it branches into different objects.

The notion of object-centred relations is employed in a diverse range of knowledge settings to characterise processes such as learning during crisis (Müller-Seitz & Macpherson 2014), art exhibition development (Shaw 2013) and organisational strategy (Jarzabkowski, Spee & Smets 2013; Werle & Seidl 2015). However, KKC distinguishes epistemic objects from the totality of objects in people’s lives; epistemic objects are involved in intimate relations such that knowledge about them is revealed over time, for example the chemical compound that the scientist is studying in order to learn its function or properties, or the organism that the scientist is studying to learn its behaviour. KKC builds on the notion of “epistemic things” defined by Rheinberger (1992a) and develops it further based on her studies of scientific knowledge production in laboratories (Knorr-Cetina 1981, 1996, 1997, 2001a). KKC identifies two key features of the unfolding character of epistemic objects in her writings:

- \* lack of completeness of being (never quite themselves, continually mutating into something else, structures of absences), and
- \* non-identity with itself (being contingent on further research).

On first inspection, epistemic objects and objectual relations seem relevant to the foresight field in at least four ways. First, the two key features of epistemic (knowledge) objects are suggestive of knowledge of the future. For instance, broadly speaking knowledge of the future is incomplete, in the process of becoming the known present, and there is always another tomorrow to know. Second, KKC (2001a, 2010) points out that the production metaphor is a successful conceptual guide in research of laboratory and scientific work, and is also reflected in the conception of the constructivist



approach. Rheinberger (1992a, p. 2) defines an experimental system “as a future-generating machine”. The terms ‘generating’, ‘production’ and ‘construction’ all seem fitting FS metaphors when thinking about actions in the present that have consequences for the future and hence could be said to be producing the future. Indeed, as the review of the FS field shows, various futurists find a constructivist approach resonant with FS; for example, see Fuller and Loogma (2009). Third, concerning relations of care or wanting to objects of foresight or the future, surely many people feel, at least for one moment in their lives, desire or care for something they do not yet have. Fourth, there is little doubt that the object idiom is relevant to FS because of the many situations in which participants described not only human but also non-human actors that mediated participants’ engagement with the future by having effects that changed their knowledge of themselves or the world.

For example, for Riley, the navy boat and its redirection is one of many reminders about how his planned activities have been disrupted by unexpected events such as wars. This insight is an important element of his own approach to the future.

Riley:<sup>11</sup> I was all signed up to go but it got cancelled because the boat got (.) um (.) commissioned for the navy ... to go down to the Falklands ... so again (.) you know (.) there’s a/ another kind of *thread* of um/I guess/of political questioning and awareness around (.) the rights and wrongs of that and colonial past and (..) questioning kind of those sorts of things (.) um // *but also* the/I guess (.) you know/having this *plan* ((clap hands)) that I was going to do this/then there’s this kind of random *thing* that no one would have/*no* one really had *anticipated* or expected/that kind of just throws all that

For Carly bottles of insulin, crowds and guns wrapped in bundles of clothes are instrumental objects which she uses to present the meaning of the uncertainty of the future. This is one of the many reminders she has about the uncertainty of the future. This uncertainty is an important element in her own approach to the future.

Carly: And I also lost my aunt during that period ... she had diabetes and she was using the insulin and she ran out ... and the unfortunate part for her was/the Wednesday she was going to town to buy a new bottle / that was the Wednesday morning they came ... we saw a *huge* crowd of people ... with bundles/the people wrapped their guns in/in clothes ... and at that time we just heard the first gunshot and everything went ((‘blast’)) ... so we didn’t know what was gonna happen/we didn’t know how long that was gonna last ... and this is the thing about foresight / you know/ ’cause you know/you *never* know what’s going to happen in the future/you planned that this and this and this is gonna happen/and then what’s really gonna happen/I mean/it’s far far far from what you prefer or far far far from what you plan

To change Carly’s and her aunt’s plans suddenly, without warning and traumatically, Carly brings life-threatening objects into the event that prevent her aunt from obtaining life-sustaining bottles of medicine. The crowds with guns just appeared one morning and prevented her aunt from leaving the house to buy the bottles of insulin she needed. With that event, Carly must wrench her aunt’s presence and involvement from the rest of her life, an aunt she loves, and only bundles of guns, huge crowds and shots of fire and bombs blasting would be sufficient to do this. The day

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<sup>11</sup> The conventions used with extracts are listed in the thesis frontmatter in ‘Key to interview extracts’.

before, the future she knew was incomplete, it did not contain this event. On that fateful morning, the event became the present moment and suddenly she has other tomorrows to know. The guns in their presence, and the insulin bottles in their absence, are the instruments of the ‘future-generating machine’: with them she can destroy existing plans and generate new plans, and do this very quickly. It is an event that has strongly informed her understanding of the uncertainty of the future.

However, even though the conceptualisations of scientific enquiry in laboratory work capture the sense of scientists working with the indeterminacy of the future, the conceptualisations themselves have taken on board various boundaries that affect the extent to which they can represent or not represent characteristics of capacities to engage with the future. A few are covered here. KKC’s (1997) and Rheinberger’s (1992b) key object features are based on their studies of the scientific research process. Scholars of scientific work have argued for a constructivist interpretation of scientific enquiry as purposeful and directed activity demarcated by a particular context. KKC’s argument, for example, characterises a delimited context (for her research) as one “in which indeterminacy (or contextual contingency and openness of selection) does not run counter to the idea of scientific success” (Knorr-Cetina 1981, p. 12). However, while she assumes an undifferentiated social context for the laboratory as bounding the area of her study, she places the source of purposive activity with the individual (p. 16). As mentioned in the methodology chapter of this thesis, Mol (2010) and Law (1992) point out the questions raised about what the researcher means by the individual.

Furthermore, for KKC (1981) the scientific research process is conceived of as an activity where it is necessary to create a representation of scientific objects to find out what is not yet known. For Rheinberger (1992b) the research process reveals the scientific object. KKC (2001a) argues that the unfolding character of the object matches a structure of wanting and desire on the part of the subject (the researcher, research group or institution). KKC (2010) explains that these features and characteristics are highlighted when a production or manufacturing process metaphor is applied to scientific knowledge processes. However, as Rheinberger (1992a, p. 309) emphasises, “knowledge that we do not yet have” is not just produced in any manner; rather, “an entire *system of experiments and controls* is needed” (italics original) to establish proof. The identification of ‘an entire system and controls’ in spite of an undifferentiated context for studying scientific enquiry alerts us to other relationships simultaneous in the scientific research process. Perhaps these are not as important to include in scientific enquiry conceptions, but I suggest they are important in characterisations of capacities to engage with the future.

The alert concerns at least one other objectual relation which can be identified in the laboratory literature. Laboratory scientists also establish relationships with at least one other object in the research process. KKC builds on the notion of epistemic objects on Rheinberger’s (1992a) conceptualisation of “epistemic things”. Rheinberger (1992a) describes the ‘epistemic thing’ as the phenomenon at the centre of an experimental system. Rheinberger (1992b, p. 391) explains that the scientific object is realised by unfolding the epistemic thing into different experimental systems. The

experimental system is thus, according to his explanation, a representation of things that cannot be grasped, a model “of what is going on ‘*out there in nature*’” (p. 391, italics added). However, Rheinberger (1992b, p. 392) finds nature as such has to be excluded from the experiment and may even be a threat or danger. Excluding nature is achieved through the stability of the technological object. Rheinberger (1992a, p. 311) identifies the technological object as the arrangements by which to refer to the epistemic thing. Technological objects are, for their purpose and within the conditions they are being used, “sufficiently stabilized scientific objects”. He explains that a technological object is “used under the proper boundary conditions [as] an answering machine” (p. 312). It is ‘an answering machine’ because it is constructed to answer a specific question when operated under the relevant boundary conditions within which the scientific object can fluctuate and oscillate; together, the technical object and the scientific object, the experimental system, functions as “a future-generating machine” (p. 312). Further, without the identity conditions granted by the technological objects, the “particular piece of nature under inquiry does not exhibit the characteristics of a scientific object” (p. 312). KKC (1996, 1997, p. 10) argues that the distinction between epistemic things and technological objects is problematic and unnecessary (on the basis that technological objects are themselves continually unfolded). However, the distinction made by Rheinberger offers a useful starting point for adding to the one unfolding object-centred relation a second objectual relation of engagement with the future as identified in my data.

## 5.2 Two objectual relations of engaging with the future

Throughout this section, I draw on the data to characterise two objectual relations of engaging with the future. I relate the first objectual relation to the unfolding epistemic (scientific) object characterisation of KKC and Rheinberger. For this unfolding objectual relation, I first present a selection of examples of similarities between KKC’s and Rheinberger’s characterisations and this research data, and then I present examples of where this research data adds to the epistemic objectual relation conceptualisation. I characterise the second, and new, objectual relation as ‘co-creating’. I suggest these two objectual relations can be thought of as two modes of engagement with the future.

### 5.2.1 Engaging with the future as unfolding

KKC’s and Rheinberger’s (1992a, 1992b) characterisations of unfolding epistemic objects in scientists’ work resonate with characteristics found in my data. Numerous characteristics of an unfolding relation can be identified in KKC’s and Rheinberger’s writings. For example, Rheinberger (1992b, p. 391) describes experiments as the setting up of conditions that offer sufficient resistance to possibilities, as sufficiently stable embodiments of concepts to be able to “realise what one does not yet know”. Rheinberger (1992a, p. 312) describes how the scientist has to accommodate themselves to the system’s conditions because the technological object restricts and stabilises the epistemic thing, it functions as “an answering machine”. The epistemic thing, on the other hand, according to Rheinberger (1992a, p. 312), is a “question-generating machine”.

Furthermore, Rheinberger likens the experimental system to a labyrinth that is forcing and constraining the researcher into particular directions in the experimenting process because the existing walls limit how the construction proceeds. However, he continues, the researcher does not know exactly where this will lead and hence cannot plan for what will ultimately be produced. In addition, Rheinberger (1992a, p. 309) cites François Jacob as describing the experimental system as “a machine for making the future” because it produces answers and shapes the questions that are going to be answered; the experiment defines the thing that is not known prior to the start of the experiment. KKC (2001a, 2010) describes the production metaphor of knowledge that fits the wanting and desire of the scientist.

These and other characteristics are very similar to this project’s data. For example, the setting up of structured and structuring experimental systems has similarities with the planning mentioned by participants. Most participants at some time in their lives thought of the future as something that can be structured or controlled (often identified as a planning or controlling activity or feeling). Instruments and planning are similar in that, just like a researcher who sets up a resistant experimental system that forces, constrains and directs, so a participant sets up a situation that forces, constrains and directs; both attempt to set up an ‘answering machine’ yet do not know exactly what they will get. In many examples, the planning also involves a material component expressly as part of the planning.

For example, Diego has planned from an early age.

Diego: I think the planning was always there/I’m consciously/I planned all the way/like this case when I told you that (.) um/I was there for a year in England and I saw this opportunity of only being for three months/some kind of thinking / which is some kind of planning / was like [describing the planning]/and I did that/I don’t know how consciously but I know I did it/that thinking and planning/the whole idea of presenting this other option and make it valid/okay

I interpret Diego’s example of planning at the age of 13 as setting up resistances to force the direction of his future school attendance, to “make it valid”. In addition to reasoning with his parents, his planning also involves his place at his school and a tutor.

Julii describes an element of control during primary school.

Julii: That element of/you kind of have control over some aspects of it/and you know you can create your own future essentially in lots of ways/or at least influence it greatly // so um/just trying // yeah/it’s sort of the (...) the people aspect of it/to try and get (.) um/people to think that they actually do have some type of control/and um/decision-making they can do to help/to help themselves and to help others/or help/yeah

Thus control is evident in Julii’s determination to help her mother with the housework. She has to convince the other family members to contribute to different housework tasks, and to do this she draws up a cooking and chores roster. A computer and printer help her in her efforts to influence family members to get a better outcome for her mother.

The data also displays examples which resonate with objectual relations characterised by desire while displacing something unknown (it could be, for instance, the unknown dangers and

surprising events of the world, business or family) by an ordering system that generates the future.

For example, Tyler describes such an ordering system.

Tyler: Speaking of career/about how I see this/um (.) contributing to my future career/um ((tch)) so it *definitely* does/it's/it's helped me to/um (.) direct me where I want to go/'cause again/I suppose in retrospect/again I had reached a point in my career where I'm [job title]/like I started out [describes career progress]/so I've sort of climbed the tree up to a [role]/and then there's/that's kind of one of these roles where you're at the top/in a way/of a certain tree/and you can go many different ways // um/now I have clarity on which sort of direction I want to go // *and* as it turns out the opportunity has just recently/um (.) been put forward // so I've applied for/um (.) a [another] position // so I'll be reporting directly to the CEO // in a way looking at the entire organisation's portfolio/so *DEFINITE* synergies with the course and looking/*thinking* big/not just thinking about/this is a project/how do I get that across the line/it's thinking about *all* projects/where does the organisation want to go/where should it invest its money/yeah/and thinking industry trends and that sort of stuff/very excited .hh

The ordering system Tyler describes is related to his career. He has climbed to the top of one of the trees in his profession, from where he has clarity on the direction he would like to go from all the many different ways he could go. His climb up the tree has been directed by the tree itself (the tree functions as an ordering system) and for his future career the FS master course has helped structure the direction he would like to go. By applying for a new position he is displacing the unknowns of 'surviving' (e.g., the "very bad experience" of not having a job anymore) with an ordering system (the organisation has positions and job descriptions that provide prototype instructions on what to do) but to which he will have to accommodate himself (or risk losing his position and inviting the uncertainty of being out of work). In the new position, he will be producing knowledge using the structuring of the portfolio concept. However, he does not yet see exactly what knowledge will be produced, nor the direction it might lead him and the business. By defining the unknown knowledge through the portfolio concept and the organisational system structure, the organisational system functions as an answering machine by constraining the direction which can be taken (out of an unknown number of possible answers) yet constraining the knowledge that Tyler will have to produce. Moreover, whatever knowledge he does produce, about the organisation's portfolio, will act as a question generator about where the organisation could or does not want to go.

### 5.2.2 Extensions of unfolding objectual relations

Participants describe various situations and give reasons that show greater complexities in their ways of engaging with the future. It may be that they adapt their approaches to engaging with the future or take into consideration additional effects which they have not realised in other situations.

For example:

Cloey: So I think that ability to/not only/not just the ability to reflect/but to reflect upon a *number* of circumstances ... So it's not just / you know / one thing builds on another / it's/and I think (.) part of that is / you know / increasing complexity and understanding that complexity ... the idea of: it is complex/you're/there's never going to be one single path and I think you have to/it's almost as if you can select and discard options [describes options]/you actually make these decisions as you get older / whereas I suppose when you're

much younger the options are all there for you/regardless of whether you feel you have talent skill or ability in any of it .hh

Advancing in age means that Cloey is starting to adopt a different perspective on and approach to her future. As a 20-year-old artist the future was not something she needed to worry about, since to become famous as an artist, “you’ve got a long lead time” and in the future she would “get around to it one day”. Getting older means that Cloey is focusing on defining her future more precisely and being conscious of shaping her own future. However, as she explains, the reflection she is doing on her life is different and a more complex activity to when she was 20. Her reflections at 20 were like constructing a single path, whereas at a more mature age she is more flexible with her options.

Diego too mentions different perspectives.

Diego: At least you have the opportunity to learn from the people that that are *close* to you in life and everyone is gonna bring some *different* perspective and you’re gonna have a *different* vision *AFTER* you (.) uh (.) see how someone else sees life ((taps on table)) so that makes (.) uh (.) I think it takes us a lot again to all the experience that I talk to you about / living in a country that is very poor and the the things that *worry* people there are completely *different* to what *we* think of are real problems/so that’s *DEFINITELY* a very *different* perspective/probably I *tend* to do that more consciously now/so yes again it’s it’s all about learning but learning from people / not just from my actions that you do if you look backwards/and all the interactions with all those people ... if I have the (.) um (.) experience of putting all this learning in practice probably my vision of the foresight field is gonna be different because the experience is gonna change it/is probably gonna frame it better or put it in/the perspective is gonna change / I guess/one thing is *learning* and it is very important but then you go and put it in practice and your vision changes/probably it’s gonna change all the time

Diego has a very different perspective because of his experiences. It is about how he understands engaging with the future and hence how he now consciously engages with the future. He realises that your perspective changes as well when you put a vision into practice. To put it another way, he has learnt from experience that he changes perspective through his experience.

The notion of shifting perspectives in contrast to maintaining a single perspective, and in particular most participants’ often-repeated reference to taking wider, alternative perspectives or looking for the bigger picture, evokes a sense of heightened tendency to moving attention to the horizons, of movement to looking further, more broadly, more inclusively, or of shifting to another view. This section has described how engagement with the future resembles in some respects the characteristics described by the epistemic objects conceptualisation. The section has presented an increase in complexity in the objectual relations that add to the characterisations of unfolding epistemic objects. The next section focuses on an objectual relation that presents characteristics unlike an unfolding objectual relation.

### 5.2.3 Engaging with the future as co-creating

In this section I identify and characterise a new objectual relation in the participant data. It is a relation unlike any identified in the laboratory studies. There might be a hint of it in Rheinberger’s (1992b, p.

392) finding that nature as such is a threat and danger to the experiment and has to be excluded, but the character of the relation in the participants' data is very different and thus is at odds with Rheinberger's description.

Frida's gesturing with her arms and head, her instruction for how I am to move my arms, begins the identification and characterisation of this relation.

Frida: Yeah I'm just trying to/I'm just trying to think of the way that I explain it // it's like (...) if you draw a straight line (.) you know (.) from your head to your hand (.) and that line goes from your head to your hand (.) you can see what you want to do and you do it/that's kind of a smart goal (.) type of feeling

Barbara: Okay

Frida: Whereas what I found in going through that construct-aware transition was about/you/like almost like a *protractor*/an *opening* that out to the *full* 180 degrees of possibility/I suppose/so instead of just being that one-dimen/you know/that two-dimensional line you've got/ no / that one-dimensional line // you've got that *WHOLE* other dimension that opens up

Barbara: Okay/is it between/is the protractor going between my finger and my head/as well?

Frida: Yes/if you put your arms out like an alligator/and then you lift up your top arm until it comes way over your head/it's that difference

Barbara: I see

Frida: So the planning person has their hand in front of you/you can see where you want to GO:/and that's the way you're aiming for // and how I feel now/I've got that realm of possibility which includes the stuff behind me now/you know it's not *just* that stuff in front/it's the *whole* experience

Frida was very good at making "smart goals" when she was younger. That type of "planning to act" is "not the type of planning that appeals" to her anymore. The type of action she is "excited about at the moment" is very different. In her protractor and alligator instructions, she describes how to conceive of the difference between the two types of action (and by implication her engagement with the future). I interpret her gesturing as that the one-dimensional line represents a single future direction aimed at a single endpoint that is constraining and limiting. She is indicating that her transition has made her aware that she has a relation to so much more in this open space around her than a one-dimensional line straight in front of her indicates. I interpret that she is identifying at least two differences. The first is that between a directed relation aimed at something 'known' (represented by her hand) and something for which there is no reference (there is no hand, only open direction). The second difference is between desiring to produce knowledge and facts (something that can already be talked about but which needs more investigation) and not knowledge per se or something to be known but experience.

Interpretation of participants' descriptions has identified an alternative objectual relation, another mode of engaging with the future that is different to an unfolding relation. Every participant

refers, in one way or another, to an objectual relation that is related to the future but is representative of something beyond their control, beyond their knowing. Such an objectual relation is not one about which the unfolding can be known, but from which surprising events can come. To lesser or greater extents, other events or actors may jolt participants into realising a different theory of time altogether that gives expression to this different relation. They may demonstrate the relation in the particular concerns they express, and what they do and say they do in the interview. This alternative relation is often matched by a willingness to embrace alternative modes of knowing in relation to the future, instead of wishing to reveal it with more knowledge. Some participants describe affects associated with this relation that are distinctly different from the care and desire affects that are associated with an unfolding objectual relation.

### Realisation of a different objectual relation

At the age of 20, Cloey recognises a relation with a future that is “out there somewhere in the future/and I’ll get to it/I’ll get around to it one day”.

Carly describes, based on her experiences in challenging and unexpected situations, that change is something that “can happen at any time” and “it can be really catastrophic”. The relation that she has with God is what helps her to deal with these unknowns. She may plan for what she wants for her daughter, but “it’s what God says that is final”. She does not know what that is, and must strive and push to do her best.

Carly: What would have happened to my parents?/what would have happened to my family?/you know? so/I just thank God that / you know / he had guided me/you know / to attain/to reach a certain/you know / position and be able to do something for my family because / you know / change is/and this I think with a course like this/this is what (.) um (.) um (.) foresight is trying to talk about/’cause you *never* know what is going to happen in the future/*right?*

Tyler describes that because of the FS master course he now cannot help assessing events in the world against what he has learnt in the course. He is “not blissfully ignorant anymore” and appreciates the world “so much more”. However, he is also “less happy really / in a way”. In saying this, he identifies a relationship with the world *out there* that is increasingly making him unhappy.

