The emergent phenomena of a complex world produce novel situations and opportunities that are difficult to prepare or plan for. Futures Literacy is proposed as a participatory transformative practice for developing capabilities that help individuals to both sense, and make sense of, novelty, through anticipation for emergence. This dissertation contributes to the empirical basis of how engaging in critical self-reflection as a collective, produces valuable insights into how assumptions form the lenses through which we imagine times later than now.

The learnings that occur when individuals encounter simulated emergence in a challenging but supportive and creative environment, and the products of that process in terms of concrete actions, are contextualised within Futures Literacy learning journeys. This dissertation explores the role of transformative learning for understanding the social learning that occurs at a Futures Literacy Laboratory (FLL) through analysis of participant experiences and reflections using the Wenger-Trayner value creation framework.

This study articulates that learning through anticipation for emergence is characterised by complexity, impredicavity, and reflexivity, which requires a broad range of cognitive and emotional skills to navigate. Participants of an FLL who are open to the process encounter deeply challenging critiques and insights that come to be understood as significant steps in understanding the inner sources of anticipatory assumptions. If these can then be explored under conditions of psychological safety, then alternative lenses become available that allow for the enhanced perception of the emerging present as well as their own boundaries. This process is cognitively and emotionally demanding and contingent on enabling factors and initial conditions.

Weaving the participant experiences of this event into a broader narrative of learning provides opens opportunities for individual insights and practice, but also opportunities for new avenues of research. The results indicate that there is positive evidence that FLLs provoke reconsideration of established assumptions and can foster new lines of thinking. Situating FLLs as Transformative and social learning spaces, allows for the identification of practical implications and the generation of learning narratives than contribute to our understanding of the change processes at play in Futures Literacy capability building.

Key words	Futures Literacy, Anticipation Studies, Transformative Learning, Social Learning, Wenger-Trayner Value Creation Framework

LEARNING THROUGH THE LOOKING GLASS

Anticipation through the Lens of Social and Transformative Learning at a Futures Literacy Laboratory

Master's Thesis
in Futures Studies

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LIST OF ABBREVIATIONS

CIKCP – Collective Intelligence Knowledge Creation Process
C-KIC – Climate – Knowledge Innovation Community
DD – Deep Demonstration
EIT – European Institute of Innovation and Technology
FFRC – Finland Futures Research Centre
FL – Futures Literacy
FLL – Futures Literacy Laboratory
FLxDeep – Futures Literacy Across the Deep
TL – Transformative Learning
UTU – University of Turku

Man knows himself only to the extent that he knows the world;
he becomes aware of himself only within the world,
and aware of the world only within himself.
Every object, well contemplated, opens up a new organ of
perception within us.
– Johann Wolfgang v. Goethe

1   INTRODUCTION

Students of history, politics, economics and particularly futures studies are often preoccupied with fundamental changes (Tuomi, 2017). Like the tectonic stresses that give rise to earthquakes, the forces that contribute to these revolutions or transformations are constantly at play underneath the surface, but rarely become visible until a surprising new event occurs. The complex systems of the human world are equally prone to shocks and surprises; recent events such as Brexit, the Covid-19 pandemic, and the invasion of a European democracy are all illustrative examples. Anticipation Studies and Futures Literacy are relative newcomers to the diverse field of futures studies, yet they provide compelling new ways of perceiving and understanding change. Of particular interest to these new ways of relating to futures studies, a shift is occurring from seeking to identify and control exogenous forces of change towards an exploration of the endogenous instruments of perception that we use to make sense of change. Developing human capacities that harness anticipation for emergence could provide an intriguing new way to disrupt the biases and assumptions that impair the exercise of human imagination and agency in relation to surprising futures.

All life anticipates all the time (Rosen, 1985). Humans engage in conscious anticipation daily to plan and prepare, which often taps into the material dimension of the future (the latent potential of the present that may be expressed over time), such as a coiled spring, radioactive half-life, or greenhouse gas build-up in the atmosphere. There is also a human dimension to the future, the sets of beliefs, models, and images that people have about times later than now, which are also taken into account in planning and preparation activities, but which are prone to much greater uncertainties due to the adaptive and collective nature of social activity. Simply understanding what is happening now, let alone understanding what the future will, or could be, requires the expenditure of a huge amount of energy and attention. It is not surprising, then, that humans take short cuts and make assumptions based on historical patterns, often relying on second hand information and assessments, creating a composite mosaic image from available sources. These images of futures colour the lens through which we anticipate, and so influence the decisions we make in the present. Outside certain academic circles, humans rarely give much thought to reflecting on the inputs to the processes of anticipation. Becoming more futures literate is about developing the personal capacities that

contribute to process of anticipating what the future could be, but also imagining how the future could be different. According to Miller,

> *"The gist is a dual hypothesis: first, that being futures literate improves the ability of people to sense and make-sense of novelty, including the richness of ephemeral time-space unique phenomena; and second, that this enhanced ability to appreciate, even cultivate complexity ... might enable humans to adopt strategies intended to improve our prospects for resilience as a species by using the gift of human agency in ways that are more balanced between planning and creative spontaneity, between continuity based insurance of risk and diversification that embraces uncertainty."* (Miller, 2018, p. 9)

The importance of this, which he calls Anticipation for Emergence, lies in its shift of emphasis, from the idea of the future as something external, something that will happen to us, to a recognition that futures are generated internally through collective and individual ways of relating to experiences and the environments in which they occur. Whereas a parallel development in the field, Futures Consciousness, describes the psychological capacities that constitute futures thinking, the practice of Futures Literacy describes a means by which interventions can act directly to develop individuals' anticipatory capabilities. This comprises an increased awareness of the broad processes of change that are already happening, as well as awareness of how assumptions influence the perception of, and relation to, these processes. An integral element of futures literacy is learning to become more resilient and more nuanced in our understanding of the lenses used to generate the futures we depend upon for our day-to-day decision making.

Anticipation for Emergence in its present form has only recently become an area of interest to the academic futures community, and so relatively little empirical validation of its framework and core processes has so far been accomplished. The Futures Literacy Laboratory (FLL) exposes participants to simulated emergent futures in a challenging but supportive environment. FLLs proceed through a staged process that harnesses the collective sensemaking capacities of a group of participants while facilitators support the self-reflection processes to instigate development of this new capability called Futures Literacy. The primary foci of this research are whether, and if so how, transformations occur in perspective and capability through the learning engendered by this process.

Futures Literacy Laboratories have been conducted on numerous occasions within the UNESCO network in the last decade, fourteen of which have been presented as case studies by Miller (2018a). Yet, to date, the only systematic evaluation assessing the link between FL development outcomes and FL as a capability has been conducted by Damhof (Damhof *et al.*, 2020).

This dissertation adds new empirical understanding of the evaluation of FLLs, arising from an opportunity to observe the Net-zero Maritime Hubs Futures Literacy Laboratory organised in Turku in October 2019. This event also provided transcripts of working group discussions and access to group facilitator expert insights; these, together with the participant-observer experience, were used to address the research questions that arise at the intersection of transformative learning and futures literacy capability development.

1.1   Research Problem and Research Questions

Much of the evidence for FL has not been generated from systematically assessed processes, and so reports of its efficacy are (for the most part) anecdotal and based on practice rather than empirical evidence. The opportunity to evaluate the efficiency and efficacy of the futures literacy process for producing transformational learning that could be equated with the development of futures literacy as a capability is intriguing but subject to significant complexities. Perhaps the most difficult element of this is that it is impossible to observe directly the learning occurring in the brains of participants, and thus must rely on reported experiences of the process. Furthermore, disentangling whether a given individual would have come to the same conclusions with or without having participated in the lab, or simply by another route, is also impossible to know. In light of this, learning is considered to be an ongoing, non-linear and complex process, within which this event is just one among many that the participant will encounter on their journey of learning about futures literacy. Learning is considered to be the act of identifying, negotiating and creating meaning which has subjective value, in this work sense-making and meaning-making are considered to be integral to learning. There is also the issue of being unable to know what opportunities would have otherwise been missed, or taken, had assumptions not been reconsidered at the FLL. This study follows the approach of using the researcher-as-a-lens, to make useful interpretations of the qualitative data in narrative form that can be used as the basis for further learning and research. While the direct contributions of FL to innovation processes and in its benefits to actors

engaged in whole systems transition processes are likewise nearly impossible to observe directly, this study provides thematically organised observations linked to recommendations gathered from throughout the event. The intent here is to mobilize the suggestions and ideas of the participants themselves who have the closest knowledge of the working environment of their organisations and link them to the expertise of the facilitators to provide suggestions that will be of most use to the specific situation of the participants after the event.

Aims

Given the limited investigation of the dynamics of FLLs, this study will aim to identify and evaluate what, and how, participant experiences contribute to the development of anticipatory capacity through transformative learning dynamics.

Objectives

1. To identify examples of learning occurring through collective meaning making processes within the FLL.
2. Using participant observation, to synthesise aspects of the FLL experience into a summative interpretation of its dynamics.
3. To produce recommendations for developing futures literacy practice in the context of the participants' organisations.

1.1.1   Research Questions

1) What did the participants of the Net-Zero Maritime Hubs Turku 2019 FLL experience? If experience is understood as to be taking place in the form of value creation through social learning.
2) What stories of learning are visible in the findings?
3) What prospective value was anticipated from the FLL experience, and what recommendations for enhancing and sustaining this value creation can be made?

1.1.2   Boundaries of the Research

This study reports on the findings of the Futures Literacy Laboratory held in Turku in 2019 and takes some initial steps in organising the findings in creative ways to produce further insights. Establishing causal relationships is not the purpose of this investigation. The study was initiated in the context of an ongoing real-world project to produce in-

sights from an evaluation of Futures Literacy practice. As the project came to its conclusion at the end of 2020, the scope of this study was expanded and came to be used to inform Futures Literacy practice in numerous FLLs and FL training events held since then. Exploring the links between FL practice and participant experiences and the contributions of transformative learning remain the boundaries of this research.

1.2 Structure of the Dissertation

Chapter 1 – Introduction, introduces the problem of learning to better understand ongoing transformations through anticipation for emergence and its associated personal capability, Futures Literacy, addressed in this study. The aims of this study are defined as identifying and evaluating how participant experiences contribute to the development of anticipatory capacities through transformative learning dynamics. Chapter 2 – Theoretical Background, defines and summarises the core conceptual frameworks used in this thesis and contextualises them in relation to Anticipation studies. The Futures Literacy framework of Riel Miller is explained in relation to the three paradigms of futures studies used in this thesis: forecasting, foresight, and social constructivist foresight. Furthermore, transformative and social learning theories are briefly introduced to help conceptualise the transformative learning space of a futures literacy laboratory. Chapter 3 – Methodology briefly describes the materials and data gathering procedure used as the basis for analysis of the Turku 2019 FLL. Chapter 4 – Findings, presents a compilation of the six areas of findings organised according to the Wenger-Trayner value creation through social learning framework. Chapter 5 – Analysis, firstly organises the learning dynamics of participants as narratives, and secondly links thematic observations with participant and facilitator recommendations. Chapter 6 – Discussion, reflects on how the answers to the research questions fit into the wider research context, with discussion of relevant themes from the theoretical framework and an evaluation of the research process. Chapter 7 – Conclusion summarizes the findings of this study and provides final thoughts.

2 THEORETICAL BACKGROUND

This chapter reviews the current knowledge that informs the approach and concepts used in this study. The first part of this chapter situates Futures Literacy in relation to futures studies. This is accomplished by using a typological comparison of approaches within the field that study anticipation. The concepts and frameworks that define Futures Literacy are then introduced and briefly elaborated. The second part of this chapter introduces selected concepts from transformative learning and social learning theories that help to address specific issues related to the research problem.

2.1 Anticipation and Futures Literacy

Anticipation as a concept and anticipation studies as a field of research are both relative newcomers to the fragmented and diverse field of futures studies (Marien, 2002, 275; Kuosa, 2011, 331; Son, 2015, 127-128). Situating anticipation studies within the array of existing frames of futures research is the first objective of this section, to this end the six foresight frames (Minkkinen, Auffermann & Ahokas, 2019) are used as a guiding framework. The ontological assumptions of anticipation studies, emergence, complexity, and intersubjectivity are defined and explained. Two key concepts that link anticipation studies and Futures Literacy, anticipatory systems, and anticipatory assumptions are then introduced and elaborated, before moving into an overview of the Futures Literacy framework. Finally, the generic design of a futures literacy laboratory (FLL) is described.

2.1.1 Social Constructivist Foresight

Anticipation studies is variously referred to as 'the third level of Futures Studies' (Poli, 2017a, p. 5); 'social foresight' (Poli, 2015a), and 'design-oriented foresight' and 'constructivist foresight' (Tuomi, 2019, 8-9). To understand the positioning of anticipation studies in relation to the field of Futures Studies, it is useful to first illuminate the typical characteristics of the more established approaches of forecasting and foresight. As has been pointed out on numerous occasions (Marien, 2002, 275; Kuosa, 2011, 331; Son, 2015, 127-128), approaches within the field of futures studies are highly fragmented and lack a unifying theory or paradigm. Some scholars contend that this is not necessarily a negative characteristic, as it fosters a diversity of perspectives (Bell, 2002). Categorical distinctions in a field characterised by inter-, trans-, and multi-disciplinarity,

and without coherent schools of thought are rarely going to be more than vague general-isations, yet such simplifications are also necessary for comprehending the nuances between approaches. To this end, the six foresight frames (Minkkinen, Auffermann & Ahokas, 2019) are used as a guiding framework for unpacking and expanding on these differences. The six foresight frames framework was selected on the basis that it is both sensitive to established approaches within futures studies, while also drawing on the most current research on anticipation. Furthermore, the framework makes use of levels of organisation that provide a structured integration of multiple previous typologies (Anderson, 2010; Sharpe *et al.*, 2016; Miller, 2018a; Tuomi, 2019). The terms for approaches – forecasting, foresight, and (social) constructivist foresight – as well as the terms for the frames – predictive, planning, scenario, visionary, transformative, and critical – will be used for the sake of consistency where relevant in this work.

It is worth acknowledging that many such typologies of paradigms in futures studies have been identified previously to Minkkinen's. These typologies frequently consist of three levels (Tapio and Hietanen, 2002, p.598-602). From their review of typologies, Tapio and Hietanen point out that the first level often has "a discernible positivistic-technocratic-extrapolative-predictive-descriptive school of thought". This first level has a clear parallel to Minkkinen's forecasting, including the predictive and planning frames. No clear agreement seems to coalesce around the second level of these typologies. The third level, however, tends to represent the preferred paradigm of the author of the typology (Tapio and Hietanen, 2002, p.601). It is acknowledged that this study has also adopted a set of typological distinctions that is in line with Tapio and Hietanen's observations, although the caveat here is that the selection of the typologies is made not on the basis of the author's preferences, but rather on the basis of the typologies recognised by the literature most relevant to this work. Broadly speaking, the predictive and planning frames cohere to forecasting, the visionary and scenario frames are referred to as foresight, and the critical and transformative frames are situated within social constructivist foresight. All these frames can be considered as being interested in anticipation as a human activity, though they differ in ontological stance and epistemology (see figure 1). According to Minkkinen *et al.*, these differences give rise to different logics for how and why anticipated futures can be used. The differences depend on whether the system under consideration is seen to be more closed or open, and whether a more normative or interventionist stance is adopted.
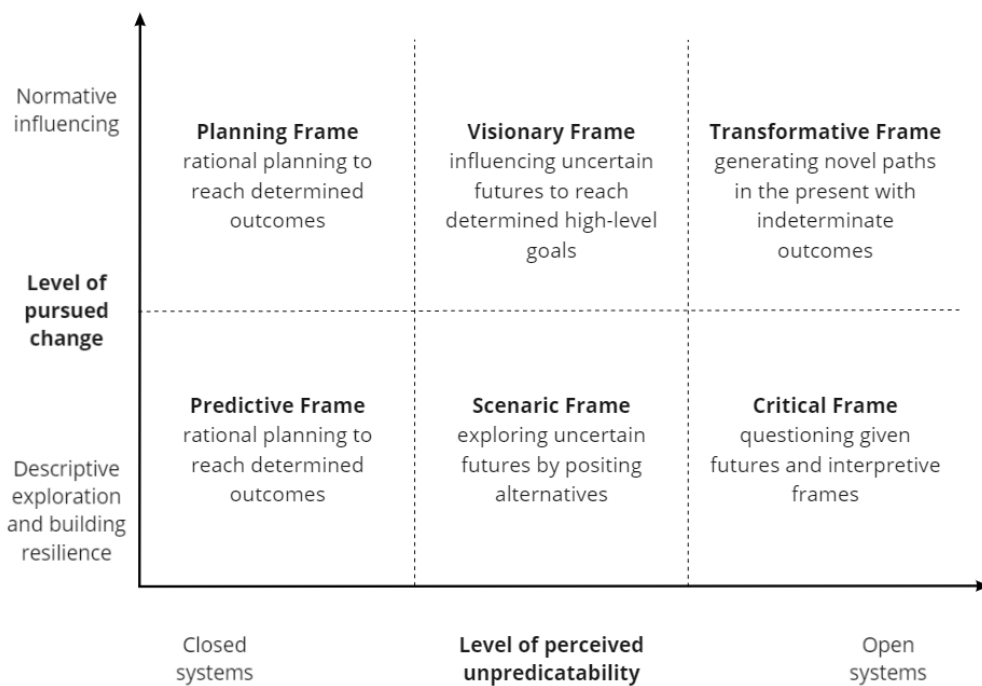
Figure 1 The six foresight frames, adapted from Minkkinen, Auffermann & Ahokas (2019)

First, a brief overview of the three general approaches within which the six frames fall will be provided, followed by a discussion of their differing ontological positions.

The predictive frame and planning frame can be considered to fall within the paradigm of forecasting. Within these frames, the future is assumed to be determined by the past and yet also amenable to pre-emptive action given sufficient warning. Predictions may be presumptively true, that is, true given the data available in the present moment, but it cannot be known whether the prediction will be terminally true, indeterminate or false (Bell, 2003, 230). In other words, predictions can influence future outcomes by becoming self-fulfilling, self-invalidating or self-defeating prophesies. Knowledge creation focuses on calculations based on quantitative data gathering, which is inherently historical in nature, and makes use of statistical methods to quantify probabilities. Closed system modelling with quantifiable inputs allows for the simulation of future states. The predictive frame is oriented towards preparation for probable contingencies through calculated futures based on quantitative empirical data gathering, applicable to very short or very long-term probabilistic forecasts e.g., economic forecasting and climate change. Minkkinen, Auffermann and Ahokas (2019, p. 6) identify the following methods with the frame including "trend extrapolation, predictive modelling, and expert

oriented methods e.g. Delphi", Miller goes on to observe that these are often applied to closed system simulations (Miller, 2018a, p. 27). The planning frame makes use of probable calculated futures to optimize technocratic road mapping, furthermore traditional back-casting and technological road-mapping are applied to closed systems subject to rational control. (Minkkinen et al.,2019, 6).

The scenaric and visionary frames fall within what is commonly recognised as foresight, although the approach contains many paradigms and approaches. The future is assumed to be composed of a combination of a "long shadow" of the past that extends into the future, or 'present futures' (Adam and Groves, 2007, 33), and the hopes, fears, expectations and ideas of *futura* (Poli, 2015, 88), leading to hybrid processes of knowledge creation. Foresight is concerned with processes for managing chronic uncertainty through the clarification and simplification of a wide diversity of alternatives down to meaningful strategic decisions. The scenaric frame prepares for possible contingencies through rigorously imagined futures based on hybrid qualitative-quantitative data gathering and interpretation methods. Traditionally, low agency has been assumed, and so the focus tends towards building resilience through pre-emptive adaptation. Traditional scenario planning is a typical example of the scenaric approach. The visionary frame focuses on methods that identify and gather support for the shaping of desirable 'future presents' to be implemented into an "empty and open" future (Adam and Groves, 2007, 33-37). The normative optimization of pathways towards the selected imagined possible future is exercised in the context of semi-open systems, examples of this include sustainability visioning, policy visions, and participatory pluralistic back-casting. (Minkkinen et al., 2019, 6).

The constructivist foresight approach encompasses the transformative and critical frames. Unlike the previous approaches, the generation of anticipated futures for the purpose of preparation or planning are not the primary purpose, but rather, the focus is on detecting emergence in the present, in which imagined and futures are used as the basis for detecting novelty; the deciphering of unknowable unknowns and the invention or discovery of phenomena that are surprising, different and unexpected (Louie and Poli, 2017; Miller, 2018a, pp. 27–28). The critical frame of the constructivist foresight approach identifies the assumptions embedded within e.g., worldviews, discourses, or paradigms that have been used to create probable, possible, or preferable futures through forecasting or foresight. The critical frame repositions futures in the context of alternative paradigms to support the detection of alternative, unimagined ways of under-

standing given futures. An example of this approach is Causal Layered Analysis used for strategic thinking. The transformative frame of constructivist foresight builds upon the reframing process of the critical frame to stimulate self-reflection for the purpose of sensing innovative ideas and the sensemaking of difference through experimentation and learning in participatory, reflexive processes. A key example of this is the Futures Literacy Laboratory (Miller, 2018a). (Minkkinen et al.,2019, 6).

Here, a brief foray into explaining the ontological foundations of the Six Foresight Frames, as depicted in Figure 2, provides further insight. These frames are organised along two axes comprised of ontological distinctions. The horizontal axis distinguishes between the openness of the system upon which a given approach bases its understanding of the future, ranging from closed systems to semi-closed/open systems, to open systems. This division aligns with the probabilistic, possibilistic, and constructivist approaches to understanding the future. Another way of understanding the implications of the openness of a system is in terms of perceived unpredictability, or complexity, with closed systems being simple and predictable, and increasingly open systems being increasingly impervious to prediction, to the point where one must focus primarily on uncertainties until one reaches the unresolvable complexity of open systems.
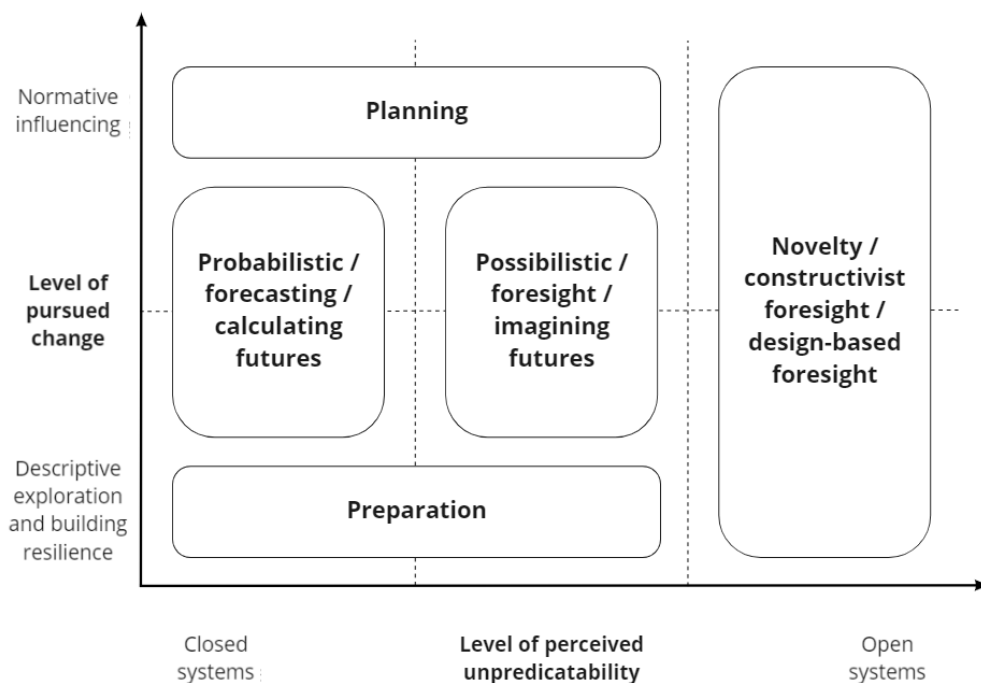
Figure 2 Ontological foundations of the six foresight frames, adapted from Minkkinen, Auffermann & Ahokas (2019)

The probabilistic approach focuses on closed systems, systems that can be reasonably understood in their entirety through reductionism, or the examination of constituent components. These systems follow Newtonian laws; continuity is assumed without exogenous influence and; it is therefore possible to enumerate probable futures through calculation based on sufficient historical quantitative data (Poli, 2017a; Minkkinen et al., 2019; Tuomi, 2019). On the other hand, possibilistic approaches consider the systems to be semi-closed/open, operating in the arena of known-unknowns rather than the known-knowns of closed systems, with an appreciation of the turbulence inherent to human systems. Such systems are characterised by discontinuities rather than continuity, and an imperviousness to reductionism. With this in mind, the approaches therefore considers it reasonable to make use of expert or aggregate qualitative data to describe and explore alternative possible imagined futures (Poli, 2017a; Minkkinen et al., 2019; Tuomi, 2019). The constructivist approach departs from the possibilistic approach in that, rather than focusing on uncertainty, it appreciates complexity, or "the emergence of phenomena from a plurality of interactions" (Louie and Poli, 2017, 2). The complex nature of the future is in its generation through self-referential relationships; complexity is both the source and the consequence of emergent phenomenon, which Poli and Louie refer to as impredicavity. The difference between complexity and uncertainty is that complexity can give rise to emergent novel phenomena, whereas uncertainty is an expression of inability to predict the outcome of a situation with multiple possible outcomes. Thus, if the future is considered to be complex rather than simply uncertain, then there is no guarantee that any knowledge relevant today will remain so in the future. Furthermore, as yet unimaginable emergent phenomena may make entirely new types of knowledge possible. In light of this, according to Tuomi, experimentation, learning and design are key capabilities necessary for generating knowledge in a present situated in an complex system characterised by emergent novel futures (Tuomi, 2019, 10). Tuomi places a strong emphasis on personal level capability building as a strategic response within this kind of environment. This conclusion is a critical argument for the role of futures literacy in building resilience to future surprises.

The vertical axis adds a second level of ontological distinction, based on whether a given approach is more reactive or proactive; specifically, the degree that the future is considered to be malleable by human agency. For forecasting and foresight, this takes the form of a distinction between approaches that focus more on preparation or planning; the former is more oriented towards describing, exploring and building the capaci-

ty to react to changes, whereas the latter is more oriented towards the rational identification of the action pathways towards a particular expected or imagined future (Minkkinen et al., 2019, 7). Planning and preparation are types of anticipatory system identified by Miller in the futures literacy framework. This framework will be fully described in the next section, but given that Minkkinen's typology partially integrates Miller's work, it is necessary to raise certain points here. Miller emphasizes the *contingent* nature of futures detected with the first level anticipatory systems of preparation (Miller, 2018a, p. 27), and observes that their ontological understanding of future is characterized by disruptions from external forces, which are then managed in terms of risk and opportunity., Miller goes on to point out that the second level anticipatory system of planning seeks to replicate *today's* ideas of the future, in the future; that is, they are optimization futures which seek to fill an 'open' and 'empty' future (Adam and Groves, 2007, 57) with patterns from the past and present, which can be rational or normative, both of which are measured and evaluated in terms of results.

Although various definitions of constructivism/constructionism exist, for the purposes of this study the term "constructivist foresight" used in the Minkkinen typology rests primarily on the work of Fuller and Loogma. The common thread of constructionism is a focus, not on defining the objective truth or an objective truth of reality, but rather on the construction of reality through social processes through reference to and interaction between shared symbols. An important distinction between 'constructivism' and 'social constructionism' is that the former "tends to be used in relation to individual (psychological) 'constructions of reality', whereas [the latter] asserts that meaning and understandings emerge from the interactions between people that is "neither objectively nor subjectively, but inter-subjectively" (Fuller and Loogma, 2009, p.72). This appreciation of inter-subjectivity is the commonality between critical and transformative frames that justifies their categorization as social-constructivist foresight, although of course there is considerable overlap, and the boundaries are permeable. When viewing the list of contributors to 'Anticipation studies' in comparison to those that identify as being aligned with 'social-constructivist foresight', one could consider the two to be near synonymous. That there is considerable overlap is hardly surprising, given that one has flowed from the other, and given the position that reality is social constructed then the recognition that complexity gives rise to emergent novel phenomena that creates

conditions of impredicavity, is relatively easy to incorporate into an ontological position.

