Knowledge Creation and Mobility in and through Futures Workshops

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Abstract

Participatory *futures workshops* are commonly used to create future-oriented knowledge. It is essential to understand how to manage *futures knowledge* to benefit from it and utilise it; however, it is unclear how the *knowledge creation* process is developed in futures workshops and how the created futures knowledge is mobilised by participants. These questions were answered by an empirical study using participant observation and interview methods. The results showed that futures knowledge is socially constructed through several processes, but individually interpreted, and that individual understanding and personal contacts are vital for knowledge mobilisation.

Keywords: futures knowledge, futures workshop, knowledge creation, knowledge mobility

1. Introduction

Futures knowledge is a contradictory concept; facts about the future do not yet exist, but we must plan for the future of our increasingly complex urbanised societies. Futures knowledge is the interpretation of potential futures gathered and validated in justified ways. A growing body of literature has recognised the importance of, and need for, futures knowledge in decision-making and everyday life (Pouru et al., 2019; Schmidt, 2015; Van der Steen & Van Twist, 2013; van Dorsser et al., 2018). There are many sources of futures knowledge and many different kinds of futures research methods. The central principles of futures *knowledge creation* are that uncertainty is always present, interdisciplinary perspectives and critical thinking are needed, and various possibilities and 'what-if' thinking should be considered (Gabriel, 2014). Strategic and critical discussion underpins valuable

futures knowledge, and such discussion involves different perspectives and values. A social constructionist perspective is often adopted in futures studies research (Fuller & Loogma, 2009); however, the futures knowledge creation process is still poorly understood (Baškarada, Shrimpton, & Ng, 2016; Bootz, 2010; Slaughter, 2001) and there have been few empirical studies.

Futures workshops are a common, traditional method for creating futures knowledge on certain topics. They involve participatory methods of knowledge creation, which can be modified for many purposes; for example, participatory workshops have been used to generate futures knowledge to plan more sustainable cities with better facilities and policies (Street, 1997). In addition, knowledge created in futures workshops can be utilised to benefit society, meaning that futures *knowledge mobility* following workshops is vital. Futures workshops have many identified outcomes, including organisational learning, increased individual capacity, and the empowerment of stakeholders (Bonsu, Dhubháin & O'Connor, 2017; Eerola & Miles, 2011; Rhisiart, Miller & Brooks, 2015), but this study specifically examined how futures knowledge is created and mobilised.

In recent years, increasing interest in knowledge creation in futures workshops has led to some relevant studies being published (Eerola & Miles, 2011; Dufva & Ahlqvist, 2015); however, more research is needed, in order to identify the elements of futures knowledge creation in the futures workshop process and further develop both the process and post-workshop futures *knowledge mobility*. This would improve the effectiveness of the method and determine the factors influencing workshop outputs (Nygrén, 2019). Futures knowledge is valuable for decision-making; consequently, futures knowledge management is important (Kaivo-oja, 2012) and the processes of knowledge creation, mobility, and utilisation should be understood more fully before knowledge management can be improved.

The first objective of this study was to find out how futures knowledge is created in participatory futures workshops and which factors of a workshop influence knowledge creation. The second objective was to explore how post-workshop futures knowledge is mobilised and possibly utilised in workshop participants' organisations. Data for this study was collected in two futures workshops, attended by key urbanisation stakeholders in Finland, through participant interviews and participant observations. The importance and originality of this study lie in its exploration of the knowledge creation process during futures workshops, and its identification of the factors that influence this process and the post-workshop mobilisation of futures knowledge by participants.

2. Theoretical Background

2.1. What Is Futures Knowledge?

Knowledge is traditionally defined as 'justified true belief' (Nonaka, 2013; Nonaka & Takeuchi, 1995) and perceived as objective and fixed. Knowledge creation theory considers knowledge to be a dynamic process between humans, with individual beliefs justified as components of aspirations for 'truth' (Nonaka, 2013). Futures knowledge can also be viewed as personal beliefs that are justified in dynamic human processes. Futures knowledge constantly evolves in human encounters when people exchange thoughts and ideas, and knowledge has both tacit and explicit dimensions (Nonaka, 2013; Nonaka & Takeuchi, 1995). Explicit knowledge is presented in texts or data; tacit knowledge is embedded in humans and it is more difficult to articulate. Similarly, futures knowledge has different dimensions and the personal, tacit dimension is more difficult to transfer than codified forms of futures knowledge, such as written scenarios or future images (Ahlqvist & Uotila, 2020; Voros, 2008).