Tyler: Well not to the point of being depressed but .hh um // you know/I was always *really* happy with the world // I was in/in terms of (.) um/this was my space and it was very insular (.) um/having now expanded to that understanding of there is so much more out there ... fifteen to twenty years ago I *TRUSTED* in the world out *there right?*/the law was the law/and governments they were the omnipotent system out there/and everything was right/um (.) yeah/to now being exposed to the flaws of humanity/and to be able to sort of *genuinely* say that as well/’I’m exposed to the flaws of humanity’ and/and understand (.) um/how we are not getting it quite right/it’s not right

### Realising a different theory of time

For some participants, jolting experiences have been significant enough that they counter and resist attempts to structure events, experiences or even language in, what for them, are limiting ways. For some of the participants, the idea of the future or time is transformed from something linearly



sequential and single valued to something more complex.

Some participants' approaches to the future include distinct ways of reasoning in relation to time, implicitly or explicitly, although there are differences in their concerns. This is not to argue against the epistemic object conception. Time and the future are, however, for participants a significant enough issue that they change or attempt to change the conversation to suit their concerns. Some participants' experiences sensitise them to not only knowing about an object and its history and future, but also knowing of the different ways in which it could 'unfold'. Unlike the speculations of artists that show a formal sequence, internally coherent although occurring sporadically, unpredictably, and irregularly, (as described by George Kubler (cited by Rheinberger 1992a footnote, p. 323), these participants do not speculate on the future according to a formal sequence. They recognise in more complex ways the effects of time on how they engage with the future, whether that is to speculate or to plan or whatever.

For example, Cloey continues with her description of her different approach.

Cloey: I was saying that but you can make irrational choices *rationally* because you can say/it's perfectly ridiculous that I am going to go off and and / you know / live in a caravan and just drive around/live off welfare or something // you know/why would you throw away a good job or something? // *but* you can actually rationalise that away and say 'I want to do this because I've worked hard for the last thirty years and/you know/I actually do want/I'm choosing now to drop out'/so .hh you can actually be rational and make seemingly totally irrational choices

Cloey's different approach is due to her maturity. She feels that she is making harder and more rational choices for her future. However, to be rational can mean to be irrational.

Frida also adopts a different approach to time.

Frida: Yeah / so I mean the only way I can really describe it is (...) this is / you know / this is tricky/when you/when we .hh // we did a 'storytelling for change' course last year/and the first session of that course was to map out your life's journey (.) I found it *incredibly* difficult and eventually the only way you could really make sense of it was to map it out using [a sine wave structure]/because that helped me kind of identify where my thinking (.) was around certain things

Frida has found that she can no longer tell a linear story of her life. The structure she adopts involves many curves, including sine waves, spirals and U curves, and it significantly influences her approach to and engagement with the future.

Riley recognises the structure assumed in the interview. On more than one occasion, he said something very like the following:

Riley: Yeah/so so so so .hh that was very *lo:ng* roundabout way of (.) um (.) I guess what I'm saying is/it's really/to go back to your question/around *DRAWING LINES*/I think / you know / I can *draw* lines and I can make those patterns/from my standpoint now around (..) looking at (..) life/I don't know/I guess this/this is something I've/I've had for a *WHILE* // that sometimes the *REALLY REALLY* trivial decisions make/have a *huge* impact that you can't foresee

Riley is objecting to my way of asking questions that seems to him to imply that earlier events lead to or cause later events. He characterises what he perceives as assumptions about the links

between events as “drawing lines”. At least part of the interview is about Riley demonstrating to me my flawed assumptions about a linear past-driven theory of events; for example, that earlier events could be thought to lead to later events. He identifies one of the flaws, a narrative fallacy, that he believes the structure of the life course interview is imposing on his life experiences. He feels so strongly about convincing me on this issue that after the interview he sends me a reference to a chapter in a book by Taleb (2007) on this same topic. Riley is not the only participant who recognises, attempts to draw my attention to and adopts different, or very different, meanings of time or the future.

Robert, for instance, also recognises implicit time structures.

Robert: Well okay / I'll attempt to // part of the difference is sort of like the difference between expectation and anticipation (.) for example/so here we might expect things to happen/or we might expect this mix of alternative futures to be available about which we make a decision or a choice/but that is a totally different feeling to anticipation/because expectation has a focus from the / let's say / just say from now to the future we expect that these are some things here/anticipation includes that but also has the reverse happening as well/truly where the future does inform us now/so ... you are curious about that future but the future is also curious about me/so this future up here / it's / like / it's calling me into being to do whatever is required to begin to/you know/engage in an act to meet this potential appear/okay?

Robert recognises the implicit ways in which time, or temporality, structures and influences how he understands his experiences and life. He is very attuned to and can draw attention to different shades or gradients of things that time brings to a situation. For instance, he recognises different ‘directions’ of time in the ideas of expectation and anticipation: he says he has a two-way relationship with a future which he expresses in different ways, such as when he anticipates a future, the future also anticipates him. Robert also describes four trajectories in his life, each with a future that remains with him, always there, ready to be taken up again.

In contrast, a specific theory of time is assumed by the laboratory researchers for the laboratory scientists. KKC (1981) describes scientists as “indexical reasoners”. She explains that “indexicality” is a notion that derives from ethnomethodology, it is part of the approach that ethnomethodologists take to researching sites such as laboratories. For ethnomethodologists, explains ten Have (2004), indexicality is an early core notion used by Garfinkel to indicate that the meaning of utterances is specific to the time, space and tacit rules of the situation actions or to a situation that they apply; in principle, all utterances or situational actions are indexical. KKC (1981) points out that ethnomethodologists study the meaning that things have for people on the assumption that meaning keeps on “unfolding” with the practical activities taking place. Ethnomethodologists adopt the practices of indexicality to be able to reach closure in their research analyses on these unfolding meanings. Thus, temporal order, not necessarily recorded against the time measurements displayed a clock, is an important and ongoing practical concern for ethnomethodologists like Crabtree, Rouncefield and Tolmie (2011), who study work.

For KKC (1981) the significance is that through the methodological practice of indexicality,

time and space are brought back into science; that is, the researcher interprets time and spatial issues as effects produced in scientists' work. For example, an experiment is conducted with another instrument that is readily available because ordering the instrument specified in the instructions would take too long, but this timing issue is not recorded by the scientist whereas it is noted by the researcher. Therefore, indexicality allows KKC (1981, p. 59) to, for instance, characterise scientists as "tinkerers" and "opportunistic" researchers because of the ordering she notices in their activities. However, one of the five rules of interpretive procedure that the researcher is required to follow, in her role as interpreter of scientists' work, states that because scientists use a rule of standard time, she too needs to interpret their actions according to standard time. Therefore, indexicality allows her to note the issue of time ordering, the assumption being that time is characterised as scientific time. Consequently, the assumptions of standard time (e.g., linear order of events and causality) are pre-assumed in the descriptions of 'unfolding' of the epistemic object as observed in the scientists' activities.

This seems to be confirmed by Rheinberger, who notes that his use of coherence of an experimental system resembles George Kubler's "formal sequence" in that coherence refers to a linked progression of experiments (1992a footnote, p. 323). Furthermore, this means KKC, Rheinberger and other researchers using these interpretive rules are restricted from characterising scientists' activities or reasoning activities as anything other than the meaning of standard time.

### Embracing alternative modes of knowing

Some participants show a greater willingness to embrace alternative modes of knowing, being and acting ('doing') in relation to the future, instead of wishing to reveal it with more factual knowledge.

For example:

Ayumi: Sensing what is emerging/um (.) and (.) um (.) primarily sensing what is emerging and (.) um (.) just reinforcing (.) um (.) that I am someone who is/holds that energy for what's emerging in the world and giving it a safe place to reside / you know / actually in my body / you know/I would have to say (.) um (.) I'm a / I'm a vessel for that (.) um/you know it's kinda frustrating in a way because there's so much about do do do/but you know .hh I just / I'm just not one of those kind of people .hh and and (.) um (.) I mean / not that I don't go there intellectually and emotionally and and all that but (.) um (.) I'm just not somebody / I'm better at holding things / holding energy / holding what's going/consciousness and that type of thing

Ayumi accepts that her niche in the world, when it comes to the future, is not an intellectual and emotional one. Rather, she gives the future a safe place to reside, in her body, because "it may not have gained enough strength or enough (.) um (.) momentum or enough (.) um (.) there may may not be enough of it to tip over to mainstream".

Robert also talks of a different way of knowing.

Robert: It was just a matter of *time* for me to actually *START* that/and and that was just like this *confluence* of/you know/the serendipity of life and how events just *arise* in some weird/some strange way/where all the conditions to enable that just fell into place/you know / I *MET* the people that I needed to meet/you know / the conversations that I needed to have just *happened*/you know/the *yes* for this/the *yes* for that/the how does this/here's the

answer/they just fell into place / they just enabled this to happen/with just the sense of/you know/was a magical/you know/experience actually how it all just fell into place

Robert describes this way of knowing and experiencing as “magical”. It’s a way of knowing where “events just arise in some weird/some strange way” and “where all the conditions to enable that just fell into place”. He talks of “the serendipity of life” and how he can be creative inside all of that within which he is seeking to bring a whole range of futures to life.

Riley demonstrates yet another way of knowing.

Riley: But it’s the *ones* where you’ve kind of wandered across *that* kind of thing that then you can *put* yourself in a position to be (...) in a *serendipitous space* // you know/so maybe it’s/you know/wandering with a *little bit* more purpose .hh at that point/but you’re still kind of/you know // I mean / you still *sat* under a big tree (..) hoping that other people come down the road to talk to you // you know/but you’ve chosen / you know/you’ve chosen an apple tree because people like apples ... and then you kind of go a *BIT* closer and then stuff may or may not happen // and then you wander on

Riley illustrates with an account of a wanderer and an apple tree a type of knowing about the future that makes a place for serendipity. I get the sense that what he describes is a situation that is about neither knowing nor not knowing.

### **Embodying alternative affective objectual relations**

Some participants describe, implicitly and explicitly, affective relations that are distinctly different from relations of desire or care.

For instance, Ayumi talks of a shift.

Ayumi: It’s trusting that the universe is going to bring you what you need (.) um (.) that (.) um (.) I don’t have to expend all this energy trying to control everything but but but it’s at a different level

The shift Ayumi describes is from a controlling and planning approach to the future to one where she is “just waiting to see what happens and just respond in the moment as much as [she] can”. In the situations where she is much more controlling, such as in trying to ensure her son’s safety, she is in a “much more fearful place”. However, she comes full circle with her teenage self and is willing to step out into the unknown. A totally surprising and *AWESOME* invitation to join a project came to her decades after she had planted the seed; it seems to her the best things that happen are those she did not plan or control for. She thinks it mystical and magical to see what comes to her, and the texture of the relationship she describes is one of “trust” and a mixture of surprise and happiness. She provides different reasons for why she has this trust; for example, she has more faith and trust that other people can take care of themselves, and she does not know the best paths for them anyway. This may also have something to do with her greater experience and knowledge (compared to her younger self), which means she is able to hold a bigger picture of the possibilities.

Carly also talks about placing trust and faith in God.

Carly: So the thing is (.) I always have to put my trust in him / I always have to pray that the good things that I plan for myself come to pass // Believe in him and having faith that things are gonna work out for you the way that you want them

Neither Ayumi's nor Carly's trust is about being a passive receiver: Carly still realises she has to plan and strive for where she wants to be, while Ayumi feels she still has to work at improving this relationship.

Frida provides a different example:

Frida: But the/I'm thinking of sine waves/you know / the distance between the peaks and the troughs is much shorter now/they're not lasting as long // you know / I'm getting to a stage where I can/I'm not there yet/but I can see a stage where I could hold those things/where / you know / where those waves kind of collapse in into each other and you're holding both of those things at the same time // I'm not there yet // but the emptiness is more productive emptiness now // does that make sense?/rather than depressing emptiness

Frida describes the texture of an affective relationship as potentially no longer motivated even by brute emotions like care or desire. Her sense of this relationship quality deepens each time she goes up or down the sine waves and the various other curves of her life. The terms she uses for this relation are "emptiness" and "fullness".

### Co-creating features

Some participants describe features of the objectual relation that I characterise as co-creating.

For example:

Frida: And there was no *solution* to these conversations // we didn't get to the end of those conversations and say 'right / okay now / we know this/this is the definition of a futurist/this is the definition of a foresight practitioner/this is what future studies is versus futurology', we didn't *come* to any of those/there was no *answer* at the end of that except for what we had done/what we developed through the/through the discussion/so the discussion itself was the answer

Frida describes her experience of conversations held in classes during her FS master course that demonstrate what these two features mean in this situation. The difference is in being part of a conversation that is held open for long enough but for which no solution or answer is or can be reached. The discussion itself is the answer. I interpret from this that the conversation is co-created (the persons in the room at the time determined the content of the discussion) and co-expressed (it is about each person's particular participation, including each person's particular not-participation – which could be a withholding from the conversation). Frida also talks of the kind of work that excites her as work where she has less control over outcomes, with much more ambiguity and uncertainty. She is not describing a situation where she and others are passively co-constructing.

Riley makes a similar point, in a different situation.

Riley: (...) but some of the (..) *BEST* moments are the ones that are *random* and *unexpected* and *not* what you thought // and it's the mix of *serendipity* / of *putting* yourself in those *positions* but also just *chance* of who, what and where/and whether those things happen // but stuff *WILL* happen // and *NOT* knowing what is something to look forward to

Riley is emphasising that you must deliberately put yourself in those situations; indeed, he clarifies that you of course need to have found out first that you like apple trees in order to place yourself under the apple tree. 'Serendipity' and terms with similar meaning are mentioned by nearly

half the participants in reference to how to hold yourself or how to wait on serendipity in a way that is productive and is not merely perceived as an act of rationally determined but unknown chance. It requires that you put yourself in the position, that you realise that multiple futures are happening and you are working to make them happen, that you do not need answers, but yet you have to make decisions now because life goes on, that you only make the decisions you have to make now while leaving the rest undecided and open, and that this is not necessarily direct action. In other words, in short being a partner in creating means you must act now and must try to integrate everything you know about the future as you decide to act now. But at the same time, being a partner in expressing the wonder of the world, you realise there are many things that you do not know and must allow to happen while trusting it is right knowing something may or may not happen, now or whenever.

Frida presents another example of the deliberateness of the co-creating relation which reinforces the idea that this relation is not about a passive, blank, merely empty receptacle sort of one-way relation.

Frida: Well the action is *taken* in the present moment/so the / you know / the/we don't lock ourselves in // we have more degrees of freedom // so the *actions* we take are more open

Barbara: I see/so thinking

Frida: And I think partly that's a result of the futures thinking/partly that's also a result of my husband .hh you know / he likes to do things on/on a *debt-free* basis

Barbara: On a/sorry / on a what-free basis?

Frida: *DEBT-free*/so part of that is financial debt/but part of that is just sort of keeping even with the world/sort of debt-free / you know what I mean? ... I guess we both share that desire to be self-*reliant* and to be *independent* and to be able to look after ourselves/we both share a/you know / a value around / sort of/I dunno/*equity/fairness*/you know / that/it's not/it's just that we don't expect a *reciprocation* I suppose // but *NOR* do we want to get into a position where somebody *HAD* to reciprocate in a/you know/in a very *BIG* kind of way .hh I don't know if that makes sense/I'm just thinking my sister makes all sorts of/she is much more *GENEROUS* I suppose and open in spirit in terms of relationship/I think my partner and I are more *reserved*/more / yeah / just more independent

The actions she takes, with her partner, are open and debt-free. They take actions in the present but leave future possibilities open. Not merely open, but debt-free. This is the way she holds herself towards what still has to happen, allowing for anything unknown to happen, yet demonstrating, very much like Riley, that it requires effort to act in the moment in that way. To decide what is debt-free action, is not merely passive knee-jerk reaction to events in the world, needs careful consideration and yes, it is action that needs to be taken now. This is an engagement with the future that is very different from aiming to produce knowledge or a notion such as "living forward" as described by KKC (2010, p. 180) for financial information analysts.

### 5.3 Differences in complexity between participants of each relation

This section presents patterns of differences in complexity of the two relations corresponding to

participants' progress through their FS master's courses. Participants supplied information about their progress in a short survey attached to their consent forms. Based on analysis of the data and this information, the participants are grouped into three groups (summarised in Table 5.1). The first group shows the two participants who, at the time of the interviews, had attended either none or only their first classes in the first unit of their course. The second group shows the three participants who, at the time of their interviews, had completed at least one unit in their courses and were partway through or nearly finished. The third group shows the four participants who had already graduated from their courses at the time of the interviews. No particular order is implied in the order of the names or the order of transcription extracts used. Since the data contains the participants' discussions of their life courses, it means the data of more progressed students includes coverage of their experiences during their FS courses.

Table 5.1 *Summary of participants' progress in their futures studies master courses*

<b>Progress in MFS course</b>	<b>Participant name</b>
Starting	Diego, Carly
Partly to nearly completed	Cloey, Julii, Tyler
Graduated	Frida, Riley, Robert, Ayumi

General patterns that relate to participants' progress in their FS courses are as follows. All participants express to some degree the notion of a 'co-creating' objectual relation. The degree to which this relation forms the basis of each participant's approach to the future is greatest for the graduated participants. The complexity of the descriptions of this relation is also greatest for the graduated participants. The graduated participants are more likely than the other participants to make clear the extent to which they no longer realise an orthodox version of time. The partly or nearly completed participants are more likely to have more complex notions of engagement with the future than the starting participants. All participants' data shows an increase in complexity of their engaging with the future with increasing age and experience, which often they attribute directly to maturity and experience.

### 5.3.1 Complexity of unfolding objectual relation

All participants, to greater or lesser extents, acknowledge that at a younger age they practised a rational, orthodox approach to engaging with the future. Some admit that as a younger person they were even very good at this. Their descriptions about how that engagement worked at different ages show a typical pattern. At the youngest age, the future was an undifferentiated whole that was almost not thought about or was easily managed and controlled (e.g., by being on time). Until, for most participants, there happened one or more very challenging events that deviated from the norm or raised questions about who they were and where they belonged, which caused them to add further

controls to try to improve things or keep things safe. The reasoning was typically that if you have enough information, then you get the bigger picture and you have greater control. Experiences such as taking out a loan that goes over many years extend your future, while other experiences expand your world or your realisation about your relative position in life compared to others. As age advances, so generally the amount of reflection and the complexity of being able to ‘look forward’, or look past the next thing, or consider a wider range of options, or to shift from looking backward are all activities that add to the complexity of what it means to engage with the future through an unfolding relation.

As with the shift in importance granted to the co-creating relation, there is a difference in the relative importance of the unfolding relation for the graduates compared to the other participants, and a lesser difference for the participants at intermediate stages in their courses. Graduate participants express less interest in or are less motivated by activities that are planning-based or that involve detailing future activities or options.

### 5.3.2 Complexity of co-creating objectual relation

Most participants, prior to their FS master courses, report that they referred to a co-creating objectual relation in a number of different ways, but generally it was assigned a lower priority. For example, some describe the relation as an interest that had been there all along and see it as a thread continuing throughout their lives which they have only at a later age allowed more importance. Experience in the failure of a rational approach to engaging with the future (e.g., unwelcome outcomes of planned events or wonderful unplanned events) has contributed to the transition. For a few participants, there is someone close to them who is already engaging with the future according to such a relation and has become an example to follow and learn from through experience.

Brown (1991) offers a way of noticing complexity. He argues that objects are perceived in a process that derives parts from antecedent wholes and that complexity increases to fill the duration of the existence of the entity. Participants earlier in their progress through their FS master courses express this relation in (as yet underived) wholes (i.e., with few or no details of any derived parts); for example, as needing to trust, to have faith in greater powers than yourself, that you cannot know what will happen in the future, to just ensure you strive to reach your highest potential and to seek more information so you can plan more accurately, identify and weigh up risks, and cover more contingencies. Often a sense of fear is expressed with this, or a dread of the catastrophes that may happen, which motivates the need to perform.

Discussions of time and the future often raise paradoxical issues (for example, see Adam & Groves 2007; Bussey 2014; Bussey, Inayatullah & Miljević 2008; Hutton 1977; Karlsen, Øverland & Karlsen 2010; Polak 1973; van Asselt et al. 2012). The graduated participants describe or demonstrate their co-creating relation in fine detail. Yet they also manage to convey a sense of subtle reasoning around these paradoxical issues. They weave together the need to act now because life goes on while still keeping open what can be kept open, to intending to position yourself in the action while realising



there is no certainty about what will happen, to realising there are consequences to your actions while realising you cannot think of everything, to folding and unfolding with the future yet refrain from needing answers and remaining in a state of wonder and awe of the future, which is in wonder and awe of you, to giving up all your frames so as to be able to conceive of novel futures yet still needing to develop from some frame, and so on. And they hold the ambiguity and uncertainty that such a set of difficulties creates while being comfortable with these as joys of life, that they experience greater degrees of freedom, feel they can be more creative, are less concerned about or fearful of the future, and recognise that the best things happen under these conditions.

#### 5.4 Achieving greater intensity of becoming

My analyses of epistemic object relations in connection with engaging with the future in my participant data and the laboratory study literature show that: a) futurists demonstrate an unfolding relation that I liken to laboratory scientists' unfolding and wanting epistemic object relation, but with characteristics that go beyond the scientists' unfolding relation; and b) futurists demonstrate a co-creating relation unlike anything identified in the laboratory scientists' literature. Projects that aim to compare scientists and futurists may produce other results. However, the aim of this research is not to compare but to identify and characterise aspects of futurists' engagement with the future in connection with dealing with situations of complexity, uncertainty and change; for that purpose, the analyses of the laboratory study literature are useful.