2.1.2   Anticipation

This section defines various uses of the term 'anticipation'. Aside from the common usage of the word meaning all forward-looking perspectives and activities, there are two important technical usages that will be defined here.

'Anticipation' as a noun is broadly synonymous with the 'social constructivist foresight' defined in the previous section, that is, the area of futures studies that goes beyond forecasting and foresight to incorporate and appreciation of complexity, impredicavity, and inter-subjectivity (Poli, 2017a). This approach is termed anticipation studies throughout this work to distinguish it from the common usage term as well as anticipation as a subject. Some scholars also use 'anticipation' as a term to distinguish the subject of inquiry in the field of futures studies instead of 'futures'. Thus the 'Discipline of Anticipation' encompasses all approaches within futures studies that seriously consider the future, including forecasting, foresight, and anticipation studies (Miller, Poli, and Russel in Miller (ed) 2018a, p. 55). 'Anticipatory' as in 'anticipatory systems' specifically refers to Robert Rosen's framework, which is detailed below.

2.1.3   Anticipatory Systems

At its core, the concept of anticipation is primarily concerned with the mechanisms by which people use expectations about the future to inform their actions in the present (Poli, 2017a). Such mechanisms are termed anticipatory systems. The concept of an anticipatory system stems from the work of mathematical biologist Robert Rosen, who stated that the precondition for life is anticipation (Louie in Poli ed., 2017). Rosen defined an anticipatory system as "a system containing a predictive model of itself and/or its environment, which allows it to change state at an instant in accord with the model's predictions pertaining to a later instant" (Rosen, 1985, p.339). In other words, an anticipatory system responds to anticipated changes in its external environment before they occur, acting not only on post facto feedback from the environment but also ex ante feedforward on anticipated outcomes and consequences.

In a human social context, not only is the perception of reality, i.e. the external environment, socially constructed, but so too is the meaning of the anticipated changes. Tuomi calls this phenomena the "ontological expansion of reality", that is, the process of becoming through the constant innovation of ideas and material conditions (Tuomi, 2017). Reality comes to be 'known' at an individual, social and evolutionary level through the interaction between living things and their environment in a mutually constructing "ongoing process of action" (Tuomi, 2017, p.2-3). This layer of interpretation and creation of meaning clearly adds a level of complexity to the act of anticipating that moves us far beyond the realm of prediction, and even uncertainty.

According to the above definition of an anticipatory system, all life and so all humans anticipate constantly, albeit non-consciously, for example single celled organisms and trees. Riel Miller points to *conscious* human anticipation as being of key interest, as this area includes processes that generate anticipatory assumptions that are subject to choice whereas non-conscious anticipation is involuntary. Anticipatory assumptions are "what enable people to describe and invent imaginary futures" (Miller and Sandford, 2018, p.8). Anticipatory assumptions include the frames and models that inform the creation of content of future imaginaries. Considering the how and the why of the production of anticipatory assumptions through the interaction of collective knowledge creation processes and anticipatory systems is the focus of futures literacy (Miller, 2018a).

2.1.4   Futures Literacy Framework

The futures literacy framework (Miller, 2018a, pp. 20–34) distinguishes between three types of anticipatory system: planning, preparation, and novelty. The first two of these three anticipatory systems use futures for the purpose of 'anticipation for the future', whereas the third type of anticipatory system uses futures for the purpose of 'anticipation for emergence'. The futures literacy framework provides a conceptual framework for identifying six kinds of anticipatory assumption. However, these are discussed only briefly here to link with the discussions on anticipatory assumptions above.

In his explanation of the futures literacy framework, Miller first distinguishes between anticipation as a personal capability utilised in conscious anticipatory systems and the non-conscious anticipation exercised by flora and fauna, relevant in the fields of biology, sociology, physics etc, linking to Rosen's relational biology and situating futures literacy in the broader context of anticipation as an intrinsic property of life. Atten-

tion is then drawn to the three types of conscious anticipatory system: preparation, planning and novelty. The three types of anticipatory systems exist in parallel to forecasting, foresight and constructivist foresight (see figure 2 in the section above for an illustration how they relate). The addition of the second axis focusing on agency, or normative stance, allows distinction between forecasting using the future for preparation (predictive frame) and forecasting using the future for planning (planning frame), as well as foresight using the future for preparation (scenario frame) and foresight using the future for planning (visioning frame).

Type 1 anticipatory systems engage in preparation for contingent futures. The systems within which anticipations are generated are assumed to be closed or semi-closed. Within the predictive frame, predicted futures are generated to provide anticipatory knowledge of more or less certain future states. An example of this would be the use of an orrery, or mechanical model of the solar system, by ancient Greeks to predict on which days solar eclipses would occur. When considering systems that produce variability, in which multiple alternative future states coexist as potential outcomes, approaches within the scenario frame generate alternative images and pathways that could lead up to these future states. Knowledge of probable or possible futures is then used to pre-emptively adapt in anticipation of the contingent future state. (Miller, 2018a, pp. 59–60).

Type 2 anticipatory systems engage in planning for optimization futures. The systems within which anticipations are generated are assumed to be closed or semi-closed[1]. The main difference between type 1 and type 2 is that it is assumed that the future is malleable to human agency. Approaches within the planning frame make use of knowledge of the predictable consequences of actions to detail a roadmap of actions that will produce a future state that is optimal for the decision makers. A typical example of this use of the future is the innovation development roadmaps of computer chip manufacturers. Approaches within the visioning frame identify visions of preferable futures under the assumption that the pull of a preferable vision will be strong enough to attract change towards that state. Within this frame, the generation of images of the future that optimize desirability are the focus. Planning for optimization uses anticipated futures to

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[1] The term 'semi-closed' is used here because closed systems are not subject to human agency. Yet uncertainty is also assumed to be manageable, so I use this term to distinguish it from the acknowledgement of complexity in semi-open systems.

identify preferable pathways or preferable end states that shape actions in the present. (Miller, 2018a, pp. 59–60).

Type 3 anticipatory systems engage in the detection or creation of novelty. The systems within which anticipations are generated are assumed to be semi-open or open[2], meaning that the systems are assumed to be complex in nature, thus able to produce novel emergent phenomenon. The key difference between type 3 and type 1 and 2 systems, according to Miller, is that the future is assumed to be non-actionable from the present, meaning that discontinuities and emergent phenomena will invalidate any knowledge that we believe that we have of the future. Approaches within the critical frame essentially seek to decolonize futures populated by predictions, roadmaps, visions, and scenarios that were generated within paradigms that will no longer be dominant by the time a described future present becomes the present present. Approaches within the transformative frame take action not with consideration of a given future, but instead act upon the thinking of individuals in the present, in line within the social-constructivist position that both futures themselves and the means that we create futures that are socially constructed. Transformative framings are thus reflexive in nature, in the sense that the actors are asked to act upon themselves. In type 3 anticipatory systems, anticipated futures are instrumental in the sense that they are used as a lens not to look into the future, but to look into the basis of beliefs and mental constructs that we hold to be true in the present that describe the limits of what we consider could be possible and preferable.

"Use the future" is the phrase coined by Miller (2018, 27-28) to describe the purpose of deploying an anticipatory system. The 'use of the future' driving anticipatory systems 1 and 2 is called 'anticipation for the future'. Anticipation for the future considers the anticipation of future states to be the end goal, either to prepare for contingencies or to plan for optimization. Anticipation of future states in the form of predictions constantly creates and destroys self-fulfilling, self-altering, or self-negating prophesies (Bell, 2003, p. 229-230). Bell also points out that roadmaps are "both models of reality and realities themselves", highlighting the self-reinforcing nature of futures, once they are anticipated. Socio-technical/ecological imaginaries, images of the future, scenarios and so forth, are all examples of constructed 'knowledge' of futures, though I use the term 'knowledge' cautiously here with de Jouvanel's futura in mind (Jouvanel, B. 1967,

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[2] This is an adaptation of Miller's phrasing, who used "semi-closed/open" for type 3 anticipatory systems.

in Poli, 2017c). The aim of highlighting various kinds of futures as the products of anticipatory systems is to emphasize how they often take a form that persists, even after their utility has faded. Miller emphasizes that futures as products are particularly useful as benchmarks against which actions can be assessed towards achieving goals. (Miller, 2018a, chaps 1–3).

'Anticipation for emergence' is the purpose of using the future in anticipatory system type 3. In this mode, descriptions of future presents are not the product of an anticipation process, but rather, descriptions of future presents are the subject of critical analysis and reflection. A key example of an approach within the critical frame which taps into shared symbols of constructed reality is Sohail Inayatullah's causal layered analysis, a technique that emerged from applied critical futures studies and has seen use in many futures literacy contexts. Causal Layered Analysis is used to deconstruct a 'used futures' or familiar, colonized images of future presents, then reconstruct the narrative of a future from a transformed metaphorical base layer upwards (Inayatullah, 2008). The core purpose of type 3 anticipatory systems is not to identify which future present is most probable, or preferable, but to first open up the possibility space by systematically identifying and critically re-evaluating the paradigmatic basis of such future presents, then introducing alternative paradigms through which to construct future presents that are free from historical power relationships and vested interests. When anticipated futures are used to expose the *internal paradigms of individuals*, rather than the macro level paradigms of society, then they are being used to transform individuals' perspective and understanding of how and why anticipations are generated and how and why anticipatory systems are used. This, then, is the territory of futures literacy.

2.1.5 Futures Literacy as a personal capability

Futures literacy, adhering to the conceptualization coined by Riel Miller, is defined as the personal capability to diversify how and why futures are used. Miller considers futures literacy to involve; making implicit anticipatory assumptions explicit; sensing and making sense of anticipatory assumptions through collective intelligence knowledge creation processes; and, diversifying how and why we 'use the future' through anticipatory systems and processes (Miller, 2018a, pp. 58–60). Miller hypothesizes that developing the capability of futures literacy enhances agency, as increasing the diversity of options and tools available is in essence an expansion of freedom (Miller, 2018a, p. 67).
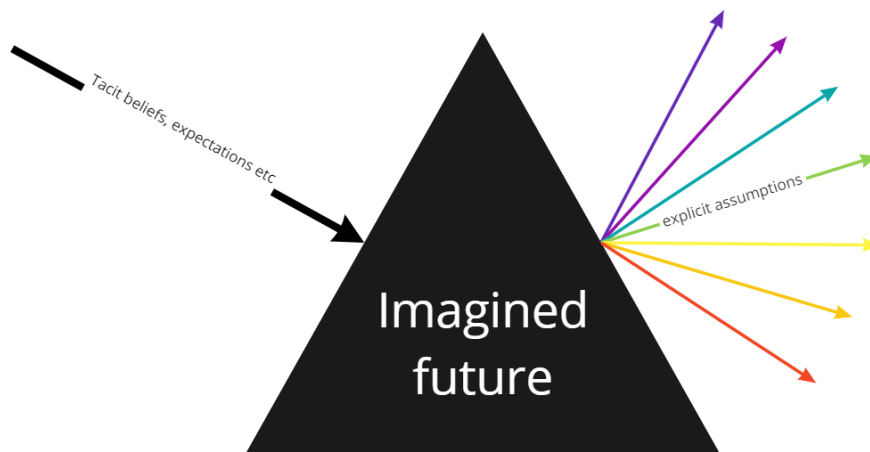
Figure 3 Illustration of "imagined futures as prism to refract tacit futura into explicit anticipatory assumptions"

In contrast to anticipatory systems type 1 and 2, imagined futures are used as a tool to identify one's own internal paradigm through contact with an imagined future that is neither desirable/undesirable, nor likely/unlikely, but rather designed to be challenging and based on unfamiliar anticipatory assumptions. In other words, imagined futures are not projected from our interpretations of signals of change, but instead the conditions of an imagined future act as a prism to refract the white light of one's own tacit beliefs, expectations, and models into visible anticipatory assumptions. On a cognitive level, having been made explicit, anticipatory assumptions may then be reconsidered, critically re-evaluated, and potentially substituted for alternatives. Miller posits that exposure to this process produces emergent novelty, in the form of new decision options in the present, new questions, or the re-evaluation of apparent failures as emergent successes (Miller, 2018a, p. 54). Rather than imagined futures being the purpose of action in the present, futures are imagined as a means to access alternative presents.

On a social level, a parallel connected process is also taking place in which long-held values and beliefs are being critically re-evaluated. Futures literacy practitioners report that appreciation of the social and collective dynamics of futures literacy processes are key to supporting impactful interventions (Lianaki-Dedouli and Plouin, 2017; de Boer, Wiekens and Damhof, 2018; Kazemier *et al.*, 2021). A key dimension of this work is further exploration of the emotional and cognitive confusion that this process engenders, and the role of supportive peers in a space setup to be generative. This is reflected in the framing of Futures Literacy events as having social and transformative learning dimensions, discussed later in this chapter.

"Walking on two legs" is a phrase used by Miller to emphasize the importance of relying not only on one purpose of using the future, but rather synchronizing the usage of both anticipatory systems type 1 and 2 that anticipate for the future *and* anticipatory systems type 3 that anticipate for emergence. Miller presents type 3 anticipatory systems as critical but neglected (Miller, 2018a, p. 22). Recent literature has interpreted this call for rebalancing as a normative bias that privileges novelty over continuity (Facer and Sriprakash, 2021). Facer and Sriprakesh go onto call for a diversity of futures literacies rather than overemphasis on the cognitive capability as described in Miller's main work.

The above imperative to "walk on two legs" can also be interpreted as a recognition that the ontological and epistemological positions of both Bell's critical-realism (Bell, 2004) and the social constructivism of critical futures studies (Slaughter, 2002; Inayatullah, 2008) can make complementary and simultaneous contributions to futures and foresight work. Futures practice and interventions frequently make use of such hybrid positioning in recognition of the messiness of challenges encountered in real world situations where the rigidity of a more rigorous academic approach may not be conducive to generating tangible outcomes.

2.1.6   Futures Literacy Laboratory Design

The Futures Literacy Laboratory (FLL) method is founded on two pillars; action learning research and a process of collective intelligence knowledge creation.

Action learning is characterised by iterative processes of action, reflection, and learning. It has its origins in managerial training processes pioneered in the early 1980s, and was later adopted by educators in a variety of sectors (Revans, 2011). Cyclical learning and research theories abound including but not limited to experiential learning (Kolb, 2014), double-loop learning (Argyris, 2002), as well as cyclical systems archetypes (Senge, 1990). Riel Miller cites the influence of John Dewey's *How we think* (Dewey, 1910), the book describes an early example of cyclical learning interpreted as a five step process of inquiry. As such Dewey's work is credited as being the root of later cyclical learning theories (Wenger-Trayner and Wenger-Trayner, 2020, p.149). Miller's interpretation of Dewey's work is attributed as being central to the design of the procedure of a futures literacy laboratory (Miller, 2018a, p. 97).

Whereas 'Collective knowledge creation' is a term that has been in use in the managerial and education literature since the late 2000s, 'Collective *intelligence* knowledge

creation' is a term unique to Riel Miller's work on futures literacy. The closest corresponding body of literature seems to be the work of Otto Scharmer and Theory U on 'presencing' (Scharmer, 2018). A collective intelligence knowledge creation process is different to a generic knowledge creation process in that by engaging in the process of sensing and sense making *as a group*, complexity can be brought in through the diversity of participant perspectives and interpretations. Such a process also necessitates that the implicit is made explicit through sharing and communication. Furthermore, a group can share a diversity of specific past experiences and imagined futures, as well as come to a collective understanding of their meaning, tapping into both the need for specificity and generality through intersubjective understanding. In short, the use of a 'collective intelligence knowledge creation' process is deployed by Miller in the design on the basis that they are 1) efficient in moving assumptions from tacit to explicit, 2) inspire creativity, 3) relate to multiple axes of the futures literacy framework, and 4) are adaptable (Miller, 2018a, p. 37).

FLLs are a general purpose tool, customisable to explore specific hypotheses across a wide variety of contexts, while tapping into each of the six anticipatory assumptions, (Miller, 2018a, pp. 38–39). The general design of an FLL will proceed through the following three phases:

Reveal

The first phase of the lab invites participants to express what they think and feel about the future and to build a shared understanding of how the future is used day to day. The aim of this phase is to shift anticipatory assumptions from implicit to explicit, for the purpose of demonstrating that there are different kinds of future, e.g., probable, and preferable. Uses of such futures are typically manifest in the form of planning and preparation activities. The focus of this phase is placed on hopes and expectations. The phase is designed with a time horizon that is far enough into the future to move participants beyond concerns about being 'accurate' or 'wrong'. Causal Layered Analysis is frequently deployed to facilitate the generation of a collective understanding and narrative. (Miller, 2018a, pp. 102–103)

Reframe

The second phase of a lab simulates using the future in an atypical mode; to identify and explore novel futures by adopting unfamiliar anticipatory assumptions. The aim of this

phase is to challenge participants to use the future for a purpose other than preparation and planning. Colloquially, to 'reframe' means to place an image or debate in a new or different context (*Cambridge Dictionary*, 2022), in the context of futures literacy this means placing a familiar topic – typically the theme of the lab - and placing it in a future context in which unfamiliar non-probabilistic and non-preferable conditions are prevalent. The participants are invited to 'play' with anticipatory assumptions; to generate specific and concrete details about the meaning of the theme and practical details of living in this imagined future, freed from the constraints of using the future for planning and preparation. For this purpose, the Learning Intensive Society scenario is often deployed, which suspends typical anticipatory assumptions, effecting a change in the conditions of change across a range of areas of human activity, including economic, social, political, technological, ecological and gender functions. (Miller, 2018a, pp. 104–105).

Reflect

The third phase of the lab creates opportunities to draw comparisons between the uses of the future in phase 1 and phase 2, to draw out insights about the experience. The aim of this phase is to surface reflections on the cognitive and emotional aspects of the previous phases. Insights into why futures are used in a particular way, and what futures can be used for, are identified and discussed. This phase is reflexive in that participants are engaged in two meta-cognitive activities, 1) in building their understanding of the practice of futures literacy, and 2) thinking about thinking about the future. Conclusions of this phase centre around the role of imagination and creativity in using the future, particularly a diversification of the 'whys' and of the 'hows' the future is used. This phase takes the form of a facilitated discussion. It is worth noting that a stage 4 is mentioned as a possible extension of the reflection, focusing on the choices to be made in light of the conclusions of the lab. (Miller, 2018a, pp. 105–107)

Next Steps

In the Turku 2019 FLL, a stage four was implemented focusing on the concrete actions that could be taken to implement insight from stage three into organisational processes. The prompts used were concerned with how Futures Literacy could be fostered, how the impact of the lab could be extended, and an opportunity to articulate new ideas that could act as experimental applications of Futures Literacy in practice.

2.1.7   Conclusion of Theoretical Background Part One

In this first part of the theoretical background chapter, the approaches and concepts related to Futures Literacy and social constructivist foresight have been described, positioned in relation to key approaches within the field of futures studies, and considered in how they relate to futures literacy as a capability. The literature on Futures Literacy is composed of numerous elements including a description of a conceptual framework for identifying different types of anticipatory system, a definition of futures literacy as a capability, and a proposed method of intervention that is designed to develop this capability called a Futures Literacy Lab – Novelty (FLL-N). Understanding of these concepts and frameworks is necessary to grasp the thinking behind this capability called futures literacy. The body of knowledge theorizes what happens when participants participate in a FLL. This study builds on the state of the art of studying Futures Literacy interventions, currently consisting of 14 case studies of Futures Literacy interventions detailed in Miller (2018). The efficacy of an FLL in developing Futures Literacy as a capability is investigated further in this research through the use of a framework that facilitates a deeper and more structured analysis of the learning taking place at an FLL.

Futures Literacy is situated in the transformative frame of futures studies. It is termed transformative because approaches within this frame seek to act on the agents of change. In this case the action is the development of a new set of skills and insights that relate to how anticipatory assumptions are generated. The agents of change are maritime systems innovators participating in an intervention designed to stimulate self-reflection, leading to a potential transformation in their way of thinking. Scholarly consideration of learning that brings about transformations in point of view has a longstanding and extensive wealth of literature. The second part of this chapter briefly introduces the relevant concepts and frameworks from this body of literature that are used to explore the research questions of this study.

2.2   Social and Transformative Learning

This section of the theoretical background opens with a description of the contributions of transformative learning theory to the conceptual framework used to make sense of the learning taking place in an FLL. Following this, a significant development of transformative learning that incorporates elements of systems complexity is used to demonstrate the synergies between transformative learning theory and issues of complexity

highlighted in the prior discussion of futures literacy. The final element is the value creation through social learning evaluation framework deployed to structure and categorise learning events.

2.2.1 Transformative Learning

Transformative learning theories have primarily been developed within constructivist education research, where in recent years they have come to take centre stage (Merriam and Bierema, 2013, 98). Transformative learning was first formulated by Mezirow in the late 1970s as a theory of learning comprised of ten phases, starting with a disorienting dilemma and then proceeding through a formative cognitive sense making process (Mezirow, 1991). Transformative learning literature in the 1990s and 2000s would give more attention to the non-cognitive aspects of the transformative learning process, including the role that emotional and spiritual experiences, intuition, and affective processing also play through storytelling, arts-based learning, embodied learning, and emotions (Taylor and Cranton, 2012, p3; Merriam and Bierema, 2013, p88). The distinction between transformative learning and other kinds of learning is rather blurred, with the term 'transformative' often being misused or over-used. However, at its core the theory describes how fundamental changes can take place at a basic level in human cognition through learning experiences (Taylor and Cranton, 2012, pp. 3–10). In its revised form, transformative learning theory provides a powerful framework for understanding the processes of sense making, critical questioning of assumptions, and critical self-reflection processes that occur in futures literacy labs and, more widely, transformative futures processes. Broadly speaking, Mezirow's philosophical positioning is aligned with the humanist traditions within futures studies (Kuosa, 2011) and constructivist ontological assumptions (Fuller and Loogma, 2009). Indeed, there is a long list of futures methods and approaches that share an interest in the transformative potential of collectively imagining the future, ranging from transformative scenario planning (Kahane, 2012), Three Horizons (Sharpe *et al.*, 2016), the Seeds of the Good Anthropocene (Raudsepp-Hearne *et al.*, 2019), and the Six Pillars approach (Inayatullah, 2008).

Perhaps surprisingly, the intersection of transformative learning and *futures literacy* has only very recently become the focus of research papers in the field of futures studies (Kazemier *et al.*, 2021; Pouru-Mikkola and Wilenius, 2021). Numerous parallels can be drawn between the goals of futures literacy processes and the transformative learning agenda. Both are concerned with designing experiences that elicit personal level trans-

formations that may have social change implications, through the reframing of implicit assumptions to produce a radical new perspective. Both consider how the critical questioning of assumptions and self-reflection can bring about this fundamental shift in point of views and habits of mind (Kitchenham, 2008). Practitioners in both fields emphasise the creation of a "sacred space", a space of trust and vulnerability allowing for self-reflection through collective discussion, reflection, and re-evaluation of past experiences and new knowledge (Merriam and Bierema, 2013, 96) (Kazemier *et al.*, 2021). Emphasis in both transformative learning and futures literacy literature is placed on the emancipatory nature of reframing knowledge (Merriam and Bierema, 2013, p.97) (Miller, 2018a, p. 66). There is also significant overlap in the role of adult learning educators and futures literacy facilitators as change agents initiating a change process with unknowable ramifications, the ethical considerations of which are a weighty responsibility (Merriam and Bierema, 2013, p.100).

The three-stage model of a futures literacy laboratory was conceived around the cognitive learning elements of the Dewey learning cycle (Miller, 2018a, p. 97). Transformative learning lends additional concepts for understanding the role of both cognitive (Mezirow, 1991) and non-cognitive aspects of the FLL experience (Kitchenham, 2008). The concepts and synergies advanced here are intended to demonstrate how the body of transformative learning theory has informed this study's interpretative stance and conceptual understanding of the learning that takes place in a futures literacy laboratory. Furthermore, an understanding of transformative learning is foundational for the appreciation of the frameworks elaborated in the following sections.

2.2.2   Complex Systems and Transformative Learning Framework

Research at the intersection of systems thinking, anticipation studies and education research is scarce, but a work that offers useful concepts Jacobs (2019) to fill the gap between transformative learning research and complex systems theory is introduced this subsection. It is useful in identifying and structuring the interactions taking place during the transformative learning of a Futures Literacy Lab. Jacobs frames the stages of transformative learning within the dynamics of complex systems, linking interior cognitive, emotional and other interactions with the external stimuli. Jacobs clearly articulates two processes in play. The first is CSRA – Critical Self-Reflection of Assumptions. This is subjective reframing, focusing on one's own psychological and cultural assumptions or premises that limit understanding of one's experiences (Jacobs, 2019, p.5-6). Reflection

on both one's own perspective *and* the social context leads to reflexive adaptive capacity which, according to Jacobs, is the foundation for profound transformations. Secondly, CRA – Critical Reflection of Assumptions, or objective reframing, focuses on the interpretation of external stimuli in terms of content, process and premise (Jacobs, 2019, p.6), building on the work of (Kitchenham, 2008, 88). Reflection on other's assumptions requires a supportive environment which enables independent thinking. In other words, thinking outside the constraints of other's assumptions requires empathy and emotional intelligence to articulate, but can lead to genuine collaboration.

Of particular note here is the emphasis on the social context of transformative learning – the support and respect required in the discussion of revealed assumptions which leads to collective meaning making (Jacobs, 2019, p.6). Participation in a collective intelligence knowledge creation process that reveals one's own habits of mind and placing them on the table for discussion with others can, rightly, lead to feelings of vulnerability. Thus, there is an ethical imperative to provide adequate support. Although transformative learning theory usually focuses on individuals and individual outcomes, discourse is by necessity a collective and collaborative process (Jacobs, 2019, p.8). The social aspect of transformative learning taking place within a collective intelligence knowledge creation process is an ongoing area of research (de Boer, Wiekens and Damhof, 2018).