In futures knowledge 'futures' is in plural form because the future is undetermined and always has various possible outcomes (Bell, 2003; Sardar, 2010). Therefore, it is essential to challenge one's existing assumptions about the future (Bell 2003; Wilkinson 2016). Considering the future and creating futures knowledge will open up new perceptions, make people aware of potential dangers or opportunities and motivate them to take action (Bell 2003; Sardar 2010).

To some extent, futures knowledge is an illusion (Gabriel 2014) and 'beyond our epistemological reach' (Ahlqvist & Uotila 2020, p. 4). Nevertheless, it can be considered knowledge for two reasons. First, futures can be systematically explored via scientific methods, such as building scenarios, strategies and visions (Gabriel 2014; Pouru, Dufva, and Niinisalo 2019). Second, the literature on knowledge accepts tacit knowledge, and likewise, futures knowledge can be considered the tacit foreknowledge of experience-based expectations (Polanyi, 2005).

Futures knowledge can simply be a result of foresight, or a futures studies method (Eerola & Miles, 2011), and can take different forms, such as systemic models, calculations, narratives, images, scenarios, weak signals, or wild cards (Ahlqvist & Uotila, 2020; Chermack, 2019; Frewen Wuellner, 2011; Milojević & Inayatullah, 2015; Voros, 2009). Any future-oriented knowledge can be called futures knowledge (Pouru et al., 2019), but personal interpretation influences how the knowledge is understood and used (Hautala, 2018; Voros, 2008). Ahlqvist and Uotila (2020), in their relational theory of futures knowledge, argued that futures knowledge statements are made from certain positions or contexts and that the perspective of the observer or actor influences the different ways in which futures knowledge is interpreted and recorded. The 'local knowledge' embedded in the observer further influences how the futures knowledge is understood (Ahlqvist & Uotila,

2020); therefore, individuals have different ways of knowing, because knowledge is always part of their personal experiences (Voros, 2008). In addition, according to Dator (1995) futures knowledge can feel astonishing and irrational and may thus be difficult for others to accept or understand (Dator, 1995).

Dufva and Ahlqvist (2015) proposed four different types of knowledge relevant to futures workshops: codified knowledge, which can be background material for the workshop; articulated knowledge, which is process-related (i.e. things that participants say or write); embodied knowledge, relating to participants' expertise and knowledge; and finally, out-of-radar knowledge, which consists of 'weak signals' or 'wild cards' (i.e. emerging trends or surprising events). The last two types (embodied and out-of-radar knowledge) are the most interesting, because they are integral to futures workshop results, but central futures knowledge is built stepwise during the workshop process.

A general assumption is that futures knowledge is useful for developing society (Bell, 2003; de Jouvenel, 1967). Different types of futures knowledge (personal, organisational, and societal) are needed in order to intervene in complex systems and situations. Futures knowledge is necessary for making decisions in turbulent social circumstances and managing our daily lives more efficiently and sustainably (Wilkinson, 2016). Futures knowledge can be a tool for decision-making and planning; for example, scenarios can be a starting point for discussion and critical thinking, helping organisations to learn (Chermack & van der Merwe, 2003; Eerola & Miles, 2011). The future, however, is open (not fixed) and always holds various possibilities (Sardar, 2010); hence, in order to produce, evaluate, and use futures knowledge, profound dialogue is vital (Wilkinson, 2016). Since futures knowledge is socially constructed in people's interactions, through language and negotiation (Fuller & Loogma, 2009), the process of knowledge production is even more important than

the result, because of the individual and group learning that ensues; as Fuller and Loogma (2009) stated: 'Foresight is both a social construction and a mechanism for social construction.'

Gabriel (2014) argued that futures knowledge is only an illusion of knowledge; however, he presented some definitions and basic rules for scientific enquiry into the future. Firstly, although the future cannot be known, anticipation and strategic thinking about alternative futures are acceptable. Secondly, it is important to see the complexity of the world and not think deterministically. Thirdly, thinking about the future requires discursive scepticism, because alternative futures are mentally constructed. Regardless of the arguments about futures knowledge being an illusion, the concept of futures knowledge is still practical and commonly used (Pouru et al., 2019; Wilkinson, 2016). Futures knowledge derives from the interpretation of current existing knowledge and is justified by relevant groups (Hautala & Jauhiainen, 2014); thus, futures knowledge is the interpretation of potential futures gathered and validated in justified ways.

Futures knowledge may resemble knowing (Eerola & Miles, 2011, p. 266), which is practice oriented and more holistic (Ibert, 2007). Futures knowledge rarely concerns pieces of information, but more often guides thinking and decision-making; therefore, the evaluation and interpretation of futures knowledge needs to be practiced constantly and purposefully (Slaughter, 2001) in order to gain holistic understanding of future developments. Future developments means here different evolving processes, trends, and changes that might take place. In summary, futures knowledge relates to agreement on plausible future developments, but it is not a fact or a prediction; only a plausibility.