The discussions in this chapter show the importance of the additional, and new, object relations and the extensions to the relations. Key characteristics of the two relations are summarised in Table 5.2. It shows futurists have an expanded range of ways for achieving creativity to deal with the novelty, surprise, uncertainty and ambiguity in complex situations. That the co-creating relation takes on greater importance in how participants conduct their lives and interactions with other people speaks to greater creativity in dealing with the future. Their preference changes from only unfolding knowledge of the future by looking for that creativity strictly allowed for by controlled conditions to additionally welcoming and looking out for surprising and emerging conditions in the world. Both relations speak to awareness of the moral choices involved in stabilising emerging entities and also to more of the involvement of the whole in engaging with the future. However, the co-creating relation calls on greater awareness of the moral dimension of creativity.

Table 5.2 *Summary of key characteristics of the two relations*

<b>Unfolding relation</b>	<b>Co-creating relation</b>
Set up structured or controlled conditions for creative emergence	Open to all experience for creative emergence
Directed at something 'known'	Realisation of the 'unknown'
Constraints and resistances	Embracing alternative modes of

	knowing and doing
Ordering system, single perspective	Awareness of and choosing alternative ordering systems
Wanting relation	Alternative affective relations
	Co-creating, lack of control, welcoming uncertainty and surprise
Repeat with similarity	Repeat with similarity or difference
	Realisation of moral / ethical choice
<b>Extensions</b>	
Flexibility, adaptability, multiple paths	
Realising shifting or multiple perspectives	

The two relations are both important for creativity, but the co-creating relation is particularly important for a more holistic approach to creativity. Two important characteristics of the unfolding and co-creating relations identified are about the emerging of entities and their stabilisation. These characteristics are different for the two relations (see Table 5.2). The unfolding relation involves entities emerging under narrowly controlled conditions from which the creative event is confined or forced to emerge, situations where the uncertainty and complexity have been controlled and reduced to conditions that are known and fixed but allow sufficiently narrow opportunity for something to emerge. Once the entity has emerged, the aim is to repeat it with similarity, that is, to stabilise the entity. The co-creating relation involves recognising creativity in the world without necessarily having any control or impending knowledge of its emergence or expecting that it could be noticed according to one particular, rational, way of knowing (see for example, Goonatilake 1998 and Markley 2012). Once it has emerged, the aim is to repeat it with similarity or difference; that is, there is a choice involved in whether to stabilise the entity or not, to co-express the entity or not; and this raises moral and ethical concerns. Therefore, creativity achieved via the unfolding relation is not the same as creativity achieved by the co-creating relation. Therefore, employing the two relations together establish a more holistic approach for engaging with the future.

Schmidgen (2013, p. 11) cites Péguy (1961, p. 126) in connection with a creative process in one of Claude Monet's paintings of water lilies; Péguy concludes that it is not the thirty-fifth lily that Monet painted that is the best, but the first one, "because he was able to do it least well". Painting the first lily was a unique event and thus the best. By 'best' he might mean, for instance, the most creative one or the one that took the most work to achieve. The other lilies are repetitions of the best event since they can remember the first event, and thus they are not as creative or have not taken as

much work. The point is, for the first lily to emerge is a much more emergent event, from inexistence to lily, than for the other lilies. In describing what it is to construct something, Latour (2005, p. 89) describes visiting a construction site to get insight into “what it is for a thing to emerge out of inexistence by adding to any existing entity its time dimension”. By adding its time dimension, he is referring to the repetition of the ‘first’ event of the entity; that is, for something to exist it must not only appear in the first event out of inexistence, but the entity event must repeatedly be constructed or it would cease to exist.

With the unfolding relation in the laboratory literature, Schmidgen and Custance (2014, pp. 49–51), citing Latour and Woolgar (1986) and Bruno Latour (1990), explain how what emerges from a scientific experiment (e.g., the TRF substance) exists between being made up and being something new. They cite Latour (1990) as explaining that what emerges in the laboratory is “something new ... *not* manmade”, yet constructed by humans and “never escape from their manmade settings” (Latour 1990, p. 64, italics original). Combining this with the creative lily event, they mean that the ‘first’ event, the one that comes out of inexistence, whatever it is that makes the needle of the apparatus register a deviation or a difference, the one that is beyond the scientists, all their apparatus and controls, is the best event, the creative event, and their construction of the scientific fact builds on that event to stabilise the scientific entity. The scientific entity, the ‘real’ TRF substance, is stabilised by repeating the creative event and the constructing work of the expanding network of statements and actors. That is, within the narrow range of conditions that the experiments control, a creative event does indeed occur, and the scientists demonstrate the capacity to hold and construct a scientific object from that creative event by repeating the experiment to achieve similarity (e.g., through needing to prove the validity of the result).

But in contrast to the laboratory, the world is not a set of human-controlled experiments. The co-creating relation is needed to notice and register all the other signals of creativity in the world, all the creative events not controlled by laboratories, including laboratory events. The difference with the unfolding relation identified for futurists is that to notice and recognise from the world of events the creative events requires a way of remaining open to anything yet expecting something, while not having any preconceived idea of where or when it happen or what it is, yet needing all they have to be able to recognise it. Like the scientists, the futurists too must construct from that creative event the expanding networks to stabilise the entity, but in contrast to the scientists they do not have a diagram or reference with narrow sets of guidelines telling them what entity to construct. Rather, futurists have all the objects of the world to help them with the construction towards a stabilised entity. In terms of creativity, if the unfolding relation has a creative dimension, then the co-creating relation has a much wider creative dimension and requires a greater capacity to hold the creativity. The repetition in the construction and stabilisation of the entities, the ‘holding’ of the entities, draws attention to the moral dimensions of situations and the differences between the two relations.

If the ‘first’ event is the best, the most creative, then the first repetition is the most morally involved one. If the first event, the creative event, is beyond humans, then the repetition and

stabilisation of the event by humans involve a choice. The unique first event remains true to itself each time it emerges from inexistence, but the constructions build on the creative event and are not flawless – they may indeed be ‘untrue’ to the creative event – and nor is the particular entity being constructed necessarily ‘desired’. This means there is a moral dimension to repeating and stabilising what is emerging, the signals indicating the creative event is interpreted, and thus choices are involved. With the unfolding relation, the range of possible interpretations is narrowly specified; the scientist repeats the whole event although the moral choices they make are beyond themselves: the moral choices have already been made. With the co-creating relation, there is no already-available interpretation of the emerging world entity and the futurist has to integrate all that they already know, while simultaneously realising they do not know everything. The futurist thus has to choose what to construct from the singular event; there is no aim already available for what the next step in the construction process should be, nor for each step after that, and the whole must be interrogated anew for the choices to be made. Therefore, I conclude that the co-creating relation involves the ‘whole’ more consciously, and requires greater awareness of the moral choices involved, greater capacity to hold the choices and the creativity, than the unfolding relation.

The two relations are both important for the capacity to deal with ambiguity and surprise, but the co-creating relation is particularly important in situations of complexity, uncertainty and change. The unfolding relation is characterised as exercising control to achieve a particular goal or aim; for example, to set up the conditions that control the emergence of a new entity and to control the stabilisation of the new entity. In contrast, futurists who demonstrate the co-creating relation make specific mention of how surprising the creative events of the world are; these events are not occurring under controlled conditions and there is no known aim or goal to use to recognise the creative events as having happened or, when this is recognised, how to continue to construct from that. That is where the variety of objects come in to help futurists look for emerging entities. Following KKC’s closet metaphor, the unfolding relation can rely on everything in the files in the drawers to orientate and give structure to constructions. However, the co-creating relation is directed at what is in the spaces between the files and drawers, including the unknown outside the closet. With aims and goals there is something to measure progress against; without aims and goals measurement is not possible, so what emerges is unpredictable and anything could happen. The co-creating relation is characterised as an active state of being ready with everything you have, ready for a surprising and novel event to emerge, without knowing what to expect and having no goals, aims or targets. When the surprising does emerge, it requires being ready to respond in the moment, it calls on being ready with everything you have, including moral reasoning resources; the response may be to be in wonder and awe of what emerged. Thus I conclude the co-creating relation extends the capacity to deal with ambiguity and surprise in ways that the unfolding relation does not require.

In summary, the analyses in this chapter show that the two relations of unfolding the future and co-creating the future are not simply antipodes or opposing polarities, but both relations are elaborated in more complex ways over a person’s lifetime and progress through the FS courses

corresponds to the complexity of the development of the two relations. This chapter shows how a second relation of co-creating takes on greater importance in how participants conduct their lives and interactions with other people, giving them two complementary ways of responding under different situations. While they retain their ability to control for specified conditions, they include that as one option in a wider sense of being actively attentive to, seeking out, yet being patient in waiting for any kind of surprising condition to emerge, including having a wider sense of ways for responding to what happens. Analyses show that there are corresponding patterns between participants' progress through their FS courses and the extent to which they display the two relations: the more progress, the more the co-creating relation is developed.

The next chapter identifies a new process, not previously identified, that suits this different mode of relating to the future. It is evident from the different features of the co-creating relation, for example, being less happy about the world and their repertoire of ways to engage with the future, that participants are very likely to contribute to an increased intensity of becoming of the situation they are in.

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## Chapter 6

### A new process of engaging with the future

The previous chapter has drawn attention to two objectual relations contributing to participants' capacities to engage with the future; one relation is characterised as the unfolding and revealing of the future as an epistemological object, and the other as a co-creating relation with the unknown that is emerging. This chapter presents and describes two processes identified in the data. First, a reflection process involves assigning and translating events and objects between marks on a time framework, and taking perspectives on events and objects in order to project future events and objects. Second, a process of turning to the conditions involves attending to and transforming the activity that is producing the future. I argue that it is with the addition of the second process and extended variations on both processes that participants display a fuller or more complete capacity to engage with the future. Using literature bearing on Latour and Woolgar's (1986) laboratory study as a reference point, this chapter explores two processes associated with time in my data.

The first section critically dissects Latour and Woolgar's (1986) laboratory study and, from a review and analysis, identifies time-related processes according to three themes. It is more than an introduction to set the scene. Rather, the aim is to really make the distinction between the processes of the scientists and those of the researchers in connection with time. Descriptions on the same topic that span the range of researchers are not often found, and even less for processes related to time. The details are also very important for the identification of the participant processes. Drawing on the data, the second section introduces and characterises two processes associated with time. Participants' reflection and turning processes are similar to and add to the themes identified in the laboratory literature. Some of the differences and similarities are highlighted throughout the chapter. The last section discusses the contribution of the two processes to dealing with situations of complexity, uncertainty and change.

#### **6.1 Processes of engagement with the future in the laboratory study**

Futurists' engagement with the future involves working with heterogeneous objects and constructing futures while tending to collapse the distinction between action and theory (see the FS review chapter). The literature bearing on STS laboratory studies shows that the construction of facts and objects in laboratories and the study of that work also involve processes linked to time, even though the study is concerned with scientists' work with scientific objects and facts. For example, Latour and Woolgar (1986, p. 238) refer to a materialisation process to emphasise the importance of the time dimension in the stabilisation of statements about scientific objects. Thus, the following introduction concentrates on three themes related to time in the literature relevant to the laboratory study. The focus is not on the scientific work in the laboratory, nor on the study by Latour and Woolgar as an investigation into laboratory scientific work. A review of the laboratory literature makes it evident

that discussions of time are different for particular researchers or researcher groups.

Three themes of time are identified in a review of the laboratory study literature. These themes correspond to researchers' different ways of realising time, of paying attention to processes of action, change and time, and recognising time, depending on who or what is being studied. For instance, the processes of time that laboratory scientists use in describing their work as reported by Latour and Woolgar (1986) are not the same as the ones that Schmidgen and Custance (2014) discuss in relation to Latour as the empirical philosopher. This is perhaps not surprising given Law and Urry's (2004) strong claim about methods. Law and Urry (2004, p. 397) argue that differences between findings from methods in different research traditions are not the same as different perspectives on a single reality, but "become instead the enactment of different *realities*" (italics original) although not necessarily disconnected realities. Specifically, Law and Urry's (2004, p. 397) point is that there is a shift from epistemology, where what you know depends on your perspective, to ontology, where what you know is being made differently. However, the notion of different realities does not necessarily help with identifying what may be different about making those realities and in particular being able to characterise the differences in processes related to time.

Furthermore, Schmidgen and Custance (2014, pp. 44, 46), note that Latour and Woolgar (1986) assume that scientific activity cannot be adequately described using logic and mathematics or, as it turns out, by classical exegesis either. Therefore, processes associated with time are distinguished for the laboratory scientists (first theme), for Latour and Woolgar's study of the laboratory scientists (second theme) and for Latour as an empirical philosopher (third theme). The three themes are covered in relevant sections in the remainder of the chapter.

### **6.1.1 First theme: Time as the organising and structuring frame for events**

Latour conducted two years' fieldwork at the Salk Institute for Biological Studies in the mid-1970s. He personally and closely followed the day-to-day science activities and processes in the laboratory. Latour collaborated with an English sociologist, Steve Woolgar, to write up the account of this scientific work in *Laboratory Life* (LL). Unless otherwise indicated, page numbers in the first and second theme sections refer to LL (Latour & Woolgar 1986). LL describes a variety of situations where the scientists present their work as being ordered according to the standard Gregorian time framework and clock time. Scientists in this laboratory have two main objectives: to purify natural substances and to manufacture analogues of known substances (p. 70). When the scientists discuss their scientific activities with scientifically informed visitors, they describe their efforts as attempting "to isolate, characterize, synthesise and understand the modes of action of releasing factors" (p. 55).

When the scientists talk about their field, they present in broad outlines the early years of the field (it was formed between the 1940s and 50s), how the field developed over the years (the two fields of the nervous system and endocrinology came together) and what the veterans believed and accomplished (the veterans of the field offered explanations that are hailed as breakthroughs). When the scientists relate these breakthroughs, they assign dates to the particular events. For example, they

say: “In 1969 we discovered the structure of the thyrotropin releasing factor” (p. 56). LL notes that the further in the past or the future, the more distant the events. LL also notes the importance of the historical events and papers produced in relation to the scientists’ work.

The scientists maintain how important it is for their work to know who did what when and how. In fact, the scientists keep track of the range and scope of papers published by the laboratory. The list records the papers according to date. LL presents graphs that plot against time the numbers of papers dealing with different substances and numbers of papers for the laboratory and for the main lines of enquiry. For example, one graph shows that the proportion of releasing-factor publications in neuroendocrinology rose from 17 per cent in 1968 to 38 per cent in 1975. LL describes the scientists’ work as following a process of discovery over time that the scientists write up in the literature.

The written document is a crucial resource in the discovery and communication of findings about a substance and its structure (p. 50). Particular significance is attached to the document and certain papers are acknowledged as major achievements. The first important step in discovery is to be able to duplicate as close as possible the facts reported by earlier studies. Deductions are made from earlier studies and then hypotheses are verified with experiments. The scientists’ objective with their papers is for their discoveries to be verified by their community. The papers present their aims and discovery paths and form a cumulative record of their findings and discoveries. The discovery path is also reflected in the significance given to the dates of papers, and a discovery is not complete until it is written up. Writing up and publication mean it has been communicated. Publication also means the discovery is dated, which is necessary to establish the order of discovery, confirming who did what when and how. Compared to the significance of the written documents, the transformation activities performed in the laboratory are insignificant. It is, rather, the discoveries that are important for their careers.

The scientists make decisions about their careers by evaluating work opportunities and possible future investments. Time is in short supply in the laboratory (p. 229) so they have to be strategic. The correct order for doing things, the setting of priorities, are linked to publication dates (p. 112). There are constant tension and pressure about getting new results, gaining credibility from that and then reinvesting it in further programs and work. That is why there is effort directed to getting manuscripts written up in time, to getting supplies and animals ordered quickly and to having the routine assay work done well. In relation to what motivates them to do their work, the scientists frequently refer to “investment, rewarding studies and exciting opportunities” (p. 191). They hope to be involved in important breakthroughs and discoveries, although just doing good work also receives credit; credit in terms of a successful career involves both credit as reward and awards, and credit as credibility (p. 198). The scientists accumulate credit by having their names on published papers and also by purifying substances and producing rare fractions and samples. Dates marking the events of a scientist’s accumulating credit are a very important element in the curriculum vitae, the “balance sheet of all his or her investments to date” (p. 208). Those about to move on often mention their



concern for the fate of substances they are responsible for producing (p. 71). In short, the scientists are under pressure to do new experiments, to move to new positions and to generate new studies to extend their balance sheets.

There is also a time order to how scientists progress the activities in their programs. For instance, one program about isolating new natural substances involves cycling samples between purification and assaying stages until a substance has been isolated, and then in the final stage the configuration of the amino acids is specified. Another program sets out to evaluate the function of substances whose structure has already been determined. The descriptions provided in LL of the scientists' focus on their discoveries while assigning less significance to the activity that produces the discoveries resonates with Torbert's (2000, p. 257) description of the empirical positivist approach, which is "well designed to digest single-loop feedback" enquiry that disregards action or perception and the specific situations that particular people face in order to generate certainty of a real outside world. There is nothing in LL that suggests the scientists discuss, examine or are intrigued by their own use of the standard time framework or display any unusual (other than 'standard') practices associated with time; this may be different in other laboratories where the scientific object is related to topics such as relativity.

Given that LL studies the scientists' activities, this suggests a different span of enquiry focus and hence also the noticing of different processes associated with time, such as an inversion in time.

### **6.1.2 Second theme: An inversion in time**

Latour and Woolgar's (1986, pp. 27–29) interest in the workings of scientific activity stems partly from their dissatisfaction with social scientists' portrayal of science as a world apart by taking science products for granted, staying silent on the substance of scientific activity and providing little self-appraisal on the conditions and methods of the production of scientific findings. They assume therefore the need to depart from earlier work with "a particularly irreverent approach to the analysis of science" which they call "an anthropology of science" (p. 29). Specifically, they confine their own ordered account to the TRF(H) substance based on information and observations Latour amassed over the two-year period of the in situ study. LL adopts four different methodological approaches in the analyses to create distance from the scientists' activities and disputes so as to discern patterns emerging from the observations. In their analysis Latour and Woolgar want to discover how debates are resolved without getting involved in the debates themselves (p. 179). Although they do not state an aim of describing processes associated with time in the laboratory, their descriptions of the time inversion are in terms of events in time and space. This is important because it shows that the inversion they describe is not a theoretical construct for the practical activities of constructing scientific facts and scientific objects. Like KKC, they mention the problem of indexicality in science and cite Barnes and Law (1976), who argue that scientists' expressions cannot escape indexicality (Latour and Woolgar 1986, p. 184). They have a sense of something more in the work of the scientists when they are producing facts, even though the scientists consider those things irrelevant.

Nonetheless, Latour and Woolgar argue that the practising scientists are involved in producing ordered and plausible accounts of a particular scientific fact out of a multitude of interpretations of disordered observations.

As Latour and Woolgar (1986, p. 240) see it, much of their laboratory investigation is devoted “to specifying and describing the very moment at which [a kind of] inversion occurs”. It is an inversion process linked to time, in that out of the stabilisation of tradition in the present a new event is generated that approaches from the future, and experience is gradually inverted to a fact and transmitted. In other words, the works that are passed on in the form of printed materials are read and interpreted in the present, and new experiments are constructed with the interpreted information. The experiments produce a signal that is interpreted as a possible new substance, and thus the event that will prove the new substance is one that approaches from the future. Finally, as the experiments begin to record the facts of the new substance, theoretical statements about the substance are constructed and refined, the statements are written up in printed works and the works are passed on.

Latour and Woolgar identify five areas in which a moment of inversion is evident. First, anyone who is involved in the construction of scientific facts is convinced these facts are not constructed. However, contrary to the logical and theoretical accounts by the scientists, LL describes the slow, practical work (microprocesses) with inscriptions and accounts that transform statements into objects, or facts into figments or artifacts. Second, those involved are satisfied that they have not been persuaded of the facts. Yet LL observes scientists’ activity “so [rhetorically] skillful, indeed, that they manage to convince others not that they are being convinced but that they are simply following a consistent line of [logical] interpretation of available evidence [of reality]” (p. 70). Third, participants are convinced that their thinking processes are not affected by material considerations. Yet LL illustrates the important impact of materialisation; it describes how, over time, the use of statements in noncontroversial ways in neighbouring disciplines impacts on the statement transformation activities of the laboratory conducting the original research. Fourth, the scientists maintain that investments in their credibility are unrelated to the soundness of the science produced. Yet LL illustrates how economic and knowledge production considerations are entangled. For example, budgets have effects on the types of instruments that can be bought and that impacts on the production of statements. Finally, those involved consider circumstances entirely irrelevant to their accounts of science. However, LL does not argue that circumstances merely impact on scientific practice, it argues that “science is entirely fabricated out of circumstance” which only appears to be irrelevant because of scientists’ specific localised practices (p. 239). The connection with time is seen in LL’s description of the inversion in terms of the transformation of statements.