Figure 4 illustrates the interactions that arise from feedback between conceptual complexity (green) and the stages of transformative learning (blue), with the synthesis of the two highlighted (grey). Non-linearity refers to the emergent phenomena that arise from self-referential complex adaptive systems in which observations of cause and effect are opaque. This gives rise to dilemmas, as dominant paradigms are called into question with consequent emotional turmoil. Reflection on the validity of assumptions in light of this disequilibrium has ramifications beyond the initial inquiry. With sufficient disruption to the dominant paradigm, new meanings begin to arise from the destruction of the old assumptions, new relationships are recognised in emergent 'aha!' moments, which then form the basis of new categories and distinctions. With the identification of new boundaries, referring to the distinctions and relationships between categories that constitute 'boundary objects' or shared symbols of meaning, new interdependencies come into focus. Individuals experiment with these newly understood relationships, in practice acquiring new skills and competencies to adapt to the new understanding. As the new paradigm becomes established, new exceptions begin to arise from

emergent phenomena, and the cycle repeats. (Jacobs, 2019). An intriguing question is how the stages of transformative learning develop, and are made visible, by the process design of a futures literacy lab.
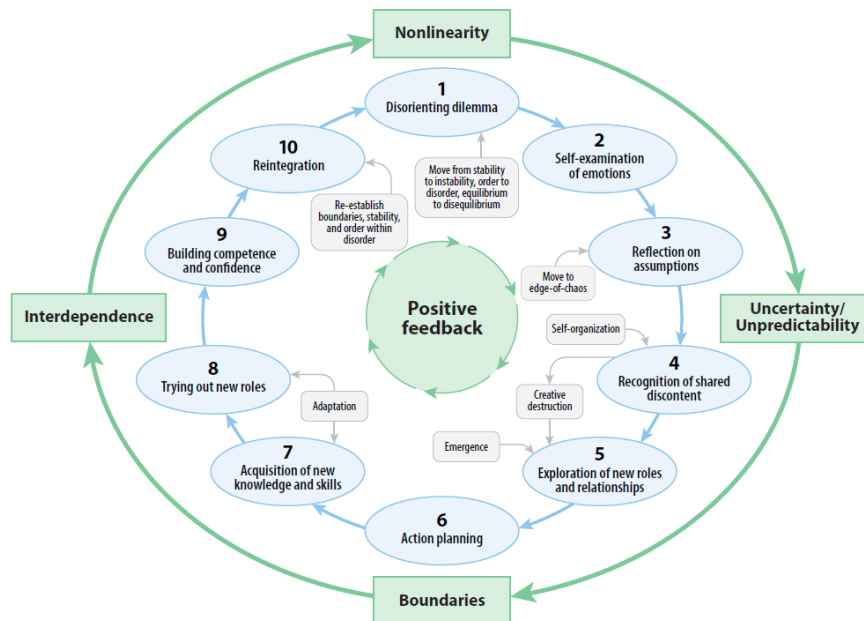
Figure 4 Transformative learning through a complexity framework, adapted from Jacobs (2019)

The synthesis of the transformative learning and complexity frameworks proposed by Jacobs complements the complexity thinking and transformative potential present in a futures literacy laboratory process. The contributions of complexity to transformative learning are necessary for understanding the theoretical underpinnings of a futures literacy processes, and are clearly of greater utility than relying on the Dewey learning cycle, or Mezirow's transformative learning in isolation. This framework is most useful as a means of interpreting the big picture of the learning process occurring before, during and after a futures literacy lab, with an emphasis on the cognitive learning aspects of that process. However, this understanding of the context of learning is not sufficient for analysing the multiple layers of meaning making that occur in the 'messy' organic experience of learning that occurs in a live futures literacy laboratory.

2.2.3   Value Creation through Social Learning

This brings us to the final element of the theoretical background, a bridging of the gap between transformative learning theory, complexity, and collective intelligence

knowledge creation processes. The Wenger-Trayner Value Creation Framework (Wenger-Trayner and Wenger-Trayner, 2020) incorporates transformative learning theory elements, and an appreciation of complexity in collaborative learning environments, while also being sufficiently well-established as a tool of mixed methods research to be appropriately applied to the materials under analysis in this study.

In brief, the Wenger-Trayner Value Creation Framework conceptualises learning experiences as the creation of value through the negotiation of shared meaning in social learning spaces. Value here is defined by the Wenger-Trayners as the utility of a learning experience for making a desirable change in the learner's present or future. Figure 5 illustrates the eight levels of value creation; Orienting, Immediate, Potential, Applied, Realized, Transformative, Enabling and Strategic. The details of these levels will be discussed further in the context of their subsequent use in Chapters 4 and 5. Important characteristics of this framework are: 1) Each layer of value creation has sub-layers that lend clarity to the analysis matrix used in the qualitative content analysis method deployed in this study for answering research question 1. 2) The layers map closely onto the guiding questions of the FLxDeep project reporting (see Table 1 for details of these questions in Chapter 3). 3) The scope of a value creation analysis can extend both before and after the social learning space under consideration, incorporating cyclical learning both within the learning space and between learning spaces, both of which are relevant for answering research question 3 - identifying practical recommendations for action. 4) The Wenger-Trayner framework is aligned with the ontological and epistemological positioning of social constructivist foresight and social constructivist learning theory, essentially, that meaning (futures knowledge, learning, value) is constructed through social interactions and is not directly observable, focusing on the role of human processes in the negotiation of this meaning. 5) The framework understands value creation from a holistic perspective, incorporating emotional, social, cognitive, and physical dimensions of importance to participants.

Strategic Value

Orienting Value

Sustainability Loops

Immediate Value

Potential Value

Applied Value

Realized Value

Transformative Value

Enabling Value
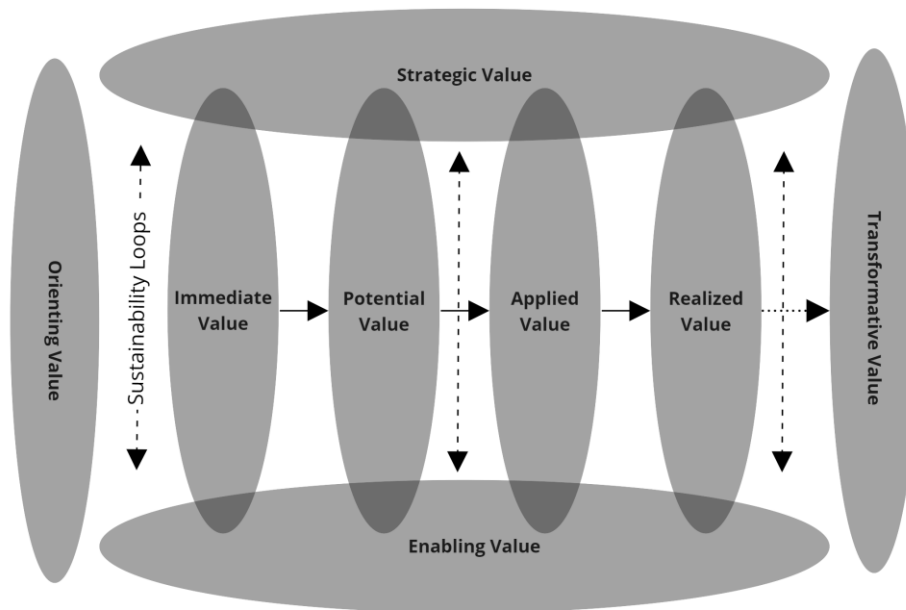
Figure 5 Social Learning Value Creation Framework, adapted from Wenger-Trayner & Wenger-Trayner (2020, p. 75)

Meaning making in social learning spaces is considered here to be analogous to the collective intelligence knowledge creation processes designed into futures literacy laboratories, and as such it is suitable for answering research question 1. The stages of value creation provide a structure that explicitly supports the creation of narratives of learning, providing the basis for an analysis that communicate the arcs of learning that can be used to answer research question 2. Furthermore, the tool incorporates levels for identifying value creation for stakeholders external to the social learning context – strategic value, as well as the value of acting upon the process itself internally among participants before, during and after the event – enabling value. Along with applied value, these form the basis of observations and recommendations in the final stage of the analysis which answer research question 3. The Wenger-Trayner framework bridges the theoretical background of the subject of this study with the practicalities of executing the design.

2.2.4   Conclusion of Theoretical Background Part Two

Transformative learning theory provides numerous concepts that are useful for understanding the learning processes at play in the reflexive capability development space of a FLL. The intersection of complex systems and transformative learning is a relatively unexplored yet valuable elaboration on processes at play in such a transformative space.

Parallels between the collective intelligence knowledge creation process of an FLL and the TL and complexity framework suggests that there is room for the identification of further compatibilities between the two areas of knowledge. The synergies between FL and TL have, however, only recently become a topic of interest in the literature, with parallel developments published across the UNESCO network in Europe in 2020-2022. Transferability of concepts between the tradition of futures studies in Finland and the capabilities approach of Miller's Futures Literacy was explored by Pouru-Mikkola and Wilenius (2021). Initial work on conceptualising the capabilities that could be taught within Futures Literacy was conducted by the UNESCO Chair for Futures Literacy at the Hanze University of Applied sciences (de Boer, Wiekens and Damhof, 2018). The Hanze team went on to develop a faculty training course in higher education for developing futures literacy capabilities (Kazemier *et al.*, 2021) which made use of the Wenger-Trayner value creation framework to evaluate learning outcomes through a survey tool.

The Wenger-Trayner framework bridges the gap between TL theory, complexity, the transformative frame, and social-constructivist foresight, which makes it well suited to the complex research problem under consideration in this dissertation.

2.3 Chapter Conclusion

Futures Literacy is a relatively new concept and practice at the leading edge of anticipation studies. As such, considerable criticism and discussion is ongoing in the established futures studies and foresight communities, and not least among Futures Literacy experts themselves. Research has variously pointed to the incoherence of the Futures Literacy Framework (Kurki, 2020), purported that Miller adopts an unacknowledged normative stance (Ahvenharju, Minkkinen and Lalot, 2018), and a there has been a failure to consider the narratives at play in futures literacy processes (Liveley, Slocombe and Spiers, 2021). This Chapter's review has also identified an overemphasis of cognitive modes of learning in the Dewey learning cycle upon which the FLL design is based, as well as the challenges that adopting anticipation for emergence and reflexive practices pose for participants.

Perhaps one of the most clearly articulated critiques of Futures Literacy in recent years has been the call to "provincialize" Futures Literacy (Facer and Sriprakash, 2021). A key criticism levelled by Facer is that, if being futures literate means being able to detect and generate novelty, and being able to ask 'new questions', then such a defini-

tion seems to privilege an ontological and epistemological stance that values novelty. Facer places particular emphasis on the elements of present and past enduring into the future that cannot be easily acted upon, such as endemic hierarchical power relations and inequality. This is less an outright rejection that constant "ontological expansion" (Tuomi, 2017) is occurring, but more a rejection that such a concept should be integral to the definition of futures literacy through explicit reference to novelty detection and/or creation. In short, Facer argues that futures literacy should be inclusive of other ontological and epistemological positions that are external to the social foresight approach of Anticipation to avoid colonization of the Futures Literacy as a capability by western-centric bias.

Facer's summary of Miller's position as described in *Transforming the Future: Anticipation for the 21ˢᵗ Century* is clear and intelligible interpretation of the book and makes valid criticisms that contribute to scholarly understanding of Futures Literacy. However, her definition does not take into account material published elsewhere, nor the body of experience of Futures Literacy practitioners, and critically, it fails to recognise the significance of Miller's argument about the importance of "walking on two legs". Broader consideration of Miller's works outside the contents of this chapter is clearly beyond the scope of this thesis, nevertheless a step is taken here towards articulating the experience of both practitioners and participants. I would argue that "walking on two legs" is an important reconciling statement with regards the claims of Futures Literacy. This metaphor is used to emphasise that being futures literate involves becoming more fluent in *coordinating* use of both Anticipation for the Future *and* Anticipation for Emergence. This does not involve an exclusive focus on novelty, nor the adoption of the ontological position of social constructivist foresight, being multi-paradigm in nature. Rather, Futures Literacy processes call for less familiar, more imaginative and creative ways of sensing and making sense to be recognised as valuable complements to tried and tested logical-rational processes of strategic decision making that tend to make exclusive use of forecasting and foresight. In other words, futures literacy involves being able to critically re-evaluate the anticipatory assumptions generated by using *all three* kinds of anticipatory system. As outlined in this chapter, the anticipatory systems of planning (forecasting, road-mapping), preparation (scenario, visionary), and novelty (critical, transformative) are situated at differing epistemological and ontological junctions. The claim that novelty is an under-utilised aspect of anticipation that can yield

synergies when used in combination with other anticipatory systems (Miller, 2018a), is not the same as privileging novelty over other kinds of anticipation.

Futures Literacy as a capability is a term that is in an ongoing process of being defined and refined. Practitioners, scholars, and students of Futures Literacy are engaged in an ongoing negotiating as to the meaning and boundaries of this nascent concept. Nevertheless, the idea of Futures Literacy has a charm that captures the imaginations of people who feel motivated to try to effect change. It contains within it an implicit promise to unlock reserves of unconsidered ideas, to expand the realm of the possible, and to enable us to move past barriers that may be blocking bold new ideas. In short, the idea of Futures Literacy resonates with change agents, thought leaders, and decision makers. Whether Futures Literacy processes deliver all that they claim is still an open question. Much of the face validity of Futures Literacy seems to stem from the recognition that transformations of internal perspective are the first step towards manifest transformations in the world around us. The main thrust of this work is in exploring the internal dimensions of transformation, the role of collective processes in facilitating this self-reflection, and the insights and actions that emerge through this learning journey.

3 MATERIALS AND METHOD

This chapter details the research materials from the Net-Zero Maritime Hubs FLL that was run in Turku in 2019, and how they were used to answer the research questions. First, the details of the event and participants are described. Second, the nature of the research materials available and how they were utilised is explained. Third, the research process is elaborated with reference to a three stage qualitative content analysis process (Elo and Kyngäs, 2008). Fourth, the analysis matrix used to reconcile the objectives of the intervention project and the research objectives of this study is justified and explained. Fifth, the process of further analysis of the findings is described and justified, detailing the approach behind the use of narrative to identify FL learning journeys, and the layers of value pertinent to the identification of practical recommendations.

This study uses qualitative content analysis to identify participant learnings from the transcripts of the 2019 Turku FLL Net-Zero Emissions Maritime Hubs. In addition, four semi-structured interviews were conducted with group facilitators to produce secondary collaborative analysis of these transcripts. The results of the content analysis, and the commentary from the semi-structured interviews are presented in Chapter 4. A synthesis of participant and facilitator findings is used to inform the analysis of participant experiences and learnings which are presented in the form of insight narratives and value creation themes in Chapter 5.

3.1 Futures Literacy Laboratory: Net-Zero Maritime Hubs, Turku, 2019

On October 24th and 25th of 2019, a futures literacy laboratory called Net-zero Emissions Maritime Hubs was held in the port area of Turku, led by researchers from the Finland Futures Research Centre (FFRC) at the University of Turku (UTU). The lab was held in the context of the Futures Literacy Across the Deep (FLxDeep) initiative funded by the European Institute of Innovation and Technology (EIT) Climate – Knowledge Innovation Community (C-KIC) through its Deep Demonstration (DD) programme for stakeholder participants from local and international European maritime hubs. The Turku lab was the first in the series of "proof of concept" labs. FLxDeep would go on to collaborate closely with EIT C-KIC in two Futures Literacy training courses and numerous engagements embedded within the DD programme throughout 2020. The 2019 Turku FLL was co-designed with partners from two DD theme areas: Long-termism and Net-Zero Emissions Maritime Hubs. The Net-Zero Emissions Mari-

time Hubs Deep Demonstration aimed to show how port communities can achieve net-zero emissions by 2030. The Long-termism Deep Demonstration addressed the short-term thinking that acts as a barrier to meeting the 1.5 degrees targets of the Paris agreement. The DD programme designates the actors with the agency to bring about this change as 'challenge owners'. Three such maritime hub challenge owners were invited to take part in the Turku lab; Valencia, Piraeus, and Cyprus. Outside of the DD framework, local actors from the Turku maritime hub were also invited to the event.

The composition of the participants can be broken down as follows:

- 18 participants
    - 3 EIT Climate KIC staff members
    - 2 challenge owners from Cyprus
    - 3 challenge owners from Piraeus
    - 2 challenge owners from Valencia
    - 5 local maritime actors from Turku
    - 3 members of the C-KIC Deep Demonstration design team
- 6 event organisers
    - 3 group facilitators
    - 2 group co-facilitators
    - 1 "planted" participant

Participants were divided into 4 breakout groups preassigned on the basis of maximizing geographical and organisational diversity, with a total of 6 people in each group. A diversity of actors from different countries, organisations and sectors were present at the event. Participants were primarily composed of policy makers, researchers, consultants, high level managers, and systems transition innovators. This sample with a high number of experienced professionals is representative of individuals interested in developing Futures Literacy capabilities. Such participants may be bringing dissatisfaction with the status quo, resentments at policy failures, or impatience with the pace of reform, and so might be inclined to seek out involvement in a FLL that offers a radical new approach. As such, there is a degree of favourable self-selection bias in this participant sample.

The starting premise of FLxDeep is that 'complexity makes deliberate whole system transformation extremely difficult' yet adopts the hypothesis that 'Futures Literacy can help (systems innovators) be more adaptive, resilient, and effective in their efforts' through the action learning/research approach of 'holding futures literacy labs and de-

veloping DIY tools that support futures literacy in daily work'. Notable design decisions for the 2019 Turku FLL include the use "waking up in the year 2040" thought experience, the creation of a 'movie poster pitch' to explore the Learning Intensive Society scenario for the reframing phase, and a 'me-two-we' based exercise for the reflection phase. All of these are in line with the standard FLL procedure established in the previous section. It is worth noting that some improvisations were enacted during the event, the first being a round-robin introduction proposed by a participant so that everyone could "know who is in the room", and the final reporting back plenary replaced by a showing of the music video for Radiohead's 'Numbers' with an explanation of its relevance from the MC.

3.2 Research Materials

The Turku 2019 FLL Net-Zero Maritime hubs generated more than 600 minutes of recorded audio materials from four breakout groups and plenary sessions. The audio material was transcribed (full transcripts available on request), and an appropriate subsection[3] of the transcripts was selected for semi-deductive content analysis guided according to the analysis matrix based on the social learning value creation framework (Wenger-Trayner and Wenger-Trayner, 2020). Transcripts of the second day focusing on stage 3 and stage 4 of the FLL were the richest material for analysis. Stage 3 focused on participant responses that directly addressed the experience and learnings of participating in the phases 1 and 2. Stage 4 focused on identifying concrete next steps and actions that the participants could take to leverage their FLL experience. The focus here is on the reported experience of the participants and their reflections, rather than the anticipatory assumptions that they generated during the event. The stage 3 and 4 transcript subset consisted of 38,000 words combined from all four groups. The full set of transcripts amounted to 65,000 words.

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[3] Complete sets of recordings were not available for the first day of the event. After investigation of the extant audio material for phase 1 and 2, the material was not considered to be critical for investigating learnings consisting primarily of anticipatory assumptions being made explicit. The available phase 1 and 2 audio materials were nevertheless transcribed and used to get a fuller understanding of the context of later discussions, and a sense of the group dynamics. Transcribed stage 1 and 2 materials are not referenced in this study.

3.3   Method – Data Gathering for RQ1

The data were gathered according to a three stage approach; preparation, organisation, and reporting the analysis and results (Elo and Kyngäs, 2008). The research process of this study follows the teal line in figure 6 below.
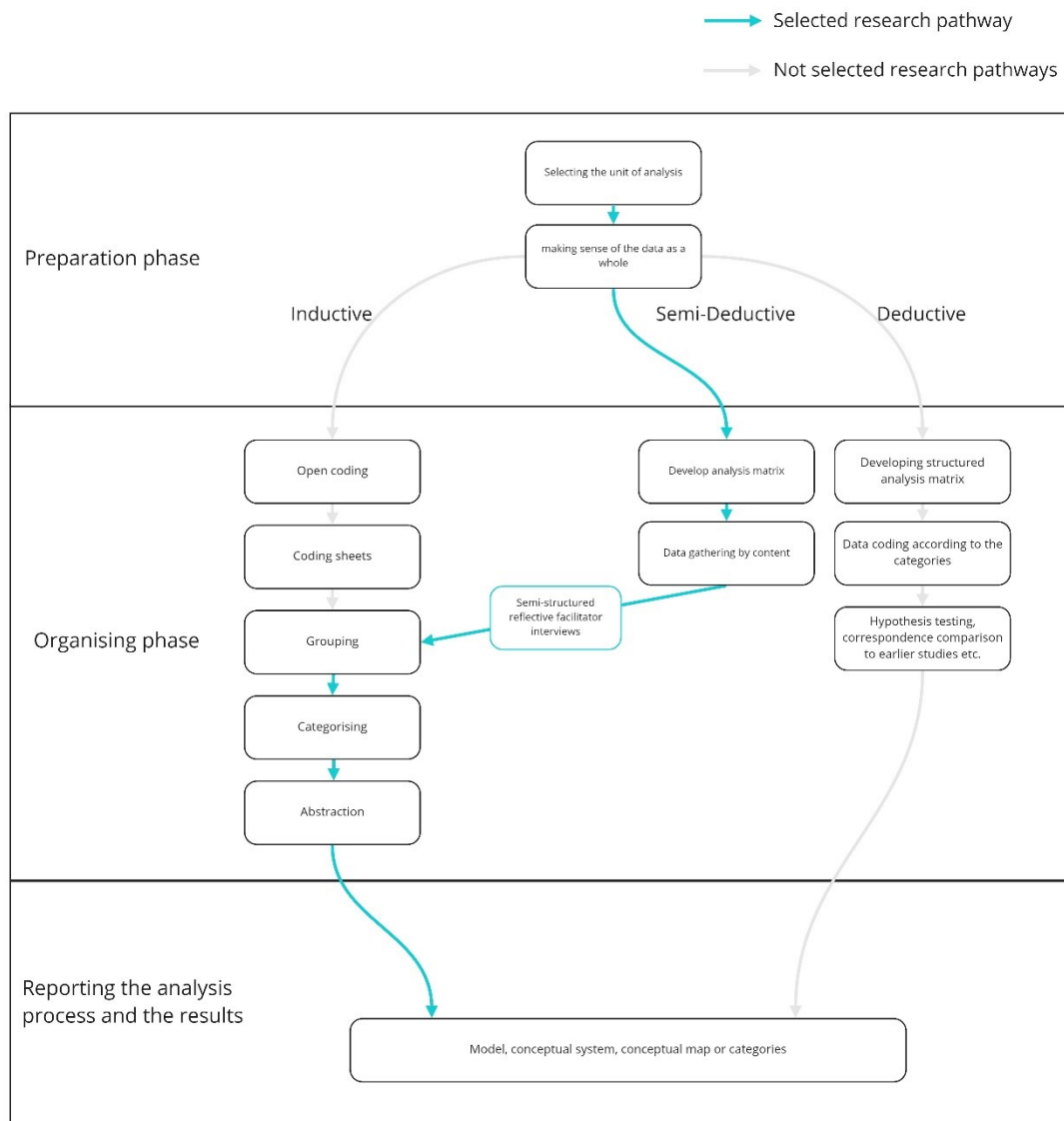
Figure 6, Data gathering and analysis pathway adapted from Elo and Kyngäs (2008).

The study initially adopted a semi-deductive research stance, the analysis matrix was determined by the reconciled needs to address the questions of interest to the FLxDeep project reporting and the more structured approach available through use of the Wenger-Trayner framework (see the analysis matrix in Table 1 below). After data gathering was

complete and initial categories were established according to the value-creation levels, the research process moved into a more inductive mode, exploring the findings for emergent themes that would highlight participant learning journeys at the event, and coherent thematic groupings of insights and recommendations that could be articulated as practical suggestions.

3.3.1 Research Process

Qualitative content analysis is recognised as being both flexible and idiosyncratic, (Elo and Kyngäs, 2008, p.114) a great advantage when dealing with the complex learning phenomenon present in a FLL. Elo and Kyngäs go on to say that the method should be used with caution, as the inherent flexibility comes with the disadvantage that the research questions addressed by the method tend to be overly ambiguous or far reaching, and so care must be taken on the part of the researcher not to make excessive interpretations.

As noted in the previous section, the study adopts a semi-deductive approach to data gathering, then pivots to a more inductive approach when analysing the findings. The 'questions of interest' to the project were reconciled with the social learning value creation framework to develop the analysis matrix employed for the content analysis of the transcripts. Details of this framework are in table 1 below.

Audio recordings of phases 1 and 2 were not available for 2 of the 4 groups, however this did not impact the research design as the focus was on learning outcomes visible in phases 3 and 4. Transcription of all available audio material was nonetheless undertaken to establish context. Complete recordings for all four break-out groups where present for phase 3 and 4. An initial analysis uncovered numerous examples of learning statements that fit the social learning value creation framework analysis matrix, so analysis of all four groups of phases 3 and 4 could proceed. The transcription focused on manifest content.

The semi-deductive approach adopted can be summarised as follows. First, the content was scanned for examples of learning, experiences, and recommendations; all such extracts were tagged for further consideration. Some of the identified extracts were quite long, in part due to imprecise, circuitous, or elaborative language. These extracts were summarized as part of the data compilation process. Extracts included context and so could range in length from a single sentence to up to five linked sentences. Second, the summarized extracts were categorized according to the analysis matrix correspond-

ing to the level of value creation occurring, with direct reference to their context within the transcript.

Table 1 Analysis Matrix

Social Learning Value	Value Subtypes	Question of Interest	Code
Learning interactions	various[4]	*What examples of participants grappling with the difficulties encountered while using the future for emergence were visible?* *What common conceptual misconceptions and pitfalls were encountered while moving through the FLL?*	*Struggle, Misconception*
Immediate value	Identification, productive discomfort, mutual recognition as learning partners, engaging with other perspectives	*What visible evidence was there that the experience affected participants cognitively, socially, or emotionally? (e.g., changes of thinking or questioning of deeply held assumptions)*	*Impact*
Potential value	Insights, critique, information, skills, collective voice, intangibles	*What ways to create value through new ways of thinking, doing etc. were identified?*	*Advantage*
Applied value	Adoption, adaptation, being more assertive, increasing your influence, harnessing energy, leveraging connections, inventiveness, reuse	*What uses or concrete applications of FL or FLLs were identified?*	*Use*
Strategic value	Internal – learning agenda, strategic context, External – ongoing engagement, alliances, aspirations and expectations, stakeholders, resistance, power, learning theory	*What ideas were generated during the lab for the role of further developed FL capacities?*	*Idea*
Enabling value	Internal – process, commitment, documenting, internal leadership External – social learning support, resources, strategic facilitation, organisational initiative	*What needs or gaps were identified that could be further developed to enhance FL capacities?*	*Need*

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[4] Learning interactions result in value creation, the level of that value depends on the context. More detail on this can be found in appendix 2, where level of value creation is listed with struggles and misconceptions.

Table 1 shows how Wenger-Trayner value creation levels and the question of interest to the project were aligned (Wenger-Trayner and Wenger-Trayner, 2020). The initial coding used in the transcripts and compiled data was based on the questions of interest, the Wenger-Trayner levels of value creation and the question of interest coding are used near synonymously in later analysis chapters. Also included here are the Wenger-Trayner value-creation level subtypes referenced in Chapter 4.

3.3.2   Semi Structured Interviews

Semi-structured interviews were conducted with group facilitators 6 months after the Turku 2019 FLL. The interviewees were asked the questions of interest to the project listed above in addition to general context questions. Due to the time gap between the event and the interview, annotated transcripts were provided to the interviewees beforehand to assist with recollection of the events of the FLL. The interviewees were asked to review the highlighted extracts and add their own comments or interpretations. The interviews were summarized, and the points raised were categorized according to the analysis matrix and were later integrated into the findings. Facilitator reflections and participant extracts are distinguishable from each other throughout this text.

Harnessing the insights and reflections of peers is a way of making use of collaborative resources, an example of how one of the six research validity principles were deployed at this stage of the data gathering and analysis process. Examples of the research validity principles (Winter R. in Fisher, 2010) deployed at this stage of the study include: reflexive critique, accepting that interpretations are coloured by our values, assumptions and prejudices and that exposing these to the reader provides insight into the researchers own thinking (full details of the gathered data is available in Appendix 1-3, and the transcripts are available on request); collaborative resources, feeding the findings of the transcripts back to peers and incorporating their feedback back into the research through interviews, and; risks to one's own values, how to show detachment to the material, categories, interpretations, research design, the questions and the focus of the research. The research design was modified extensively from the original project report, as sufficient time was available to employ appropriate rigour and significantly rework and structure the findings.

3.4   Method – Analysis of the Findings: Answering RQ2 and RQ3

Brief descriptions of the method of analysis are included here, with more in-depth descriptions reserved for the relevant chapter.

3.4.1   Insight Narratives

Insight narratives present linear arcs of learning visible from interpretation of the findings and close analysis of the transcripts. They are composed of linked learning interactions, immediate value, and potential value findings. This analysis does not attempt to identify cause and effect relationships, but rather to organise the collective sense making of participants into visible narratives.

3.4.2   Prospective Value Creation Themes

Prospective value creation themes identify links between observations of leverage points at the Applied, Enabling and Strategic value creation levels, and recommendations for concrete action to create further value for participants after the FLL. The analysis is a description of the potential value of the lab from the perspective of the participants about how they might make use of their experience in their own specific organisational contexts. Four of seven themes identified in the initial analysis are selected for presentation as illustrative examples of topics and areas of action identified by participants and facilitators.