2.2. Futures Workshops

A futures workshop involves a participatory process aiming to creating futures knowledge, which originated in the 1960s and had the purpose of empowering citizens to influence their future (Jungk & Müllert, 1987). Since then, similar workshops have followed, also with the aim of creating new ideas and futures knowledge using participatory methods. The classic futures workshop has five stages: firstly, arrangements are made for the workshop, such as inviting participants (preparation phase); then, during the workshop, participants define the problems (critique phase); use their imaginations and values to find new solutions (fantasy phase); and finally try to relate these new ideas to the current situation (implementation phase). The last phase (follow-up) includes writing the workshop report (Jungk & Müllert, 1987). The participants may work individually or in diverse small groups during the workshop. Various frameworks for futures workshops have been presented in the literature, including Voros' generic futures process, Inayatullah's six pillars of futures thinking, or Miller's Futures Literacy Laboratories (Inayatullah, 2008; Miller, 2018; Voros, 2003, 2006, 2009). Nygrén (2018) categorised different kinds of future-oriented workshops (for example futures workshops, foresight workshops, scenario workshops, scenario planning workshops, stakeholder workshops, and backcasting workshops), the main objectives of which might vary despite their similar characteristics. For all the workshops, *participatory discussion* is commonly the key to shaping the future (Borch, Dingli, & Jørgensen, 2013).

Although individual learning in the workshop process has rarely been studied, research has shown that foresight can benefit individual learning and capacity-building (Rhisiart et al., 2015). Frith and Tapinos (2020) studied how scenario-planning workshops affected participants' cognition, stating that a number of mechanisms enabled by contextual factors will generate change in participants' mental models (Frith & Tapinos, 2020). These

contextual factors include group diversity, personality types, safe space, adequate time, and uncertainty, which all relate to futures workshops, including intra-organisational ones. Other studies have identified similar factors that influence the success and experiences of workshops and should be considered when organising a futures workshop. The structure of the workshop is important (Lauttamäki, 2016; van Vliet, Kok, Veldkamp, & Sarkki, 2012), and participant selection has a major influence on workshop success (Bonsu et al., 2017; Burt, Mackay, van der Heijden & Verheijdt, 2017; Carlsson-Kanyama Dreborg, & Padovan, 2008; Gunnarsson-östling, Svenfelt & Höjer, 2012; Lauttamäki, 2016; Nygrén, 2019; Street, 1997). Participants' personal characteristics can influence the workshop flow and output (Burt et al., 2017), since participants' expertise can limit the discussion and creativity if participants' professional backgrounds restrict their acceptance of other perspectives (Lauttamäki, 2016); however individual characteristics are often unknown beforehand. Workshop facilitators can help to prevent such problems, and thus have an important role for workshop success (Eerola & Miles, 2011; Lauttamäki, 2016; Nygrén, 2019; Street, 1997). An active facilitator can guide participants and support their best performance (Wright & Cairns, 2020). This study analysed the factors that benefit the knowledge creation process during futures workshops, and the next section discusses this process.

2.3. Knowledge Creation in Futures Workshops

Knowledge creation is an interactive process between individuals and the environment, and the social context is crucial for the process (Nonaka, 2013; Rutten, 2017). Knowledge creation in futures workshops has been inadequately studied, and the perspective of the earlier studies has been constructionist (Chermack & van der Merwe, 2003; Dufva & Ahlqvist, 2015; Eerola & Miles, 2011). The constructionist-cognitive

understanding of knowledge (Hautala, 2018), which was used in this study, holds that knowledge is collectively constructed, but individually interpreted.

In a futures workshop, futures knowledge is constructed in social spaces when different areas of expertise are brought together (Dufva & Ahlqvist, 2015; Fuller & Loogma, 2009); therefore, social dynamics have a critical impact on knowledge creation. Levels of trust and social capital, and diverse norms and values, influence social dynamics (Rutten, 2017). It is vital that individuals in a group feel comfortable and have a safe environment in which to discuss their ideas and create knowledge; however, extremely weak or strong social dynamics can hamper knowledge creation (Rutten, 2017). A futures workshop is a place for exchanging tacit knowledge, if the social interaction and mutual trust allow it (Ibert, 2007), but this might be difficult to achieve if the workshop participants are unfamiliar with each other, there is only a single workshop, or the process is short-term. To enable all the workshop participants to feel comfortable about participating in the process, all their ideas and perceptions should be accepted broadmindedly (Mitchell & Nicholas, 2006). This broadmindedness also facilitates liberation from the current situation that is required when creating futures knowledge (Balcom Raleigh & Heinonen, 2019).