The inversion in time is evident in the tension between the genesis and stabilisation of a fact (e.g., a fact such as TRF is a newly discovered substance or TRF is a white powder, p. 110) and the taken-for-granted, logical fact of the existence of the “real” TRF (“TRF *really is* ...”, p. 177, italics original). TRF is an important substance in the laboratory and the scientists organise their work around a static reference which is an abstract model of how substances like TRF are involved in how

the brain controls the endocrine system. LL notices differences in the status of different facts and constructs a catalogue of five types of statements that connect what appears to be a confused mixture of unconnected papers, texts and statements into a network. Statements move through the stages of the catalogue via transformations in their status by changes in their modalities (e.g., by adding or dropping a statement about the statement that casts doubt on the statement, such as “I don’t believe ...”, p. 81). LL describes the inversion in time as what happens over the whole process of statements.

During the genesis and stabilisation phase of a statement, the who, what and how facts are important and the status of the object may be “subject to some dispute” or a “hotly contested” issue (p. 76). Hence, the statement’s status (e.g., whether it is true or false, likely or probable) is highly uncertain. The statement becomes more stable through many small microprocesses, those daily laboratory activities including “even the smallest gestures” (p. 152). In regard to the microprocesses, a two-fold process of transformation occurs. First, local and rapidly changing circumstances quickly erode the small steps of the microprocesses, which means that, retrospectively, practices and statements appear to be unrelated; thus, the analogical path is replaced by a logical connection. Second, complex local circumstances that make the flashes of intuition and weak links between statements possible are replaced by highly condensed summaries of the origins of the idea. During the process, as a statement becomes more stable it becomes “*a split entity*” (p. 176, italics original); that is, referring to the entity is understood in two ways. One entity is a set of words which is a statement *about* an object (e.g., the statement about TRF as a newly discovered substance). The other entity is a set of words corresponding to the object itself which has a life of its own (e.g., referring to what TRF really is). As stabilisation increases, statements about the object decrease, while more and more reality is attributed to the object itself. Eventually a switch takes place and the inversion is complete when the object itself becomes the reason for formulating the statement in the first place. The status of the object has thus gradually shifted to being “taken as self-evident ... a well-known, unremarkable and noncontentious fact” (p. 76). All traces of its production are now irrelevant and no longer of interest. Furthermore, the object’s past is inverted. Instead of at first being a doubtful proposition or a disputed issue, the object has now been there all along, just waiting to be discovered. Its history is turned into a single pathway leading to its inevitable discovery (p. 177).

For the scientists, the important point about their reading and writing is, “that they were writing *about* something” (p. 53, italics original), that is, about the scientific object, and hence only the successful attempt of getting to it is important. Their aim is to discover and confirm the facts about scientific objects, to draw on the facts to discover or confirm further facts and findings, and to reproduce copies of the scientific objects or substances. Their aim is achieved when they have verified these facts and communicated these findings and facts, and produced these substances (p. 75). In contrast, Latour and Woolgar have different aims with their research enquiry. The difference between the scientists’ and Latour and Woolgar’s enquiry approaches is noticeable in the processes of time that are described.

Another process related to time can be identified in studies of Latour’s philosophy,

methodology and developments in his work such as a turning of time.

### 6.1.3 Third theme: A turning of time

This theme is mainly derived from studies by Schmidgen (2013) and Schmidgen and Custance (2014) of Latour's philosophy, methodological principles and relevant developments in his work, particularly as they relate to time. Unless otherwise indicated, page numbers in this third theme section refer to Schmidgen and Custance (2014). According to Schmidgen and Custance's (2014) analysis, the question that Latour repeatedly returns to is how knowledge, time and society relate to each other. Latour wants to know how knowledge is passed on (e.g., traded or delivered). He wants to know about the differences between how experience and knowledge are passed on. And he wants to know about the effects of the passing on of the knowledge itself (p. 3). Latour's early work, according to Schmidgen and Custance (2014), focuses on the problem of exegesis in a way that includes all actors, not only human actors.

Latour recognises that the basic scientific activity in the laboratory can be examined with exegesis, but not classical exegesis, since that would focus on the mathematics and logic in the texts. Rather, he recognises the laboratory as a special case of interpretation practices, the laboratory as a whole as an institution producing scientific tradition by "continual production of oral and written exegesis, rereading and revisions, which refer to organic and machine-based laboratory events" (p. 46). For the laboratory study, Latour defines a new type of exegesis. He extends interpretation to the laboratory since he views exegesis as more than reading historical texts and involving more than pens, papers or printers. LL widens the definitions of texts and writing. Writing is widened to inscriptions that are more than letters and symbols; it is a term "to summarize all traces, spots, points, histograms, recorded numbers, spectra, peaks, and so on" (p. 45). LL widens the definition of texts to all inscription devices, to devices such as the analysers that print out assays.

Schmidgen and Custance (2014, pp. 17–18) describe a form of turning that is the focus of Latour's work. In Latour's early interest in the question of exegesis, he demonstrates how exegesis involves a question of time. Another important aspect of Latour's exegesis is the interplay of difference and repetition (p. 6). The reading and interpreting of texts involving equipment and animals connect to events in the depths of time (Schmidgen & Custance 2014, pp. 46–47). An example of turning is when a reader shifts attention from the lines of text to the effects the reading of the lines of text are having on them. When a reader reads so as to grasp the original meaning of the text, then the text becomes an event approaching the reader from the distant past. In other words, there is a shift from lines of text to an effect being experienced by the reader in the present. This is referred to as turning since the reader connects with what is being read in the present with (the activity of) a past event.

The inversion in time described in theme 2 can be described in terms of a turning in time when the practice of interpretation is in focus, although interpretation is the work of a heterogeneous network of actors. For example, to construct the scientific object involves experimentation. This

initial stage of setting up the experimental conditions involves costly and detailed work to maintain, by force, experiments that repeatedly give the same results in all details. A steady baseline or reference point needs to be established and maintained. Thus scientists re-create what has been handed down from the past into present stable laboratory conditions and are able to substantiate differences (Latour & Woolgar 1986, p. 152). Experiments are re-created under present conditions such that they reproduce the past results and substantiate the differences between the present and the past (Latour & Woolgar 1986, p. 53). Any differences that do result could be potential new hypotheses leading to new findings. The scientist reading the inscriptions might make out a difference in them, potentially to form a new hypothesis, and thus the reader is making out an event that approaches them in the present, but from the direction of the future (Latour & Woolgar 1986, p. 48). The significance of this, for this thesis, is that here we see the inextricable entanglement pointed to by Whitehead between being and becoming (mentioned in Chapter 1). One example of that is: events happen (activity in the present) and are written down (stabilised in lines of text in the present) and handed down (repeated activity in the present) to be read and interpreted (repeated activity in the present) until well understood (stabilised experience of connecting to the past event in the present).

## **6.2 Two processes of engaging with the future**

Throughout this section I draw on the data to characterise two processes of engaging with the future. I characterise the first process as reflection, as processing events ordered to space or time frameworks. I characterise the second, and new, process as turning to the conditions that prefigure the future, turning to the processes and practices that attend to the conditions, or turning to earlier processing. I also compare these descriptions with specific topics mentioned in the three themes identified for the laboratory study and other relevant literature.

### **6.2.1 Reflection as a process of engaging with the future**

The data shows that all participants reflectively process events from and to anywhere (between) on a time framework, whether those events are located in a time framework's past or the future, including reflecting from the future on a past that has not occurred yet. Three non-graduate participants showed surprise or hesitation when asked to reflect on the past of their life that has not happened yet, from a time in their future. The same question to the graduates evoked not the least surprise or hesitation but, rather, eagerness or interest. The data also shows that work is involved in making translations between events located along a time framework. The time framework is a key element to the reflection process; the time framework *is* time, unremarked and unremarkable, an external object to the participant (most often in the shape of a line with numerical indices at fixed intervals) for a process of organising (transforming, (re)assessing, translating, comparing, adding, and so on) events. Due to the richness of the data, I mainly focus the discussion in this section on extracts from two participants. Cloey's opening remarks at her first interview demonstrate the relating of events ordered by a time framework. Cloey starts her interview by noticing how "everything is relative" in thinking

about her life course. In filling in her life course chart, she has had an argument with herself because she realises that what she is “measuring [to plot on the chart] is what has come before in relation to what is actually happening now”. For instance, in thinking of previous relationships, she has measured them against her current relationship in terms of “lack”. She is aware that this relativity between her present and her past colours the way she measures her past. She goes on to briefly refer to her school and first university, where she “made *huge* numbers of mistakes and errors” but “came out of it relatively unscathed”. Then she comments on her chart preparation process.

Cloey: And it’s interesting then to reflect on what was some of the events that happened then that you simply repeated the same errors

While Cloey uses the words “reflect on” to refer to the results of her comparison and assessment of events, the reflection process referred to here is not in the content of the comparisons she makes. She does not just talk about it, she demonstrates it in what she does (see later in this section). By her demonstrating reflecting in the interview, her retelling and comparing of the events recurs in the actual now and happens over the remnants of prior nows, to paraphrase Brown (1991, p. 143). This means Cloey simultaneously revives content from past events (events that are related according to the time framework) and compares the contents of those past events in the actual now.

For example:

Cloey: Well it was interesting plotting things like relationships because/you know/you could actually say that/I was very aware that I was measuring previous long-term relationships against current relationships/So you’re looking at that in terms of *lack* of things/because it was a previous relationship .hh so that’s going to happen/um/as opposed to what is happening now and then maturity comes into this a lot/so age and experience/um/ and again that’s coloured it ... and I would suggest that in terms of .hh being able to choose the appropriate partner was probably I think one I didn’t learn ... again my new partner/who’s now my current husband [is supportive of her doing things] ... whereas with my first partner it was more/I think I got to the stage where I was looking after *him*/so there was resentment there ... /So that was an issue and why I also was desperately avoiding someone else/I suppose/ you know / did I not trust myself to assess what this new person was like

Cloey compares her past and present relationships by reviving the past relationships and relating them to each other and the present relationship. She also marks out relationships on the chart, thereby situating them together on a page at her different ages. Bringing these relationships together from different places in a time framework is not without effort. Cloey has to argue with herself about how she is doing the relating and what might be affecting it in the present: she asks herself difficult questions about trust and she has to repeatedly indicate their relative positions on the time framework with words such as ‘current’, ‘previous’ and ‘first’. Comparing relationships which are not ordered by a time framework would not have involved the kind of argument she is having with herself about their relative ordering to the time framework.

Comparing Cloey’s description to Latour and Woolgar’s descriptions, the reflection process is similar to what the scientists do at the establishment of a laboratory or to duplicate earlier reported facts; they need to relate and compare events reported in earlier studies from different times together in the present.

Diego demonstrates the transformational work involved in reflectively processing a future event at a past position on a time framework. He does not know why he has few memories until age 10. However, he was living a good life and hence “everything was very beautiful and happy because we don’t really look that much happen in the future/like day by day issues with/and that’s it”. But then at age 11 the family split up, which “was not such a good moment” and “weren’t supposed to happen” and was “something very *different* from/from what the usual life in an eleven-year-old kid”. I get the sense that, with that incident, Diego’s future (at that age a little future) is created and simultaneously altered in a big way.

Diego: So how was gonna be my life from there I didn’t know/who am I going to play with?/and I/and I kind of/I think I tend to think a little bit about .hh what’s gonna happen in the future of my life?/at that *age* you/I don’t think you have the idea in the *long* run/but still it’s a big change/so who I’m gonna live with?/where am I gonna live with? uh // am I gonna live with my brother or not? uh // how am I gonna ’xplain this (.) uh/situation to [my] friends

In relation to this creation event of his future self, Diego demonstrates a form of inversion, a translation from his future to his past self that is another characteristic of the reflection process. For Diego to create a future requires the work of a “not such a good moment” and the negative responses of a whole culture towards such moments. At age 11 he was suddenly “*different*” with something that was going to “be like a stamp ((sound like fist into palm)) on my face/or something/and that’s gonna draw my future because *THAT* happen to *you*”. This difference stayed with him until the age of 13 or 14, before he could transform his new future self to “normal”, “common” and “not such a *bad* thing” and put the bad moment behind him, that is, at age 11 on the time framework. However, for him to realise the transformation of his future self from “different” to “normal” and to translate the differences to his past self, he had to attend for a whole year a school in another country with a “*totally* different/food/culture/way of learning/sports” and had to “realise *there*/in that moment” the differences in views of such events. Only then could he “put that [bad moment] behind a little bit”. He concludes, reflecting on that event in the interview:

Diego: Yeah / it’s / it’s around here / thirteen to fourteen / that’s the year I was there and probably what I was trying to tell here that moving *away* was/uh/ kind of/uh/ ideal in terms of taking perspective and seeing that there was / there is something else after/after that

He means that by going away at age 13–14 he could “see something else after” the bad event. The something he could see was himself without a stamp on his face, that is, he splits ‘himself’ into two persons, one who has a stamp and another without a stamp. The ‘himself’ with the stamp and the bad experience is left behind at age 11, while the other without the stamp continues with his life as the ‘real’ himself.

This reflection process by Diego is very like the splitting-of-objects process by the laboratory scientists identified as the inversion in time (theme 2). Like the scientists who invert statements into facts by splitting an object into the fact of the object and the real object, so with reflection: the person (here and now) does not move, but splits off what is to be left behind, connected to an age, while the

relation to time is inverted. As Diego demonstrates, it takes much microprocessing, two to three years of processing, to do this splitting. Similar to Latour and Woolgar's analyses of statement transformations, in the interview it takes Diego a number of statements and their transformations (the description of the whole event) to do the inversion so that he can continue with himself without a stamp on his face at age 13. Similar to what Latour and Woolgar show for the scientists, for Diego this certainly involves more than merely language. Unlike the laboratory scientists, for whom only the fact is relevant and remembered, the details of the event, because it is such a traumatic and exceptional event in determining who he (himself) is before the event, at age 13 and after are important for Diego. Therefore, he remembers enough of the inverting work and it is a process he learns to repeat and improve in increasingly complicated ways for other events. For instance, it becomes part of the way he does his planning. Therefore, the reflection process characterised from the data is similar to the laboratory study processes, but also goes beyond the laboratory studies. This additional work of reflecting on a situation and being aware of doing so, and of improving on the quality of doing so, contributes to how futurists' work increases the intensity of becoming of a situation.

### 6.2.2 Extensions of the reflection process

Throughout the previous section I have characterised a reflection process and commented on its similarity to the laboratory processes. However, in the data are example characteristics of the reflection process that are not represented by the laboratory version. Reflection is not limited to comparing the present with the past.

For example, Cloey speculates about future reflection, for which she invents a word.

Cloey: So sometimes I sort of/you know/|/there is that reflective piece of/you know/a bit of self-analysis // so why /why did I do that? .hh 'what am I likely to do next?' // and if it's something that I'm *not* sure is to my benefit/how do I actually stop myself from doing it? .hh // but then/that's the reflective/it's sort of reflective and inflective ((questioning tone)) // I'm trying to think of a future term/so reflective is looking back/I don't want reflexive [...] I think inflective ((questioning tone)) .hh

Cloey even makes up a new word, "inflective", in trying to express reflection that is looking forward. Nor is reflection restricted to looking only one step ahead, or as far as one can see to the horizon. Cloey mentions on a number of occasions that she "just wants to know what happens next". She means she wants to know what comes behind the horizon, after what is currently thought of as the future. One of her examples is about leaving for "new" and less "messy" situations, carrying that through, which means you "have these breakthroughs" since you finish in a "*better*" situation and "then you can actually *start* to see/the / you know/there's an end to this and it will be done". She attributes this to experience, to "the double-loop action research", and so "you have a much broader perspective". It means she can see "ahead" and "take advantage of situations". She means that just because there is a particular future in sight currently does not mean that is the end, as she has experience that gives her "confidence" to look beyond the particular horizon because there will be



something, a skill perhaps, that she will gain in this particular stretch to the horizon, that she can take advantage of when reaching the horizon, and thus can plan for beyond the horizon.

Diego provides another example of the reflection process that is different to the scientists' time processes. With his conclusion (about there being something else after), Diego demonstrates a characteristic of the reflection process demonstrated by all participants in one way or another and to lesser or greater intensities and extents. Participants often perform an activity (with some variation) concerned with the future over the course of the interview. For example, they may repeatedly develop a bigger picture or a different perspective, or move, unfold or translate along arcs, cycles and trajectories. This characteristic is generalised as repetition of phases where each phase is different in one or more respects to the previous, often something like bigger, more open or more inclusive. In order to be different, an inversion or translation of some form occurs. The forms of inversions or translations are many and varied in complexity. Some examples are: the poverty of an engineer is translated to "the bigger picture" (Riley) of the participant, the beauty of a collection of paintings alongside queues of people unable to buy food "opens eyes" (Riley), changing life conditions and business failures are "transcended and included" (Robert) for a participant's greater intensities of purpose, focus, energy, wonder or curiosity, "unpicking that hesitation" to take action "was kind of the turning point" giving her "greater insight" into herself (Frida), being in the arts meant she was expected to be aware of the "wider world" although "looking back with *hindsight* [she] was as superficial as anyone else [although at the time] was quite sincere .hh" (Cloey), or taking a career break to test herself in a different industry overseas shifted her to "being more open in what was happening with [her] and what was in [her] head" (Juli). Participants talk of the difference either as being noticed after the translation (often as being received) or as the reason for the translation.

Continuing with Diego's conclusion about a change in perspective and seeing something else he did not see before, once he settles on the type of work he wants to be involved in and what he wants to study, he talks about getting or growing a bigger picture of his future, later in life the stability of an income from work that gives him security, lets him pay off a loan for a motorcycle in less than three years and thus extends his future. Then, an investment in a house a few years later extends his future even further than three years because he has to "COMMIT" to a 30 or 40-year loan. He means that the terms of the loans, from 3 to 30 and 40, stretches his future out in ever larger stages.

Specifically:

Diego: The good thing about working is you learn in a real life specially when you're twenty-one or twenty-three, you get independent financially/which is great/gets you a *much* bigger future for you 'cause [for him to get his] first long-term/not really long-term/but three year long it took to buy a motorcycle/so I think I was in/I was thinking I had some stability in the long run in terms of incomes and/because I'm very secure in terms of money

However, after four years at that job and with a much longer future, Diego feels constrained by the "fixed barriers" of his organisations' "small department" and also because of what he "*WANTED*" his career to be, he has the idea of taking a different role to "take a wider perspective".

Another job, being in charge of a department, provides the wider perspective he needs, until they turn down his request for funds for his department, funds which he was previously given. He realises that he only knows about his department, he is only looking out of his department's window, which means he cannot see the whole thing. So he realises he needs to change from that position. He needs a "bigger picture" of "what is gonna happen with the *WHOLE* business in the future", he needs to have "more answers and understanding/more how things work". On this occasion, the translation required to give him the bigger picture and more information involves tensions and conflicts at work, a move to a "POOR COUNTRY" which is "probably the most different experience in [his] life" where soon "[he] was feeling a little bit trapped" and where "opportunities opening up in the future were getting smaller and smaller". Two comparisons can be made to the laboratory study themes.

First, the expansion of Diego's "big picture" (the growing number of perspectives he can take on a growing number of areas) is in a way similar to the expansion in the journal articles plotted on the laboratory references list. For a particular event, Diego can develop more intricate plans than on previous occasions and thus makes a greater contribution to the intensity of becoming. This he describes by the difference in how he made plans to move to a different country for him and his family compared to his planning to attend school in another country at age 8. Somewhat similarly, in the library each extra paper is adding another perspective or another area to the total experience base of the laboratory and hence a meeting on a particular topic may involve discussions that previous meetings could not consider.

Second, comparing Cloey's and Diego's descriptions to Latour and Woolgar's (theme 2) descriptions, the reflection process is similar to what the scientists do at the establishment of a laboratory, relating references from different times together in the present. However, there are differences too. At least one difference, between Cloey's toiling over the relative positions of the relationships on her time framework, the work of creating a new future for Diego and the scientists' sweating over equivalences, is in the purposes and aims. In the establishment phase of the laboratory, Latour and Woolgar specify and describe the invisible work done with inscriptions, statements and texts, the work to read and transmit correctly events in different places on time frameworks, which involves stabilising an actual machine (of human and non-human entities) for producing and substantiating unchanging objects and maintaining stable conditions in the present; that is, doing repetitions to achieve similarity. From my data, this is different for the participants in that work by a wide range of actants can be brought to bear to produce and substantiate similarities as well as differences between events.

This is not the same as Bachelard's "recurrent history of science", which, according to Chamizo (2007, p. 212), is about evaluating the past according to present thought and allowing that evaluation to contribute to present thought. Cloey believes one of the reasons she reflects is to learn from experience so as to make a difference. She expresses this through an example about malfunctioning software. She asks if they are "actually learning from the process" when all a new software package does is not fix the problem but "just do exactly the same thing again/but faster".

She brings in feedback loops from systems theory to argue against “simple repetition” and to argue for breaking cycles if you want to make a difference.