3.4.3   Reflections

The findings of this study were gathered according to the iterative process typical of qualitative content analysis research. The research design, conceptual framework and method was adapted according to familiarity with the materials and increasing awareness of the issues at play. No research design is perfect at point of inception, yet this study does not go so far as to adhere to action research principles of iterative design and redesign. The main issues while conducting this research were 1) balancing the short term needs of the project to produce results, with the imperative to follow a consistent structured approach. 2) Accepting that interpretations are coloured by our values, assumptions and prejudices – a mind informed with conceptual constructs is prone to seeing these constructs as patterns in the data (this study recognises that this bias is inescapable, and compensates by differentiating between the structured approach to compil-

ing the findings with the self-acknowledged idiosyncratic analysis). 3) Documentation and archiving of the research materials and process has been a major issue throughout, with a vast amount of qualitative data comes a vast amount of qualitative data management, developing a systematic reference system on-the-wing proved challenging, yet adhering to principles of transparency has been imperative throughout the process. Many details of the research process are omitted from this text but are available on request.

3.4.4   Chapter Summary – Materials and Method

This chapter has provided a brief insight into the main characteristics of the materials and methods employed to answer the research questions. The chapter opened by detailing the character of the FLL case study under consideration and composition of the participants that were attracted to attend an event focusing on fostering an alternative way to use imagined futures. Following this, the selection of research materials from the event consisting of transcribed audio recordings from four breakout groups covering stage 3 and 4 of the FLL was justified. Qualitative content analysis conducted first in a semi-deductive mode during data gathering, and then an inductive mode during the categorisation stage was described as the primary method of the research process. Semi-structured interviews were conducted with group facilitators to supplement audio recording transcripts. The analysis matrix used was derived from a synthesis of the Wenger-Trayner framework and the questions of interest of the FLxDeep project.

4 FINDINGS

This chapter describes and interprets the significant details found in the transcripts that explain what is taking place in the focus groups at the Net-zero Maritime Hubs, Turku, 2019, FLL, in answer to research question 1; *what did the participants of the Turku 2019 FLL experience?* Extracts from the transcripts of phase three – Reflect, and stage four – Next Steps are presented, and the meaning making taking place is discussed. The findings from the large body of qualitative data available to this study are organised in sections according to the levels of value creation through social learning of the Wenger-Trayner framework. A key function of this chapter is demonstration of the contribution of transformative learning theory and the role of social learning in understanding the reflection and sense-making stages of participatory futures processes.

Retaining the essence of qualitative data after successive stages of interpretation and summarization is of paramount importance for this type of study to aspire to high standards of research integrity. In the interests of transparency, and providing the necessary context for readers to make their own judgements about the interpretations of this chapter, summarised tables of transcript extracts are provided at the beginning of each section. Furthermore, detailed tables that show the relationship between the findings in this chapter that were used to generate specific learning and thematic analyses are available in Appendix 2. Sections covering the levels of value supplement extract summaries with direct quotes from the transcripts of the focus group recordings. It should be noted that the extract summaries may be a condensation of very long utterances from the transcripts, or a composite of multiple similar utterances. The interpretations were written with direct reference to the context of a given extract or extracts, the facilitator commentary added during the interviews, references to relevant theory established in chapter 2, and direct observations from my role as participant-observer in the event itself.

The findings in this chapter are divided into six sections that correspond to both the levels of value creation of the Wenger-Trayner framework *and* the questions of interest to the FLxDeep study. The questions of interest to the project were formulated after an initial analysis of the potential of the transcript data. These questions informed a coding system that identified Struggles & Misconceptions, Impacts, Advantages, Uses, Ideas, and Needs. The synergies and overlap between the Wenger-Trayner framework and these categories were insights that came out of the work for the FLxDeep project. Discussion of the overlapping, but not entirely analogous, boundaries of the questions of

interest to the project and the theoretical constructs of the Wenger-Trayner categories is included at the beginning of each section. Furthermore, sections are subdivided into content from the focus group transcripts and content from the semi-structured reflective interviews with group facilitators. The FLL transcripts are currently in the process of being published in an open-source data archive, and they are also available on request. Facilitator reflections are drawn from summaries of the interviews and annotations made by facilitators on the transcripts. Conclusions that can be drawn from consideration of the participant experiences as whole and justifications for the need for further analysis are in the final section of this chapter.

4.1   Learning Interactions – Struggles and Misconceptions

Struggles and Misconceptions are examples of difficulties in comprehension and adoption encountered while moving through the Futures Literacy Lab.

‘Struggles’ are the difficulties described by participants during the third stage of the FLL in which participants reflect on their experiences of using the future in the first two stages. They tend to have been identified in response to the question prompt 1) - *What stands out to you most about yesterday's session?* Only struggles relating to reflections on using anticipation for emergence (AfE) were considered, other cognitive or emotional difficulties unrelated to AfE were not evaluated. Struggles were often recurring topics of disagreement around which exploration of Futures Literacy as a capability took place. Facilitators highlighted struggles experienced by their focus group during the reflective interviews, with supporting examples drawn from the transcripts.

Misconceptions are conceptual misunderstandings or misapplications identified by group facilitators from their vantage point of expertise in futures literacy and futures thinking. The main difference between misconceptions and struggles are that misconceptions generally create negative value, from the point of view of the event organisers, whereas struggles may have terminally neutral or positive learning outcomes for a given participant (Wenger-Trayner & Wenger-Trayner, 2020 p.52).

Misconceptions and struggles were the only category of participant experience coded that does not have a direct equivalent layer of value creation in the Wenger-Trayner framework. The Wenger-Trayners recognise that these learning events do take place, but refer to them as learning interactions. They see learning interactions as being necessary for value to be created but focus on the value outcome, rather than the interactions that give rise to that value in their categorical distinctions. Sub-categories of value can

be identified for each of the struggles and misconceptions and are retained in the detailed tables of appendix 2. Where relevant, these subcategories of value are referred to in the text.

Extracts are referred to in the text by their abbreviation, for more detail on how to read these codes and for a detailed list of extracts, see appendix 2.

4.1.1   Learning Interactions – Participants of the Focus group

Table 2 Struggles and Misconceptions – Participants of the Focus Group

Abbr.	Extract Summary
SP1	*Thinking of ways to apply futures literacy in organisations in a practical way.*
SP2	*Relentlessly asking "but what would it mean if...?".*
SP3	*Moving past self-imposed limitations of being "realistic".*

Participants across multiple groups found using anticipation for emergence challenging. The first extract (SP1) highlights the difficulty of switching from a cognitive, abstract understanding of the anticipation for emergence component of Futures Literacy to seeing ways that it could be used in the context of their organization. This participant emphasizes the difficulty of relating the high-level concept with ground level applications. Secondly (SP2) we see an example of the emotional effort required to engage in actively imagining the myriad implications of a novel future. Participants were required to engage with complexity and emergence through reconsideration of basic anticipatory assumption in the context of the 'Learning Intensive Society' scenario used in phase two of the FLL. This process is an emotionally and cognitively demanding task, and not one that a typical participant is likely to have done systematically or frequently outside of a moment of crisis before participating in an FLL. The struggle here is with the realization that we operate efficiently day to day by *not* questioning assumptions; we operate within the confines of familiar schema. Emergent novelty may have already made such schema no longer fit for purpose, even if evidence of the change has not yet been encountered; exploring the ramifications of that is demanding. The third extract (SP3) references a discussion that occurred across several groups, having been picked up and transferred during plenary sessions. Whereas focus group 4 made a decisive move against the need to be realistic, identifying it as a limitation to imagining novel futures, some members of focus group 2 concluded that Futures Literacy provided a way to make "better visions" i.e. more realistic visions (see SF1 and MF3). It is worth noting

here that this discussion was sparked by a facilitator using the term "realistic" during a plenary session, though this is not immediately evident in the transcripts.

The struggle of using anticipation for emergence is articulated by one participant from group 4, "*It's difficult because we shouldn't only use the things that we know from the present, but of course we use them because they're the only things that we know, but still going beyond that, obviously it is difficult, but every time you succeed or find something that goes beyond that, I think then you have that capacity of, somehow, being futures literate.*" Group 4 produced a particularly provocative reframe phase output, and went on to have productive reflective discussions, the quote here highlights the potential benefits of moving past the difficulty of grappling with emotional reactions to setting aside firmly held beliefs and thinking beyond the confines of orthodoxy.

4.1.2   Learning Interactions – Facilitator Reflections

Table 3 Struggles and Misconceptions - Facilitator Reflections

Abbr.	Extract Summary
SF1	*Moving past using reframing as a tool of visioning to using it as a tool for exposing assumptions and switching between alternative perspectives.*
SF2	*Struggling to make the leap from critical questioning to being open to novel futures.*
SF3	*Recognising that [the participants] have an agentic role in cocreating the places and uses for FL.*
MF1	*Failing to move past the use of "canned futures", pre-packaged visions of futures stemming from e.g. industry bias, assumptions about sustainability, and green growth.*
MF2	*Failing to move outside one's comfort zone of expertise to explore novelty.*
MF3	*Learning Intensive Society scenario deployed as a vision of a desirable future.*

The group facilitators identified further struggles occurring within their groups. One facilitator noted that (SF1) their group was enthusiastic to make use of the Reframe stage as a tool of visioning (see SP3), this led on to misconception (MF3) that the Learning Intensive Society scenario was an 'ideal future vision'. The facilitator express how using Reframe for creating visions is still being understood in terms of using anticipation for the future (AfF) rather than using Reframe as a tool to expose and reconsider assumptions. This is an example of how an initially appealing but misleading understanding of an idea easily spirals away from the premise if allowed to. Enthusiasm without introspection on the 'why' of imagining and using a diversity of futures, can lead to misapplications of tools meant for other purposes. This is a hidden struggle in the sense that unless it is pointed out by an expert or further encounters with Futures Literacy, the participant may not realise that they are labouring under a misconception

even given time and self-reflection. The second struggle (SF2) identified by facilitators is a shift from criticality to receptiveness. It is easy to deconstruct visions of futures created by others, but to focus that criticality inward on one's own assumptions is not so easy as it requires questioning of the internally generated anticipatory assumptions that inform our actions daily. This demonstrates the challenge of becoming receptive to alternatives when we are invested in the status quo. The third struggle (SF3) hints at the difficulty of the diffusion of a new practice within an organizational culture, as well as a sense that enacting futures requires expertise rather than being a capability of all conscious humans.

Misconceptions MF1 to MF3 are common errors in understanding of the core concepts of futures literacy. They indicate that the purpose of an FLL stage has been misunderstood, or that participants have not yet grasped the nuance of FL as a capability. Facilitators with a specialised understanding of Futures Literacy are able to identify misconceptions quite easily, especially when they are more prevalent ones that occur frequently in futures workshops (MF1). However, it is worth noting that these errors may be self-corrected at a later time by participants as they reflect on the events of the FLL. Encouraging participants to explore alternatives that are outside their comfort zone requires the creation of a safe space that makes permissible wild imaginings and playfulness, without which it is easy to become entrenched (MF2). Facilitators commented that MF3 can be a common misconception about Futures Literacy Labs and can occur when the disposable nature of reframed futures are not sufficiently stressed. MF1 and MF3 are indicative of over-reliance on familiar ways of using the future; subscription to visions of futures created by others to mobilize action.

4.2   Immediate Value – Impacts

Impacts are the participants' self-reported changes in thinking. Evidence that this is taking place could be in the form of a participant "thinking out loud" by questioning previously held assumptions. Impacts could also manifest by the participant describing their experience of a cognitive, emotional, or social change. These changes in thinking are closely associated with phase 3 of the FLL, in which the participants were asked to reflect on the changes of their thinking compared to their use of futures in phase 1 and phase 2 of the lab. Impacts are generally reported in response to questions prompt 2) *What were your assumptions about the future at the beginning and how are they*

different now? And 3) *What was different about your experiences imagining the future in Part 1 (Predictions & Desired Futures) compared to in Part 2 (Reframed Future)?*

Impacts are understood as Immediate Value in the Wenger-Trayner value creation framework – "value gained from being in this place at this moment with these people, having this particular experience" (Wenger-Trayner & Wenger-Trayner, 2020, p.80). 'Impact' and 'Immediate value' overlap in meaning but are not synonymous. Immediate value here is a subset of impact, focusing on the short-term value creation within the context of the lab, rather than longer term changes that may be realised months or years later, and in different contexts. Confining 'impacts' to immediate value is useful in that it breaks down a potentially amorphous and far-reaching concept into a more manageable chunk of data that can be observed in the transcripts.

4.2.1   Impacts – Participants of the Focus group

Table 4 Immediate value - Participants of the focus groups

Abbr.	Extract Summary
IP3[5]	*Reframing and the wider FL capacity building process is not best done alone, the support of a group was essential for collective knowledge creation.*
IP5	*Reframing as a group moved participants beyond predictive and preferable thinking about the future to 'imagine something completely different'.*
IP2	*Limitations of relying on extrapolations based on historical data gathered by consultants.*
IP4	*Deep questioning of the validity of extrapolative practices to inform long term planning processes which do not consider emergence.*
IP6	*Recognition that present ways of thinking and decision making are rooted in assumptions about the future that do not adequately consider uncertainty or emergence, being aware of these leads to different decision making in the present.*
IP1	*Value of other views that go beyond technology, multi-perspective view of futures.*

Participants reported a range of immediate value gains from engaging with each other in the collective knowledge creation process of the FLL itself. Although this value creation varied from group to group, immediate value created included the mutual recognition of other participants as learning partners (IP3, IP5), producing value from the discomfort of being pushed outside their comfort zone (IP2, IP4), identification with Futures Literacy as a means of making an important difference (IP6), and the value of engaging with other perspectives (IP1). (Wenger, 2020, p80-82).

Participants from group 4 and group 1 reported that engaging with anticipation for emergence in the reframe stage of the lab was made easier by doing it as a group and went on to highlight the value of this through mutual recognition of other participants as

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[5] Note that extracts are presented ordered and grouped by their value subtypes which have been omitted from these summaries. The groupings are described in the overview text at the beginning of each section.

learning partners. For example, one participant from group 1 reported that working with others helped them to move past the point where they would have otherwise stopped questioning, to consider alternatives that they would not have otherwise considered. A participant from group 4 noted that the collective process of reframing helped them to recognise the assumptions underlying the desired and predicted futures of each group member, and that when they worked through the reframe together, they produced anticipatory assumptions that were very different compared to the anticipatory assumptions that they would have produced had they been working on their own.

The recognition of the value of productive discomfort was also shared across groups. This was evident in the willingness to discuss personal questioning of deeply held beliefs, and in seeking the value to be gained from exploring beyond that discomfort. In one case in group 4, a participant questioned the planning expertise that was central to their career and that had been used in numerous previous projects, describing their conclusion that long term planning was not fit for purpose in the light of emergent novelty as "that was a complete crash of my world". Group 4 went on to discuss how they were dissatisfied with the prominence of business as usual, utopian, and dystopian images of the future in external consultant's scenarios and would also later identify overreliance on extrapolations and quantitative data gathering as failures to address the limitations of these approaches. Group 3 also engaged with the discomfort of questioning their organisations' reliance on long-term planning out to 25 or 30 years, stressing that it is "too long to complete our thoughts and plans" considering emergent novelty.

Identification, or moving closer in terms of commitment or understanding to something that you care about (Wenger-Trayner & Wenger-Trayner, 2020, p.80) is evident in a quote from a participant of group 4 who said: "*I realised that we act in a way in the present thinking about our future and assuming somethings in the future that in fact we don't know that they're going to happen, so if we change the way of thinking about the future, you will absolutely change the way that you will act in the present.*" This suggests that the participant has been able to gain insights on how to make a difference to the future through alternative thinking in the present.

The value of engagement with alternative perspectives is reflected in comments made by group 4, who expressed a desire to invite more varied people with different perspectives to FLLs; artists, outsiders etc., who would be able to make contributions from outside the typical frame of reference of maritime "experts". Group 2 also recog-

nised that when considering futures, there is a greater requirement for multi-disciplinarity to bring more factors and perspectives into the conversation.

4.3   Potential Value – Advantages

Advantages are the articulation of ways of creating further value from the new ways of thinking and doing identified through the experience of the lab. This could be in the form of new options opened up by the disassembly of assumptions that were acting as barriers to the perception of viable alternatives. This is a process that seems to be contingent, and developing upon, the shared experience of collective reinterpretation and meaning making across membership of a group. Advantages could be gained from the adoption of a vantage point that allows for greater sensitivity to non-linear pathways, or the recognition of in-progress emergent phenomena. Advantages include ways of using Futures Literacy on a meta-foresight level to recognise what futures are being used by others (and oneself), identifying and switch the assumptions that act as inputs to anticipatory assumptions, and consciously playing with alternative assumptions that may reveal previously unconsidered alternatives or potentials. This definition is in line with the advantages of FL articulated by the main proponents of futures literacy (Miller, 2018a), (Poli, 2017b, pp. 67–73).

Potential value is near synonymous with advantages, and so can be drawn on to help understand both the participant and facilitator comments. Potential value includes "*the tangibles and non-tangibles that you carry with you as the result of your meaningful experience in the space.*" (Wenger-Trayner & Wenger-Trayner, 2020, p.84). Insights that grant a new perspective or understanding are a common potential value identified at this stage, in common with skills related to futures literacy capabilities and critiques of practices that are deemed no longer fit for purpose. (Wenger-Trayner & Wenger-Trayner, 2020 p.84-86).

4.3.1   Advantages – Participants of the Focus group

Table 5 Potential value - Participants of the focus group

Code	Extract Summary
AP1	*Ability to spot the potential opportunities inherent in a wider array of alternative futures that move beyond conceptualizations of probable/improbable and utopia/dystopia.*
AP3	*Recognition of the role of systemic patterns of change as being inherent to an appreciation of emergence.*
AP4	*Appreciation that emergence in businesses provides competitive advantage or the ability to avert disaster.*

AP5	*Thickening of the present or shortening of the distance between the present and the future.*
AP2	*Creating synergies between recognised novelties and identified continuities in our visioning processes, is based on improving our understanding of novelty as being an emergent property of complex systems.*

The majority of participant potential value creation was in the form of insights, with some instances of critique and information that could be used to create advantage. Critiques of previously held assumptions (AP1), new perspectives or ways of looking at a situation in the form of insights (AP1, AP3, AP4, AP5), and the acquisition of useful information (AP2) were reported. (Wenger-Trayner & Wenger-Trayner, 2020, p.84-86).

The insights and critique of AP1 drew upon extracts from all four groups, although each group describes the insight that they gained in a different way. A participant from group 1 points out their previous reliance on using the future in a practical and realistic way had been limiting *"... just sticking to the realistic things that could be materialised even now so not even that imaginary, so now I think about the future [...] in a more far reaching way, trying to actually think about something that doesn't exist, in that sense I think this was really useful."* A second participant from the same group also highlights how they would dismiss any idea that was not immediately and obviously useful, not giving any room for experimentation, failures, or serendipity; *"I would not consider [alternatives] as options at all, I would say this has a low probability of success so scrap it, scrap this, scrap the other…"*. This same sentiment is echoed by a participant from group 2 who simply states that *"I opened up more and began to think that a lot can change"*. In Group 3, a participant that was generally quite entrenched in their position that nothing new would come from this process, being a long-standing expert in the field of foresight within their company, recognised that *"if you think about what was the result, it did help us to broaden our view [...], I can see that."* In group 4, a participant related how comparing the images of the future in the past to how things turned out in the present illustrated how unreceptive to the idea of radical changes we were in the past, and remain resistant today, which leads us to think about the passage of time in a faulty way *"we kept saying it is not possible, it cannot happen, it has to work (like) today, trade is going to grow (...), keep assuming and extrapolating but thinking that we imagine, but we don't imagine a lot of the time, so we are just extrapolating standard things, it was [...] completely out."*

AP5 refers to an insight that a participant of group 4 had into their relationship with the future, *"so I reduced my mental distance in how I feel about the future, once I really*

started to think about it in a concrete way, because usually [you] think about what is the future [going to be]? but you are not really trying to imagine, imagine it in (a formative) way, so that was my [insight]." The act of thinking seriously about the future in a way that was not *trying to determine what the future is going to be* helped them to realise that they were not utilizing their ability to imagine the future as much as they could be. Broadening one's perception of the present moment to be 'thicker', meaning to include a greater awareness of both memories and anticipations in this moment in time that we call the present as an idea has been developed at length by Anthony Hodgeson (Hodgson, 2019).

Group 3 discussed insights around the importance of systems thinking, and the perception of systems, as being necessary for the recognition of emergence (AP3). One participant points out that their research into systemic changes helped them to identify threshold questions. Another participant from the group brought attention to the tendency to focus on the 'hard' technological factors in the sustainable development of ship systems without enough consideration of the relationship between business models, regulation, investment, and behaviour change.

Group 4 discussed how considering emergent novelty is a factor in business resilience (AP4), "*if you think about it now you are ahead of the game, otherwise you see what happened to Nokia.*" This is a typical way of articulating the advantage of engaging in foresight work, but here they are recognising the additional role of futures literacy, and in particular, an appreciation of using anticipation for emergence.

AP2 places the emphasis on the value of the conceptual knowledge gained about futures literacy at the Turku 2019 FLL, and how it may contribute to the work that the participant is engaged with in the deep demonstration project. As their organisation is oriented towards evidence and research, this injection of new content and process knowledge is seen as valuable.

4.3.2 Advantages - Facilitator reflections

Table 6 Potential Value - Facilitator reflections

Code	Extract Summary
AF8	*A reflective stance gives the ability to better comprehend what transformations are occurring as well as an openness that alternatives exist once you move beyond your own assumptions.*
AF3	*Individuals are encouraged to make and communicate opinions, but opinions need to be defended by seeking proof, which consolidates our own assumptions. Developing individual FL capacities enhances our ability to be highly critical in the formation of our own opinions.*

AF9	*Taking multiple perspectives, especially an interest in social aspects of the future beyond a focus on technology and problem-solution thinking, increases perceptiveness and sensitivity.*
AF7	*Recognition that multiple present futures can be used as alternative lenses, and that the choice of a particular lens has an impact on present decision making with future conse-quences.*
AF1	*Being able to switch between using the future for assessing probable futures, generating desired visions, and for imagining strange discontinuous futures.*
AF4	*As a means of enhancing personal and group capacities for challenging tacit assumptions; the more people that can develop FL within a group or at an organisational level the better able they are to overcome institutional resistance.*
AF2	*You cannot know how an innovation will be used or how a vision will play out and therefore using both AfF and AfE is necessary for resilience.*
AF6	*Developing FL provides an appreciation of the role of emergence in the unfolding of the future which enhances our preparedness for the eventuality that unknowable things can and will occur by reducing our shock and increasing our sensitivity.*

It is to be expected that facilitator reflections identify numerous potential advantages stemming from developing futures literacy capacities. Compared to participants, facilitators were more able to identify the skills related to generating insights through futures literacy (AF1, AF3, AF7, AF8, AF9), critiques of existing practices related to relying on anticipation for the future (AF2), insights into individual cognition when considering futures (AF3, AF8), necessary skills when using future literacy (AF1), the intangible sense of increased confidence in the face of unknowable novel futures (AF6), and the benefits of speaking with a collective voice (AF4). (Wenger, 2020, p.84-86).

The substance of the facilitator's reflections is of greatest relevance to the themes of the analysis in Chapter 5, and so are discussed further in the context of the arcs of learning visible.

4.4   Applied Value – Uses

Concrete applications of Futures Literacy were coded as "uses". These were most fre-quently discussed in the final phase of the FLL – Next Steps. Participants were answer-ing the question "*What concrete initiatives, lines of inquiry, experiments, or innovation programs should your maritime hub or home organisation pursue?*". This question prompted some very rich discussions among the participants, the following sections on needs/enabling value and ideas/strategic value also draw on the discussion of this ques-tion.

The Wenger value-creation framework identified two aspects to "applied value", it includes both "the application of potential value" and "trying to make a difference by applying oneself to address a challenge, situation or opportunity". Examples of applied value include the adoption of potential value through follow up or the implementation

of an idea, adaptation of an idea to create a new one, reusing the FLL format in a new setting, being more assertive and confident when talking about what needs to be done, harnessing the synergy of overlapping interests, among others. It is worth noting here that, technically, the applied value identified below has not yet been implemented in practice, so this occupies a middle ground between potential value and applied value, potential-applied value if you will. As a follow up study has not yet been conducted it is enough for the purposes of this investigation to point out the intent and direction in which future actions and practice are aimed. The analysis section that draws on these results focuses on linking the observed intent of potential-applied value with recommendations for action sourced from across the event as a whole.

Facilitators did not reflect on applications of futures literacy, as they were neither the beneficiaries of the process nor stakeholders in the organizations involved, but rather viewed application as the prerogative of the participants.

4.4.1 Uses – Participants of the Focus group

Table 7 Applied Value - Participants of the focus groups

Code	Extract Summary
UP1	*As a tool for seeking out assumptions and critically questioning them.*
UP5	*Utilisation of reframing questions in the context of a questionnaire. Ties with design thinking and engineering perspective.*
UP3	*Deployment of reflection space utilizing FL as part of the ongoing Deep Demonstration processes, to give space and time to be reflexive and critically question assumptions.*
UP4	*As a process underlying mass citizen engagement, through deliberative polling for example.*
UP7	*As an argument to break out of BAU, growth, and collapse as baseline scenarios.*
UP8	*In development and planning discussions use FL to 1) question extrapolations 2) Propose an additional level of thinking; consideration of emergence 3) Explore emergent or disruptive change.*
UP6	*As an argument to push planning projects to consider more alternative possibilities, emergence, and reconsider reliance on extrapolative modes of using the future for long term planning.*
UP2	*Individuals who have experience of participation in FLLs acting as FL ambassadors in their organisations with the task of 1) Expanding the realm of the possible 2) Explain the relevance of emergence and its impact on planning 3) Articulate the utility of wild imagining 4) Support initiatives for others who want to develop their FL.*
UP11	*Integration of FL into the CKIC Maritime Hub Deep Demonstrations for stakeholder engagement, identifying leverage points, and defining a vision*
UP9	*Making use of the outcomes of FLLs to engage local business actors in innovation processes.*
UP10	*Engagement with new working groups in the European Sustainable Shipping Forum.*
UP13	*We do not think as imaginatively as we think we do about the future, we tend towards extrapolation of today's standard ideas even when we think we are being imaginative, radical, or novel, tending to draw on media sources, FL can be used as a tool for rigorously reimagining.*
UP12	*Exploring the effect of running an FLL at an early stage in the Deep Demonstration process – to enable mutual value creation, orchestration, trust building etc. holding an FL lab as a catalyst.*

Phase 4 of the FLL asked the question "*What concrete initiatives, lines of inquiry, experiments, or innovation programs should your maritime hub or home organisation pursue?*" The large number of extracts referring to applied value across all groups flows from this question directly asking about adoption/adaptation in their context organisation.

Participants from all four groups indicated that they would be interested in applying futures literacy in their own organisational context, either directly as adoption, in the form of taking up futures literacy processes as their own (UP1), indirectly in the form of adaptation of processes experiences at the lab to their own context (UP3, UP4, UP5), or in the explicit reuse of the entire FLL format for their own purposes (UP12). A role for Futures Literacy in the decision making of organisations was identified, being more assertive in arguing for more radical courses of action (UP7, UP8) and as a means to enhance the influence of radical or alternative voices in meetings otherwise dominated by orthodox positions (UP6, UP8). Futures literacy was also seen as having a role in being the focus for enhanced motivation or sense of agency, which was prominent in the identification of the role for Futures Literacy ambassadors inside C-KIC (UP2) but also to spread the enthusiasm to stakeholders (UP11). Some participants discovered that Futures Literacy could be a pivot point for the leverage of contacts and connections towards their desired goals (UP9, UP10). A key insight was that Futures Literacy can be applied as a tool for rigorously reimagining in situations when greater inventiveness is required for creative problem solving (UP13).