A futures workshop is an organised knowledge-creation process, which aims to bring participants together, and the knowledge creation is incidental (Rutten, 2017). Earlier studies identified four phases of knowledge creation in groups: 1) knowledge accumulation, 2) interaction, 3) analysis, and 4) creation and integration of new knowledge (Mitchell & Nicholas, 2006). Through dialogue, participant mental models interact and a common mental model can be created (Frith & Tapinos, 2020). Group conversation decreases ambiguity and facilitates members' interpretation or *sensemaking* (Hautala, 2018; Bowman, 2016). New insights are integrated by adding a new perspective or new ideas based on the

statements of others (Dufva & Ahlqvist, 2015). Shared understanding and sensemaking generates coherence among various actors and may influence their later actions (Bowman, 2016).

Group members also have individual processes of knowledge creation. Mitchell and Nicolas (2006) identified these processes as transmission, cognition, and positioning, which all influence each other: workshop participants are constantly taking in new information and adjusting or altering it according to their own mental models (Chermack & van der Merwe, 2003). In the transmission process, individuals in a group communicate their ideas and views and try to understand the messages of others (Mitchell & Nicholas, 2006), usually interpreting the message from their own perspectives, which may lead to new understanding. Interpretation is one part of sensemaking (Tapinos & Pyper, 2018). The new knowledge is integrated into individuals' existing mental models, or their models are reconstructed or changed to accommodate the new knowledge (Chermack & van der Merwe, 2003; Mitchell & Nicholas, 2006; Tapinos & Pyper, 2018). The positioning of new knowledge appears later in the process, during decision-making and planning (Frith & Tapinos, 2020; Mitchell & Nicholas, 2006), and enactment is the final stage of sensemaking (Tapinos & Pyper, 2018).

In a futures workshop, individuals and groups create knowledge and individuals interpret that knowledge based on their former knowledge and experience (Chermack & van der Merwe, 2003; Hautala, 2018; Mitchell & Nicholas, 2006; Voros, 2008); thus, the changed mental models of workshop participants contribute to their created futures knowledge (Frith & Tapinos, 2020). These different processes of knowledge creation were observed in this study. Next, knowledge mobility following workshops is discussed.

2.4. Mobility of Futures Knowledge

Mobility can be defined as a change of position in a specific space (Jöns, Meusburger, & Heffernan, 2017), and knowledge becomes mobile through people and processes that enable knowledge to circulate (Weller, 2017). One challenge is to ensure that the created futures knowledge is used, and known, by other parties who could benefit from it (Eerola & Miles, 2011). Futures knowledge can be a tool for decision-making, so the mobility of futures knowledge is important, but its role is under-researched in policy mobility research (Werner & Strambach, 2018). Futures knowledge created in futures workshops moves with the participants, who share and use the futures knowledge in their own organisations (Eerola & Miles, 2011) through their changed mental models and various documents and materials (i.e. boundary objects that are explained later) obtained from the workshops (Bowman, 2016; Frith & Tapinos, 2020; Paraponaris & Sigal, 2015; Tapinos & Pyper, 2018). The individual changes in mental models contribute to changes at the organisational level (Chermack & van der Merwe, 2003; Rhisiart et al., 2015) enabling workshop participants to mobilise their futures knowledge in their own organisations.

Certain situations or places benefit knowledge mobility following futures workshops, and the transfer of knowledge can occur through formal or informal, and personal or impersonal, channels (Alavi & Leidner, 2001). The futures workshop process (Cairns, Wright, Fairbrother & Phillips 2017; Carlsson-Kanyama et al., 2008; Gunnarsson-östling et al., 2012; Volkery & Ribeiro, 2009) should ensure that personal contact between participants who have experienced the workshop supports knowledge mobility. The workshop participants can offer their knowledge and experience to their colleagues to interpret in formal or informal situations. A formal situation might be a training session or a meeting, and an informal one might, for example, be a coffee break discussion; nevertheless, face-to-face situations are the most effective channels for knowledge mobility (Paraponaris & Sigal,

2015; Torre, 2008). The method of transferring knowledge in organisations influences the way organisations utilise that knowledge and possibly change their operations accordingly. Often, informal discussions are more effective, since they are more relevant to the participants (Chermack & van der Merwe, 2003).