Cloey: All they'll do is/it's almost they repeat the same events over and over again hoping for the different outcome/whereas other people you might say/take it as a learning experience of // well this doesn't/didn't work/maybe I need to do something different next time // ... where you're doing just exactly the same thing again/it's a closed system and there is no progression in it/so you have to think/well how do you break that continuous cycle/which can either be a progressive cycle/which is for improvement/or it's simply repetition/and that's when you have to put the interventions in/and the interventions might be / you know / you can't just actually buy new software/you have to deconstruct the whole thing and reconstruct it

Cloey demonstrates becoming aware of the need for another process to address the conditions (or rather the prefiguring conditions) that make a situation what it is. She wants to attend to the original means to change the ends, rather than undoing the ends, as she realises that the original means is just one way of producing the situation. Her suggestion to deconstruct and reconstruct is an attempt to find words to explain what this other process might need to be. However, there are few terms in (current) everyday use to give expression to what this process is or how it works (even referring to means or conditions can be misleading) and it involves different ways of using language. The turning process observed in Latour's philosophy and methodological principles (theme 3) is a way of describing the process. For instance, if Cloey considers the fragility/stability of the events those people are repeating over and over again, then that may be a starting point: a small frown on a face in a particular meeting when options are being considered or a broken cable of a computer that could not send an agreement on time may be all the 'deconstruction' needed. On the other hand, many perspectives on many situations may be needed to reconstruct the conditions to produce different events. Simply Cloey's realising the repetitions and looking for differences in how those events are produced are contributing to increasing the intensity of becoming.

However, there is another process required, a process that Cloey is attempting to explore with her new word “inflective” and with her software example. It is a process that is different to the reflection process and another key element to the main thesis about how different capacities to engage with the future can make a difference to the intensity of becoming in a situation, as will be shown. I identify and characterise this process in the next section by drawing on the data and also comparing with the turning process described in theme 3.

### **6.2.3 Turning to the conditions as a process of engaging with the future**

Some participants demonstrate that they have a way of turning to the conditions to attend to them for particular reasons. The processes are implicit in the ways the participants discuss their life courses, the events of their lives and the ways they hold the conversations in the interviews. It is often the case that this process is identified because these participants went against or tended away from (so to speak) the historical structuring of the Life Chart's time framework. Here, time is in the way things (e.g., objects, beings, words, or events) change. Here, time is often multiple (in the one thing) in that

there are many ways of describing and relating the change of one thing (including that it does not change). Time is also often multiple in that different things can change in different ways. Furthermore, time is multiple in that one thing is itself multiple. Here, time is often remarked and remarkable particularly the time in the external (standard) time framework. This means the process can turn attention to how things are related through their multiple times. I see parallels between this process of the participants and the inversion and turning-in-time processes identified in the laboratory study literature presented in this chapter. The inversion and turning-in-time processes in this section start with the interviews with Riley.

In the final interview, Riley offers his solution to the problem of the narrative fallacy (as mentioned in the previous chapter) that he has been trying to point out to me.

Riley: And the other thing is more/you know/as that I've pointed towards in the black swan stuff is/you know/I think the way you are at now is really useful/that point in time and that 'how was I *right THEN?*'/kind of thing/in some ways all the things leading up to that [further demonstrations of the narrative fallacy] or/whereas I think the point of/way of/this bit of like what was going on at that point in time/and why/what was the change and why is that interesting?/because I think then there is a/I think *THERE* you would find the difference between people who chose to go and do an MBA and people who chose to do foresight

Barbara: At that point/why was it interesting?

Riley: Yeah/what was/why did that/*THIS strange* thing appeal/compared to *THIS* thing over here that is/you know/universal and well-known/and all the rest of it // and I think that's/I think for me there's/I'd sort of say there's more/there's *more* likely to be difference *THERE*/whereas before that/I dunno/I think it's going to be difficult/I would see they're going to be probably/be problematic too really

Although he does not use words such as 'turning' or 'condition' in offering his solution, Riley is referring to something anterior in a process because he uses the word "deeper". Furthermore, he is saying that something like a reflective approach (to examine life events historically, along a time framework) is exactly what he thinks is problematic in the way I am approaching this study. He is saying I have to remain with those conditions at that now moment right "*THEN*" and "*THERE*"; by which I understand is that I am to examine the conditions that generated the choices then and there. Riley is directing me to examine the conditions (e.g., how one thing appeals and another not right there and then) that prefigure or configure the choices he makes (following the description by Brown 2008 that the then and there already contains the remnants of pasts and futures then and there).

I link Riley's explanation to elsewhere in the interview when he refers to having "*extra* layers of understanding of why you might" think, respond or behave in a particular way. He explains, in connection with those layers, that you can see the patterns, understand where the patterns come from and try to change them. He uses the word 'reflect' here but in reference to how "*you are*" and not in reference to events sequenced in a time framework. I also equate the word 'layers' with phases or networks.

Riley: I guess the impact is (...) having an understanding of how you *are* (.) whether that be

self or in groups or whatever (.) um (..) and being able to *REFLECT* on that/*SEE* those patterns and *UNDERSTAND* where they come from and all the rest of it/means that // you're not actually (.) be able to change them *FULLY*/sometimes that's too deep in our makeup // but you can/*KNOWING* (.) [gives an example of how he is in a group] *KNOWING* that I *can* make some adjustments to step towards being (.) you know (.) *different*/but I'm *not* going to be [gives an example of being entirely different in a group] .hh

On another occasion in the interview, Riley describes an engagement as being about the work required to do this particular kind of process of turning to the conditions. He contrasts it with another, dissimilar, process.

Riley: (.) and I guess/you know within *those* kind of/realms [mentions exception] um (.) comes with its own *frame* of rationale about the future that you are being taught *WITHIN* (.) you know so if you're (.) doing a business degree then you're probably being taught within a *FRAME* about the future that's about assuming a bunch of stuff // um (.) the same with (.) [mentions exception] um (.) but I think/for *this* the deliberate (..) questioning/you know/you're throwing all your ((tapping on table while talking)) *frames* of/of the future *AWAY* and then trying to *RECONSTRUCT* *other* things that are useful ((stops tapping)) to *construct* different futures around (.) um (.) so (.) that's a very *DIFFERENT* (.) *engagement* 'cause you're taking stuff/you know/you've got // *YES* you're kind of adding these/these (.) frames but also/you're actually throwing a *LOT* *away* at the same time (.) you know/you're throwing away your assumptions about (..) economic growth or / you know / *whatever* it is // you're discovering all those assumptions that you've held and those are being stripped away // then you need something else to *construct*/you know (.) *FROM*/um (.) whereas I think lots of other stuff you'd be constructing *WITHIN*

In other words, for him the going-deeper or the process of turning to the conditions is a process where he has to adjust and “break *AWAY*” from his existing frameworks and then construct *FROM* other frames. He discovers the assumptions he holds; in the words of Brown that is the seeds or the underlying form, or in Latour's words it is the alignment of actors and the nature of their actions. Then Riley has to construct from another frame; the word ‘construction’ implies doing work too, not only to construct different outputs (futures in this case) but to also change the relations in the deep conditions (e.g., the actors and the nature of their translations) so that he *can* construct different outputs.

This draws attention to an extended interpretation of his reaction to my research approach. Riley demonstrates a turning process in a way which is not a reflecting process but an in-the-moment intervention or interruption process. At the same time that he is talking about his life experiences, Riley is also focusing on the conversation and on the relations in the conversation process. He wants to change how the conversation is going, he wants to change the enquiry process itself, and he is attempting to influence the conditions that are directing the conversation so as to have a different conversation and a different enquiry. He is very clearly turning to the conversation process while he is maintaining the conversation. He does not present a prepared solution at the start of the interview. Rather, it is something that he develops during the interview as we talk. After a few attempts at repeating what he finds problematic, he announces in the middle of one of these repetitions: “I wasn't sure what I was saying until then either/but *that's* what I'm saying”. His solution is not addressed to the content of his experiences, nor is he suggesting a known method for this kind of study and neither

is he talking about a theory. Rather, he is considering the way we are talking *about* his life experiences and how he has come to attend his FS course. He is attempting to describe what he felt as the difference between a historical reflection process and a process of attending to the conditions.

He approaches his ‘intervention’ by repeating a number of imaginative counterfactual sketches of his life to clarify his point; each sketch is more or less different from the previous, they are increasingly extended with items that are clearly not from his own life experience and Riley becomes more confident of his point with each repetition. For instance, he adds events such as his ancestors landing with boats on new shores and planting flags to reinforce his point. In effect, the point he is trying to make becomes different to itself, it turns from being about his life to becoming a point to discuss in relation to how the enquiry should be done. In this way, the ancestral events are inverted and transformed into an event that approaches from the future (the aims of the study and what it needs to achieve). If perhaps Riley is exercising a new type of exegesis, somewhat like the one described by Schmidgen and Custance (2014, pp. 17–19) of Latour, by reading and writing the conversation differently, then perhaps Riley is trying to break usual habits so that the future can be rewritten. That is, he is ‘reading’ more and more correctly a difference he wants to highlight, but not only for himself, for my benefit too in my research. However, he is not staying with “reading correctly”. He proceeds to obtain an outcome of not-similarity. He is doing work to make a difference to our aims with the conversation and to the outcome of the research. In any case, Riley’s turning process is increasing the intensity of what the study could become, as is evident from this discussion.

In a somewhat different way to Riley, Frida recounts numerous occasions of shifts in herself, transitions through phases, transition conditions and changes. She refers to many challenges, a few “horror years” and good experiences when she felt more of who she is falling into place. She refers to a wide variety of objects that often are associated with specific expressions of being; the names of these objects are shorthand ways of referring to a set of conditions or states of being, such as a “U” and a “sine wave”. By mobilising these objects, she is translated and transformed from one set of conditions to another. On other occasions, she starts with a set of conditions (referred to by the shorthand name) and introduces a translation to a different condition. For example, she places herself in the “pessimism quadrant” but then hesitantly says that “optimism is creeping back in”. These conditions are linked to the things she does in her work, how she feels about the world or her work or herself, and so on. I interpret these descriptions by Frida as her way of turning to the conditions. It helps her make sense of how she is in the world and of how the world is in relation to her.

The next two extracts are short illustrations of many other more complex descriptions.

Frida: At the end of [states a year] I was really/I was really trying to find out what was going on and who I was and making sense of that meaning and purpose // you know / those questions at the bottom of the U/who am I and what is my life’s work?’

Frida: And as I further said/I think/I think most of those things [the changes she has experienced] are around certain conditions/transition times/for those levels of development // so I’m feeling like I’m in a comfortable spot now/as opposed to being in a kind of tipping point/I suppose // yeah

This framework gives her a way of concentrating on the conditions of how she is without needing to fashion a story based on herself as an entity moving along a time framework. In fact, she finds trying to fashion a story of her life in that way too difficult. Frida names at least five occasions when she has reinvented herself. This probably contributes to why, at a particular event, she “found it *incredibly* difficult” to map out her life’s journey according to a story structure. The only way she can do this is to follow a framework of sine waves (and all the actors and alignments and translations that come with it) that is not tied to time frameworks or sequences of events but to, for instance, “where [her] thinking (.) was around certain things”. She describes how she moves up and slides down the sine waves, going into different stages and spaces (different conditions on the different parts of the sine waves) while changing ‘how’ and ‘where’ she was, “where” she was “sitting”, what she was “trying to do” and so on. Furthermore, these objects, the sine waves in particular, change depending on where she is on the waves. She is realising that the “sine waves/you know, the distance between the peaks and the troughs, is much shorter now/they’re not lasting as long [and she can see a stage] where/you know/where those waves kind of collapse in into each other” and then the conditions she will have when that happens will be more productive.

The dynamics and conditions of the sine waves described by Frida are very different to the descriptions of the tree Tyler is climbing in his profession (see Chapter 5); there are “roles” at particular “points” on the tree and the tree directs where he can go and different roles allow him to be “thinking big”, to get different outcomes by “thinking ... of where the organisation want to go” but his climb up the tree is not a process of turning to examine the conditions of climbing up the tree, of enquiring into, for instance, ‘where’ or ‘how’ he is or what he is trying to do.

When Frida describes her work and the projects she is involved in, she hardly ever orders those by time but rather by what they mean for her, how her contribution in the world is changing or alternatively what she wants to do in the world, what effects she can achieve or the way she prefers working. The various objects release her from a static time framework and instead orient her according to their sets of conditions. She can move from being someone who “finds her own way and criticises what is going on”, being “an observer” and “apart” to being someone who takes “more collective action”, takes “more collaborative action” and “being able, can *LEAD* action”. In other conditions she might be more of “the *observer* on that action” or “stand on the sideline”. The objects not only give her a way of explaining why she behaves or feels in a particular way, but also give her a way of making an assessment of herself and attempting to change when she does not appear to be in the right space. The objects help her specify what she does or wants to do, why, how and so on. Of course she still refers to years and how old she was, but when she refers to her Life Chart, it is often only to remind herself of the place or what she was doing or her age. She rarely uses the chart from the other direction, namely, as the organising reference from which she is moved through life.

The next extract is one of the many examples that demonstrate how she can move to a new way of operating.

Frida: So scale and impact/I think/is one thing that has come out in that last couple of years that wasn't there before // it was important to get good results before/but now I want to be big results .hh/you know/it's moving towards that/you know/social transformation rather than specific project change

Further evidence that Frida is not simply talking about something but is undertaking a process for turning to the conditions in the sense meant here (although not in the interview and not a reflection process) comes from a number of occasions on which she experiences change. One example is the following:

Frida: Yeah (.) yeah (.) so I guess I took that/I took that experience outside the classroom/so it wasn't just a normal book that I wrote/it was actually an experiential project that was (...) you know (.) that kind of gave me/that/you know/that/that *forced* me to make that shift in myself/you know/so/*that* let the light in .hh

Frida is not restricted to using the objects with the conditions in processes with herself. She also uses the objects with groups of people. One of the objects has four quadrants, each quadrant specifying two conditions in relation to the future. By stepping into all the quadrants “to feel what it's like” the people are turning to those conditions; Frida reports that it is “often quite a catalyst for people”. The point is clearly that a process of turning to the conditions producing the future, even a very simple process that gives the people “a whole [new] way in”, can bring about a greater intensity of becoming. This can be compared to what Latour (1997) explains about cleared paths. Once a path has been cleared and constructed, and we travel that path, then the construction process itself remains invisible and the travellers do not need to experience the initial clearing of the path. However, when it is necessary to once again construct a path or to construct the path in another place, then the traveller/clearer has to experience the clearing again. Some paths require hard work to make or remake. Thus, the process of turning to the conditions, of clearing a path, of feeling what it is like, is surely sometimes a catalyst.

The data shows that the participants' processes of turning to the conditions extend the turning-in-time process (theme 3). One difference has already been mentioned, namely, that Riley attends to the processes to make a difference, not only to do research that seeks similarity. Therefore, the next section focus on some differences in participants' turning processes to the one described in theme 3.

#### 6.2.4 Extensions of the process of turning to the conditions

Earlier in this chapter, I mentioned Law and Urry's (2004) strong claim about the methods and about different realities, that different realities circulate in different networks that may to some extent overlap. That is, what a particular network of actors understand by, let's say, a medical condition, may differ between networks, and differences may coexist in a network and may overlap between networks. Robert provides a particularly distinctive extension to this notion of different realities. He talks about various “patterns” of his life that coexist. He explains for instance “in this single picture these multiple overlays of things which just thinking now they reflect / you know / the coexistence



of multiple futures that are unfolding in real time as well // so there's the family pattern that's evolving here / underneath that there is the professional pattern that's unfolding with all of its complexity and peaks and troughs and things like that as well ... [and other trajectories in e.g., business, knowledge]”. Furthermore, an important point for Robert is the temporality within things. He means that temporality applies to the realities of the different trajectories. That means those realities have futures within them that are real, and they do not have a linear temporal flow, that they are actualising and can choose to actualise those futures. For him the “multiple overlays each [have] their own different temporal patterns”. The futures in those realities are real, with their own agency and freedom. With this freedom they inform and shape people. With this agency they anticipate people and call them into existence to do whatever is required to do for that reality.

Robert feels strongly about the “complete inadequacy of all the disciplines that we use to begin to understand anything [like this happening]”. The point of difference with the realities mentioned by Law, and hence the process of turning to the conditions, is Robert’s recognition of temporality within all realities. This means that in whatever situation he is, he can turn in any direction, realise another reality and step from one reality into the other. He can turn in any direction by recognising temporality within words, language, objects, events, states of being and so on, and he can describe this temporality in terms of trajectories, gradients, vectors or whatever suits the situation. This goes beyond the turning in time (theme 3) to a turning between any events at any time, whether in the past, present or the future. It comes down to the interplay between being and becoming indicated in Whitehead’s words quoted in the first chapter.

### **6.3 Achieving greater intensity of becoming**

My analyses of processes in connection with engaging with the future in my participant data and the laboratory study literature show that: a) futurists demonstrate a reflection process that I liken to laboratory scientists’ reflection process, but with characteristics that go beyond the scientists’ process; and b) futurists demonstrate a process of turning to the conditions that I liken to a process identified for the researchers studying the laboratory scientists, but with characteristics that go beyond the researchers’ process. Projects that aim to compare scientists and futurists may produce other results. However, the aim of this research is not to compare but to identify and characterise aspects of futurists’ engagement with the future ; for that purpose, the analyses of the laboratory study literature are useful.

The discussions in this chapter show the importance of the additional, and new, process and the extensions to the two processes. Key characteristics of the two processes are summarised in Table 6.1. They show futurists have an expanded range of ways of dealing with change and instability. That the process of turning to the conditions takes on greater importance in how the participants conduct their lives and interactions with other people speaks to a wider range of ways of dealing with and envisaging change that leads to different futures. Their shift in focus from manipulating entities on a fixed time framework to bring about change to using a variety of objects that specify conditions of

change, and attending to the conditions that prefigure the outcomes, speaks to a greater flexibility to originate patterns of assembly and thereby increase their ways of dealing with complex and changing situations, and release responses from fixed and static patterns of change (that is, to provoke, strengthen and concentrate). A moral dimension is particularly obvious with the second process. Furthermore, both processes together speak to more of the ‘whole’ engaging with the future, that is, greater inclusiveness of diversity of views and possibilities to, for instance, resolve problems.

Table 6.1 *Summary of key characteristics of the two processes and their extensions*

<b>Reflection process</b>	<b>Process for turning to the conditions</b>
‘External’ time framework structures events in linear sequence	Different objects describe change through different conditions
Relate and compare events on the time framework	Awareness of processes
Transform events by splitting, translating and inverting	Recognising and redirecting processes in-the-moment
Repetition with similarity	Inverting and transforming events to create difference
	Recognising layered processes and their conditions / effects
<b>Extensions</b>	<b>Extensions</b>
Awareness of the reflection process	Temporal multiplicity within things
Reflecting past, present and future events	
Repeated phases of improving ‘complexity’ of reflection process	

<p>Experimenting with other processes</p>	
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Being able to recognise that a diversity of ways of change is happening, could happen or could be influenced to happen, in what appears to be stable and static states, is important for originating a greater range of patterns of assembly. Two important characteristics of the two processes identified for futurists are how repetition and comparison are involved in achieving change and stability, and how they use a diverse range of objects that specify different patterns and conditions for how entities change. First, for the reflection process. To achieve change and stability for example, entities are manipulated by splitting, assigning properties to the entities depending on what is to be left behind and what is to be retained, increment the ‘age’ of the one so it is moved along the time framework, while keeping the other entity’s ‘age’ the same so it remains at the earlier age on the time framework and thus moves further into the past. Views about how the entity is changing or ought to change are brought out by repeated comparisons between entities on different parts of the time frameworks. The pattern for how an entity can change is through the splitting process that assigns different values to the properties of the two split entities and the numerical incrementing or not incrementing of its age. Second, for the new process of turning to the conditions. To achieve change and stability, participants use for example, interchangeable objects not tied to a rigid time framework to obtain different views of how an entity is changing or could change. Objects can be interchanged or the results of two or more objects can be woven together (without needing to be reduced to one fixed framework) to provide alternative views of or for change of the same entity. The participants used a variety of objects, for example, objects that specify situational conditions and dynamics (e.g., Theory U by Scharmer 2007), objects that specify different developmental and values conditions (e.g., Graves, Cowan & Todorovic 2005; Susanne 2004) and objects that provide an integrating framework of relations between many other objects (e.g., Wilber 2001). This is a sample of the more often referred to objects that provide the participants a diverse range of patterns of change for how alternative future entities can be assembled from current conditions, and a diverse range of ways for generating different interpretations of how entities are being assembled. This is needed in complex situations where there are no final definitions to problems or solutions except those that are produced by the actors there and then.

The flexibility inherent in both processes, but particularly in the process of turning to the conditions, is important for being able to provoke, concentrate and strengthen, and thus to release responses to change, responses for change or expectations of change from fixed and stable patterns of change. By turning to the conditions, futurists can identify how actors’ origination of assembly patterns are stable, static or inflexible, choose to strengthen any dimensions of an entity to remain stable by repetition with similarity, and choose to provoke changes in interpretations and origination of patterns of assembly by concentrating on differences in repetition using a variety of objects that

specify different patterns of conditions (objects such as those already mentioned). In other words, by turning to the conditions and provoking, strengthening and concentrating, futurists can begin futures anew.

Originating different patterns of assembly and provoking, strengthening and concentrating highlight the moral dimension in the making of choices of patterns and what to repeat with similarity and what to repeat with difference. Moral choices are involved in choices over the processes of assembly, but the process of turning to the conditions calls on conscious selection between choices among the many possibilities generated from the objects, patterns and interpretations. This raises the need for conscious attention to the moral dimension in situations of complexity, particularly in the futurist's choices to introduce change to provoke the fixed and stable assumptions and conditions, and strengthen inclusiveness of diverse views.

Finally, the two processes taken together speak to more of the 'whole' engaging with the future. This is not only from a greater range of patterns of change to interpret situations or for recognition of a diversity of views of assembly choices. It is also because patterns are not being sought in a past, present and future that are assembled anew from a diversity of views, interpretations, values and many other dimensions, rather than in a linear arrangement of events in a fixed, static and frozen past (as is the case with only the reflection process).