Examples of the need for adoption of FL are drawn from all groups (UP1). Talking about the reason why they want to apply futures literacy in their day-to-day working, a participant from group 4 said "*I now try to push myself to think of more surprising possibilities, [...] my assumptions were either, projecting my desires based on what I think, or my concerns. now I'm trying to leave that space.*" Group 3 discussed how taking up greater reflection on assumptions was essential to the ongoing deep demonstration process in C-KIC, as the visioning stage recently undertaken had not been critical enough of the assumptions underlying their visioning process. Group 2 considered the experiential nature of FLLs suitable for stakeholder engagement, whereas Group 1 took this argument a stage further, considering including FL as a component of mass participative methods such as deliberative polling to active decision making at a local level through direct democracy. Integration of futures literacy into the deep demonstration process of

C-KIC is widespread among participants from that organisation. A participant from group 2 stated that for the visioning stage of the deep demonstration *"the ingredient of reframe concepts should be in there, [...] but after that, for the portfolio, we will try our best to get some funds towards re-framing activities and the rest should be extrapolation activities [...], trying to helping us move towards our vision."*

Arguments for greater inclusion of anticipation for emergence over anticipation for the future is interpreted as a move to be more assertive. An example of this is drawn from the participant from group 4 who had previously engaged in long term planning projects relying on best, worst and BAU scenario projections, they talk about how if they were in such meetings again, they would make the case for including one additional alternative scenario beyond the typical three, a small but noteworthy shift in position. Group 3 articulated how they would include an appreciation for emergence in project proposals by *not* including a vision of how things would be done or be used, so leaving space open for beneficiaries to decide how to make use of the outputs of the project rather than deciding in advance, they call this "*it is a small step, but it is a strong step*". These initial steps in being more assertive are synergistic with more radical voices, which do not typically have as much influence as more conservative voices (Wenger-Trayner and Wenger-Trayner, 2020, p.91), articulating arguments based on futures literacy insights to pursue an agenda of greater consideration of emergence in planning and development discussions dominated by voices using anticipation for the future.

Futures Literacy Laboratories produce significant levels of enthusiasm and motivation in participants in part this flows from a renewed sense of agency that participants feel when they realise that there are more alternative options open to them than they had previously believed, and that it is possible for radical changes to occur even if they are not easily visible from the vantage point of the present and from within the paradigm of forecasting. A participant from group 4 describes how they see a change in one of their junior colleagues over the course of the FLL "*yesterday to be honest I was excited to see you, from morning till afternoon, especially yourself. Because you had this question in your eyes, and then by the end of the day they were lighting up, I mean I could see it happened to be honest, it was so beautiful.*" This change in energy is seen as a precious resource, and they go on to say how it could be used going forwards "*So what I was thinking is, you are the best ambassador, so you have lived through this one, so if at some point this is very useful for the strategy*". They go on to list four key ways that an ambassador of futures literacy in an organisation would be able to make a difference,

see UP2. This idea of harnessing the energy of those with 'bright and shiny eyes' is also brought up in group 2 who talk about deploying such people as attractors of people with similar thinking within their organisations.

We see some instances of participants from group 3 highlighting the need to exploit the synergies, overlaps and connections between existing networks, using Futures Literacy as the reason to act in concert. Members of the same group go on to point out local and regional opportunities for leveraging their professional networks.

All groups discussed how futures literacy could play a role in enhancing inventiveness, its role in idea creation and the identification of unconsidered alternatives was clear. Examples of this include a participant from group 4 who stated "*when we re-framed the future, we get something, something new came out, man it was completely different from what I was thinking about the future*." Group 1 discusses how developing futures literacy encourages experimentation, refencing inspirational radical practice in Portugal which mixes port infrastructure and aquaculture.

Facilitator reflections relating to applied value were categorised as either enabling or strategic value creation as the facilitators were asked to comment on the participants' reported experiences rather than on how the facilitators themselves would further apply the learning of the FLL.

4.5   Enabling Value – Needs

The gaps between present uses of the future and new capabilities gained through developing futures literacy were coded as "needs". Often these utterances started with "we need to be able to…" or "if we had X then we could do Y". This was an area of interest as these often signify what learning needs to take place or what resources would enable such learning to take place.

In terms of the Wenger value framework, this is encompassed by the "enabling" level of value creation. In their words, enabling value is "learning how to enable learning", so enhancing the effectiveness of the social learning space itself. They classify enabling value into two categories; *internal* enabling value reflects the actions of the participants to engage in metacognitive activities during the event i.e. learning how to learn about futures literacy, *external* enabling value reflects support and resources that come from outside the learning space. Enabling value supports and can be generated by each of the other value creation levels from immediate, potential, and applied. (Wenger, 2020, p.98).

In the results below we see an entanglement of internal and external enabling value, as it is difficult to draw the line between the learning space event of the FLL and the ongoing social learning that would take place within the organisation of C-KIC. In the results below, internal is considered to be the learning that took place at the 2019 Turku FLL, as well as discussed ideas for the continuation of a futures literacy learning space involving one or more participants.

4.5.1 Needs – Participants of the Focus group

Table 8 Enabling Value - Participants of the focus groups

Code	Extract Summary
NP2	*A simple technique/procedure for working with FL after the FLL. Lacking enough grounding in futures thinking can make it difficult to apply/design FL activities.*
NP6	*Training and practicing the critical questioning of assumptions on a daily basis.*
NP1	*FL resources for participants to take home with them, materials that they can refer to, or engagement with an ongoing line of communication or community.*
NP3	*A resource that acts as a reminder of the ideas and concepts discussed in the FLL.*
NP5	*FLL participants acting as ambassadors in their organisations, taking the opportunity to suggest exploring one more alternative future, discontinuities, questioning assumptions.*
NP4	*Balanced, curated futures sources as input for urban and maritime sectors into the design thinking process, no information overload.*
NP7	*Advocating for funding bodies to change the way that they fund new projects from top down to bottom up – funding with looser constraints. Funding for AfE.*

Groups 1, 2 and 4 discussed how internal adoption of Futures Literacy within their organisations could be optimised for their own purposes (NP2, NP6). Group 3 had greater organisational heterogeneity among participants and so did not discuss a unified approach. A participant from group 3 expressed interest in FL materials, indicating a degree of commitment to learning more about FL (NP1), whereas the more engaged groups 1 and 4 both discuss ways of deepening commitment to FL in their organisations (NP1, NP6). Groups 1 and 4 are also the most enthusiastic about documenting the learnings of the FLL (NP1, NP3). Internal leadership in the form of an FL ambassador is actively cultivated between participants in group 4 (NP5). Groups 2 and 4 identify the need for external social learning support in the form of local FL practitioners deployed for the implementation of FLLs in regional contexts (NP4). All groups discuss funding for developing further FL capacities, though there is no consensus on how best to approach this issue (NP7).

All groups saw FL as a capability that they wished to adopt and develop. Discussions focused on the operational level of implementing FL in day to day working processes, meetings and workshops with stakeholders. A common theme was that, despite keen interest in the topic of the Turku FLL, few participants had the time to engage with materials on a deep level "*[thinking about how] we can take this up, [...] because peo-*

ple won't have more than 3 minutes, I mean think about how much people read the [FLL prereading] article that [was] sent [...] it was like scroll, scroll, scroll." Groups agreed that developing FL capabilities would need to be optimized to be lightweight enough to be used on a day-to-day basis, yet also engaging enough to capture the interest of potentially sceptical colleagues. FL was seen a sophisticated and powerful tool, but for the same reasons groups raise concerns ranging from 1) the need to establish how receptive colleagues would be to the introduction of FL into their day to day working 2) how open or closed minded stakeholders would be when engaged with an FL capability development process 3) how FL would be received by stakeholders with a managerial or technical mindset 4) and how to scale up FL learning for a mass participatory process. These concerns were compounded by the need to adapt FL to fit with the schedule and processes of the Deep Demonstration methodology.

The resolution to continue developing and encouraging others to develop FL capabilities after the event of the FLL was clear in groups 1 and 4. A participant from group 4 notes the gap in their cognitive capacity in the ongoing difficulty of escaping the "baggage" of assumptions when trying to come up with radical new ideas. To facilitate the gradual filling in of this gap, group 4 resolves to set up specific FL activities in order to "anchor themselves into doing something". Group 1 recognises that maintaining communication between the attending C-KIC participants, to learn from what each other is doing hints at the initial idea for a community of learning. A participant from group 3 asks for scans of materials for later review, this participant had some difficulties communicating in their non-native language and so this could be a sign that they recognised the value of the experience even if they were unable to participate as fully as they would have been able to in their mother tongue.

The documentation of experiences and learnings from the FLL were emphasised by groups 1 and 4. A participant from group 1 said that they would appreciate "*something small just to remind us of what we had here, like something... but of course not like learning materials, nothing ordinary, but something that would catch our attention, maybe to come back to these videos once in a while, something for us to just not forget about it, but that is something that I'm a bit afraid about, because normally you are very enthusiastic for the first week and then it tends to vanish away.*" This quote is particularly illuminating as to the reason for wanting documentation, to sustain the enthusiasm and energy of the lab for as long as possible after the event. Additionally, it is interesting to note that the participant is less keen on "learning materials" and more on

materials that provoke a strong reaction or stand out as inspirational. Group 4 is also keen to avoid material seen as heavy, preferring a reminder in the form of a "cheat sheet".

As noted in UP2, discussed in the previous section on applied value, the role of Futures Literacy ambassador was seen as a way of channelling the enthusiasm and energy generated at the lab into applied value generation in practice. In this extract we see a more senior participant of group 4 encouraging a more junior participant (from the same organisation) to take up the topic of Futures Literacy at an upcoming recurring organisation meeting;

> *"P4: if you come to the meetings every Tuesday, and you think about this topic, that is yours, take it!*
> *P2: it is so complicated!*
> *P4: I know, but you take it, what did you say? Out of your experiences where you are projecting what you know, voila."*

This is interesting on two levels: firstly, that mastery of FL is not seen as necessary to be able to use it, the enthusiasm and unique perspective of the junior participant being more important; and secondly, that the senior participant places so much importance on Futures Literacy capabilities to the point where they go out of their way to foster a major learning opportunity for both the junior participant and their organisation.

Groups 2 and 4 recognised that a continuation of the social learning space of the FLL would need additional external social learning support. Group 2 recognised the value of external futures specialists in organising the Turku 2019 FLL, seeing it as part of the ongoing process of building FL capacities in ports for the purpose of supporting radical innovation. Group 4 requested additional input in the form of curated articles as a resource for further exploring futures and as inspirational material. This request was tempered by facilitators in the reflective interviews who noted that most articles on futures studies are not necessarily in line with the AfE component of Futures Literacy.

Although all groups discussed the role of external resources in the form of funding for futures literacy projects, two points stand out as being of particular interest. Group 1 raised the issue of the kinds of projects that funding bodies are willing to give money to; "*CKIC doesn't actually give money for this [projects that support anticipation for emergence] what they could is, if something is not fundable so it cannot get financing,*

to do some advocacy and lobbying to change the kind of projects that get some financial support, go back and say okay there are not open calls for that but this came back from the market so open calls for this as well because there is a necessity for that." This extract points to the idea that there is a need to change the *kind* of project that receives funding. Funding calls are an expression of the present, conventional, paradigm, and so suggesting a feedback process that seeks to act on the premise of those calls is quite a radical idea. Funding a project without clearly defined, measurable outcomes, but which instead seeks to open space for new ideas to find expression without expectations, shares more similarities with start-up incubators than large scale conventional EU mechanisms. This is also in line with the reorientation of EIT (C-KIC's funding body) from being a top down output focused innovation body, to taking a more bottom up user created value approach; in other words providing funding to make the tools but not telling people what to make with the tools. The second issue of external resourcing was identified by both group 3 and group 1 who discussed the stifling effect of private corporate funding on the publication of research results, with one participant pointing to the difficult of publishing meaningful results from their research due to the perceived need protect competitive advantage. This was seen as hypocritical, as companies were keenly interested in such results from public research, and the discussion culminated in the identification of open innovation as a necessary condition of external funding.

4.5.2   Needs - Facilitator reflections

Table 9 Enabling Value - Facilitator reflections

Code	Summary
NF2	*Enough members in an organisation who are willing and able to question their assumptions, to overcome the negative impact of entrenched opinions, expertise, or siloes which can be a barrier to being open and explorative.*
NF1	*The need for playful and lightweight FL exercises to be done in other meetings that highlight what futures are being imagined, there are assumptions embedded within those futures, we should reveal them and explore them.*
NF3	*Recruiting skilled local FL practitioners who can run localised FLLs.*
NF4	*Online resources, courses, FAQs, for stakeholders to engage in FL capacity building activities.*

Facilitators reflected on the comments identified by participants, identifying both internal and external enabling value creation measures. Facilitators from groups 1 and 4 reflected that for organisational culture change to occur, shifting towards greater commitment to learning about FL, a critical mass of voices would need to advocate for the development of FL capacities as well as having enough people willing to listen. As FL

is such a new capability, the concept often needs to be explained and demonstrated, which instigates organisational resistance. Internal and external facilitation of FL development is thus necessary for adoption.

In order to address the internal process optimization concerns of NP1 and NP6, a facilitator suggested that simply opening up a five-minute space at the beginning of meetings for the discussion of the future in the form of interesting or innovative new development would be enough to remind people of the ideas discussed at the Turku 2019 FLL and keep them "warm".

For Groups 3 and 4, it was clear that for the deployment of FLLs in regional settings the strategic facilitation of such events by skilled local FL practitioners in the native language of participants would be necessary. External enabling value through strategic facilitation focuses on the learning needs of stakeholders rather than participants. This would tie into the strategic aspirations with regards the deployment of FL with stakeholders, discussed further in the following section in IdP2, IdP6 and IdP8.

Facilitators noted that it would be necessary to create tailored learning resources for the participants to engage with each other in a learning community. This is an example of an organisational initiative focused on creating a social learning space for FL for stakeholders, but also would also have the dual purpose of being an internal source of enabling value in the form of social learning support for participants themselves.

4.6   Strategic Value – Ideas

Participants were given the prompt "*What concrete initiatives, lines of inquiry, experiments, or innovation programs should your maritime hub or home organisation pursue?*", within the responses to this prompt, answers to the question of interest "*What ideas were generated during the lab for the role of further developed FL capacities?*" were coded as "ideas". Ideas reflect the links that were drawn between the development of FL capabilities and the strategic aims of the participants' organisations. Although this varied from participant to participant depending on their organisation, the majority of answers relate to engaging stakeholders or allied organisations, and in the case of C-KIC, a reconsideration of the agenda from incremental innovation to radical innovation.

Ideas and strategic value have a strong conceptual overlap. "Strategic value reflects the extent and quality of conversations and relationships that help to clarify the direction and usefulness of a social learning space" (Wenger-Trayner & Wenger-Trayner, 2020, p.106). As such, strategic value is generated through conversations about how learning

fits into the bigger picture of what matters to whom. This could be internal conversations with other participants in the process, or external conversations with stakeholders. It is notable that the definition emphasizes the mutually negotiated interpretation of how the learning fits into external goals, and expectations, as well as how external actors play a role in the learning space. Strategic value creation, like enabling value, can occur through interactions situated in each of the other levels, from immediate, potential, applied and realized, as the value created in the moment is negotiated in relation to the big picture of strategic concerns. (Wenger-Trayner & Wenger-Trayner, 2020, p.106-107).

4.6.1 Ideas – Participants of the Focus group

Table 10 Strategic Value - Participants of the focus groups

Code	Extract Summary
IdP5	*Using short video or audio media to provoke discussions about the future on relevant topics at the beginnings of meetings.*
IdP1	*Starting a mailing list for sharing weak signals to keep the discussion going after the event and bring new people in.*
IdP4	*Bringing FL into the Intent stage of the DD process, to have those involved develop their FL before moving on to generate a vision so that they can critically question underlying assumptions.*
IdP7	*Running an FL capacity development process with local business innovation development networks.*
IdP8	*FL as a tool of regional foresight networks. Increasing the sophistication of strategic foresight – combining local stakeholder thinking with vision generation and strategy generation.*
IdP2	*Run an FLL with a broader stakeholder group, including unusual stakeholders, who are practically connected to the port at a later stage in the DD process.*
IdP6	*Gradually introducing FL to individuals related to ports, to generate interest and momentum for further FLLs run by UNESCO.*
IdP9	*FL follow up activities that focus on linking up stakeholders and actors with shared interests.*
IdP3	*In future FLLs, including presentations from people with interesting and innovative ideas to challenge assumptions or typical modes of thinking of people with an engineering mindset.*

For C-KIC participants, the main strategic imperative was how FL should be used to support the Net-Zero Emissions Maritime Hubs Deep Demonstration process ongoing in their organisation, either as a challenge owner or as a C-KIC design partner. For non-C-KIC participants, concerns ranged from how to maintain the competitive advantage of their company, to how to create synergies between regional foresight actors. Internal strategic value focuses on the C-KIC participants, as they were the majority group amongst the participants. C-KIC design partners were keenly interested in shifting the learning agenda of their organisation towards greater focus on futures literacy capacity development integrated into their internal community of practice (IdP5, IdP1). C-KIC

design partners and challenge owners were also interested in discussing the strategic context of deploying Futures Literacy as part of the Deep Demonstration process (IdP4). It was universally agreed that the development of FL capabilities should involve a broad spectrum of partners, with possible alliances discussed at all tables (IdP6, IdP7, IdP8). Those involved in the Deep Demonstration process discussed numerous ideas around greater participation of stakeholders in FL engagements (IdP2, IdP6, IdP9). Also considered was how future FLLs should be organised to have maximum impact with primary stakeholder groups given an expectation of resistance from certain mindsets (IdP3).

Specific ideas for orienting the learning agenda of meetings were discussed by group 4. One participant related how using a song on the theme of a pre-reading article was used to provoke discussion about the future. They go on to say that the advantage of using provocative media is that it brings participants to a place where they are able to discuss key issues more quickly than reading academic articles. This relates to the points made in NP1 and NP3 in about the need for lightweight documentation, and a focus on impact over depth of provocative materials. A second example of the reorientation of the learning agenda also occurs in group 4, who discuss how setting up a mailing list and newsletter, first for participants of the FLL, and then expanding it to include stakeholders would shift thinking to be on the "same page" about futures literacy capabilities. This idea combines the idea of sustained learning about FL with the strategic objectives of C-KIC to maintain ongoing engagement with stakeholders *"to keep it* [interest in FL and radical change] *warm for years to come"*.

The strategic orientation of participants is visible when they discuss how they see themselves making use of FL in relation to the Deep Demonstration process. A participant from group 1 states their position clearly: *"I think in my work, the main thing is to stay close to the deep demonstration, particularly the problem owner when they consider what the portfolio should look like, because that is key to developing the impact pathways, even if you are not completely sure what they will look like, to get a sense of what levers of change you might be using, and that is essential to the work that I am doing"*. Perhaps this participant is being politely sceptical, staying close to the official terminology of the C-KIC Deep Demonstration (DD), however that they are making use concepts such as "levers of change" used in Miller's orientation presentation and discussed with interest in this group, as well as appreciating the emergent nature of the DD impact pathways. There is a degree of negotiation and dialogue taking place between the concepts of FL and the internal/external strategic environment. In another example

of the dialogue between the strategic context and learning about FL, a participant from group 4 discusses how they would bring FL thinking into an upcoming workshop run by their organisation in Spain two months following the Turku 2019 FLL; they muse on how they would look for opportunities to apply FL in practice during the vision creation process of the upcoming event.

Opportunities to pursue external alliances are discussed across multiple groups. Specific examples of this are brought up in group 3, who identify synergies between FL capacities development and the maritime accelerator project in Turku science park, as well as the University of Turku and C-KIC. Group 2 identifies the untapped potential of the concentration of actors involved in foresight in the Southwestern Finland region "*this network structure has holes in its relationship where there should be talking or cooperation, I was discussing yesterday with Turku Business Region person who is here, how they see their role as a coordinator.*" Furthermore, participants from group 3 resolve to make a joint proposal to the European Sustainable Shipping Forum. Linking up actors with similar interests and goals in order to pool resources and make joint proposals is seen as par for the course.

Conversations about how to engage stakeholders in futures literacy processes took place across all four groups. These discussions tended to focus on three aspects of strategic value creation 1) creating value through increasing the breadth of stakeholder involvement in future FLLs, 2) how to introduce FL concepts gradually to overcome expected resistance and generate enthusiasm for future FLLS, and 3) the role of Futures Literacy in creating positive network effects.

Potential for strategic value creation was seen in linking actors and stakeholders in groups 2 and 3. Group 2 focused on the role of the C-KIC community in delivering value to stakeholders by involving them in the generative conversation of the strategic visioning phase of the DD process, reinforcing the bottom-up approach identified in the enabling value section. Group 3 had a lengthy discussion about learning from the different projects involved with C-KIC, recognising that factors such as the cultural language of different stakeholder groups, the need to adapt FL processes to local conditions, and the varying needs of municipalities and shipping operators, variously make a 'one size fits all' approach inappropriate. Yet the group also recognises that learnings and synergies are possible, and that the unifying purpose of achieving net-zero emissions maritime hubs requires collective reflection.

Group 4 focused in on the need to overcome perceived resistance, considering how they would gradually introduce FL as a tool for opening up constrained thinking as groundwork for a lab in partnership with UNESCO. Frequent references to this resistance are made throughout the conversation *"they are going to open their eyes, it is going to open their minds"*, *"that could be a start to convince them"*, *"how do we land this into our port environment"*, *"we need to train our minds in a different way"*. The outcome of this discussion is that such engagements need to be introduced gradually, that groundwork must be done before introducing them to a full FLL.

Group 1 and 4 were enthusiastic about the idea of involving atypical stakeholders in future labs, such as local citizens next to port managers, fantasy and science fiction writers, visionary architects, NGOs, and tech start-ups. These less typical perspectives were considered to be antithetical to the engineering and managerial paradigm dominant in ports. The introduction of such unconstrained radical viewpoints was seen as a way to catalyse deeper discussions that would open more options through the re-evaluation of entrenched assumptions which is a necessary step for embedding FL in the wider stakeholder engagement strategy of the DD.

4.6.2   Ideas - Facilitator reflections

Table 11 Strategic Value - Facilitator reflections

Code	Summary
IdF1	*Spending five minutes discussing the future at the beginning of meetings.*
IdF3	*Mirroring as a technique for pointing out what uses of futures are being talked about at the table, making an opening for other uses of the future to be explored.*
IdF2	*Using surrealist games for generating and processing weird imaginings.*

Facilitators made several noteworthy recommendations for sustaining these strategic value creation conversations. The first suggestion is to talk about the future for five minutes at the beginning of each meeting in order to sustain the leaning agenda of futures literacy in day to day working. Adopting this measure would also bring new elements of the strategic context into focus as they emerge. The second suggestion involved 'mirroring', which involves one person in a taking the role of an observer who first listens and takes notes, then reflects back their observations to the group. The observer notes what uses of futures are present in the dialogue, then makes these implicit uses of the future explicit in their reflections. This process simulates the first phase of an FLL and facilitates the identification of alternative ways of using the future. This tech-

nique reveals the intentionality behind uses of the future, helping the different participants of a meeting to recognise that alternative voices and perspectives also play a role in moving towards the shared aspirations of the group. Alternatively, when applied in a context involving people who have not participated in an FL process, it can be used to reveal the power dynamics at play. The third suggestion relates to the learning theory behind FL, that reframe scenarios are effective because they are not realistic, indeed, the games of surrealist artist collectives are seen as highly effective in revealing assumptions and toying with alternatives to simulate encountering novelty.

4.7   Conclusions of the Findings

This chapter has presented the compiled fine-grained findings that answer the first research question of this study; *what did the participants of the Net-Zero Maritime Hubs Turku 2019 FLL experience?* The six guiding questions of the FLxDeep post-FLL report investigation were reconceptualised as the levels of value creation of the Wenger-Trayner social learning framework and were used to demonstrate the strong, if imprecise, links between transformative learning theory, value creation through social learning and the designed experience of a Futures Literacy Laboratory. Qualitative data from focus group transcripts and summaries of semi-structured facilitator interviews has been presented and interpreted to paint a picture of the complex interplay of learning taking place. When simulated emergence was encountered and processed successfully in a psychologically safe environment, value was produced across the multiple levels of meaning making. This was a clear demonstration of the clarifying role of transformative and social learning frameworks for understanding the participant experience of a collective intelligence knowledge creation processes at an FLL. The Wenger-Trayner framework is a particularly useful construct when grappling with the tangled and complex problem of evaluating reflexive action research on anticipatory systems and capabilities.

Condensing and interpreting participant experiences risked losing sight of the impacts of an FLL on such intangibles as mood, infectious enthusiasm, new feelings of optimism and so forth. Giving precedence to the voices of participants is an attempt to retain the essential meaning of their experience. Preserving the richness of detail present in the data gathered in balance with a mode of presentation that respects the attention of the reader can only ever be a compromise. Nevertheless, from the evidence presented in this chapter, FLLs appear to be an effective way to stimulate progression through some of the stages of reflection of transformative learning that can potentially lead to trans-

formed ways of perceiving. This is not to say that wholesale transformations of habits of mind took place at the FLL, but rather that such an event can be a stimulating experience that facilitates taking another step on the extended learning journeys that each one takes concerning complexity, anticipatory processes, and how imagined futures are used. There is no *being* Futures Literate, only *becoming* Futures Literate.

To summarise, based on the participants' own words and the observations of the group facilitators, participants of the Net-Zero Maritime Hubs Turku 2019 Futures Literacy Laboratory experienced encountering and generating novel ideas that challenged tacit assumptions that they held about the future. Faced with challenges to their typical modes of thinking, two of the four groups adopted a stance that allowed them to produce greater insights into their own thinking to produce radically different ideas. The other two groups' event experience was characterised by limited engagement with anticipation for emergence, maintaining focus on their own areas of expertise or declining to significantly challenge familiar paradigms. As with any process characterised by complexity, individual experiences were highly contingent on initial conditions. Likewise encountering emergence, and reflecting on the futures literacy process, produced highly idiosyncratic insights which were nonetheless incorporated into the collective meaning making of the body of participants.

Having described the character of the participant experience, two further questions of importance beg to be considered; what did this experience mean? And what can be done with it? Answering these questions requires analysis that goes further than description of what happened. In answering the first question, the next chapter will tap into a generative interpretation of these findings to communicate insights about the kinds of learning dynamics that were in play at the event. It goes on to answer the second question by considering how the latent energy of the event could be channelled through in-practice experimentation with the insights of the FLL.

5   ANALYSIS

This chapter presents two modes of inductive analysis of emergent themes from the findings. These were undertaken to explore the answers to research question 2; *what stories of learning are visible in the findings?* and research question 3; *What prospective value was anticipated from the FLL experience and what recommendations for enhancing and sustaining this value creation can be made?*

In pursuit of answers to these questions, the research process moves from a semi-deductive mode guided by the Wenger-Trayner framework and interests of the FLxDeep project, to an inductive mode that seeks to give expression to the emergent voices and themes evident in the materials. In this mode, the researcher acts as a lens for magnifying specific details of participant insights while also drawing connections between elements that would otherwise remain invisible in the background noise of the data. This study emphasises the importance of prioritising the voice of participants who are closest to the learning and contexts of application, while also deepening the analysis, which is a unique characteristic of its design in relation to previous FLL case studies.

The first part of this chapter presents four stories of futures literacy learning journeys, termed insight narratives. The insight narratives explore the value creation flows between the learning interactions, immediate value, and potential value levels of the findings. The themes covered by the insight narratives are: Questioning Extrapolation; Novelty Collective; Resilience to Surprises; and Exploratory Perspective Switching.