Mobilising knowledge across organisational boundaries is difficult and has therefore been termed a boundary issue (Bowman, 2016); however, different boundaries (i.e. physical, social, or mental) can also be found inside an organisation, including between units (Paraponaris & Sigal, 2015). Boundary objects can help to mobilise knowledge across these boundaries, because the objects facilitate sensemaking (Bowman, 2016; Paraponaris & Sigal, 2015). In the case of futures workshops, these boundary objects can be narratives or scenarios created during the workshops, but incorporating the output of futures workshops into the thinking of other people is challenging (Eerola & Miles, 2011). All participants draw their own interpretations and experiences from the futures workshops; hence, unless there is some written output (i.e. boundary objects) from the workshops to support common understanding or mental models, the futures knowledge might differ depending on the group setting and individuals' ability to absorb the knowledge (Baškarada, Shrimpton & Ng, 2016; Kazadi, Lievens & Mahr, 2016).

2.5. Conceptual Framework

A futures workshop forms a context for knowledge creation processes. The workshop is an organised knowledge creation process. The contextual factors of futures workshops enable knowledge creation: participant selection, the personality types of participants, facilitation, the structure of the workshop, adequate time, and a safe space (Bonsu et al., 2017; Frith & Tapinos, 2020; Lauttamäki, 2016; Nygrén, 2019; van Vliet et al., 2012; Wright & Cairns, 2020). Futures knowledge creation processes occur in diverse group

settings during workshops, including the social dynamics (that can benefit or hamper the processes), the interaction of participants, the integration of knowledge, and the interpretation or sensemaking processes (Bowman, 2016; Chermack & van der Merwe, 2003; Frith & Tapinos, 2020; Mitchell & Nicholas, 2006; Rutten, 2017). Following workshops, the created knowledge is mobilised by individuals, who can influence change at the organisational level (Chermack & van der Merwe, 2003). The conceptual framework for this study is presented in Figure 1.

Insert Figure 1 here.

3. Empirical Study

3.1. Focus of Workshops on Urbanising Finland

Urbanisation is an increasing global phenomenon that, in the future, will present new challenges and opportunities for different localities. The various phases of urbanisation occurred later in Finland than in many Western European countries (World Bank, 2018), but urbanisation has proceeded rapidly since the 1950s and, nowadays, the urbanisation rate is around the European average; nevertheless, cities and towns are relatively small in Finland. The large cities are growing, but small towns are suffering from declining populations. According to 2004–2014 statistics, Finland was one of the EU member states where the transformation to an urbanised society proceeded most rapidly (EuroStat, 2016, p. 65), and these changes in urbanisation need to be reflected in Finnish planning and decision-making.

The 'urban paradox' is that cities with concentrated populations are places with conspicuous benefits, but also many emerging challenges (Florida & Mellander, 2018; Glaeser, 2014). The larger the city, the more possibilities exist and the higher the economic activity. Simultaneously, social inequalities, segregation, and environmental issues create

significant problems in large conurbations. In Finland, the issue of urbanisation has been under-researched. The drivers of urbanisation are as unclear as its impacts; thus, futures workshops are a feasible means of handling Finland's urbanisation and discovering its drivers, impacts, and development.

3.2. Materials and Methods

3.2.1 Futures Workshops on the Urbanisation of Society

The material for this study was collected from two futures workshops using participant observation and interviews. The X Project, which was part of a national research programme, organised two futures workshops with the aim of finding paths to the future urbanisation of Finnish society. The scope of the X Project was to determine the potential trajectories of urbanisation in Finland up to 2039, based on research and policy-relevant analyses. Two workshops were conducted, a year apart. The first workshop was organised in autumn 2016 and the topic of that workshop was 'Urbanised Finland 2039'. The aim of the workshop was to discover the drivers and progress of Finnish urbanisation. The second workshop was organised in autumn 2017 on the topic 'Finland is urbanising. Is Finland urbanising?' The aim of the second workshop was to create scenarios for 2039, based on three preliminary scenarios, which were evaluated and developed further. The author of this article worked as a researcher for the X Project, but was not actively involved in planning the workshop or analysing the results; thus, the author was able to participate in workshops, with no distractions, and concentrate on participant observation during the workshops.

Both workshops were attended by participants from different stakeholder groups concerned with urbanising society. Ultimately, the workshop participants represented different cities, regional councils, government agencies (e.g. the Finnish Transport

Infrastructure Agency), ministries (the Ministry of the Environment and the Ministry of Economic Affairs and Employment), universities, research institutions, construction companies, consultancies, and small local non-governmental organisations (NGOs). The first workshop involved 39 participants and the second, 50 participants. Involving these participants allowed different perspectives of urbanisation to be incorporated: government representatives had a planning perspective, city representatives were interested in changing the urban lifestyle and modifying city services with co-creative methods, and local organisations wanted to include the viewpoints of various interest groups, such as immigrants.