In summary, the analyses in this chapter show two processes associated with time and elaborate on the processual aspect of capacity to engage with the future. With a reflection process, the participants can translate, move and transform themselves along a time framework. The participants demonstrate a more extended range of reflection process characteristics to that identified for the scientists in the laboratory study literature. The reflection process has characteristics for increasing the intensity of becoming, but to a far lesser extent than the characteristics identified and described for the process of turning to the conditions. The new process of turning to the conditions mainly displayed by the graduated participants is broadly characterised according to the case of Latour's new type of exegesis methodology (described by Schmidgen & Custance 2014). Specific characteristics identified and described elaborate on the broad case process specific for futurists. The distinct characteristics of the process of turning to the conditions demonstrates clearly how these participants contribute to increasing the intensity of becoming in ways that are catalytic and lead to the actualisation of alternative futures. The new co-creation/co-expressing relation (discussed in Chapter 5) and the new process of turning to the conditions (discussed in this chapter) suggest a second mode of engaging with the future. I claim that the combination of two modes of engaging with the future, rather than one mode, has far-reaching consequences for our futures. This claim is explored with scenarios in the next and final chapter.

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## Chapter 7

# Futurists re-turn becoming to being

With this project I aimed to answer two questions. The main research question is: How do futurists engage with the future? The secondary research question looks for the relevance of postgraduate master's education to futurists' engagement with the future. In Chapter 1, I posed these questions in the context of a puzzle about humans' desire for certainty, rather than uncertainty, in a world of constant change, where the future is uncertain and quantum physicists have concluded that at the most fundamental level of this universe there is only indeterminacy. There are numerous examples where the problem of certainty shows up and there are many other examples of the immense costs and human misery of failure to adequately deal with change and uncertainty. Therefore it is a puzzle worth investigating and I take my starting point as the uncertainty and change associated with complexity. In an increasingly complex, dynamic and interconnected world, businesses, governments, academia, groups and citizens want to know whether and how they can thrive, innovate and make important decisions for the future, and they trust the certainty that the solutions from those in professional occupations (e.g., doctors, engineers) provide, including their solutions for complex problems. Scholars locate professionals' expertise in their (Western) scientific enquiry approach, an approach held up as the pre-eminent model for dealing with and resolving problems and challenges, an approach that takes a *being* view of the world. But professionals' solutions based on this model of constructing knowledge are often implicated in failures to deal with change and unexpected surprises associated with complex dynamic problems.

As outlined in the introduction, many reports express concern about the adequacy of such solutions to address complex global challenges, to assist organisations to identify and grow new sources of strategic value while the fortunes of industries fluctuate, to enable educational institutions to develop the human capital necessary to cope with rapidly expanding knowledge environments and enable organisations, businesses and governments to deal with complex and challenging situations. All those activities, from solving problems to developing human capital, are activities that involve people engaging with the future, and futurists in the field of futures studies claim to have a unique approach to engaging with the future that makes advances on the scientific process. Futurists have many work backgrounds, often starting their careers as professionals, before moving into FS, either building on their background experience or developing into new areas. Thus, this thesis asserts that studying how futurists engage with the future (this study's main research question) will contribute insights into how to better deal with situations of change and uncertainty.

This thesis identifies and characterises two aspects of capacity to engage with the future. These aspects are the relational and processual, with a focus on the future and time. Close analysis of participant data shows that futurists' capacity to engage with the future, for both the relational and processual aspects, are similar to but extend beyond those identified by Knorr-Cetina and Latour.

Whereas Knorr-Cetina characterised scientists as ordering their relation to the future as the unfolding of knowledge towards goals or targets under controlled conditions, the research participants in this study are characterised as going beyond that. Their relation to knowledge is to be actively poised for, yet aware of, the limits to knowing and responding, and the emergence out of inexistence of new and novel events and entities from the world where they have no control. Whereas Latour identified the reflection process of researchers as the ordering and manipulating of entities along a (standard) time framework, the participants in this study go beyond that. This thesis identifies a process wherein they turn to the conditions from which the future is being generated to identify change in what appears to be stable or static. This often involves objects that specify the conditions for change without fixed time frameworks. This thesis contends that futurists' engagement with the future demonstrates ways of engaging with the future that are better suited to dealing with situations characterised by change and uncertainty, and this is evident in how futurists' engagement with the future increase the intensity of *becoming* of situations.

My analyses show there are differences between the participants' capacities to engage with the future depending on their progress through their FS postgraduate courses (this study's secondary research question); this suggests that perhaps FS education is relevant to developing their capacity to engage with the future. However, this would really need to be tested with a bigger sample that includes those who have not done FS postgraduate courses. The data available from this study on the effects of their postgraduate education, which is not reported in this thesis, could provide a starting point to scope an in-depth comparative study on the effects of postgraduate educational courses that include and do not include futures studies education, with participants selected from futurists and non-futurists. The heterogenous nature of futures studies and of futurists as a group (as pointed out in this thesis) will need very careful consideration.

This thesis has argued that by increasing the intensity of becoming, futurists produce four effects that demonstrate how their approach is more suited to dealing with change and uncertainty than an approach established on principles of certainty. The new epistemic object relation and process of turning to the conditions identified in this thesis are inspired by, and thus grounded in the principles of ANT and process philosophy. This thesis identifies a new relation, a co-creating relation, that brings a new perspective on creativity in the face of uncertainty, both theoretical and practical. Rather than trying to control against ambiguity and surprise, this relation focuses on creativity in the world, over which there is no control, and adopts an active and involved stance (in contrast to a disinterested stance) so as to be able to recognise and respond appropriately. This thesis also identifies a new process of turning to the conditions that brings a new perspective on dealing with and conceiving of change in the face of uncertainty, both theoretical and practical. Rather than a single frame of change, this process encourages a diversity of views of change, often with the use of specific objects, that goes against the certainty of a frozen past and a homogeneous framework of change. Both the new relation and process play a role in the participants' aiming to encourage complexity and novelty, that is, by going beyond seeking control to achieve certainty, and by motivating change

through concentrating, provoking and strengthening, particularly in their dealings with people. As briefly pointed out in the discussions of the results, a moral dimension is strongly evident with the new relation and process that is less obvious with the scientific approach. The moral dimension needs further mapping out work. The analysis was based on a small and non-representative sample of futurists and of past and present postgraduate FS students, but this does not invalidate the identification of these new aspects. These relations, processes and effects could be further explored and tested in longitudinal research since all the participants of this study agreed to be contacted in the future should the research be extended. In addition, further research is needed to see to what extent this type of capacity to engage with the future is present in the general population.

I here draw conclusions about theoretical, practical and methodological implications for different groups, followed by my final thoughts.

## **7.1 Theoretical implications**

Over and above the ongoing need to widen the reach of FS theory, the participants in this study demonstrate ways to engage with the future that are not identified in current FS literature, or in other literature that does investigate engaging with the future such as psychology. The relational and processual aspects of capacity to engage with the future, as described and characterised in this thesis, are new to futures studies. It contributes to work done to understand how people engage with the future. The mass of scientific research which is being conducted on specific constructs around how people engage with the future – for instance, studies of futures orientation can now consider testing for the approaches identified in this thesis.

The way in which this thesis has brought together the analytical perspective and inspiration of ANT and process philosophy to study engagement with the future is unique. This thesis also presents another view for consideration in futurists' discussions of theoretical foundations. In terms of establishing theoretical foundations for FS, further exploration of the principles of ANT and process philosophy should be considered, for FS foundations and FS theory in general should be considered.

Educators and futurists are attempting to bring a greater awareness of FS into education. The relations and processes here identified will add additional dimensions to their efforts to improve educational outcomes. This extends to topics such as diversity and creativity, as the discussions in the data analyses chapters show.

## **7.2 Practical implications**

The results of this thesis provide direct ideas for dealing with the problems reported by futurists as discussed in Chapter 2. The analyses and discussions in this thesis show the opposing poles of social / human and nature / non-human that currently occupy futurists' attentions are misdirecting their effort to address their problems. Latour characterises modernity as being the ongoing separation of the social and nature through the work of purification and translation. This thesis reviews the FS

literature through Latour's analytical lens on modernity and identifies similar work of purification and translation (purification work creates and maintains two opposing zones as presented along the horizontal axis while translation work is presented along the vertical axis of Figure 2.1). It argues that futurists are being distracted by the work of purification from resolving the problems they attribute to the purification work. This thesis argues that futurists could start to overcome this problem by re-establishing the connection between the work of translation and the work of purification. It requires both the relation of co-creating and the process of turning to the conditions. Without the process of turning to the conditions, the relation of co-creating is powerless to influence change to the work of translation, or to draw attention to consequences and moral implications. Without the relation of co-creating, without a way to distinguish between the creativity of the world and the creativity achieved by human control, the process of turning to the conditions cannot make visible the construction work that achieves purification, stability and certainty, nor identify different pathways of change. Further research building on the research of futurists' problem situations and informed by this research and ANT studies, should be conducted. The aim would be to examine these results in connection with practical FS situations and situations of engaging with the future in general (e.g., management decision making). From that could be implications for research into education and practice of professionals more broadly.

Futurists introducing FS into schools and universities should consider the vertical dimension and the misdirection of the divide between social versus nature. All practising futurists need to become aware of their own inclinations to want to reinforce that separation. I believe their FS education is relevant to the differences noted between the participants, given what they disclosed in the interviews about the effects that certain learnings of their courses have had for them, for example in connection with certain classroom practices, classroom situations, curriculum learning objectives or curriculum content. This does not mean that learnings on the FS courses could not be obtained elsewhere, and indeed some participants noted special occasions where they experienced similar learnings on other courses or learning from life in general. However, the effects of the education are not clear, in particular not on how the experiences or curriculum relate to the relations and processes identified by this research. The reports from the participants of this study provide a start for further research into the specific effects of or the connections with FS education. All these questions on the effects of FS education need further investigation. Furthermore, the differences observed between the participants in terms of their progress through their FS courses could simply be due to the heterogeneity of futurists as a group. Further studies are needed.

### **7.3 Methodological implications**

Research itself involves engaging with the future. The implication is twofold: accounting for researchers' own engagement with the future in their research; and accounting for how the research methodology prefigures engagement with the future. Every researcher, irrespective of whether they are aware of it or not, performs a particular understanding of how change happens, and thus of the



future, which structures their reasoning about the implications of their research. Furthermore, every researcher uses a particular methodological approach in their research, or follows a particular pattern of activity, all of which provides a reasoning structure about how their research actions are related to their research outcomes, and thus to the future. My experience with this thesis has been that there is little help available about how to do this well, and more research and experience with this are needed. I have found that ANT and process philosophy, with their particular principles, provide a very good basis for doing this sort of research. However, studies of the future or futures are very scarce in both literatures. The theory of the world (ontology) is very different with ANT and process philosophy, compared to mathematical and enduring-substance entities, and this has played a very important role in my being able to identify and characterise aspects of the participants' capacity to engage with the future.

#### **7.4 A promise of new times**

I am in no doubt that futurists are delivering on the promise of FS to make a difference. But perhaps it is not a difference that is easy to see. The futurists who created the jigsaw puzzles referred to in the prologue certainly had no idea what specific difference in the world they were making. Nevertheless, this thesis is evidence that they did indeed make a difference by inspiring me to include time in my research. This research provides evidence of another difference that futurists are making and I believe it is in what Latour is alluding to when he says:

**If we want to recover the capacity to sort that appears essential to our morality and defines the human, it is essential that no coherent temporal flow comes to limit our freedom of choice. Latour (1993, p. 141)**

Therefore, I want to turn to that fortuitous meeting of time and futures mediated by a jigsaw puzzle piece.

Futurists are helping us make the connection between the particular “smooth” and homogeneous” (Latour 1993) and “fixed” and “frozen” (Serres & Latour 1995) characteristics of (standard) time with its undesired effects on how we make our world. The work of futurists convinces me that the sense of the “permanence that resides in flux”, Whitehead’s phrase for something that is difficult to put into words, is not accounted for by our (standard) time and certainly not by a time founded on principles of order. In this regard, futurists are not only helping us construct alternative and more desired futures, but they are helping us construct alternative and more desired *times*.

I see this also in the puzzle over experts’ desire for certainty. Futurists’ work is helping us realise we are constructing futures, so it applies to time too. Therefore, it is in our power to construct other times with other characteristics. Futurists’ work helps us recognise the detrimental effects of the particular ordering formulation in our current standard time. By the ordering formulation of time, I mean both obtaining similar, consistent and homogeneous results in repetitions of a procedure, and hierarchically privileging and isolating (standard) time over all other times. Futurists’ work helps us become aware of the (standard) time associations we are making, and how those are constraining and

narrowing our becoming. Futurists' work helps us to re-make time associations according to a multiplicity of values.

In other words, the promise that futurists are realising is helping us transition from the time of a current life cycle to new times of other life cycles. This is the task that I believe futurists are working on, to bring fuller awareness of the complexity of time to consciousness.

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## References

- Aaltonen, M & Holmström, J 2010, 'Multi-ontology topology of the strategic landscape in three practical cases', *Technological Forecasting and Social Change*, vol. 77, no. 9, pp. 1519–1526.
- Adam, B 1995, *Timewatch: The social analysis of time*, Polity, Cambridge.
- Adam, B 2004, *Time*, Polity, Cambridge.
- Adam, B 2006, 'Time', *Theory, Culture & Society*, vol. 23, no. 2–3, pp. 119–126.
- Adam, B & Groves, C 2007, *Future Matters. Action, Knowledge, Ethics*, Brill, Leiden, Netherlands.
- Ahlqvist, T & Rhisiart, M 2015, 'Emerging pathways for critical futures research: Changing contexts and impacts of social theory', *Futures*, vol. 71, pp. 91–104.
- Association of Professional Futurists 2015, *Association of Professional Futurists (APF)*, viewed 10 April 2017, <<http://www.apf.org/>>.
- Australian Business Deans Council 2014, *The Future of Management Education Initiative: Final Report*, Australian Business Deans Council.
- Australian Government 2013, *Strategic Research Priorities*, Department of Industry.
- Australian Industry Group 2015, *Addressing Enterprise Leadership in Australia*, Australian Industry Group.
- Australian Workforce and Productivity Agency 2013, *Human capital and productivity: Literature review*, Commonwealth of Australia.
- Ayres, RU 1989, 'The future of technological forecasting', *Technological Forecasting and Social Change*, vol. 36, no. 1–2, pp. 49–60.
- Baaquie, BE 2013, *The Theoretical Foundations of Quantum Mechanics*, Springer, NY.
- Bamber, V 2015, 'Mixing decks: Frameworks for master's scholarship', *Higher Education Quarterly*, vol. 69, no. 3, pp. 221–236.
- Bardon, A 2013, *A Brief History of the Philosophy of Time*, Oxford University Press, New York, USA.
- Barnes, B & Law, J 1976, 'Whatever should be done with indexical expressions?', *Theory and Society*, vol. 3, no. 2, pp. 223–237.
- Bell, W 2002, 'Advancing futures studies: a reply to Michael Marien', *Futures*, vol. 34, no. 5, pp. 435–447.
- Bell, W 2003, *Foundations of Futures Studies: Human Science for a New Era*, Transaction, New Brunswick, London.
- Bell, W 2009, *Foundations of Futures Studies: History, Purposes, and Knowledge – Human Science for a New Era Volume 1*, Transaction, Piscataway, NJ.
- Berger, PL & Luckmann, T 1975, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Penguin, England.
- Bergson, H 2015, *Creative Evolution*, Sheba Blake, New York.
- Billett, S, Harteis, C & Gruber, H (eds), 2014, *International Handbook of Research in Professional and Practice-based Learning*, Springer, Dordrecht, Netherlands.
- Bishop, P & Dator, J 2013, 'University Foresight Network: The Search for Common Ground among Foresight Educators', *Bi-annual Meeting of the World Futures Studies Federation*, World Futures Studies Federation, Bucharest, 27 June 2013.
- Bishop, P & Morrow, R 2009, 'Reflective practice and practitioners', *Journal of Futures Studies*, vol. 13, no. 4, pp. 1–4.
- Booth, C, Rowlinson, M, Clark, P, Delahaye, A & Procter, S 2009, 'Scenarios and counterfactuals as modal narratives', *Futures*, vol. 41, no. 2, pp. 87–95.
- Borup, M, Brown, N, Konrad, K & Van Lente, H 2006, 'The sociology of expectations in science and technology', *Technology Analysis & Strategic Management*, vol. 18, no. 3–4, pp. 285–298.

- British Academy 2009, 'The Global Financial Crisis – why didn't anybody notice?', *British Academy Review*, vol. 14, pp. 8–10.
- Brown, J 2008, 'The inward path: Mysticism and creativity', *Creativity Research Journal*, vol. 20, no. 4, pp. 365–375.
- Brown, JW 1991, *Self and Process: Brain States and the Conscious Present*, Springer-Verlag, New York.
- Brown, JW 2002, *The Self-Embodying Mind: Process, Brain Dynamics and the Conscious Present*, Barrytown/Station Hill Press, New York.
- Brown, N 2003, 'Hope against hype – accountability in biopasts, presents and futures', *Science Studies*, vol. 16, no. 2, pp. 3–21.
- Brown, N & Michael, M 2003, 'A sociology of expectations: Retrospecting prospects and prospecting retrospects', *Technology Analysis & Strategic Management*, vol. 15, no. 1, pp. 3–18.
- Brown, SD & Reavey, P 2017, 'Dark organizational theory', *Journal of Cultural Economy*, pp. 1–16.
- Bundy, R 1976, 'Up the downward path: The futures movement and the social imagination', in R Bundy (ed.), *Images of the Future: The Twenty-First Century and Beyond*, Prometheus Books, Buffalo, pp. 66–77.
- Bussey, M 2002, 'From change to progress: Critical spirituality and the futures of futures studies', *Futures*, vol. 34, no. 3–4, pp. 303–315.
- Bussey, M 2014, 'Concepts and effects: Ordering and practice in foresight', *Foresight*, vol. 16, no. 1, pp. 1–16.
- Bussey, M, Inayatullah, S & Miljević, I (eds), 2008, *Alternative Educational Futures: Pedagogies for Emergent Worlds*, Sense, Rotterdam, Taipei.
- Callon, M 1995, 'Four models for the dynamics of science', in S Jasanoff & Society for Social Studies of Science (eds), *Handbook of Science and Technology Studies*, Sage, Thousand Oaks, CA, pp. 29–63.
- Cameron, RP 2009, 'Introduction to Part II: Being and related matters', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. 221–224.
- Carr, D 2014, 'Professionalism, profession and professional conduct: Towards a basic logical and ethical geography', in S Billett, C Harteis & H Gruber (eds), *International Handbook of Research in Professional and Practice-based Learning*, Springer Science+Business Media, Dordrecht, pp. 5–27.
- Chamizo, JA 2007, 'Teaching modern chemistry through "recurrent historical teaching models"', *Science & Education*, vol. 16, no. 2, pp. 197–216.
- Chapman, DW & Chien, C-L (eds), 2014, *Higher Education in Asia: Expanding out, expanding up: the rise of graduate education and university research*, UNESCO Institute for Statistics, Montreal, Quebec.
- Cherry, N 2012, 'The paradox and fog of supervision: Site for the encounters and growth of praxis, persons and voices', *Quality Assurance in Education*, vol. 30, no. 1, pp. 6–19.
- Clausen, JA 1998, 'Life reviews and life stories', in JZ Giele & GH Elder Jr (eds), *Methods of Life Course Research: Qualitative and Quantitative Approaches*, Sage, Thousand Oaks, CA, pp. 189–213.
- Coates, JF, Mahaffie, JB & Hines, A 1994, 'Technological forecasting: 1970–1993', *Technological Forecasting and Social Change*, vol. 47, no. 1, pp. 23–33.
- Coates, V, Farooque, M, Klavans, R, Lapid, K, Linstone, HA, Pistorius, C & Porter, AL 2001, 'On the future of technological forecasting', *Technological Forecasting and Social Change*, vol. 67, no. 1, pp. 1–17.
- Cole, S 1994, 'Why sociology doesn't make progress like the natural sciences', *Sociological Forum*, vol. 9, no. 2, p. 133.