The second part of this chapter presents four prospective value creation themes that link observations about areas of action and recommendations for how to enhance the leverage of acting in these areas. These draw from findings in the applied value, enabling value, and strategic value levels. The themes covered by the prospective value creation themes are: Futures Literacy Practice; Futures Literacy Community of Learners; Imagination and Creativity; and Stakeholder Engagement.

The chapter concludes with a summary that draws together learnings from the two sections.

5.1   Exploring value creation flows through insight narratives

An insight narrative is the term that I use in this study to describe the learning dynamics and flows that were observed at the Turku 2019 FLL, but which may not be visible from the data in a static or granular form. They are an attempt to breathe life into the data, to

briefly animate the flows of value creation that characterise the lived experience of a lab. These stories emulate what might have been reported by participants to their colleagues if they were asked "you attended a Futures Literacy Lab, so what difference did that make?".

The intention of an insight narrative is to tell a story about the value that is created when learning proceeds through successive stages of reflection, producing a series of insights that can form the basis for a potentially transformative conclusion. This does not describe what cause and effect learning occurred (which would be absurd in its reductionism and specificity), but rather explores the evidence for what transformational learning could have occurred from experiencing that specific cluster of insights. The iterative process of reflection, assimilation of new information and experiences was built into the FLL as short-loops (Wenger-Trayner & Wenger-Trayner, 2020, p.127-150); the third and fourth stage of the lab are designed to consolidate and transfer value from earlier stages. Although it is not possible to directly observe the changes in thinking that occurred within these learning loops, it is possible to conceptualise the relationship between the visible evidence points and make a creative leap based on consideration of the available literature. These meaning-making constructs can then be used as the basis for future verification through interviews, or used as material for individual reflection, or as a synthesis of learnings from the whole event.

An insight narrative, or value creation story, would typically be identified through self-reflection by a participant in the process (Wenger-Trayner and Wenger-Trayner, 2020, p.208), as their meaning making is the closest to the reality of participating in an FLL. However, a participant would require substantial familiarity with the Wenger-Trayner value creation framework to be able to articulate this story themselves, and require follow up interviews that were not a practical consideration for this research design. Instead, I have adopted the role of "value creation detective" (Wenger, 2020, 127-132), with the intent of uncovering the plausible stories of value creation evident in the findings.

The insight narratives presented here provide a snapshot into the hypothetical narrative arcs of the collective learning journeys of participants. The intent is not to describe the experienced reality of one individual or one group, but rather to assemble these instances in a form that can be easily comprehended. The stories are the product of my investigation of the audio recordings, transcripts, expert reflections, and the relevant literature. Interpretations of qualitative data conducted in this way can be subject to con-

firmation and other biases; considering this, the thought process behind the formulation of each narrative is evaluated as the conclusion to the relevant narrative subsection. This considers the extent to which the interpretation acts as a lens that enlarges details and connections that would otherwise have been hidden among the mess and confusion of the collective experience of attending an FLL.

In summary, each narrative is a mosaic of points of view expressed by participants and facilitators, each of which was coloured by their own biases and assumptions. As such, these narratives are more art than science, an attempt to assemble an artificially complete piece from disparate parts, yet which put together hint at a useful interpretation. There is no claim that this process moves us closer to some abstract truth, but instead that they provide case-study evidence for others to develop their of understanding of Futures Literacy.

5.1.1 Questioning Extrapolation

The critique of current approaches and perspectives destabilises participants' understanding of how to make sense of futures. Accepting the non-linear, the radical and the intuitive into the meaning making process is discomforting, as predictable and familiar methods are temporarily discarded. Yet, having permission to explore beyond the boundaries of the comfortable engenders feelings of empowerment, as creative destruction enables innovation.

Participants identified that they found it to be difficult to overcome the entrenched assumption that 'futures need to be realistic to be useful'. As a participant observer, it was clear from my vantage point that "realistic" was a deeply ingrained element of the frame of reference of maritime hubs, given the engineering mindset common to this sector. The technical problem-solving skills of engineers are less suited to the entangled socio-economic and environmental challenges of imagining radical alternative futures in the Anthropocene. Extrapolations assume that current trends based on historical data, and implicit qualitative interpretation, will continue along the same trajectory in the future, and so struggle to account for discontinuous change. Traditionally, maritime hubs have relied on external consultants to gather and analyse quantitative data for the purposes of making forecasts to inform planning and decision making. The participants of the FLL were port managers and decision makers. Their rejection of the traditional approach temporarily shifted the anticipatory system of the port closer to the edge of chaos (Jacobs, 2019) – a state of fluidity that increases the port system's receptiveness to novelty,

and potential to make radical changes. This shared discontent with extrapolative practices fed an interest not only in visions of alternative desirable futures, but also a sensitivity to futures that could be emergent given sufficient opportunity space through fostering experimentation and serendipity.

5.1.1.1 Value flow: Struggle --> Immediate Value

Resolving the critique of the current perspective in favour of a radical opening up produced a sense of optimism, that the future is more open than forecasts would imply. In a sector as conservative as maritime, cognitive tools for thinking outside the box and enabling creative disruption of the orthodox view of futures are seen as valuable.

5.1.1.2 Value flow: Immediate Value --> Potential Value

Harnessing the productive discomfort of shedding dependence on linear, quantitative methods allows an open space for innovation and experimentation to be created. This has significance both procedurally, in terms of increased sophistication of the investment portfolio creation stage of the Deep Demonstration, and also in the increased complexity of the mental frameworks of participants, which enhances their sensitivity to the opportunities of discontinuous change.

5.1.1.3 Evaluation

This theme echoes the stated aims of an FLL, to open up participants' use of Anticipation for Emergence in addition to anticipation for the future, also referred to as "walking on two legs" (Miller, 2018a, pp. 22–23). Similarly, the value flow is in line with the meaning making at the edge of chaos framework (Jacobs, 2019). Applications of the critique and insights were identified by participants themselves, who may well go on to generate further value from them through their application. Evidence to support the value creation claims was provided by participants in the form of anecdotes, declared intentions, and mutual support which, because it may or may not be followed through, cannot be verified by this evidence. The learning flows of groups 1 and 4 seemed to corroborate the value creation dynamic presented in this insight narrative. On the other hand, groups 2 and 3 maintained enduring misconceptions, resistance, language issues, and group composition issues that seemed to act as a barrier to these kinds of flows. Some members of group 2 defended the need for realistic visions or played with visions

without serious re-evaluation of their own assumptions. Some members of group 3 may have felt that this workshop was for C-KIC organisation members rather than themselves (i.e. Turku maritime ecosystem actors not involved with C-KIC, DD or FLxDeep), perhaps leading to a lack of trust in the process.

5.1.2   Novelty Collective

Gaining insight into the assumptions inherent to one's current perspectives is facilitated by engaging with the collective intelligence of a group through constructive dialogue. The negotiation of shared meaning enables creative processes amid instability that deepen self-reflection. Encountering novel futures as a group builds a collective capacity for uncertainty, self-organisation, adaptation and acceptance of unpredictability, which can be later deployed in an organisational context.

Facilitators noted that their groups' first tendencies were to apply the techniques of Futures Literacy in a familiar way; to continue doing what they had done before but with a new tool. In the maritime sector, concern with the long lifecycles of ships and infrastructure make predictive, visionary, and planning foresight frames prevalent and familiar to participants, whereas the self-reflection and critical re-evaluation of one's own assumptions required of the transformative frame is an unfamiliar exercise. Trying something new runs the risk of failure and loss of one's status as an expert or influential decision maker. Some participants struggled with this shift, particularly in group 2 and group 3, while groups 1 and 4 successfully moved fully into the transformative framing of futures. The most striking difference between these two pairs of groups were the participants' reports of the role of group dynamics, namely engaging in mutual support, recognition, and encouragement. There could be numerous reasons why a group develops a poor dynamic, ranging from group composition, personal differences, a dominant voice, facilitator skill, lack of caffeine or low blood sugar. However, developing a positive group dynamic seems to be facilitated by engaging an open, receptive and supportive mode of communication. Indeed, successfully developing this kind of collective capacity seems to be critical to creating the most value from the FLL process. Peer interactions and support are seen by Jacobs (2019, p. 10) as essential factors in the critical reflection and discourse necessary to begin making new meanings from the discomfort of encountering a disorienting dilemma. Jacobs goes on to point out that going through

the process of a radical shift in one's worldview can "leave one feeling exquisitely vulnerable", but that sharing this risk with others makes it feel less daunting. A radical shift in worldview can also upend social relationships, and so the need to establish a new community and social structure with the likeminded, as former peers reject the transformed individual and no longer offer support. (Jacobs, 2019, p.9-11).

The collective support capacity developed by groups 1 and 4 produced a more radical shift in their perspective and led to declarations of intent to utilise this capacity to create an opening for further transformative framing within their organisations.

5.1.2.1 Value flow: Struggle --> Immediate Value

It was clear that the groups that developed mutual respect and appreciation for each other's contributions were better able to progress through the stages to produce satisfying outcomes. The groups that created immediate value in this form through the successful negotiation of initial struggles were better able to explore alternatives under conditions of extreme uncertainty and support each other in self-evaluation. The emotions shared, the ideas built upon, the insights gleaned, all contributed to immediate value in the form of a sense of energy and confidence within the group. Conversely, one group had a particularly dominant participant voice who had a high status in their organisation; this voice tended to create negative immediate value, perhaps inhibiting creation of a dynamic that allowed for the exploration of a more radical framing of futures. The difference here can be understood in terms of conflict-oriented discussion and debate, and more generative modes of communication such as "yes, and…" dialogue (Kahane, 2017).

5.1.2.2 Value flow: Immediate Value --> Potential Value

The shared experience of the FLL, notably the peer support and satisfaction from the production of something genuinely new and interesting, was highlighted as of high value to participants who wanted to sustain engagement after the event. It is clear that immediate value in the form of mutual respect facilitates the creation of potential value. Participants that would go on to continue working with colleagues who had also attended the Turku 2019 FLL recognised that the shared experience created the potential for further value creation within their organisation. Translating the shared sense of momentum of the lab into tangible results was seen as requiring the collective deployment of

Futures Literacy capabilities. In their reflections, facilitators pointed out that organisations with a higher concentration of Futures Literacy understanding would be able to leverage that shared understanding to achieve further value creation aims, such as overcoming institutional barriers that were resistant to radical change. Participants reported that they were keen to expose the tacit assumptions of their organisations that they saw as limiting possibilities for innovation.

5.1.2.3   Evaluation

The factors that contribute to the creation of a supportive group dynamic that fosters critical re-evaluation and generative discourse are numerous. Participants tend to rely on familiar foresight frames when they feel under pressure to perform under conditions of uncertainty; adoption of the less familiar transformative frame is dependent on factors that reduce feelings of vulnerability (Minkkinen, Auffermann and Ahokas, 2019). Transformative learning theory provides some insight into the role of social and collective intelligence factors in the transformation of points of view and habits of mind; however, critical self-reflection of assumptions through meaning transformation to redefine the nature of the problem (Kitchenham, 2008), i.e. reconsidering the philosophical basis of one's value system is not a common learning process. The Six Foresight Frames approach (Minkkinen, Auffermann and Ahokas, 2019) is useful, in that it provides terms for the kinds of anticipatory activity that are more or less familiar to participants, and which the participants are expected to adopt. Nevertheless, it is difficult to pin down to what extent factors at the event and factors before the event were influential in the shift of foresight frame, from predictive, visionary, or scenario frames tending towards Anticipation for the Future, to the more Anticipation for Emergence oriented transformative or critical frames. It is also difficult to say how long the feeling of goodwill developed at the immediate value level of the event will last, or whether value will be realised in practice. Furthermore, the detection of transformative value creation would require tracing out the value creation activities and learning of participants through longitudinal studies.

5.1.3 Resilience to Surprises

> **Making meaning of the far-reaching implications of a novel future demands personal cognitive and emotional resources. Traversing the uncertainty and emotional turmoil of reconsidering deeply held assumptions repositions one's commitments in the light of potential radical change. Reflecting on one's core assumptions circumvents barriers to perceiving emerging novelty in the present.**

Using anticipation for emergence is emotionally and cognitively draining, and as eloquently pointed out by the participant in extract SP2, we are not well equipped for this task. It was clear that participants that engaged with the emotional responses provoked by the reframe scenario discovered a powerful way to reveal their own implicit assumptions. Although this action does not in itself help participants to predict the wider implications of a given discontinuous change in the world, it does give them a space in which to reflect on the personal belief systems, habits of mind, and anticipatory assumptions that give rise to their emotional response. This is critical when seeking greater alignment between pursuit of change that matters and the emerging novel characteristics of the present. Practising reconsideration of one's position, taking into consideration new information, arguably prepares us for adaptation, and indeed if a creative response is identified early and has the potential for scale, then this may help with proactive innovation.

5.1.3.1 Value flow: Struggle --> Immediate Value

Recognising the limitations of anticipatory systems that do not account for radical discontinuous change, as well as our own cognitive limitations, helps identify the barriers to recalibration. This is essential when committed to a task such as radical systems innovation in, for example, pursuit of climate justice. A sense of humility can go a long way to aid reflection and learning, as well as receptiveness to the indicators of potential shocks and self-awareness of our fragility.

5.1.3.2 Value flow: Immediate Value --> Potential Value

In this case, the increased resilience to surprises is less associated with knowing what surprises will occur and more with being ready and willing to adapt in the face of the occurrences of surprise. Having been primed to see the opportunity inherent to the

shock and emotional discomfort of questioning foundational assumptions, futures literacy exercise in a social learning context act as a kind of mental limbering up or stretching before commencing decision-making under the strenuous conditions of complexity.

5.1.3.3 Evaluation

The adoption of techniques that embrace complexity fit with the position of Tuomi (2017) of 'Ontological expansion', which describes the continuous and ever-changing meaning making constituting a socially constructed understanding of reality. In this state, novelty is created as much through the meaning ascribed to emergence, as through emergence itself. Being a meaning maker helps you to stay ahead of the crowd when encountering surprises by being the one defining the questions to be answered rather than being purely reactive.

This ontological perspective is not new to futures researchers, although it has been increasing in prevalence since the complexity turn of the 1990s. In "Surprise as the new normal" Heinonen argues that, in a Volatile Uncertain Complex and Ambiguous (VUCA) world, surprises are not only inevitable but also increasing in magnitude and frequency (Heinonen *et al.*, 2017). As such, being resilient to surprises requires consideration of futures that incorporate major discontinuities; simply focusing on the predictable and knowable is insufficient.

Futures Literacy educators on the forefront of collective intelligence knowledge creation in higher education identify a constellation of mutually reinforcing traits that are critical to the mastery of futures literacy. The UNESCO chair for futures literacy at Hanze UAS initially proposed that open-mindedness feeds into an exploratory mindset which enables embracing complexity facilitated by creativity, self-efficacy, and a low personal need for structure, (de Boer, Wiekens and Damhof, 2018). The importance of these psychological concepts, and of their role in futures literacy development, was further validated in a recently publication of the results of a study into futures literacy course design in higher education (Kazemier *et al.*, 2021) which detailed the outcomes of developing futures literacy as contributing to enhanced perception, a new sense of agency, and embracing of uncertainty.

5.1.4 Explorative Perspective Switching

Exploring novelty requires a willingness to step outside the comfortable and familiar boundaries of one's expertise and opinions. Practising the imagining of alternative futures through which to examine the present engages a wealth of less often considered perspectives. Increasing the variety of considered implications provides fresh insight that goes beyond orthodox thinking.

To confront an expert, a specialist with deep knowledge of a given subject, with a task that asks them to set aside the body of knowledge that guides their day-to-day activity to explore a future in which core elements of their expertise are no longer valid – or have even changed beyond recognition – is not a pleasant or comfortable experience. This is accentuated when that expertise is founded on rationality, quantitative data, and objectivity. Engaging with the vast array of possible emergences of a semi-open ended complex system under conditions of uncertainty over time becomes an emotional and introspective experience. Leaving this burden of knowledge at the door (yet also allowing it to inform the imagination) is recognised by futures practitioners as being a necessary precondition for engaging in generative, open-minded dialogue (Kahane, 2017).

Otto Scharmer (Scharmer, 2018) calls the inner source of our actions, communications and perception the "blind spot". Exploring the 'blind spot' is necessary when confronted with disruptive challenges, as it "allows us to sense and connect with a whole new set of future possibilities" (Scharmer, 2018, p.19-21). Scharmer refers to this as learning from the future as it emerges.

Adopting a broad, multi-disciplinary perspective that recognises the entangled relationships between multiple domains of human and non-human activity is a fundamental principle of futures studies (Masini, Bell, others?) and is a core dimension of futures consciousness in the form of systems perception (Ahvenharju). Recognising the limitations of specialisation, and engaging in introspection, are the first steps in recognising one's boundaries to step beyond them to open one's mind.

5.1.4.1 *Value flow: Struggle --> Immediate Value*

Recognition that one's own perspective is limited, specialised, biased and unconsciously colours the futures that we are able to imagine, helps us to be humble, in turn fostering receptivity and open-mindedness; this means that we are better able to incorporate the

inconsistent, the complex, and the nonlinear into our view of futures. Facilitators noted that "opinions are dangerous" and that a healthy scepticism towards strong opinions should be maintained (AF3).

5.1.4.2   Value flow: Immediate Value --> Potential Value

Imagining strange and challenging futures under conditions of vulnerability makes us more amenable to radical ideas. Practicing imagining a greater variety of futures means that novelty and emergence become more familiar, more thought-provoking and less disorienting. This familiarity helps us to recognise opportunities and increases cognitive agility when dealing with complex issues.

5.1.4.3   Evaluation

Jacobs (2019) argues that cognitive sophistication is increased through engaging, rather than reducing, complexity. The transformative learning cycle is thus seen as an ongoing process of increasing mental complexity to match the complexity of one's environment. The insight narrative of Explorative Perspective Switching is comparable to the out-come of Enhanced Perception detected in previous futures literacy studies (Kazemier *et al.*, 2021). Both relate to the capability to detect and make sense of novelty.

The shifting of perspective to cast an issue in a new light is not a new technique, indeed it is at the core of various critical futures studies techniques, the Causal Layered Analysis of Sohail Inayatullah (2008) is one example. Although the origins of Miller's ideas can be difficult to trace clearly (Kurki, 2020) it is clear that Otto Scharmer and his practice of Theory U has played an influential role (Scharmer, 2009). Parallels can be seen between the FL approach and theory U, as well as having clearly influenced other transformative frame futures practitioners such as Adam Kahane. Although lacking empirical foundations, Scharmer makes compelling arguments that have been found to be practically applicable, providing some degree of apparent validity.

5.2   Prospective Value Creation Themes

Whereas the first part of this chapter focused on the value created for participants through their experience of the futures literacy lab, this section pivots from retrospective to prospective. It explores the findings that expressed how the participants intended to create future value based on their experiential learning in the practical context of their

organisations. Research question 3 asked "What prospective value is anticipated from the participant experience and what recommendations for enhancing this value creation can be made?".

Here the potential for value creation is explored through four Prospective Value Creation themes: Futures Literacy Practice, Futures Literacy Community of Learners, Imagination and Creativity, and Stakeholder Engagement.

Prospective value creation themes are emergent clusters of related conclusions of importance to the participants for sustaining and enhancing the value of developing futures literacy, after the conclusion of the event. The identified themes were drawn from the enabling, strategic and applied value levels of the findings. Each is composed of two parts, the first being observations sourced from the focus group transcripts, and the second being recommendations drawn from both transcripts and the facilitator interviews.

Observations could otherwise be called take away learnings. Observations are examples of enabling value, strategic value and (prospective) applied value that were identified by participants of the focus groups during the lab. 'Prospective' is placed in parenthesis here because the applied value has been signalled but not yet delivered – the value has been identified, the intent expressed, but learning from the act of applying it in context has not yet occurred.

Recommendations are elaborations, extensions, or detailed blueprints for generating further applied, enabling or strategic value in synergy with the actions identified in the observations. Typically, recommendations are drawn from facilitator contributions in the reflective interviews, although pertinent participant comments were also included.

5.2.1 Theme 1 – Futures Literacy Practice

This theme coalesced around the need for practical Futures Literacy techniques and tools that could be used to link abstract learning about Anticipation theory, the experiences of the Futures Literacy Lab, and practical applications of Futures Literacy on a day-to-day basis. The specific application of Futures Literacy in context can be understood as a form of praxis, or applied action research, unique to its context and practitioners. In this case, the participants of the lab identified that they needed Futures Literacy techniques that were practical, lightweight, and easy to utilize, so that the techniques could be deployed by participants-cum-facilitators with the limited futures literacy experience of the lab to generate value through social learning with their peers.

Participants recognised that Futures Literacy was a capability that had practical relevance for their organisation, which could be a powerful tool for identifying and reconsidering assumptions that impact decision making. Futures Literacy techniques would need to be designed by expert facilitators before relative beginners (participants of the FLL) would have the confidence to deploy them widely and regularly to enable further FL uptake. Shifting the focus of the learning agenda to Futures Literacy (use of futures) was seen as a possible through provocative and creative means.

As previously described in section 4.6.2, facilitators identified three techniques that could be applied in practice; 1) 'Five minutes for the future' 2) 'Mirroring futures' 3) employing surrealist games in meetings and workshops. The guiding principle of considering a range of futures; probable, possible, preferable, and novel, in daily working is intended to increase the variety of futures at play at a given moment. Doing so creates learning interactions that have implications for skill development, opportunities for insights, and critique of conventional practice.

5.2.2   Theme 2 – Futures Literacy Community of Learners

This theme brings together comments that express interest in ongoing post-event engagement be-tween participants of the FLL. The sharing of conceptual knowledge, learning materials and re-sources is one cluster of reasons for ongoing engagement; another cluster revolves around opportunities for collaboration and the fostering of ongoing learning and discussion around the themes of the event. Taken together, this could form the nascent core of a futures literacy "community of learners", or "community of practice" should the broad interest be converted into organised action among peers.

Participants expressed interest in futures literacy social learning engagements after the FLL, which was seen as something that should be pursued by incorporating it into regular practice. Supplementary futures and futures literacy resources disseminated to participants could foster further engagement. For social learning independent of the FLL facilitators to occur, documentation of the insights and concepts discussed at the event should be made available.

Participants asserted that realized value could be generated through the development of professional networking around nodes of interest in futures literacy. These would expose and engage wider stakeholder networks to the impacts of the event, as well as deepening connections that could open access to resources and exert influence. Participants also identified that the establishment of a futures literacy community of

learners could act as an entry point for external stakeholders and the wider public to encounter futures literacy, and potentially collaborate on new or ongoing projects. This is in line with the Wenger-Trayner value creation framework focus on sustained value creation through iterations of long-loops, whereby previous experiences are revisited as content for new social learning opportunities (Wenger-Trayner & Wenger-Trayner, 2020, p.133-150).

5.2.3   Theme 3 – Imagination and Creativity

Imagination and creativity are central to Futures Literacy. The human capacity to imagine is inherent to anticipation of times later than now and situations other than the current. Using imagination to generate simulations of the consequences of actions, alternative scenarios, and to form visions of ideal outcomes or optimal pathways, are all activities that humans engage in. However, the prism through which all these anticipatory assumptions are projected is the prism of a given individual's points of view, experiences, biases, etc. Applying Futures Literacy involves self-examination of the root of these anticipatory assumptions for the purpose of intentionally adjusting the assumptions to generate different outcomes. This, then, is the essence of creativity in Futures Literacy, the generation of novel anticipatory assumptions that can give rise to insights, critiques, innovations, and so on. Yet engaging in this process comes with a cognitive and emotional burden as described in phases 2-4 of Mezirow's Ten Stages of Transformative Learning (Kitchenham, 2008, p.105). As a consequence, much of this burden of imagining something new is outsourced on a day to day basis, meaning that when it comes to engaging in such activities for one's self, there is a tendency to draw upon the products of other's imaginations (and assumptions) – dystopian fiction, corporate vision statements, economic forecasting – consciously or unconsciously. This tendency leads to what Riel Miller terms the "poverty of the imagination" (Miller, 2018, pp. 8, 97). This theme touches on this issue two ways, firstly by identifying ways to harness discomfort to productive ends through playfulness, and, less directly, through the creation of an environment which allows individuals to be both vulnerable and safe enough to engage in this kind of play.

To be inventive, to engage in the creation or identification of novelty, participants must progress through stages 2 - 4 of the transformative learning cycle (detailed in figure 4 of section 2.2.2); self-examination of emotions, reflection on assumptions, recognition of shared discontent. Participants identified how they could generate value

through engaging with the discomfort of unfamiliar assumptions. Facilitators pointed out that some participants found it difficult to adopt new points of view, whereas others were able to take these on more easily.

Facilitators suggested two practical means of overcoming barriers to imaginative thinking to be creative, the first was to utilise *playfulness* in futures-oriented exercises, the second was to embrace non-rational modes of thinking to stretch the imaginative muscle. The role of playfulness in futures exercises has considerable representation in the literature, as a recent Journal of Futures Studies special edition on gaming indicates (JSFdigital.org, 2017). Furthermore, the synergies between gaming and futures literacy have been discussed for almost as long as futures literacy has been conceptualised (Candy, S. in Miller (ed) 2018a, chap. 6). Incorporating playfulness into futures literacy routines has the advantage of quickly creating a permissive and creative space, in which ideas that would otherwise be left unspoken have room to be expressed. This generates enabling value through the enhanced uptake of playful futures literacy exercises in practice, as well as providing processes that can be incorporated into existing practices. The second contribution from facilitators was that learning about creativity and imagination exercises contribute directly to how we imagine futures; developing such meta-cognitive skills can produce strategic value.

5.2.4   Theme 4 – Stakeholder Engagement

This theme touches two main strands, the first being concerned with the disposition of the stakeholders invited to take part in the Futures Literacy process, and the second strand being concerned with extending the impact of the lab to external stakeholders. These are closely linked, because the participants were keen to replicate their own experience with internal and external stakeholders. They saw their positive experiences as being contingent on the disposition of the participant-stakeholders attending the lab, the latter having two dimensions, diversity of experience and perspective on the one hand, and a mindset receptive and open to engage with the futures literacy process on the other. Recommendations for enhancing the impact of these aspects were volunteered as much by participants as by facilitators.

Diversity plays a key role. One aspect of this is that perspectives that were different and unfamiliar were seen as highly valuable for their ability to provoke new and interesting ideas in the participants. Clearly, diversity of inputs is seen as multiplying diversity of outputs. Yet groups that expressed a diversity of points of view but failed to es-

tablish sufficient rapport and sense of shared purpose had less success in producing useful outputs from the futures literacy process. These groups that stumbled had individuals that were reluctant to shift out of their familiar habits of mind or areas of expertise, so clearly diversity must be tempered by adequate framing and preparation before entering the futures literacy space. Some groups discussed the possibility of applying the Futures Literacy process as a framework for engaging external stakeholders at scale, the success of this experiment would require close attention to communication of the aims and framing of the process during the convening stage (Wenger-Trayner & Wenger-Trayner, 2020, p.151-188).

Efforts to engage external stakeholders could learn lessons from participatory futures methods (Glenn, 2009), (Kahane, 2017). Numerous advantages were identified for recruiting specialist practitioners with both expertise of Futures Literacy *and* the local language and culture to collaborate in the organisation of prospective Futures Literacy events. Enabling value could be generated through expert facilitation of the event, strategic value generated through the establishment of alliances and contacts external to the organisation, and applied value could then be gained through drawing on a participants' own experience of a lab when resolving organisational details of the event. Further value could be gained through the engagement of external stakeholders with very lightweight Futures Literacy exercises to demonstrate the value of the process and build familiarity with the concepts. Finally, individuals who are not themselves stakeholders in the process and so may lack the mindset and incentive to engage with the process and have very different points of view from the participating stakeholders, could be invited in as presenters rather than participants.