The workshop duration in both cases was six to seven hours, including lunch and coffee breaks. The structure and phases of the two workshops varied, but had similar elements. Participants were divided into small groups of four to nine people, but the groups' composition changed periodically during the day. Participants were given individual, pair, and group discussion tasks. The first workshop had three facilitators and the second had five.

Here, the focus is on the knowledge creation and mobilisation process. To analyse the knowledge creation in the futures workshops and the knowledge mobility thereafter, the data was collected in two stages: during and after the futures workshops. During the workshops, participant observation was used and, after the workshops, interviews with the participants were conducted. Data and researcher triangulation reinforced the credibility of the study (Nowell, Norris, White & Moules, 2017).

3.2.2 Participant Observation

Participant observation provided an opportunity to understand how participants experienced the situation and how the process developed (Guest, Namey, and Mitchell

2017; Kawulich 2005). Participant observation is a tool to collect social data and analyse common actions in society (Corbetta 2011). The aim of participant observation was to discover the aspects of social scene and futures knowledge creation process (Guest, Namey, and Mitchell 2017; Kawulich 2005). In the first workshop, two researchers (including the author) and two research assistants conducted participant observation (Observers 1A–1D); in the second workshop, three observers (the author and two research assistants, Observers 2A–2C) conducted participant observation. All the observers took part in the workshops as participants and were involved as group members; thus, observers discussed the workshop topics with the group and, simultaneously, took notes of knowledge creation within the group. Before the workshop, all the observers discussed and agreed on which issues to observe during the session and their own role in it. This planning facilitated data collection and analysis (Guest, Namey, and Mitchell 2017). The intention was to observe how the groups worked, how group dynamics developed, how the discussion evolved, and whether new futures knowledge (e.g. in the form of 'weak signals' or 'wild cards') appeared in different phases of the workshop. These topics were observed, because social dynamics and integration, and the interpretation of knowledge, are vital for the creation of new knowledge (Bowman, 2016; Frith & Tapinos, 2020; Mitchell & Nicholas, 2006; Rutten, 2017).

The observation was semi-structured and all the observers were trained beforehand. This helped observers to focus on topic and smoothened the notetaking during the workshop (Guest, Namey, and Mitchell 2017). Four elements of the workshop interaction were evaluated repeatedly, in different phases of the workshops, using a five-point Likert scale ranging from one (very poor) to five (very good). The first element was the future orientation of the discussion: how much the discussion considered future issues or was limited to current matters (Dufva and Ahlqvist 2015). If the group only focused on current

matters, the futures knowledge was more difficult to create. The second element was individual expertise: the extent to which participants brought their expertise into the discussion. It was important that different perspectives were shared, but too-strongly presented expertise could hamper knowledge creation (Lauttamäki, 2016; Rutten, 2017). The third element was the stepwise generation of ideas: did the participants create knowledge together by building on the ideas of others to develop something new and enable futures knowledge to emerge (Dufva & Ahlqvist, 2015)? The last element, evaluated with a Likert scale, was active participation in the discussion: did all the group members participate in the discussion or was there an imbalance? Knowledge creation requires the interaction of individual mental models (Bowman, 2016; Frith & Tapinos, 2020), therefore active participation was evaluated at different stages during the day.

In addition, observers were asked to reflect on their feelings and perspectives during and after the workshops. With participant observation, it was possible to witness the knowledge creation process in the workshops and discover the relevant circumstances and aspects of this process (Corbetta 2011; Guest, Namey, and Mitchell 2017). This method increased the validity of the results and complemented the post-workshop interviews (Kawulich, 2005). A limitation of this method was that having several observers could cause inconsistency in the results: observers might understand the same situation differently, although similar semi-structured observation forms, and meetings before the event, were used to control this. Having several observers, however, increased the reliability of the study through researcher triangulation (Nowell et al., 2017). The observation notes and interview data were analysed together, as described in the next section.

3.2.3. Interviews and Data Analysis

One week after the workshops, participants were contacted and invited for a telephone interview: 12 participants (A1–A12) from the first workshop and 13 (B1–B13) from the second workshop agreed to be interviewed. The first interviews were conducted one month after the workshop and all the interviews were conducted within one month. The interviewees represented Ministries, government agencies, cities, companies, and NGOs (Table 1). The structured telephone interviews took from 15 to 30 minutes and participants were asked about their views of the workshops in general, the futures knowledge creation process during the workshops, and how they might use and transfer the knowledge from these workshops. This method allowed futures knowledge creation during the workshop, as well as knowledge mobility after the workshop, to be studied. The author conducted most of the interviews and a master's degree student conducted seven interviews (with city representatives) after the second workshop for use in her thesis.