- Cooren, F, Fox, S, Robichaud, D & Talih, N 2005, 'Arguments for a plurified view of the social world: Spacing and timing as hybrid achievements', *Time & Society*, vol. 14, no. 2/3, pp. 265–282.
- Corfield, PJ 2007, *Time and the Shape of History*, Yale University Press, New Haven.
- Cornish, E 2007, 'The search for foresight: how *The Futurist* was born', *The Futurist*, vol. 41, no. 1, pp. 50–56.
- Crabtree, A, Rouncefield, M & Tolmie, P 2011, 'The temporal order of work', in P Tolmie & M Rouncefield (eds), *Ethnomethodology at Work*, Routledge, Farnham, Surrey, pp. 81–92.
- Cuhls, K 2003, 'From forecasting to foresight processes: New participative foresight activities in Germany', *Journal of Forecasting*, vol. 22, no. 2–3, pp. 93–111.
- Cunliffe, AL, Luhman, JT & Boje, DM 2004, 'Narrative temporality: Implications for organizational research', *Organization Studies (01708406)*, vol. 25, no. 2, pp. 261–286.
- Dall'Alba, G 2009, *Learning to be Professionals: Innovation and Change in Professional Education*, Springer, Dordrecht, Netherlands.
- Danesi, M 2007, *The Quest for Meaning: A Guide to Semiotic Theory and Practice*, University of Toronto Press.
- Dator, J 1975, *De-colonizing the future*, viewed 19 November 2017, <<http://www.futures.hawaii.edu/publications/futures-visions/DecolonizingFuture1975.pdf>>.
- Dator, JA 2002, *Advancing Futures: Futures Studies in Higher Education*, Praeger, Westport, Connecticut.
- de Jouvenel, B 1967, *The Art of Conjecture*, translated from the French by Mikita Lary, Weidenfeld & Nicolson, London.
- Denbigh, KG 1981, *Three Concepts of Time*, Springer-Verlag, Berlin.
- Deng, N 2010, "'Beyond A- and B-time" reconsidered', *Philosophia*, vol. 38, no. 4, pp. 741–753.
- Dobers, P & Strannegård, L 2004, 'The cocoon: A traveling space', *Organization*, vol. 11, no. 6, pp. 825–848.
- Drennan, J & Clarke, M 2009, 'Coursework master's programmes: the student's experience of research and research supervision', *Studies in Higher Education*, vol. 34, no. 5, pp. 483–500.
- du Preez, GT & Pistorius, CWI 1999, 'Technological threat and opportunity assessment', *Technological Forecasting and Social Change*, vol. 61, no. 3, pp. 215–234.
- Elder Jr, GH 1994, 'Time, human agency, and social change: Perspectives on the life course', *Social Psychology Quarterly*, vol. 57, no. 1, pp. 4–15.
- Fabian, J & Bunzl, M 2014, *Time and the Other: How anthropology makes its object*, Columbia University Press, New York.
- Fam, D & Sofoulis, Z 2016, 'Trouble at the disciplinary divide: A knowledge ecologies analysis of a co-design project with native Alaskan communities', in D Fam, J Palmer, C Riedy & C Mitchell (eds), *Transdisciplinary Research and Practice for Sustainability Outcomes*, Taylor and Francis, Florence, USA, pp. 234–249.
- Fenwick, T & Edwards, R 2013, 'Performative ontologies: Sociomaterial approaches to researching adult education and lifelong learning', *European Journal for Research on the Education and Learning of Adults*, vol. 4, no. 1, pp. 49–63.
- Foresight University 2016, *The Foresight Guide: A Big Picture Preview of the 21st Century*, viewed 15 February 2017, <<http://www.foresightguide.com/>>.
- Fraser, JT 1982, *The Genesis and Evolution of Time: A Critique of Interpretation in Physics*, University of Massachusetts Press, Amherst.
- Fraser, JT 2007, *Time and Time Again: Reports From a Boundary of the Universe*, Brill, Leiden, Netherlands.
- Fuller, T & Loogma, K 2009, 'Constructing futures: A social constructionist perspective on foresight methodology', *Futures*, vol. 41, no. 2, pp. 71–79.
- Gad, C & Jensen, CB 2010, 'On the Consequences of Post-ANT', *Science, Technology, & Human Values*, vol. 35, no. 1, pp. 55–80.

- Gidley, JM 2010, 'An other view of integral futures: De/reconstructing the IF brand', *Futures*, vol. 42, no. 2, pp. 125–133.
- Gidley, JM 2016, *Postformal Education: A Philosophy for Complex Futures*, Springer, Switzerland.
- Giele, JZ & Elder, JGH 1998, *Methods of Life Course Research: Qualitative and Quantitative Approaches*, Sage, Thousand Oaks, CA.
- Glaser, BG 1978, *Theoretical Sensitivity*, Sociology Press, Mill Valley, California.
- Glaser, BG 1992, *Basics of Grounded Theory Analysis*, Sociology, Mill Valley, CA.
- Glenn, JC & Gordon, TJ (eds), 2009, *Futures Research Methodology*, The Millennium Project, Washington DC.
- Global Foresight 2013, *Foresight Communities – Global List*, Foresight Education and Research Network (FERN), viewed 15 February 2017, <<http://www.globalforesight.org/>>.
- Goonatilake, S 1993, 'The freedom to imagine', *Futures*, vol. 25, no. 4, pp. 456–462.
- Goonatilake, S 1998, *Toward a Global Science: Mining Civilizational Knowledge*, Indiana University Press, Bloomington, Indiana.
- Gordin, MD 2015, 'Foreword', in E Rindzevičiūtė & J Andersson (eds), *The Struggle for the Long-Term in Transnational Science and Politics: Forging the Future*, Taylor and Francis, ProQuest Ebook Central, pp. xi–xv.
- Graves, CW, Cowan, CC & Todorovic, N 2005, *The Never Ending Quest: A Treatise on an Emergent Cyclical Conception of Adult Behavioral Systems and Their Development; Dr. Clare W. Graves Explores Human Nature*, ECLET, CA.
- Greenhouse, CJ 1996, *A moment's notice: time politics across cultures*, Cornell University Press.
- Griffin, DR 1986, 'Introduction: Time and the fallacy of misplaced concreteness', in DR Griffin (ed.), *Physics and the Ultimate Significance of Time: Bohm, Prigogine, and Process Philosophy*, State University of New York Press, Albany, pp. 1–48.
- Guba, EG & Lincoln, YS 1994, 'Competing paradigms in qualitative research', in N Denzin & Y Lincoln (eds), *Handbook of Qualitative Research*, Sage, Thousand Oaks, CA, pp. 105–117.
- Gutting, G 2008, 'French philosophy in the twentieth century', in D Moran (ed.), *The Routledge Companion to Twentieth-Century Philosophy*, Routledge, London, pp. 814–848.
- Hanna, R 2008, 'Kant in the twentieth century', in D Moran (ed.), *The Routledge Companion to Twentieth-Century Philosophy*, Routledge, London, pp. 149–203.
- Hansen, NV 2004, 'Where do spacing and timing happen? Two movements in the loss of cosmological innocence', *Organization*, vol. 11, no. 6, pp. 759–772.
- Harman, G 2009, *Prince of Networks: Bruno Latour and Metaphysics*, re.press (e-books).
- Harman, G 2011, 'The importance of Bruno Latour for philosophy', *Cultural Studies Review*, vol. 13, no. 1, p. 19.
- Hawaii Research Center for Futures Studies 2011, *People: Hawaii Research Center for Futures Studies*, University of Hawaii, viewed 15 February 2017, <<http://www.futures.hawaii.edu/people.html>>.
- Heidegger, M 1992, *Parmenides*, Indiana University Press, Bloomington.
- Heron, J & Reason, P 1997, 'A participatory inquiry paradigm', *Qualitative Inquiry*, vol. 3, no. 3, pp. 274–294.
- Hesse-Biber, SN & Leavy, P 2011, *The Practice of Qualitative Research*, 2nd edn, Sage, Thousand Oaks, CA.
- Hideg, É 2007, 'Theory and practice in the field of foresight', *Foresight*, vol. 9, no. 6, pp. 36–46.
- Hines, A 2002, 'A practitioner's view of the future of futures studies', *Futures*, vol. 34, no. 3–4, pp. 337–347.
- Hines, A 2003, 'An audit for organizational futurists: Ten questions every organizational futurist should be able to answer', *Foresight*, vol. 5, no. 1, pp. 20–33.
- Hines, A 2004, 'Applying integral futures to environmental scanning', *Futures Research Quarterly*, vol. 19, no. 4, pp. 49–62.
- Hines, A & Gold, J 2013, 'Professionalizing foresight: Why do it, where it stands, and what needs to be done', *Journal of Futures Studies*, vol. 17, no. 4, pp. 35–54.

- Hines, A & Gold, J 2015, 'An organizational futurist role for integrating foresight into corporations', *Technological Forecasting and Social Change*, vol. 101, pp. 99–111.
- Holopainen, M & Toivonen, M 2012, 'Weak signals: Ansoff today', *Futures*, vol. 44, no. 3, pp. 198–205.
- Howe, L & Wain, A 1993, *Predicting the Future*, Cambridge University Press, England.
- Hurley, K, Masini, E, Boulding, E, Eisler, R, Premchander, S, McCorduck, P, Kelly, P, Bateman, D, Sahtouris, E, Smith, C, Patindol, J, Jarva, V, Milojević, I & Groff, L 2008, 'Futures studies and feminism', *Futures*, vol. 40, no. 4, pp. 388–407.
- Hutton, S 1977, 'Some renaissance critiques of Aristotle's theory of time', *Annals of Science*, vol. 34, no. 4, pp. 345–363.
- Inayatullah, S 1990, 'Deconstructing and reconstructing the future: Predictive, cultural and critical epistemologies', *Futures*, vol. 22, no. 2, pp. 115–141.
- Inayatullah, S 1993, 'Colluding and colliding with the orientalists: A response to Zia Sardar's 'Colonizing the future'', *Futures*, vol. 25, no. 2, pp. 190–195.
- Inayatullah, S 1996, 'What futurists think', *Futures*, vol. 28, no. 6–7, pp. 509–517.
- Inayatullah, S 1998, 'Causal layered analysis: Poststructuralism as method', *Futures*, vol. 30, no. 8, pp. 815–829.
- Inayatullah, S 1999, 'Reorienting futures studies', in Z Sardar (ed.), *Rescuing All Our Futures: The Future of Futures Studies*, Praeger, Westport, Connecticut, pp. 49–60.
- Inayatullah, S 2002, 'Reductionism or layered complexity? The futures of futures studies', *Futures*, vol. 34, no. 3–4, pp. 295–302.
- Inayatullah, S (ed.) 2004, *The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology*, Tamkang University Press, Tamsui, Taiwan.
- Inayatullah, S 2005, *Questioning the Future: Futures Studies, Action Learning and Organisational Transformation*, Tamkang University, Taipei, Taiwan.
- Inayatullah, S 2006, 'Anticipatory action learning: Theory and practice', *Futures*, vol. 38, no. 6, pp. 656–666.
- Inayatullah, S, Bussey, M & Milojević, I 2006, *Neohumanist Educational Futures: Liberating the Pedagogical Intellect*, Tamkang University Press, Taipei, Taiwan.
- Inayatullah, S & Milojević, I (eds), 2015, *CLA 2.0: Transformative Research in Theory and Practice*, Tamkang University Press, Tamsui, Taiwan.
- Jantsch, E 1967, *Technological Forecasting in Perspective*, Organisation for Economic Co-operation and Development (OECD), Paris.
- Jarzabkowski, P, Paul Spee, A & Smets, M 2013, 'Material artifacts: Practices for doing strategy with "stuff"', *European Management Journal*, vol. 31, no. 1, pp. 41–54.
- Jasanoff, S, Markle, GE, Petersen, JC & Pinch, T (eds), 1995, *Handbook of Science and Technology Studies*, Sage, Thousand Oaks, California.
- Johnson, BB & Marcovitch, J 1994, 'Uses and applications of technology futures in national development: The Brazilian experience', *Technological Forecasting and Social Change*, vol. 45, no. 1, pp. 1–30.
- Jones, J 2010, 'Provocative expression: transitions in and from metaphysics in Whitehead's later work', in C Combs, BG Henning & R Faber (eds), *Beyond Metaphysics? Explorations in Alfred North Whitehead's Late Thought*, Brill, Amsterdam, pp. 259–279.
- Jørgensen, MS, Jørgensen, U & Clausen, C 2009, 'The social shaping approach to technology foresight', *Futures*, vol. 41, no. 2, pp. 80–86.
- Kanes, C 2011, *Elaborating Professionalism: Studies in Practice and Theory*, Springer, Netherlands.
- Karlsen, JE, Øverland, EF & Karlsen, H 2010, 'Sociological contributions to futures' theory building', *Foresight*, vol. 12, no. 3, pp. 59–72.
- Kaur, S & Sidhu, GK 2009, 'A Qualitative Study of Postgraduate Students' Learning Experiences in Malaysia', *International Education Studies*, vol. 2, no. 3, pp. 47–56.

- Keenan, M, Loveridge, D, Miles, I & Kaivo-Oja, J 2003, *Handbook of Knowledge Society Foresight*, European Foundation for the Improvement of Living and Working Conditions, Dublin.
- Kiley, M & Cumming, J 2014, 'The impact of changing government policies and institutional practices on master's by coursework students in Australia: A viable pathway to the PhD?', *Journal of Higher Education Policy and Management*, vol. 36, no. 1, pp. 99–111.
- Knorr-Cetina, K 1981, *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science*, Pergamon, Oxford.
- Knorr-Cetina, K 1993, 'Strong constructivism from a sociologist's point of view: A personal addendum to Sismondo's paper', *Social Studies of Science*, vol. 23, no. 3, pp. 555–563.
- Knorr-Cetina, K 1995, 'Laboratory studies: The cultural approach to the study of science', in S Jasanoff & Society for Social Studies of Science (eds), *Handbook of Science and Technology Studies*, Sage, Thousand Oaks, CA, pp. 140–166.
- Knorr-Cetina, K 1996, 'Epistemics in society: On the nesting of knowledge structures into social structures', in W Heijman, H Hetsen & J Frouws (eds), *Rural Reconstruction in a Market Economy*, Agricultural University, Wageningen, The Netherlands, pp. 55–73.
- Knorr-Cetina, K 1997, 'Sociality with objects: Social relations in postsocial knowledge societies', *Theory, Culture & Society*, vol. 14, no. 4, pp. 1–30.
- Knorr-Cetina, K 2001a, 'Objectual practice', in TR Schatzki, K Knorr-Cetina & Ev Savigny (eds), *The Practice Turn in Contemporary Theory*, Routledge, London, pp. 175–188.
- Knorr-Cetina, K 2001b, 'Postsocial relations: Theorizing sociality in a postsocial environment', in G Ritzer & B Smart (eds), *Handbook of Social Theory*, Sage, London, pp. 520–537.
- Knorr-Cetina, K 2003, *Epistemic Cultures: How the Sciences Make Knowledge*, Harvard University Press, Cambridge, MA, London.
- Knorr-Cetina, K 2010, 'The epistemics of information: A consumption model', *Journal of Consumer Culture*, vol. 10, no. 2, pp. 171–201.
- Knorr-Cetina, K 2014, 'Intuitionist theorizing', in R Swedberg (ed.), *Theorizing in Social Science: The Context of Discovery*, Stanford Social Sciences, CA, pp. 29–60.
- Knorr-Cetina, KD 1983, 'The ethnographic study of scientific work: Towards a constructivist interpretation of science', in KD Knorr-Cetina & M Mulkay (eds), *Science Observed: Perspectives on the Social Study of Science*, Sage, London, pp. 115–140.
- Knorr-Cetina, KD 1991, 'Epistemic cultures: Forms of reason in science', *History of Political Economy*, vol. 23, no. 1, pp. 105–122.
- Knorr-Cetina, K & Bruegger, U 2000, 'The market as an object of attachment: Exploring postsocial relations in financial markets', *Canadian Journal of Sociology*, vol. 25, no. 2, pp. 141–168.
- Knorr, KD 1977, 'Producing and reproducing knowledge: Descriptive or constructive? Toward a model of research production', *Social Science Information*, vol. 16, no. 6, pp. 669–696.
- Knorr, KD 1979, 'Tinkering toward success: Prelude to a theory of scientific practice', *Theory and Society*, vol. 8, no. 3, pp. 347–376.
- Lakoff, G & Johnson, M 1999, *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*, Basic, New York.
- Latour, B 1988, 'A relativistic account of Einstein's relativity', *Social Studies of Science*, vol. 18, no. 1, pp. 3–44.
- Latour, B 1990, 'The force and the reason of experiment', in HE Le Grand (ed.), *Experimental Inquiries: Historical, Philosophical, and Social Studies of Experimentation in Science*, Reidel, Dordrecht, pp. 49–80.
- Latour, B 1993, *We Have Never Been Modern*, Harvester Wheatsheaf, Hertfordshire, Great Britain.
- Latour, B 1996, 'On interobjectivity', *Mind, Culture, and Activity*, vol. 3, no. 4, pp. 228–245.
- Latour, B 1997, 'Trains of thought: Piaget, formalism and the fifth dimension', *Common Knowledge*, vol. 6, no. 3, pp. 170–191.



- Latour, B 2004, 'Why has critique run out of steam? From matters of fact to matters of concern', *Critical Inquiry*, vol. 30, no. 2, pp. 225–248.
- Latour, B 2005, *Reassembling the Social: An Introduction to Actor–Network–Theory*, Oxford University Press.
- Latour, B 2010, 'Coming out as a philosopher', *Social Studies of Science*, vol. 40, no. 4, pp. 599–608.
- Latour, B & Woolgar, S 1986, *Laboratory Life: The Construction of Scientific Facts*, Princeton University Press, New Jersey.
- Law, J 1992, 'Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity', *Systems Practice*, vol. 5, no. 4, pp. 379–393.
- Law, J 1999, 'After ANT: Complexity, naming and topology', in J Law & J Hassard (eds), *Actor Network Theory and After*, Blackwell, Oxford, UK, pp. 1–14.
- Law, J 2004, *After Method: Mess in Social Science Research*, 1st edn, Taylor & Francis e-Library.
- Law, J & Urry, J 2004, 'Enacting the social', *Economy and Society*, vol. 33, no. 3, pp. 390–410.
- Leclerc, I 1986, *The Philosophy of Nature*, The Catholic University of America Press, Washington, DC.
- Lu, LYY, Hsieh, CH & Liu, JS 2016, 'Development trajectory and research themes of foresight', *Technological Forecasting and Social Change*, vol. 112, pp. 347–356.
- Lynch, M 2001, 'Ethnomethodology and the logic of practice', in TR Schatzki, K Knorr-Cetina & E Von Savigny (eds), *The Practice Turn in Contemporary Theory*, Routledge, New York, pp. 131–148.
- Lynch, M, Livingston, E & Garfinkel, H 1983, 'Temporal order in laboratory work', in KD Knorr-Cetina & M Mulkay (eds), *Science Observed: Perspectives on the Social Study of Science*, Sage, London, pp. 205–238.
- Marien, M 2002, 'Futures studies in the 21st century: A reality-based view', *Futures*, vol. 34, pp. 261–281.
- Marien, M 2010, 'Futures-thinking and identity: Why "Futures Studies" is not a field, discipline, or discourse: A response to Ziauddin Sardar's "the namesake"', *Futures*, vol. 42, no. 3, pp. 190–194.
- Markley, O 2012, 'Imaginal Visioning for Prophetic Foresight', *Journal of Futures Studies*, vol. 17, no. 1, pp. 5–24.
- Masini, E 2006, 'Rethinking futures studies', *Futures*, vol. 38, no. 10, pp. 1158–1168.
- Masini, EB 1987, 'Women as builders of the future', *Futures*, vol. 19, no. 4, pp. 431–436.
- Masini, EB 2001, 'New challenges for futures studies', *Futures*, vol. 33, no. 7, pp. 637–647.
- Masini, EB 2009, 'Luis De Molina as a precursor of the basis for philosophical and ethical thinking in Futures Studies', *Futura*, vol. 28, no. 1, pp. 6–14.
- Matthew, H, Folarin, A & Ranald, M 2016, *Complexity and Crisis in the Financial System: Critical Perspectives on the Evolution of American and British Banking*, Edward Elgar, Cheltenham, UK.
- McInnis, C, James, R & Morris, A 1995, *The Masters Degree by Coursework: Growth, Diversity and Quality Assurance*, DETYA, Canberra, Australia.
- McLeod, J & Thomson, R 2009, *Researching Social Change*, Sage, London.
- Mellor, DH 1998, *Real Time II*, Routledge, London.
- Mermet, L 2009, 'Extending the perimeter of reflexive debate on futures research: An open framework', *Futures*, vol. 41, no. 2, pp. 105–115.
- Mermet, L, Fuller, T & van der Helm, R 2009, 'Re-examining and renewing theoretical underpinnings of the futures field: A pressing and long-term challenge', *Futures*, vol. 41, no. 2, pp. 67–70.
- Miles, MB, Huberman, AM & Saldana, J 2013, *Qualitative Data Analysis: A Methods Sourcebook*, 3rd edn, Sage, London.
- Milojević, I 2008, 'Timing feminism, feminising time', *Futures*, vol. 40, no. 4, pp. 329–345.