5.2.5   Conclusions of Analysis Chapter

This chapter explored the events of the Turku 2019 FLL as learning dynamics and what new avenues of action the participants saw as newly available. Four stories linking insights from the findings into collective learning experiences were described and evaluated in light of reviewed literature on transformative and social learning, as well as participatory futures literature. Furthermore, four areas of prospective action of interest to the participants were developed with commentary from facilitators on how to leverage the energy of the event to enact the desired changes. Together the analyses have both grounded the findings in relevance and framed the individual insights of the event as being interwoven into larger patterns of continuous and collective learning.

From the stories elaborated in response to research question 2, participants responded differently to the challenges of AfE, complexity, and novelty in the Futures Literacy Lab. Identifying the dynamics that contributed to the creation of positive or negative value from engaging with these challenges provides insights into the factors at play in collective intelligence knowledge creation processes of FLLs. Successful facilitation of diverse groups requires identifying and addressing barriers, resistance, or hesitancy encountered during transformative participatory processes. Practitioners accumulate deep reserves of tacit knowledge through observation of these dynamics at FL events; yet academic and conceptual papers struggle to convey the significance of these events for participants, which come under criticism for being un-scientific. Analysis through the Insight Narratives presented here makes a claim to being rigorous but no claims to moving close to an objective truth. Rather, the assembled stories make propositions about how understanding of FL develops at a collective level which can be used to test our own understanding of the claims of FL capability development. It is clear that FL is not a capability that is simply *acquired* after attending a single event, there is no guarantee that individual attendees will even commit to the process sufficiently to gain significant value from their attendance. The sensitivity of value creation through social learning and reflexive processes to initial conditions and group dynamics is a striking insight. Furthermore, the level of interest in engaging in a self-critical and self-aware process is difficult to gauge prior to the event. This can be a difficult issue when prior engagement with foresight and forecasting processes may have built up an expectation to be engaging with a rational-logical-expertise oriented process of planning and preparation, rather than reflexive engagement with the sources of points of view.

The answers to research question 3 tend to emphasise the role of FLLs in broader processes of learning and evolution. The participants were keen to convert the energy created at the event into tangible actions that would produce significant change. That FLLs can generate such energy and enthusiasm in decision makers, managers and various other stakeholders, who came to see themselves as part of a group that had shared a unique experience, was seen as a major reason to continue with FL processes after the event. Lingering concerns, though, existed about translating the (at times) abstract insights into messages that were communicable to stakeholders who were of significance to the participants in their native organisations. Nevertheless, the importance of participating in a reflexive futures workshop was seen as critical in fostering new thinking in

policy, foresight, and decision making that contribute towards larger processes of systems transition.

Importantly, it was from this that a crack grew between the interests of the participating local maritime actors and the contingent of participants involved with C-KIC. Although careful attention was given to the importance of framing and orienting of the social learning space in the design, this may have been an element that acted as a barrier in some of the focus groups. There was general acceptance among the C-KIC contingent that further consideration was needed of the contributions of FL in the broader process of change championed through the Deep Demonstration process. FL capability is complementary to a wide variety of change processes, and of critical relevance to foresight processes that feed into the ongoing decision-making, sustainable development, just systems transition, and visioning that is occurring as part of the wider response to humanity's overextension of planetary boundaries.

6 DISCUSSION

Two main approaches are used in this chapter to discuss the implications of the findings to the research questions in the preceding two chapters. In the first section of this chapter, the findings of this dissertation are compared with previous work examining Futures Literacy interventions to demonstrate the nature of the new knowledge that has been produced. In the following section, the robustness of the findings and research process is assessed. This chapter concludes with an overall appraisal of their significance and usefulness.

6.1 Implications in the Context of Wider Research

Prior to this study, as noted in Chapter Two, research on the transformative impact of FLLs was limited to the 14 international case studies reported by Miller (2018a, chap. 5), (for the results of a review of this material, see appendix 5). This study of learning within the Turku 2019 FLL differs from the 14 case studies in three main area. The core design of the FLL under consideration was different, this study draws on different and more extensive research materials, and the method of analysis is, at present, unique.

In more detail, the design of the Turku 2019 FLL involved four expert facilitated groups of diverse stakeholders moving through the core three phases of an FLL. Seven of the 14 case studies matched this design. The remaining seven either made no use of facilitation, used peer facilitation, deviated from the core 3 phase format, or were a mass participation event. Both the size of Turku 2019 FLL and the use of expert facilitation of the groups are key differences, since this allowed for the recorded material to be of sufficient quantity and quality to be amenable to qualitative content analysis.

Of the seven case studies that did match the Turku 2019 FLL design, the origin of research materials used as the basis of reporting is in general unclear. One case identifies the author of the analysis as taking the role of facilitator/designer during the event; another reports use of a survey of participants. No further reference to research materials produced from the events is made, though most case studies produced reports, follow up events, or were embedded in a broader process.

The analyses conducted in the matching FLL case studies primarily focuses on anticipatory assumptions produced during phase 1 and 2, and new questions coming from phase 3. Three of these seven make direct reference to learnings, while others concentrated on outcomes such as "strategic process implications" to "spreading the word".

Only two of the case studies included analysis of a fourth stage, though neither of these focused on concrete applications of futures literacy in a professional context. In terms of method of analysis, two of the seven case studies rely solely on a descriptive method of analysis in reporting, three make use of Causal Layered Analysis as an analytical framework, and the remaining two organise outcomes thematically.

It is, however, important to note that value creation through social learning is very likely to be occurring at the events of these 14 case studies, but because the learnings identified were generally left unstructured and the materials used as the basis for reporting is unclear, this would be difficult to verify. Consequently, this study of the Turku 2019 FLL appears to be the only FLL case study based on detailed and accessible research materials that have been investigated using qualitative content analysis, and that organises and analyses findings using a structured framework of learning. Furthermore, it is also unusual in analysing participant responses to 4th phase prompts that directly link learnings with action.

Wenger-Trayner and Wenger-Trayner (2020) provide a well-established analytical framework in the social sciences for analysis of complex data which, with its focus on social learning eliciting potentially transformative outcomes, is relevant for complex interpersonal processes (such as the Collective Intelligence Knowledge Creation processes of Futures Literacy).

Thus, this dissertation breaks new ground; moreover, it shares an approach developed by the foremost researchers in the field (Pouru-Mikkola and Wilenius, 2021; de Boer, Wiekens and Damhof, 2018; and Kazemier *et al.*, 2021, discussed in Chapter 2). The findings of the Insight Narratives and Value Creation themes amount to a pilot study of making sense of the complex learning journeys of participants of a Futures Literacy process. Specific findings are therefore unique to their context and, while not inductively generalisable, they raise many issues for further investigation and hypotheses for future investigation. The Value Creation Themes in particular are most broadly applicable. They raise questions about how FL learnings can be embedded in practice; how a community of learners of futures literacy might support ongoing foresight processes within organisations; and how imagination and creativity might best be fostered to support strategic learning. Likewise, the insight narratives portray hypothetical learning trajectories that could be tested in diverse practical settings.

6.2   Evaluation

To assess the validity of the method used, this thesis will briefly cover four areas of technical level validity adapted from the Systematic Framework for Evaluation of Futures Studies (Piirainen, Gonzalez and Bragge, 2012, p.469). It should be noted that this framework was intended for the evaluation of foresight studies, particularly scenario studies, and thus requires some adaptation for evaluating a transformative frame case study of a capability development process. Nevertheless, this evaluation framework provides a checklist of questions for assessing conceptual, methodological, operational, and data validity which are broadly relevant for conducing rigorous scientific investigations.

6.2.1   Validity of Conceptual Foundation and Method

The conceptual foundations of reflexive learning have been well established for several decades in the education literature (Merriam, 2004; Kitchenham, 2008). Studies of cyclical learning processes have been in development for over a century, and have received interest from numerous scholars interested in the cognitive and experiential elements of learning (Wenger-Trayner and Wenger-Trayner, 2020, p.149). The flurry of recently published papers on the role of reflexivity and complexity in transformative processes (Wilenius and Kurki, 2017; Jacobs, 2019; Pouru-Mikkola and Wilenius, 2021) highlight the links between FL and Transformative Learning. Otto Scharmer was a forerunner in linking transformative learning and emergence (Scharmer, 2009, 2018), and Theory U is often cited by Miller as an example of Futures Literacy (Miller, 2018a, pp. 18, 37, 44).

Futures Literacy is understood to operate in the transformative frame of futures studies (Minkkinen, Auffermann and Ahokas, 2019), which is itself embedded within Anticipation studies (Poli, 2015b). Anticipation studies is a an approach to foresight that incorporates an appreciation of complexity, impredicavity, and the social construction of knowledge (Poli, 2017a). The Wenger-Trayner social learning framework is a good fit for sense making of the complexities of the collective intelligence knowledge creation processes occurring in a futures literacy laboratory. Detecting transformation of individuals' perspectives through the learning that occurs in a given experience, conversation, or thought process is incredibly hard, given the specificity and entangled nature

of that interaction. Standard quantitative measures of learning are particularly unsuited to evaluation of these processes.

The research was conducted with due consideration of rigour and transparency, and detailed documentation of the analytical process is provided in the appendices to show the thinking behind the conclusions made. An interested observer would be able to trace the origin of each extract and how they were used in the analyses.

The number of participants included in the data was 18, divided between four groups, which was of sufficient scale to produce a substantial quantity of qualitative data over the two-day event. The data generated was sufficient for saturation, since many of the extracts compiled in the findings were derived from multiple very similar utterances identified in the first round of analysis that were later consolidated. Group facilitator interview data provided material for triangulation.

6.2.2   Reliability of Findings

The detection of value creation through social learning is a reasonably accurate reflection of the participant experience insofar as multiple dimensions of what participants considered valuable were represented, including social, cognitive, emotional, and organisational factors. Participants sought to make sense of encountering simulated emergence and how it fits in with their prior experience through a collective sensemaking process. Participant responses to the reflective prompts on the process are assumed to be a reasonable indicator of the points of view of the participants, and so at least makes visible the social level of construction of meaning occurring.

The value creation through social learning events compiled in the findings chapter provided rich source material for stories of learning as a collective to coalesce around hypothetical value creation propositions sourced from the participants own interpretations and discussions of their experience. Insight Narratives do not claim to reveal causality, but rather to explore propositions on the relationships between struggling with complexity and emergence, psychological safety, and the creation of insights. These propositions are neither specific to any one individual nor describe the experience as a whole, instead revealing facets of the collective experience that can be used as the basis for reflection or further research. The Insight Narratives made use of story forms to help outsider-observers to see into an otherwise impenetrable collective sense making process. There is also value in the insight narratives for insider-participants, who may recognise parallels in the value creation flow of the collective story with their own internal

value creation process. These findings are specific to the event, participants, and context under consideration, and likewise specific to the lens used to generate them. A different researcher would draw different conclusions based on their own background and interests, this is a property of the design but not necessary a weakness.

The Value Creation Themes are prospective. Applied value creation had not yet occurred at the time that the data was gathered, and this is also true for strategic value, being concerned with the value generated between participant stakeholders and non-participant stakeholders. Enabling value straddles the past, present, and future, though the focus here was on prospective enabling value related to Futures Literacy capability development. Facilitator reflections were incorporated as recommendations to enhance further value creation in the participant identified areas of action and interest. The feasibility of the actions and strategies is best determined by the participants themselves, who were well-positioned to translate conclusions to actions within their organisation. Participant concerns about commitment to future futures literacy processes were present throughout the findings. In part this is to be expected at the introduction of a new and relatively untested tool, yet these concerns were primarily related to practical rather than strategic concerns. Nevertheless, numerous barriers to the uptake of futures literacy were identified; it is conceptually complicated, requires considerable time investment to build up enough confidence to make use of in practice, requires a willingness and readiness to engage in critical self-reflection, and critiques established practices. This dissertation sought to identify the main themes of the areas of action identified, of course in selection of illustrative examples it is possible that other themes remain underrepresented. Alternative modes of analysis of the findings could have exposed other interesting conclusions, but, based on the available materials, it is not possible to establish whether futures literacy proved 'sticky' after the event, and so framing these prospective results as recommendations and reflection materials is of utility primarily to interested observers rather than participant stakeholders.

6.3   Conclusions of the Discussion Chapter

This study chose, perhaps boldly, to focus on exploring reflexive and social elements of the futures literacy learning process. The intersubjectivity prevalent throughout reflexive participatory futures processes makes the research problem inherently difficult to address with conventional research methods relying on objective measures (May, 2011, p.14-15). This study chose to focus on the interpretations and sense making evident in

the conversations of participants of an FLL, a which will have been shaped by the implicit structures and expectations of the situation, which can make identification of participant insights difficult to see or distinguish from the background noise (Weinberg, 2002, p.190-191). In order to bring clarity to the otherwise difficult to perceive dynamics, an approach more in line with hermeneutics and ethnographic research was employed to showcase patterns evident when the findings were examined through the lens of the researcher.

The basic findings of this study alone are a useful contribution to our knowledge of futures literacy labs by providing an in-depth and structured view of the multi-layered social learning taking place at an FLL. The analyses apply a generative, and a practice oriented, lens to understanding the significance of the findings. The kinds of claims made as a result of these analyses is subject to many of the limitations of qualitative research, but so too extends our perception of the potentials inherent in the materials. The criteria of validity and reliability should thus be in line with the complex nature of the phenomena under consideration.

7   CONCLUSION

This chapter draws together the strands of this dissertation by first providing an overview of the topic and contents of the research matter, in which a summation of the area of focus and answers to the research questions are provided. Secondly, the chapter will highlight key implications of the findings, reflect upon the significance of these in the wider context, and also reflect on the research process itself. Thirdly, gaps in the research design and materials will be addressed, along with suggestions for further research. The chapter will conclude with speculations on the role of evaluating futures literacy processes in the broader context of futures studies and anticipation.

7.1   Overview of Topic and Content

Futures Literacy Laboratories do not take place in an environment isolated from external influences in which individual factors of success or failure can be tested. Nor are the outcomes expected to be consensus-driven, a simplification of complexity, or the identification of critical elements of a given future. Furthermore, the individuals that attend FLLs have walked a long and winding path to reach the event and will continue their own individual journey long after. Their coming together in these events is like the individual birds in a flock of starlings that form a murmuration for a short time, then go their separate ways. The phenomena that arise at such events are the unique product of that place, time, group and many other factors. This study has looked at a common phenomenon that is universal across FLL events, the social learning of sensemaking.

Anticipatory assumptions, or the models and beliefs that shape imagined futures, are frequently focused on as products of futures processes, but our understanding of how they are transformed is limited. Our inability to fathom transformation processes may be a contributing factor to the constant sense of surprise we feel at fundamental changes, as well as our inability to effect radical changes to our damaging patterns of activity.

This dissertation initially set out to develop understanding of how transformation of perspectives occurs in FLLs, but it quickly became apparent that comprehensive transformations occur at a scale and subtlety beyond the materials and instruments available. However, the more limited aim of detecting some of the initial layers of learning, and shifts of point of view, could be achieved through an in-depth qualitative analysis. Ad-

ditional layers of interpretation of the findings of this analysis provided perspectives on the implications of the learnings discovered.

In answer to research question one, *what did the participants of the Net-Zero Maritime Hubs Turku 2019 FLL experience?* It was clear from the study of participant reflections on their learnings at the FLL event that they were conscious of the multi-layered significance of the experience of the event. Six layers of value creation through sense making in social learning spaces were observed in the data; Learning Interactions involving notable conceptual and practical difficulties around anticipation for emergence; Immediate Value gained through the kind of interactions occurring in the transformative social learning space of the FLL; Potential Value identified in terms of insights and critiques that could be of use after the FLL; (prospective) Applied Value that could be created by applying such insights and critiques in practice after the FLL; Enabling Value produced by supporting and facilitating factors for enhancing learnings for both internal-participant, and external, stakeholders; and the Strategic Value of the FLL experience for harnessing resources and engagement with both internal-participant, and external, stakeholders after the event.

In answer to research question two, *what stories of learning are visible in the findings?* The Insight Narratives analysis explored what flows of learning might be at play between these different levels of findings in order to communicate the dynamic shifts possible through the collective sense making process. Four stories of perspective shift were generated; *Questioning Extrapolation; Novelty Collective; Resilience to Surprises*; and *Explorative Perspective Switching*. These stories linked reports of how struggling to comprehend and apply anticipation for emergence produced discomfort that was, in the end, productive and a source of creativity. How the establishment of spaces of psychological safety was both created by, and allowed for, the sharing of dissonances and difficulties that had become apparent through the FL process. They described the insights from critiques of ways of doing things that did not account for complexity or emergence, and how developing an appreciation for anticipation for emergence gave them both newfound perspectives and a recognition of barriers and challenges.

In answer to research question three, *what prospective value was anticipated from the FLL experience and what recommendations for enhancing and sustaining this value creation can be made?* The Value Creation Themes analyses were clusters of prospective value that could be leveraged for enhancing the significance of the FLL after the event. Here, facilitator reflections provided an elaboration of how participant insights

could be applied in practice. The four Value Creation Themes identified were Futures Literacy Practice; Futures Literacy Community of Learners; Imagination and Creativity; and Stakeholder Engagement. These themes linked observations about the need for continued engagement with both the internal and external stakeholders of the event, in order to sustain engagement, commitment, and adoption of the new practices and perspectives identified at the FLL. Concerns about the difficulty of applying seemingly abstract concepts and tools to everyday working life were prevalent, and were tied to requests for the adaptation of FL tools and techniques into lightweight forms to facilitate uptake. The power of employing FL as a collective capability was emphasised, with FL seen as a playing a critical role in political and strategic processes towards enacting radical change.

Although these findings are specific to the place and time of this FL event, and do not attempt to build knowledge according to realist approaches. The description and exploration of the significance of this event nevertheless contributions to our understanding of how futures literacy is developed through collective intelligence knowledge creation processes. The next section draws conclusions on the implications of these findings and reflects on the research process.

7.2 Implications and Reflections

This dissertation makes three contributions to the wider research context of Futures Literacy. Firstly, it presents the most comprehensive and structured analysis of the transformative learning that occurs at an FLL. Secondly, it demonstrates how the Wenger-Trayner value creation through social learning framework applies to the collective intelligence knowledge creation process deployed in FLLs. And thirdly, in conducting a structured and transparent evaluation, and documenting the materials and research process, this dissertation contributes to the growing body of literature of that assesses the validity of Futures Literacy processes. Chapter 5 provides more details of these implications.

Relatively few FLL case studies have been published, and the materials upon which reporting is based is generally unclear (Rhisiart *et al* in Miller (ed), 2018, chap. 5). The 14 case studies reviewed for this study are undoubtedly only a small fraction of the overall number of FLLs conducted, not to mention other kinds of FL engagements, processes, and trainings.

The intersection of Transformative Learning and Futures Literacy was a prevalent idea among the foremost Futures Literacy practitioners in Europe (de Boer, Wiekens and Damhof, 2018) but had yet to emerge into the academic literature at the time this research was initiated. Now this study is in line with the leading developments of this intersection in the field (Kazemier *et al.*, 2021; Pouru-Mikkola and Wilenius, 2021).

Sceptics as to the efficacy and foundations of Futures Literacy are vocal in the field of futures studies (Ahvenharju, Minkkinen and Lalot, 2018; Facer and Sriprakash, 2021), with FL seen as being practice oriented, and guided by a normative mindset. Yet FL, embedded in anticipatory studies, provides opportunities for greater synergy between the otherwise estranged disciplines of forecasting, foresight, and social constructivist foresight.

In hindsight, had the insights from conducting the research been available before the research was designed, I would have made several changes that could have enhanced the findings. Firstly, if the Wenger-Trayner framework had been published in its current form, I would have designed the data collection around the framework rather than retroactively reinterpreting the data according to the framework. This would have made the process of identifying learning flows and loops considerably easier, allowing for a more nuanced analysis of the learning dynamics.

Secondly, the process of qualitative content analysis went through numerous stages. The later stages of this process resulted in the documentation and coding system that allows for the tracing of links between individuals findings and how they were used in the analysis. Employing this system from the beginning would have made handling the data less laborious, and so could have allowed for greater insights into the links between categories. Adopting such a system at an early stage might also make the cost of changes higher, and so striking a balance between accessibility and adaptability is key in the early stages of data analysis.

Thirdly, tracing the insight narratives of specific groups and comparing these to each other could have been an interesting avenue of analysis. However, these journeys would have placed the focus more on the specifics of a particular group, making broader patterns less visible and foregrounding group dynamics. Nevertheless, this kind of finding would also be of practical benefit to FL facilitators and practitioners.

Finally, having access to the audio recordings of the two missing groups for stages one and two of the FLL might have provided background material on those groups that could have been used for comparative and context purposes. This missing data imposed

restrictions on the comparisons that could be drawn between groups and heavily influenced the design of the analysis process.

7.3   Suggestions for further research

This section links the issues raised by the findings and extensions to the research that would go some way to addressing these questions. Key questions remain about the validity of FL and the reliability and efficacy of FL processes. Two of the four groups gained only limited value from the FL experience. How these groups could have been navigated towards the creation of further insights, as well as a more nuanced understanding of the productivity of the most creative groups, are areas of curiosity. Furthermore, how insights from FL processes are deployed in practice and these experiences are again fed back into FL, or other, social learning spaces to create loops of learning that fit into the broader pattern of learning journeys in FL would also be of considerable benefit to our understanding of participatory transformative frame futures processes.

To investigate FL, further evaluations of FL processes are needed, preferably analysed along the lines of a common framework that accounts for the diversity of approaches and designs. The Wenger-Trayner framework matches these needs. Applications of this framework in further research could take the form of a comparative meta-analysis of the 14 case studies addressed in chapter 5 using the Wenger-Trayner value creation framework to detect insight narratives and value creation themes emerging from previous FLLs. Because FL is a constantly evolving and innovating practice, a broader understanding through analysis of future FL engagements could be built from qualitative data that is gathered from participants guided by the Wenger-Trayner value creation framework.

In order to trace the evolution of thinking of individual participants to compare to data on the progression of groups through the FL process, tracking of individuals across phases and across social learning events would be of interest. An issue of the available materials was that the audio quality was insufficient for the identification and tracking of individuals, video recordings would perhaps be more suitable for this. Equally, conducting follow-up interviews of FLL Turku 2019 participants could fill this gap. Group interviews that consolidate reflections on the learnings of an FL process have been trialled, but would benefit from a more systematic application (Richards, 2020).

A significant contribution to our understanding of not only FL but also transformative learning would be to follow how the sense making from FLLs evolves longitudinal-

ly to produce Applied Value, Realised Value, and Transformative Value (Wenger-Trayner and Wenger-Trayner, 2020). These layers of social value creation were beyond the scope of the materials of this study, beyond the scope of any one individual case study, but would provide insight into the generation of more profound changes through interfacing FL insights with practice applications and back into further FL social learning spaces. Such an investigation could, for example, help to further investigate how the findings of this study map onto the core competencies of futures literacy; "a new sense of agency, embracing complexity, and enhanced perception" identified by Kazemier *et al.*, (2021).

7.4   Closing thoughts

Futures Literacy, embedded within Anticipation studies, provides a framework within which critical realist and social constructivist positions on the uses for imagined futures can be considered and evaluated according to mutually reinforcing criteria. Interest in the phenomena of Anticipation for Emergence has been increasing in the futures and foresight literature, though it is often phrased in terms of wicked problems, surprise, discontinuities, or wild cards. Leveraging this common interest is critical for developing futures-oriented capabilities that relate to thriving under conditions of complexity through recognition of emergent opportunities in novel pheonomena. Social Constructivist Foresight of the critical and transformative frames can act as a means of premise reflection on studies that produce and describe futura. Anticipation studies as an umbrella discipline that provides a common theory for how humans imagine and act on anticipations serves a purpose, it provides a shared basis on which to explore synergies between otherwise disparate activities in the spheres of practice and academia.

Futures Literacy does not represent a vision of the most desirable process for reflecting on the anticipatory assumptions that shape imagined futures, it is conceptually and terminologically unwieldy. Yet it is aligned with the increasing need to make studies of futures relevant, accessible, and applicable, not only by a select few experts, but for wider deployment by humans interested in the longevity of the planet through radical departures from destructive historic patterns of behaviour. Reframing of anticipatory assumptions is deeply linked to empowerment (Milojevic, 2018, p.257-267) (Toivonen, Rashidfarokhi and Kyro, 2021). Futures research should embrace the messy and complex issues raised by reflexive participatory processes from the transformative frame,

Futures Studies is uniquely positioned to contribute to transdisciplinary research considering its long held principles (Bengston, 2018).

The FLL under consideration in this study was just one learning event in each individual participants' lifelong journey in understanding the power of their own anticipatory capacities. Weaving reflection on conscious anticipation into a broader narrative of transformative learning provides opportunities for insight for both the individuals involved but also opportunities for new avenues of research. This dissertation has found indications that Futures Literacy Laboratories provoke rethinking of established positions, that creative and critical processes are intertwined with transformative and social learning, and that developing this capacity for reflexive futuring plays an important role in enhancing human agency and perception when encountering the emergent novelty of a complex world.

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APPENDIX 1 – ANALYSIS MATRIX

Table 1 - Analysis Matrix

Social Learning Value	Subtypes	Guiding Question	Tag
Learning interactions	*various	*What examples of participants grappling with the difficulties encountered while using the future for emergence were visible?* *What common conceptual misconceptions and pitfalls were encountered while moving through the FLL?*	*Struggle, Misconception*
Immediate value	Identification, productive discomfort, mutual recognition as learning partners, engaging with other perspectives	*What visible evidence was there that the experience affected participants cognitively, socially, or emotionally? (e.g., changes of thinking or questioning of deeply held assumptions)*	*Impact*
Potential value	Insights, critique, information, skills, collective voice, intangibles	*What ways to create value through new ways of thinking, doing etc. were identified?*	*Advantage*
Applied value	Adoption, adaptation, being more assertive, increasing your influence, harnessing energy, leveraging connections, inventiveness, reuse	*What uses or concrete applications of FL or FLLs were identified?*	*Use*
Strategic value	Internal – learning agenda, strategic context, External – ongoing engagement, alliances, aspirations and expectations, stakeholders, resistance, power, learning theory	*What ideas were generated during the lab for the role of further developed FL capacities?*	*Idea*
Enabling value	Internal – process, commitment, documenting, internal leadership External – social learning support, resources, strategic facilitation, organisational initiative	*What needs or gaps were identified that could be further developed to enhance FL capacities?*	*Need*

APPENDIX 2 – COMPILED FINDINGS

A note on abbreviations used in the findings

A system of abbreviation is used in this chapter for shorthand reference to each extract. This is used to be able to refer to an individual extract with a shorthand in the main body of the text itself. The results of this chapter are combined and synthesizes to develop the analysis in chapter 5, searching for a given code allows for cross-referencing between the Results and Analysis chapters.

The abbreviation for the results content is written combining three parts, the first part denotes the guiding question (the guiding question and the social learning value creation type are mapped in the analysis matrix), the second part denotes the source material, and the number tells us which extract from the list is being referred to. For example:

*SP1 = **S**truggles – **P**articipant of the focus group – **1**st in list*

*SF3 = **S**truggles – **F**acilitator Reflection – **3**rd in list*

Likewise, the abbreviation for the analysis content in a similar three-part format, the first part denotes the analysis title, the second part denotes the subcomponent of that analysis, and the number tells us which extract in the list is being referred to. For example:

*QES1 = **Q**uestioning **E**xtrapolation – **S**truggle – **1**st in list*

*UFLR3 = **U**sing **F**utures **L**iteracy – **R**ecommendation – **3**rd in list*

Using this system of abbreviations, it makes transparent how each extract has been used, in which analysis, for what purpose and from what source material. A "--" denotes that an extract was not used as a primary source of evidence in the analysis, typically because it was a thematic outlier, though it may have been used as supporting evidence.

See the beginning of this appendix section for the analysis matrix including additional information on the guiding question used during the first round of content analysis and the value creation stage of the Wenger value-creation framework.