Insert Table 1 here.

The questions were slightly modified during the interview process and the interviews were recorded and transcribed. The results of the participant observation and transcribed interviews were analysed using inductive thematic content analysis (Guest, MacQueen, & Namey, 2012) with NVivo software. Thematic content analysis is commonly used to analyse written qualitative data, like interview transcripts and field notes (Brooks et al. 2015; Guest, MacQueen, and Namey 2012) but there are different ways to conduct thematic analysis (Braun and Clarke 2019; Brooks et al. 2015). In the beginning, the analysed texts were reread several times and key themes were identified in five phases (Guest, MacQueen, and Namey 2012; Nowell et al. 2017). In the first phase, the aim was for the researchers to

familiarise themselves with the data, by reading the interview transcripts and observation notes several times and conducting discussions between the observers (Nowell et al. 2017). Next, initial codes were created inductively from the data. The whole data were systematically worked through and interesting aspects were identified and coded (Braun and Clarke 2019; Nowell et al. 2017). Then, in the third phase, themes were identified (Nowell et al. 2017). The codes were organised into meaningful clusters (Brooks et al. 2015). In the fourth phase, the themes were reviewed and some subthemes were created. The themes are 'interpretative stories about the data' that require reflective work (Braun and Clarke 2019) In the last phase the themes were defined and named (Nowell et al., 2017). Table 2 presents the themes and definitions. The analysis was content driven, based on answers from the interviews and observation notes.

Insert Table 2 here.

4. Findings

4.1. Futures Knowledge Creation Dynamics during Futures Workshops on Urbanisation

During the workshops, the observers concentrated on social dynamics, the future orientation of the discussions, the integration of participants' knowledge, and the creation of new futures knowledge. All the observations showed that group dynamics were smooth. Most of the group members actively participated in the conversation throughout the workshops: 'Some of our group spoke less, but when we were divided into smaller groups, they also took part in the discussion' (Observer 2C).

In both workshops, the average level of future orientation was relatively high. There were differences between groups, but the groups usually had the same, reasonably high, level of future orientation throughout the workshop. Only two of the observed groups (one from each workshop) initially had difficulties leaving present issues behind and discussing

the future, but they clearly focused more on future issues as the workshop progressed. As Observer 1A described, ‘They concentrated more on practical politics and funding issues and so on.’ The introductory lectures also influenced the groups’ future orientation; for example, in a case in which the starting point was 20 years in the past, ‘There was a lot of discussion about the introduction, which referred to the year 1995’ (Observer 2A). In this case, the discussion concerned historical facts, rather than future developments.

Across the observations, the expertise of the group members featured moderately or significantly in the discussions: ‘People brought their own expertise prominently into the discussion, which sometimes made the discussion biased, when concentrated only on public transportation or city infrastructure rebuilding’ (Observer 1B). In some groups, the role of expertise in discussions changed according to the task: ‘The role of people’s expertise was quite limited, because the discussion about the scenario concerned free idea generation and changes in thinking’ (Observer 2B). Overall, the level of expertise in discussions was similar in both workshops .

The observers evaluated how well the groups generated ideas regarding the future based on one another’s ideas. There seemed to be bigger differences between the groups in this respect. Sometimes it was difficult to combine the ideas: ‘It felt that the discussion was superficial or that the ideas were not linked to the same themes. The created futures ideas were separate. They were built logically, but not based on the ideas of others’ (Observer 1B). Another observer stated that in the small group she was part of, the ideas were not based on the statements of others; however, ‘In the other groups the ideas were more often constructed stepwise’ (Observer 2A). In the first workshop, the groups’ ability to generate ideas collaboratively varied greatly, whereas in the second workshop, the pattern was clearer: all the groups performed better as the workshop progressed. Some participants

explained that their group successfully combined the individuals' ideas: 'I think we were proceeding well, and we had really interesting discussions around the table' (B7); the thoughts were developing while we were working, and we got some great ideas. It was flowing well' (B12). The dialogue allowed participants' mental models and tacit knowledge to interact: 'It was extremely successful that we had so different individuals in the group. There were so many new opinions and insights that it was really inspiring (B8)'; 'it was fascinating to hear other peoples' thoughts' (B9). Sometimes the limited time restricted stepwise knowledge creation: 'we were developing some ideas to certain direction, but we did not have enough time' (B8). When participants were unable to generate ideas in a stepwise fashion, they were dissatisfied with the workshop: 'I was expecting more from this workshop' (A7).