- Minichiello, V, Aroni, R, Timewell, E & Alexander, L 1992, *In-Depth Interviewing: Researching People*, Longman Cheshire, Melbourne.
- Mintzberg, H & Azevedo, G 2012, 'Fostering "Why not?" social initiatives – beyond business and governments', *Development in Practice*, vol. 22, no. 7, pp. 895–908.
- Mistry, J, White, F & Berardi, A 2009, 'Skills at master's level in geography Higher Education: Teaching, learning and applying', *Journal of Geography in Higher Education*, vol. 33, no. 1, pp. 123–148.
- Moen, P 1995, 'Introduction', in P Moen, GH Elder Jr & K Lüscher (eds), *Examining Lives in Context: Perspectives on the Ecology of Human Development*, American Psychological Association, Washington DC, pp. 1–11.
- Moen, P, Elder Jr, GH & Lüscher, K (eds), 1995, *Examining Lives in Context: Perspectives on the Ecology of Human Development*, American Psychological Association, Washington DC.
- Mol, A 1999, 'Ontological politics. A word and some questions', in J Law & J Hassard (eds), *Actor Network Theory and After*, Blackwell, Oxford, UK, pp. 74–89.
- Mol, A 2010, 'Actor–network theory: sensitive terms and enduring tensions', *Kölner Zeitschrift für Soziologie und Sozialpsychologie. Sonderheft*, vol. 50, pp. 253–269.
- Morin, E 1999, *Seven complex lessons in education for the future*, UNESCO, Paris.
- Müller-Seitz, G & Macpherson, A 2014, 'Learning during crisis as a "war for meaning": The case of the German *Escherichia coli* outbreak in 2011', *Management Learning*, vol. 45, no. 5, pp. 593–608.
- Nandy, A 1993, 'Futures studies: Pluralizing human destiny', *Futures*, vol. 25, no. 4, pp. 464–465.
- Nandy, A 1999, 'Futures and dissent', in Z Sardar (ed.), *Rescuing All Our Futures: The Future of Futures Studies*, Praeger, Westport, Connecticut, pp. 227–233.
- O'Rand, AM 1998, 'The craft of life course studies', in JZ Giele & JGH Elder (eds), *Methods of Life Course Research: Qualitative and Quantitative Approaches*, Sage, Thousand Oaks, CA, pp. 52–75.
- OECD 2017, *Education at a Glance 2017: OECD Indicators*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/eag-2017-en>.
- Öner, MA 2010, 'On theory building in foresight and futures studies: A discussion note', *Futures*, vol. 42, no. 9, pp. 1019–1030.
- Péguy, C 1961, 'Un nouveau théologien, M. Fernand Laudet [A New Theologian, Mr Fernand Laudet]', in C Péguy (ed.), *Œuvres en Prose, 1909–1914 [Works in Prose, 1909–1914]*, Gallimard, Paris, pp. 893–1095.
- Pickering, A 2008, 'New ontologies', in A Pickering & K Guzik (eds), *The Mangle in Practice: Science, Society, and Becoming*, Duke University Press, Durham, pp. 1–14.
- Piirainen, KA & Gonzalez, RA 2015, 'Theory of and within foresight—"What does a theory of foresight even mean?"', *Technological Forecasting and Social Change*, vol. 96, pp. 191–201.
- Poidevin, RL 2009, 'Introduction to Part III: The study of nature', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. 415–419.
- Polak, F 1973, *The Image of the Future*, Elsevier, Amsterdam.
- Postill, J 2002, 'Clock and calendar time: A missing anthropological problem', *Time & Society*, vol. 11, no. 2-3, pp. 251–270.
- Price, H 1996, *Time's Arrow & Archimedes' Point: New Directions for the Physics of Time*, Oxford University Press, New York.
- Price, H 2011, 'The flow of time', in C Callender (ed.), *The Oxford Handbook of Philosophy of Time*, Oxford University Press, pp. 276–311.
- Radloff, A, Coates, H, Taylor, R, James, R & Krause, K-L 2013, *2012 University Experience Survey National Report*, Department of Industry, Innovation, Science, Research and Tertiary Education, Canberra.

- Ramos, J 2006, 'Introduction: Action research and futures studies', *Futures*, vol. 38, no. 6, pp. 639–641.
- Reid, I, Rennie, L & Shortland-Jones, B 2005, Best practice in professional postgraduate coursework: Report of an investigation commissioned by the Australian Universities Teaching Committee, viewed 2 December 2017, <<http://www.newcourses2012.uwa.edu.au/staff/?a=494334>>.
- Rescher, N 1996, *Process Metaphysics: An Introduction to Process Philosophy*, State University of New York Press, Albany.
- Rescher, N 1998, *Predicting the Future: An Introduction to the Theory of Forecasting*, State University of New York Press, Albany.
- Restivo, S 1981, 'Some perspectives in contemporary sociology of science', *Science, Technology, & Human Values*, vol. 6, no. 35, pp. 22–30.
- Rheinberger, H-J 1992a, 'Experiment, difference, and writing: I. Tracing protein synthesis', *Studies in History and Philosophy of Science Part A*, vol. 23, no. 2, pp. 305–331.
- Rheinberger, H-J 1992b, 'Experiment, difference, and writing: II. The laboratory production of transfer RNA', *Studies in History and Philosophy of Science Part A*, vol. 23, no. 3, pp. 389–422.
- Ross, SD 1983, *Perspective in Whitehead's Metaphysics*, State University of New York Press, Albany.
- Roth, S & Kaivo-oja, J 2016, 'Is the future a political economy? Functional analysis of three leading foresight and futures studies journals', *Futures*, vol. 81, pp. 15–26.
- Rowland, NJ & Spaniol, MJ 2015, 'The future multiple', *Foresight*, vol. 17, no. 6, pp. 556–573.
- Roy, B 2006, 'A process model of integral theory', *Integral Review*, vol. 3, pp. 118–152.
- Saldana, J 2013, *The Coding Manual for Qualitative Researchers*, 2nd edn, Sage, London.
- Sanna, LJ & Chang, EC (eds), 2006, *Judgments over Time: The Interplay of Thoughts, Feelings, and Behaviors*, Oxford University Press, New York.
- Sardar, Z 1993, 'Colonizing the future: The 'other' dimension of futures studies', *Futures*, vol. 25, no. 2, pp. 179–187.
- Sardar, Z 1999a, 'Dissenting futures and dissent in the future', *Futures*, vol. 31, no. 2, pp. 139–146.
- Sardar, Z (ed.) 1999b, *Rescuing All Our Futures: The Future of Futures Studies*, Praeger, Westport, Connecticut.
- Sardar, Z & Sweeney, JA 2016, 'The three tomorrows of postnormal times', *Futures*, vol. 75, pp. 1–13.
- Scanlon, L (ed.) 2011, *"Becoming" a Professional: An Interdisciplinary Analysis of Professional Learning*, Springer, New York.
- Scharmer, CO 2007, *Theory U: Leading from the Future as It Emerges*, The Society for Organizational Learning, Cambridge, MA.
- Schatzki, TR, Knorr-Cetina, K & Von Savigny, E 2001, *The Practice Turn in Contemporary Theory*, Routledge, New York.
- Schmidgen, H 2013, 'The materiality of things? Bruno Latour, Charles Péguy and the history of science', *History of the Human Sciences*, vol. 26, no. 1, pp. 3–28.
- Schmidgen, H & Custance, G 2014, *Bruno Latour in Pieces*, Fordham University Press, Bronx, NY.
- Schon, DA 1973, *Beyond the Stable State: Public and Private Learning in a Changing Society*, Penguin, Middlesex, England.
- Sedley, D 2009, 'Presocratic themes: Being, not-being and mind', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. 415–419.
- Seligman, MEP, Railton, P, Baumeister, RF & Sripada, C 2013, 'Navigating into the future or driven by the past', *Perspectives on Psychological Science*, vol. 8, no. 2, pp. 119–141.
- Serres, M & Latour, B 1995, *Conversations on Science, Culture, and Time*, Translated by Roxanne Lapidus, University of Michigan, USA.

- Shapin, S 1995, 'Here and everywhere – sociology of scientific knowledge', *Annual Review of Sociology*, vol. 21, pp. 289–321.
- Shaw, I 2013, 'The "art object" as an epistemic process: Contesting difference in mounting an exhibition of paintings of the "Middle East"', *Journal of Material Culture*, vol. 18, no. 4, pp. 409–422.
- Simons, P 2009a, 'Introduction to Part 1: Millennia of metaphysics?', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. xviii–xxii.
- Simons, P 2009b, 'Whitehead: Process and cosmology', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. 181–190.
- Sin, C 2012, 'Researching research in master's degrees in Europe', *European Educational Research Journal*, vol. 11, no. 2, pp. 290–301.
- Slaughter, R, Inayatullah, S & Ramos, J (eds), 2005, *Knowledge Base of Futures Studies*, Foresight International, Brisbane.
- Slaughter, RA 1993, 'Responding to the inner voices of an irritated text: A response to 'Colonizing the future'', *Futures*, vol. 25, no. 2, pp. 188–190.
- Slaughter, RA 1999, 'Professional standards in futures work', *Futures*, vol. 31, no. 8, pp. 835–851.
- Slaughter, RA 2002a, 'From forecasting and scenarios to social construction: Changing methodological paradigms in futures studies', *Foresight*, vol. 4, no. 3, pp. 26–31.
- Slaughter, RA 2002b, 'Where now for futures studies?', *Futures*, vol. 34, no. 3-4, pp. 229–233.
- Slaughter, RA 2004, *Futures Beyond Dystopia: Creating Social Foresight*, RoutledgeFalmer, London.
- Slaughter, RA 2005, 'World Futures Studies Federation: Histories and futures', *Futures*, vol. 37, no. 5, pp. 349–353.
- Slaughter, RA 2008, 'Integral futures methodologies', *Futures*, vol. 40, no. 2, pp. 103–108.
- Slaughter, RA 2012, *To See With Fresh Eyes: Integral Futures and the Global Emergency*, Foresight International, Indooroopilly, QLD.
- Son, H 2015, 'The history of Western futures studies: An exploration of the intellectual traditions and three-phase periodization', *Futures*, vol. 66, pp. 120–137.
- Stengers, I 2011, *Thinking with Whitehead: A Free and Wild Creation of Concepts*, Translated by Michael Chase, Harvard University Press, Cambridge.
- Stevenson, T 2002, 'Anticipatory action learning: Conversations about the future', *Futures*, vol. 34, no. 5, pp. 417–425.
- Stroll, A 2009, 'Metaphysics revived', in RL Poidevin, P Simons, A McGonigal & RP Cameron (eds), *The Routledge Companion to Metaphysics*, Routledge, Oxon, Great Britain, pp. 209–218.
- Su, Y 2014, 'Self-directed, genuine graduate attributes: the person-based approach', *Higher Education Research & Development*, vol. 33, no. 6, pp. 1208–1220.
- Susanne, RC-G 2004, 'Making the case for a developmental perspective', *Industrial and Commercial Training*, vol. 36, no. 7, pp. 275–281.
- Taleb, NN 2007, *The Black Swan: The Impact of the Highly Improbable*, 2nd edn, Penguin, London.
- ten Have, P 2004, *Understanding Qualitative Research and Ethnomethodology*, Sage, London.
- The LEAP National Leadership Council 2007, *College Learning for the New Global Century*, Association of American Colleges and Universities, Washington, DC.
- The Millennium Project 2014, *The Millennium Project: A Global Foresight Network*, The Millennium Project, viewed 10 April 2017, <<http://www.millennium-project.org/>>.
- Thrift, N 2004, 'Thick time', *Organization*, vol. 11, no. 6, pp. 873–880.

- Torbert, WR 2000, 'A developmental approach to social science: A model for analyzing Charles Alexander's scientific contributions', *Journal of Adult Development*, vol. 7, no. 4, pp. 255–267.
- University of Houston College of Technology Foresight 2017, *Our Graduates*, viewed 15 February 2017, <<http://www.houstonfutures.org/>>.
- van Asselt, MBA, van 't Klooster, SA, van Notten, PWF & Smits, LA 2012, *Foresight in Action: Developing Policy-Oriented Scenarios*, Taylor and Francis, Florence, USA.
- Verran, H 1999, 'Staying true to the laughter in Nigerian classrooms', in J Law & J Hassard (eds), *Actor Network Theory and After*, Blackwell, Oxford, UK, pp. 136–155.
- Voros, J 2007, 'On the philosophical foundations of futures research', in P van der Duin (ed.), *Knowing Tomorrow? How Science Deals with the Future*, Eburon, Delft, Netherlands, pp. 69–90.
- Voros, J 2008, 'Integral Futures: An approach to futures inquiry', *Futures*, vol. 40, no. 2, pp. 190–201.
- Waller, V, Farquharson, K & Dempsey, D 2016, *Qualitative Social Research: Contemporary Methods for the Digital Age*, Sage, London.
- Wansleben, L 2014, 'Consistent forecasting vs. anchoring of market stories: Two cultures of modeling and model use in a bank', *Science in Context*, vol. 27, no. 4, pp. 605–630.
- Weekes, A 2004, 'Process philosophy: *via idearum* or *via negativa*?', in M Weber (ed.), *After Whitehead: Rescher on Process Metaphysics*, Ontos-Verlag, Frankfurt, Lancaster, pp. 223–266.
- Werle, F & Seidl, D 2015, 'The layered materiality of strategizing: Epistemic objects and the interplay between material artefacts in the exploration of strategic topics', *British Journal of Management*, vol. 26, no. S1, pp. S67–S89.
- Whitehead, AN 1979, *Process and Reality: An Essay in Cosmology*, corrected edn, DR Griffin & DW Sherbourne (eds), The Free Press, New York.
- Wilber, K 2001, *A theory of everything: An Integral vision for Business, Politics, Science, and Spirituality*, Gill & Macmillan, Dublin.
- Wildman, P & Inayatullah, S 1996, 'Ways of knowing, culture, communication and the pedagogies of the future', *Futures*, vol. 28, no. 8, pp. 723–740.
- Wilkie, A & Michael, M 2009, 'Expectation and mobilisation', *Science, Technology, & Human Values*, vol. 34, no. 4, pp. 502–522.
- Willig, C 2012, *Qualitative Interpretation and Analysis in Psychology*, McGraw-Hill/Open University Press, Maidenhead, UK.
- Wilson, A & Wilson, D 1971, 'Futures-orientation: Toward the institutionalization of change', in M Maruyama & JA Dator (eds), *Human Futuristics*, Social Science Research Institute, University of Hawaii, Honolulu, pp. 86–113.
- Woolgar, S 1983, 'Irony in the social study of science', in KD Knorr-Cetina & M Mulkay (eds), *Science Observed: Perspectives on the Social Study of Science*, Sage, London, pp. 239–266.
- World Bank 2018, *World Development Report 2018: Learning to Realize Education's Promise*, Washington, DC, doi:10.1596/978-1-4648-1096-1.
- World Future Society 2016, *Introducing the World's Leading Community of Futurists*, World Future Society, viewed 10 April 2017, <<https://wfs.org/>>.
- World Futures Studies Federation 2016, *WFSF in Brief*, World Futures Studies Federation, viewed 10 April 2017, <<http://www.wfsf.org/>>.
- Zeidan, RM & Richardson, K 2010, 'Complexity theory and the financial crises: A critical review', *Corporate Finance Review*, vol. 14, no. 6, pp. 10–16.

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## Appendices

### Appendix I Ethical clearance

**Vivienne Waller**

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**From:** resethics@swin.edu.au  
**Sent:** Wednesday, 4 January 2017 10:25 AM  
**To:** Vivienne Waller  
**Cc:** RES Ethics  
**Subject:** Acknowledgement of Report for SUHREC Project - 2014/316

Dear Vivienne Waller,

Re: Progress Report for the project (Report Date: 04-01-2017)

2014/316 'Exploring the life course development of individuals with post graduate foresight (future studies) education'

The Progress report for the above project (Report Date: 04-01-2017) has been processed and satisfies the reporting requirements set under the terms of ethics clearance.

Research Ethics Team

Swinburne Research (H68)  
Swinburne University of Technology  
PO Box 218  
HAWTHORN VIC 3122  
Tel: 03 9214 3845  
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Appendix II Demographic survey and 'As-it-was Life Chart'

**SHORT SURVEY**

This background information will assist during analysis of the interviews. Answering or not answering these questions does not affect your participation in this research.

**Background Information**

Gender: ..... Age: .....  
Post High school Qualification(s): .....  
.....  
.....  
Current Occupation(s): .....  
.....

Details of Master of Strategic Foresight (or similar) education

University name: .....  
Foresight/Futures Studies qualification title (e.g., MA in Strategic Foresight):  
.....  
Study mode (eg full time, part time online):  
.....  
Local or International student?: .....  
Progress through course (eg completed in 2007, currently first year):  
.....

**'As-it-was' Life Chart (on the next page)**

Life charts have been found to be a helpful approach for thinking about and reviving past life segments. The chart will be used during the interview. Completing the chart does not affect your participation in this research.

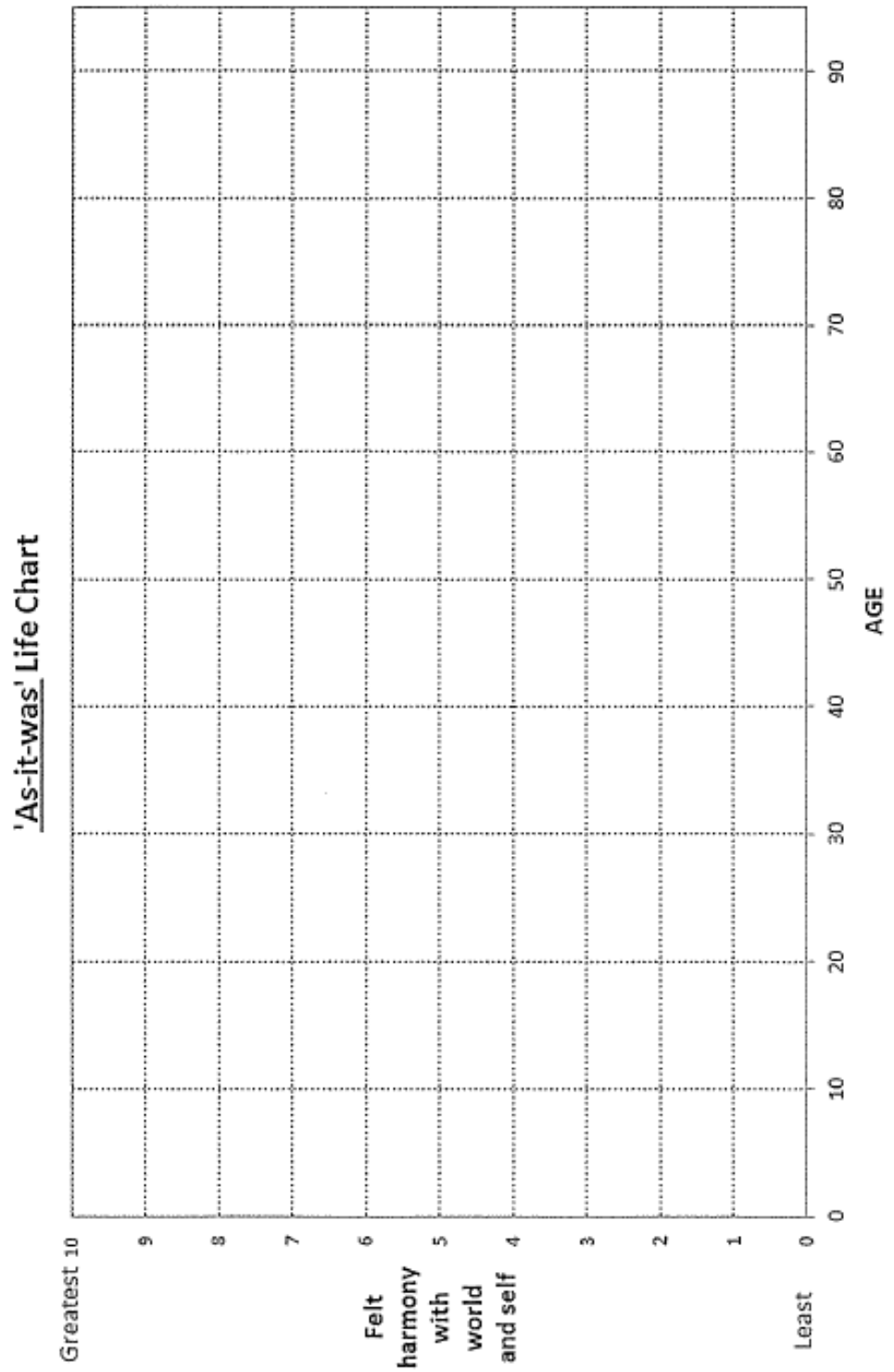
Guidelines for completing the chart

There is no wrong or right way to complete the chart. On the chart plot a line at each age (or between periods) representing the extent to which you felt in harmony with the world and self. The chart is concerned with how it felt to you at that time of your life. Feel free to modify the age scale for more space.

Briefly label:

- the high and low points of the plot,
- major critical events experienced,
- important reorientation of priorities you made that led to major transitions,
- major turning points where your life took a different direction, and
- the situations/moments of greatest doubt you experienced.

**Thank you**





## Appendix III Participant information

Pseudonym	Frida	Riley	Cloey	Robert	Julii	Tyler	Diego	Carly	Ayumi
Age	42	44	51	58	32	38	36	29	61
Post High school Qualification(s)	BSc Eng (Hons); PhD; MFS	BSc(Hons) Physics; MFS	MA	BE(Hons); BSc; MEnvSc; MBA; MFS	BComm	B Computer Science	IT	B Social Science & Economics	MFS
Current Occupational area	FS & Consulting	Consulting & Research	Higher Education	Policy	Company communications	Project Manager	Full time student	Tax office	Consulting & Higher Education
MSF study mode (eg full time, part time online)	Part time, intensives	Part time	Part time	Part time	Part time	Part time	Full time	Full time	Part time online
Local or International student	Local	Local	Local	Local	Local	Local	International	International	Both
Interview recording lengths	1:27:52	1:23:00	1:14:47	1:30:59	1:29:29	1:33:50	1:49:33	1:02:07	1:27:35
	1:17:01	1:29:45	1:51:58	0:30:08	0:50:02	0:59:12	1:21:27	0:53:21	1:23:35
	0:16:38	0:53:25	0:36:29	1:35:28	0:16:47		0:30:56	0:05:21	0:36:11