Table 2 Struggles and Misconceptions – Participants of the Focus Group

Abbr.	Analysis	Value	Summary
SP1	CUDS1	*Adoption, innovation*	*Thinking of ways to apply futures literacy in organisations in a practical way.*
SP2	RSS1	*Personal*	*Relentlessly asking "but what would it mean if...?".*
SP3	QES1	*Critique*	*Moving past self-imposed limitations of being "realistic".*

Table 3 Struggles and Misconceptions - Facilitator Reflections

Abbr.	Analysis	Value	Summary
SF1	FLPR3, CNS1	*Insights*	*Moving past using reframing as a tool of visioning to using it as a tool for exposing assumptions and ultimately to switching between probabilistic, preferable, and emergent futures perspectives.*
SF2	CNS2	*Insights, skills*	*Focusing on questioning values as a way of questioning official futures but struggling to make the leap from critical questioning to being open to novel futures.*
SF3	CUDI1	*Harnessing synergy*	*Recognising that they, the participants, have an agentic role in cocreating the places and uses for FL in the wider Deep Demo process.*
MF1	ICO1	*Productive discomfort (negative)*	*Failing to move past the use of "canned futures", pre-packaged visions of futures stemming from e.g. industry bias, assumptions about sustainability, and green growth.*
MF2	PSS1	*Productive discomfort (negative)*	*Failing to move outside one's comfort zone of expertise to explore novelty.*
MF3	ICO1	*Engaging with other perspectives (negative)*	*Learning Intensive Society scenario deployed as an official future vision.*

Table 4 Immediate value - Participants of the focus groups

Abbr.	Analysis	Immediate value	Summary
IP3	CNI2	*Mutual recognition as learning partners*	*Reframing and the wider FL capacity building process is not best done alone, the support of a group was essential for collective knowledge creation.*
IP5	CNI1	*Mutual recognition as learning partners*	*Reframing as a group moved participants beyond predictive and preferable thinking about the future to 'imagine something completely different'.*
IP2	QEI1	*Productive discomfort*	*Limitations of relying on extrapolations based on historical data gathered by consultants.*

IP4	QEI2	*Productive discomfort*	*Deep questioning of the validity of extrapolative practices to inform long term planning processes which do not consider emergence.*
IP6	RSI2	*Identification*	*Recognition that present ways of thinking and decision making are rooted in assumptions about the future that do not adequately consider uncertainty or emergence, being aware of these leads to different decision making in the present.*
IP1	PSI1	*Engaging with other perspectives*	*Value of other views that go beyond technology, multi-perspective view of futures.*

Table 5 Potential value - Participants of the focus group

Code	Analysis	Potential value	Summary
AP1	QEA1, FLPR3	*Insights / Critique*	*Ability to spot the potential opportunities inherent in a wider array of alternative futures that move beyond conceptualizations of probable/improbable and utopia/dystopia.*
AP3	--, RSI2	*Insight*	*Recognition of the role of systemic patterns of change as being inherent to an appreciation of emergence.*
AP4	RSA2	*Insight*	*Appreciation of emergence in businesses provides competitive advantage or the ability to avert disaster.*
AP5	--	*Insight*	*Thickening of the present or shortening of the distance between the present and the future.*
AP2	CNA3	*Information*	*To be better able to create synergies between recognised novelties and identified continuities in our visioning processes, requires us to improve our understanding of novelty as being an emergent property of complex systems.*

Table 6 Potential value - Facilitator reflections

Code	Analysis	Potential value	Summary
AF8	RSA1, SEO3	*Insight / Skills*	*A reflective stance gives the ability to better comprehend what transformations are occurring as well as an openness that alternatives exist once you move beyond your own assumptions.*
AF3	CNA1	*Insight / Skills*	*Individuals are encouraged to make and communicate opinions, but opinions need to be defended by seeking proof, which consolidates our own assumptions. Developing individual FL capacities enhances our ability to be highly critical in the formation of our own opinions.*
AF9	PSA2	*Insight / Skills*	*Taking multiple perspectives, especially an interest in social aspects of the future beyond a focus on technology and problem-solution thinking, increases perceptiveness and sensitivity.*
AF7	PSA1	*Insight / Skills*	*Recognition that multiple present futures can be used as alternative lenses, and that the choice of a particular lens has an impact on present decision making with future consequences.*
AF1	CUDA1, FLPR3	*Skills*	*Being able to switch between using the future for assessing probable futures, generating desired visions, and for imagining strange discontinuous futures.*

Code	Analysis	Applied value	Summary
AF4	CNA1	*Collective Voice*	*As a means of enhancing personal and group capacities for challenging tacit assumptions; the more people that can develop FL within a group or at an organisational level the better able they are to overcome institutional resistance.*
AF2	RSA1	*Critique*	*You cannot know how an innovation will be used or how a vision will play out and therefore using both AfF and AfE is necessary for resilience.*
AF6	RSA1	*Intangibles*	*Developing FL provides an appreciation of the role of emergence in the unfolding of the future which enhances our preparedness for the eventuality that unknowable things can and will occur by reducing our shock and increasing our sensitivity.*

Table 7 Applied value - Participants of the focus groups

Code	Analysis	Applied value	Summary
UP1	FLPO1 CUDA2	*Adoption*	*As a tool for seeking out assumptions and critically questioning them.*
UP5	SEO4	*Adaptation*	*Utilisation of reframing questions in the context of a questionnaire. Ties with design thinking and engineering perspective.*
UP3	DDR2	*Adaptation*	*Deployment of reflection space utilizing FL as part of the ongoing Deep Demonstration processes, to give space and time to be reflexive and critically question assumptions.*
UP4	SEO4	*Adaptation*	*As a process underlying mass citizen engagement, through deliberative polling for example.*
UP7	QEI2	*Being more assertive*	*As an argument to break out of BAU, growth, and collapse as baseline scenarios.*
UP8	FLAR1	*Being more assertive, Increasing your influence*	*In development and planning discussions use FL to 1) question extrapolations 2) Propose an additional level of thinking; consideration of emergence 3) Explore emergent or disruptive change.*
UP6	QEI2, FSO2	*Increasing your influence*	*As an argument to push planning projects to consider more alternative possibilities, emergence, and reconsider reliance on extrapolative modes of using the future for long term planning.*
UP2	FLAR1	*Harnessing Energy*	*Individuals who have experience of participation in FLLs acting as FL ambassadors in their organisations with the task of 1) Expanding the realm of the possible 2) Explain the relevance of emergence and its impact on planning 3) Articulate the utility of wild imagining 4) Support initiatives for others who want to develop their FL.*
UP11	DDO1	*Harnessing energy*	*Integration of FL into the CKIC Maritime Hub Deep Demonstrations for stakeholder engagement, identifying leverage points, and defining a vision*
UP9	SER1	*Leveraging connections*	*Making use of the outcomes of FLLs to engage local business actors in innovation processes.*
UP10	FLCR1	*Leveraging connections*	*Engagement with new working groups in the European Sustainable Shipping Forum.*
UP13	ICO1	*Inventiveness*	*We do not think as imaginatively as we think we do about the future, we tend towards extrapolation of today's standard ideas even when we think we are being imaginative, radical, or novel, tending to draw on media sources, FL can be used as a tool for rigorously reimagining.*
UP12	DDO2	*Reuse*	*Exploring the effect of running an FLL at an early stage in the Deep Demonstration process – to enable mutual value creation, orchestration, trust building etc. holding an FL lab as a catalyst.*

Table 8 Enabling value - Participants of the focus groups

Code	Analysis	Enabling Value		Summary
NP2	FLPO1	*Internal Process*	-	A simple technique/procedure for working with FL after the FLL. Lacking enough grounding in futures thinking can make it difficult to apply/design FL activities.
NP6	FLCO1, FLCR1	*Internal Process, Commitment*	–	Training and practicing the critical questioning of assumptions on a daily basis.
NP1	FLCO2, FSO1	*Internal Commitment, Documenting*	–	FL resources for participants to take home with them, materials that they can refer to, or engagement with an ongoing line of communication or community.
NP3	FLCO3	*Internal Documenting*	-	A resource that acts as a reminder of the ideas and concepts discussed in the FLL.
NP5	FLAR1, UFLO1	*Internal Internal leadership*	-	FLL participants acting as ambassadors in their organisations, taking the opportunity to suggest exploring one more alternative future, discontinuities, questioning assumptions.
NP4	FSO1	*External Social learning support*	–	Balanced, curated futures sources as input for urban and maritime sectors into the design thinking process, no information overload.
NP7		*External resources*	-	Advocating for funding bodies to change the way that they fund new projects from top down to bottom up – funding with looser constraints. Funding for AfE.

Table 9 Enabling value - Facilitator reflections

Code	Analysis	Enabling Value		Summary
NF2	PSS1, FLAO1, SEO2	*Internal Commitment*	-	Enough members in an organisation who are willing and able to question their assumptions, to overcome the negative impact of entrenched opinions, expertise, or siloes which can be a barrier to being open and explorative.
NF1	ICR1	*Internal Commitment, Process*	-	The need for playful and lightweight FL exercises to be done in other meetings that highlight what futures are being imagined, there are assumptions embedded within those futures, we should reveal them and explore them.
NF3	SER1	*External Strategic Facilitation*	-	Recruiting skilled local FL practitioners who can run localised FLLs.
NF4	FSR1	*External Organisational Initiative, Social Learning Support*	-	Online resources, courses, FAQs, for stakeholders to engage in FL capacity building activities.

Table 10 Strategic value - Participants of the focus groups

Code	Analysis	Value	Summary
IdP5	FLPO2	*Internal - Learning agenda*	Using short video or audio media to provoke discussions about the future on relevant topics at the beginnings of meetings.
IdP1	FLCO1, FLCR2	*Internal - Learning Agenda / External - Ongoing engagement*	Starting a mailing list for sharing weak signals to keep the discussion going after the event and bring new people in.
IdP4	DDR1	*Internal - Strategic context / External - Strategic context*	Bringing FL into the Intent stage of the DD process, to have those involved develop their FL before moving on to generate a vision so that they can critically question

			underlying assumptions.
IdP7	SER1	*External - Alliances*	*Running an FL capacity development process with local business innovation development networks.*
IdP8	SER1, SEO2	*External - Aspirations and expectations, Alliances*	*FL as a tool of regional foresight networks. Increasing the sophistication of strategic foresight – combining local stakeholder thinking with vision generation and strategy generation.*
IdP2	SEO1	*External - Stakeholders*	*Run an FLL with a broader stakeholder group, including unusual stakeholders, who are practically connected to the port at a later stage in the DD process.*
IdP6	SER2	*External - Stakeholders, Resistance*	*Gradually introducing FL to individuals related to ports, to generate interest and momentum for further FLLs run by UNESCO.*
IdP9	FLCR1	*External - Stakeholders, Ongoing Engagement*	*FL follow up activities that focus on linking up stakeholders and actors with shared interests.*
IdP3	SER3	*External - Strategic context, Resistance*	*In future FLLs, including presentations from people with interesting and innovative ideas to challenge assumptions or typical modes of thinking of people with an engineering mindset.*

Table 11 Strategic value - Facilitator reflections

Code	Analysis	Value	Summary
IdF1	FLPR1	*Internal - Learning agenda, strategic context*	*Spending five minutes discussing the future at the beginning of meetings.*
IdF3	FLPR2	*Internal - Intentionality, External - Power*	*Mirroring as a technique for pointing out what uses of futures are being talked about at the table, making an opening for other uses of the future to be explored.*
IdF2	ICR2	*External - Learning Theory*	*Using surrealist games for generating and processing weird imaginings.*

APPENDIX 3 – INSIGHT NARRATIVES

A note on how to read the Insight Narratives

The first cross reference when there are multiple cross references always matches with an extract coded with the corresponding value, for example IP4 (Impact Participant 4th in list) matches with Impacts – immediate value. The second and following cross references are composed of support-ing or corroborating extracts, which may have been drawn from a different stage of value creation. An example of a standard reference is that QEI2 is supported by IP4 (which corresponds impact (I) to impact (I)), however, QEI2 is further supported by additional references drawn from outside of the impacts stage, in this case by UP6 and UP7 which are drawn from the Uses – Applied value which is outside of the insight struggle-impact-advantage flow structure, but which were seen as being relevant supporting evidence and so are included to add detail to the story.

Table 13 Insight Narrative 1 - Questioning Extrapolation

Title	Abbr.	Value creation flow	Summary
Questioning Extrapolation	QE	Learning interactions → Immediate → Potential	Questioning reliance on the extrapolation of trends to explain the future helps to overcome barriers to spotting radical changes.

Narrative: Critique of current approaches and perspectives destabilises participants' understanding of how to make sense of futures. Accepting the non-linear, the radical and the intuitive into the meaning making process is discomforting as predictable and familiar methods are temporarily discarded. Yet, having permission to explore beyond the boundaries of the comfortable engenders feelings of empowerment as creative destruction enables innovation.

Value	Abbr.	Finding	Value sub-type	Extracts
Learning interactions	QES1	SP3	*Critique*	*Struggling to move past self-imposed limitations of being "realistic".*
Immediate value	QEI1	IP2	*Productive discomfort*	*Recognition of the limitations of relying on extrapolations based on historical data gathered by consultants.*
	QEI2	IP4, UP6, UP7	*Productive discomfort, increasing your influence, being more assertive*	*Deep questioning of the validity of extrapolative practices to inform long term planning processes which do not consider emergence.*
Potential value	QEA1	AP1	*Insights/ critique*	*Ability to spot the potential opportunities inherent in a wider array of alternative futures that move beyond conceptualizations of probable/improbable and utopia/dystopia.*

Table 14 Insight Narrative 2 - Novelty Collective

Title	Abbr.	Value creation flow	Summary
Collective Novelty	CN	Learning interactions → Immediate → Potential	*Exposing what we assume will be true in the future as a group can prepare us for overcoming institutional resistance to novel ideas.*

Narrative: Gaining insight into the assumptions inherent to one's current perspectives is facilitated by engaging with the collective intelligence of a group through constructive dialogue. The negotiation of shared meaning enables creative processes amid instability that deepen self-reflection. Encountering novel futures as a group nurtures a collective capacity for uncertainty, self-organisation, adaptation and acceptance of unpredictability, that can be later deployed in an organisational context.

Value	Abbr.	Result	Value sub-type	Extracts
Learning interactions	CNS1	SF1	*Insights*	*Moving past using reframing as a tool of visioning to using it as a tool for exposing assumptions.*
	CNS2	SF2	*Insights, skills*	*Focusing on questioning values as a way of questioning official futures but struggling to make the leap from critical questioning to being open to novel futures.*
Immediate value	CNI1	IP5	*Mutual recognition as learning partners*	*Reframing as a group moved participants beyond predictive and preferable thinking about the future to 'imagine something completely different'.*
	CNI2	IP3	*Mutual recognition as learning partners*	*Reframing and the wider FL capability building process is best done collectively; the support of a group was essential for collective knowledge creation.*
Potential value	CNA1	AF4, AF3	*Collective voice, insights/skills*	*Future Literacy as a means of enhancing personal and group capacities for challenging tacit assumptions; the more people that can develop FL within a group or at an organisational level the better able they are to overcome institutional resistance.*
	CNA2	AP2	*Information*	*To be better able to create synergies between recognised novelties and identified continuities in our visioning processes, requires us to improve our understanding of novelty as being an emergent property of complex systems.*

Table 15 Insight Narrative 3 - Resilience to Surprises

Title	Abbr.	Values creation flow	Summary
Resilience to Surprises	RS	Learning interactions → Immediate → Potential	*You cannot know the impact of surprise future changes, but you can become better at seeing and processing novelty, thereby enhancing resilience*

Narrative: Making meaning of the far-reaching implications of a novel future is demands personal cognitive and emotional resources. Traversing the uncertainty and emotional turmoil of reconsidering deeply held assumptions repositions one's commitments in the light of potential radical change. Reflecting on one's core assumptions levels barriers to perceiving emerging novelty in the present.

Value	Abbr.	Result	Value Sub-type	Extracts
Learning interactions	RSS1	SP2	*Personal*	*The need to relentlessly ask "but what would it mean if...?" during the reframe stage seemed to indicate that the complexity of considering the multitude of possible impacts of novel future transformations was a daunting and exhausting task.*
Immediate value	RSI1	IP6, AP3	*Identification, insight*	*Recognition that present ways of thinking and decision making are rooted in assumptions about the future that do not adequately consider uncertainty or emergence.*
Potential value	RSA1	AF8, AF2, AF6	*Insight/skills, Critique, Intangibles*	*A reflective stance gives the ability to better comprehend what transformations are occurring as well as an openness to the alternatives that exist once you have moved beyond your own assumptions.*
	CRSA2	AP4	*Insight*	*Appreciation of emergence in businesses provides competitive advantage or the ability to avert disaster.*

Table 16 Insight narrative 4 - Explorative Perspective Switching

Title	Abbr.	Values creation flow	Summary
Perspective Switching	PS	Learning interactions → Immediate → Potential	*Exposure to uncomfortable perspectives is the first step to-wards becoming better at switching between lenses to see novelty.*

Exploring novelty requires a willingness to step outside the comfortable and familiar boundaries of one's expertise and opinions. Practising the imagining of alternative futures through which to examine the present engages a wealth of less often considered perspectives. Increasing the variety of considered implications provides fresh insight that goes beyond orthodox thinking.

Value	Abbr.	Result	Value Sub-type	Extracts
Learning interactions	PSS1	MF2, NF2	*Productive discomfort, internal – commitment*	*Struggling to move outside one's comfort zone of expertise to explore novelty. Attaining a critical mass of individuals who are willing and able to question their own assumptions in an organisation in order to overcome entrenched opinions*
Immediate value	PSI1	IP1	*Engaging with other perspectives*	*Appreciation of the value of other views that go beyond technology, towards a multi perspective view of futures.*
Potential value	PSA1	AF7	*Insight / Skills*	*Recognition that multiple futures can be used as a variety of lenses, and that the choice of a specific lens has an impact on present decision making with future consequences*
	PSA2	AF9	*Insight / Skills*	*Taking multiple perspectives, especially an interest in social aspects of the future beyond a focus on technology and problem-solution thinking, increases perceptiveness and sensitivity.*

APPENDIX 4 – OBSERVATIONS AND RECOMMENDATIONS

Futures Literacy Practice - Observations (FLPO)

Value	Abbr.	Result	Value subtype		Summary
Applied	FLPO 1	UP1	Adoption		*[FL can be used] As a tool for seeking out assumptions and critically questioning them.*
Enabling	FLPO 2	NP2	Internal Commitment	-	*A simple technique/procedure for working with FL after the FLL. Lacking enough grounding in futures thinking can make it difficult to apply/design FL activities.*
Strategic	FLPO 3	IdP5	Internal - Learning agenda		*Using short video or audio media to provoke discussions about the future on relevant topics at the beginnings of meetings.*

Futures Literacy Practice - Recommendations (FLPR)

Value	Abbr.	Result	Value subtype		Summary
Strategic	FLPR 1	IdF1	Internal - Learning agenda, strategic context		*Assigning five minutes for the future at the beginning of meetings This space could be used for exploring the futures of your team, agenda subject or events in your environment.*
Strategic	FLPR 2	IdF3	Internal Intentionality, External - Power	-	*Paying attention to what futures are in use in a conversation and reflecting them back to the group for reconsideration, a technique called 'mirroring futures', taking this role could be a rotating responsibility.*
Learning Interactions	FLPR 3	SF1, AF1, AP1	Insights, Skills, Insights/Critique		*Include activities that activate consideration of probable, possible and preferable futures as well as novel surprising futures, on a regular basis in your daily working.*

Futures Literacy Community of Learners - Observations (FLCO)

Value	Abbr.	Result	Value subtype		Summary
Strategic	FLCO 1	IdP1, NP6	Internal - Learning Agenda, Internal – Process, Commitment		*Further engagement with likeminded individuals on their own Futures Literacy learning journeys was desired – through a mailing list for sharing weak signals or discussion platform. The training and practice of the critical questioning of assumptions on a daily basis.*
Enabling	FLCO 2	NP1	Internal Commitment, Documenting	–	*FL resources for participants to take home with them, materials that they can refer to, or engagement with an ongoing line of communication or community.*
Enabling	FLCO 3	NP3	Internal – Documenting		*Resources could act as reminders of the ideas and concepts discussed at the Futures Literacy Lab.*

Futures Literacy Community of Learners - Recommendations (FLCR)

Value	Abbr.	Result	Value subtype	Summary
Strategic	FLCR 1	IdP9, UP10	External - Stakeholders, Ongoing Engagement	*Connecting with other actors with mutual interest in Futures Literacy for cooperation and networking through existing platforms such as LinkedIn, Medium or Twitter, to speak with a collective voice in business*

			Leveraging connections		*forums and make join applications through funding mechanisms.*
Strate-gic	FLCR 2	IdP1	External Ongoing engagement	-	*Creating intraorganizational and public platform Futures Literacy content sharing groups for stimulating FL oriented collaboration*

Imagination and Creativity - Observations (ICO)

Value	Abbr.	Result	Value sub-type	Summary
Applied	ICO1	UP13, MF1, MF3	Inventiveness, Productive discomfort, Productive discomfort	*We do not think as imaginatively as we think we do about the future, we tend towards extrapolation of today's standard ideas even when we think we are being imaginative, radical or novel, tending to draw our visions of the future from familiar media sources. Imagining creative alternatives requires engaging the unfamiliar, strange and uncomfortable.*

Imagination and Creativity - Recommendations (ICR)

Value	Abbr.	Result	Value sub-type	Summary
Ena-bling	ICR1	NF1	Internal - Commitment, Process	*Incorporate short, playful future oriented exercises into regular meetings that highlight what futures are being imagined, there are assumptions embedded within those futures, we should reveal them and explore them.*
Strate-gic	ICR2	IdF2	External Learning Theory	- *Practicing creative imagination though use of surrealist games Artists such as André Breton and Rene Magritte used games to break through conventional thought and behaviour to generate and process weird imaginings*

Stakeholder Engagement - Observations (SEO)

Value	Abbr.	Result	Value sub-type	Summary
Strate-gic	SEO1	IdP2, IdP8	External - Stakeholders External - Aspirations and expectations	*In future engagements involving Futures Literacy, extending the invitation to unusual stakeholders and local decision makers would be critical to surface unheard voices and diversify perspectives, as well as enhancing the FLL experience and learning of focus groups.*
Ena-bling	SEO2	NF2, AF8	Internal – Commitment Critique	*Starting a Futures Literacy learning journey with an open mind, predisposed and receptive, with trust in the process enhances the impact of the experience.*
Applied	SEO3	UP4, UP5	Adaptation Adaptation	*As a process underlying mass citizen engagement, through deliberative polling for example, or by using the reframing questions as a questionnaire*

Stakeholder Engagement - Recommendations (SER)

Value	Abbr.	Result	Value subtype	Summary
Enabling, Applied, Strategic	SER1	NF3, UP8, IdP8 IdP7	External - Strategic Facilitation Being more assertive, Increasing your influence External - Alliances External - Alliances	*Recruiting FL practitioners to organise localised Futures Literacy Labs with stakeholder groups, to build external alliances and maintain engagement.*
Strategic	SER2	IdP6	External - Stakeholders, Resistance	*Gradually introducing Futures Literacy through lightweight activities to generate interest and momentum for future Futures Literacy Labs.*
Strategic	SER3	IdP3	External - Strategic context, Resistance	*Inviting presentations from actors with interesting and innovative ideas to challenge typical modes of thinking.*

Futures Sources - Observations (FSO)

Value	Abbr.	Result	Value subtype	Summary
Enabling	FSO1	NP4	External – Social learning support	*Balanced and curated futures articles, audio visual media and reports as input for urban and maritime design thinking processes*

Futures Sources - Recommendations (FSR)

Value	Abbr.	Result	Value subtype	Summary
Enabling	FSR1	NF4	*External - Organisational Initiative, Social Learning Support*	*Developing FL online resources, courses, and FAQs, for sharing with stakeholders to engage in FL capacity building activities.*
Applied	FSR2	UP6	*Increasing your influence*	*Use FL critique as an argument to push planning projects to consider more alternative possibilities, emergence, and reconsider reliance on extrapolative modes of using the future for long term planning.*

Deep Demonstration Implementations - Observations (DDO)

Value	Abbr.	Result	Value subtype	Summary
Applied	DDO1	UP11,	Harnessing energy	*Integration of FL into the CKIC Maritime Hub Deep Demonstrations for stakeholder engagement, identifying leverage points, and defining a vision.*
Applied	DDO2	UP12	Reuse	*Exploring the effect of running an FLL at an early stage in the Deep Demonstration process – to enable mutual value creation, orchestration, trust building etc. holding an FL lab as a catalyst.*

Deep Demonstration Implementations - Recommendations (DDR)

Value	Abbr.	Result	Value subtype	Summary
Strategic	DDR1	IdP4	Internal - Strategic context / External - Strategic context	*Bringing FL into the Intent stage of the DD process, to have those involved develop their FL before moving on to generate a vision so that they can critically question underlying assumptions.*
Applied	DDR2	UP3	Adaptation	*Deployment of reflection space utilizing FL as part of the ongoing Deep Demonstration processes, to give space and time to be reflexive and critically question assumptions*

Futures Literacy Ambassadors - Observations (FLAO)

Value	Abbr.	Result	Value subtype	Summary
Enabling	FLAO1	NP5, NF2	Internal – Process Internal – Commitment	*FLL participants who have become more familiar with FL concepts could begin to introduce these ideas into the day to day working processes of their organisations, thus making it easier to overcome entrenched opinions and siloed expertise.*

Futures Literacy Ambassadors - Recommendations (FLAR)

Value	Abbr.	Result	Value subtype	Summary
Applied	FLAR1	UP2, UP8	Harnessing Energy Being more assertive, Increasing your influence	*Adopting or nominating the role of Futures Literacy ambassador in your organisation. The Ambassador's role might be to champion the following four activities 1) Expanding the realm of the possible by questioning assumptions 2) Explaining the relevance of surprising emergent futures and planning for their impact 3) Articulating the utility of wild imagining for novelty creation 4) Supporting initiatives for others to develop their Futures Literacy*

APPENDIX 5 – REVIEW OF 14 INTERNATIONAL FLL CASE STUDIES

Case Study	n. participants	n. groups	facilitation	3 phase core design	AA reported?	Phase 3 analysis type	Unit of analysis	Phase 4 FLL?	Phase 4 in report - unit of Analysis	Materials	Author of the case study
case 1	17	2	expert	yes	yes	thematic	AA	3.5	unstructured learnings	?	facilitator/designer
case 2	25	4	expert	yes	yes	descriptive	new questions	no	no	?	?
case 3	28	?	no	yes	yes	descriptive	feedback	no	outcomes and findings	?	designer/organiser
case 4	15	3	expert	yes	no	descriptive	AA, new questions	no	strategic process implications	survey	?
case 5	7	1	expert	yes	no	analytical	CLA - metaphors	yes	"spreading the word"	?	facilitator/designer
case 6	<14	3	expert	yes	yes	thematic	themes	no	observations	?	?
case 7	30	3	expert	no	no	descriptive	unstructured observations	no	learnings	survey	?
case 8	<500	?	?	yes	yes	descriptive	unstructured observations	no	visions	?	?
case 9	<500	60	peer	yes	no	method	methodological	3.5	personal perspective as concluding observation	Design/survey	?
case 10	387	?	?	yes	yes	descriptive	strategic scenarios	no	discussion and implications	?	?
case 11	39	?	peer	yes	yes	descriptive/thematic	new questions	no	evaluation	survey	?
case 12	40	5	expert	yes	yes	descriptive/analytical	CLA	no	evaluation of learning from survey results	?	?
case 13	25	4	expert	yes	yes	descriptive/analytical	CLA/Scenarios	no	unstructured observations on AA and learnings	?	?
case 14	100	10		no/hybrid	no	analytical	thing from the future	no	evaluation of survey	survey	?