4.2. Futures Knowledge Created during Futures Workshops on Urbanisation

When the interviewees were asked whether futures knowledge was created in the workshops, the majority said: 'Yes' or 'Yes, to some extent'. Participants' responses in the second workshop were more positive than those in the first workshop: 'There were so many good ideas in our group' (B8)' and 'There were many new insights' (B10).

Some considered that the change in their own thinking was a key result: 'Naming a single unit of information is probably not possible, but this kind of working helps to develop your own thinking' (A12). The second workshop's participants agreed that some (or even a great deal of) futures knowledge was created during the workshop; however, it was challenging for interviewees to identify particular items of futures knowledge they had gained from the workshop. Only a few could name a future-related idea that was generated during the workshop:

> Cultural change is the point. In future, and this is now the futures knowledge, or at least hypothesis, fundamental cultural change needs to evolve before we really are an urban population. This affects the individual level and community level, as well as the deeper foundations of culture (A9).

The majority of participants said that it was difficult to recall the new thoughts or new knowledge, because time had passed since the event. Another statement was that, during group discussions, notetaking was fragmented, making it difficult to say what represented new futures knowledge; however, the opportunity for discussion was appreciated: 'I consider it essential that images of the future are discussed and debated, even if there isn't much new' (B3). Creating a holistic understanding was considered an important result: 'In the end, all this working feeds the understanding of the whole picture, without focusing on single items (B6)'. The emergence of futures knowledge required further interpretation and combining different thoughts and ideas.

The researchers observed the emergence of new futures knowledge in the form of 'weak signals' or 'wild cards', reporting that, in the first workshop, the ideas were quite conventional: 'The discussions were mostly superficial and repeated opinions recently published in the media; for example, robot cars, or the construction of a hyperloop between cities' (Observer 1C). In the second workshop, the atmosphere was somewhat more creative: 'In my group, the atmosphere was relaxed and tolerant; all ideas were accepted. The discussion immediately focused on the future and current realities did not restrict the thinking in the first place' (Observer 2C). The new ideas in this group ranged from horizontal elevators in a city to transportation by thought.

Interviewees were also asked in which phase of the workshop futures knowledge was created. A common view among the interviewees was that futures knowledge was

created during the group discussions: ‘In a group discussion’ (B7), or more specifically: ‘Only around the small table’ (B5). A few interviewees felt that they also gained futures knowledge from the introductory lectures: ‘Actually, already from the introduction’ (A9). The interaction, accumulation of knowledge and sensemaking processes in groups formed futures knowledge.

4.3. Elements Benefitting Futures Knowledge Creation in Workshops on Urbanisation

The workshop structure, facilitation, and participant selection supported knowledge creation processes. The interviewees were, in general, satisfied with the structure of the workshops, but there was some difference between the two workshops. The second workshop had fewer phases and a clear starting point (scenario drafts), which seemed to be easier for participants to deal with. One observer indicated that ‘The clear instruction and facilitation helped participants to conduct the tasks’ (Observer 2C).

The observations of the second workshop showed that facilitation benefitted knowledge creation: ‘The group work seemed effective due to the facilitation and new ideas were generated’ (Observer 2B). Another observer explained: ‘The facilitators were present to answer questions, but allowed the group discuss freely’ (Observer 2C). Sometimes, a facilitator was needed to help participants to focus on the topic: ‘We were discussing off topic, so a facilitator was needed to remind us about the task’ (B2).

All the interviewees agreed that it is important for knowledge creation and the creation of new ideas that different viewpoints and expertise are brought together: ‘There were so many different sectors represented in the discussion so, for certain, new knowledge was created’ (B6). Several participants mentioned that the best thing about the workshop was the discussion with people from different backgrounds:

> What was good in this event was that quite different fields were represented. That is really good and it prompts a different angle, so you can find new ideas and perspectives. When you discuss with like-minded people, you come up with the same ideas that everyone agrees on, but in reality, introducing new ideas into decision making is far from easy and ideas are challenged from different sources (A1).

4.4. Elements Disrupting Futures Knowledge Creation in Workshops on Urbanisation

A complicated workshop structure, inadequate facilitation, and distractions disrupted knowledge creation. In the first workshop, the structure was more complicated and some of the participants felt that they were unable to make a full contribution: 'I could not get off to a good start' (A2). In their opinion, the tasks and group composition changed rapidly, which caused confusion. One participant from the first workshop explained that 'there was some uncertainty, because there were several tasks and the difference between them was unclear. We seemed to end up with the same conversation every time' (A1).

One observer noted that when the overall vision and purpose of the workshop were unclear it influenced knowledge creation: 'It was difficult to reach deeper levels of discussion, and emerging ideas only connected weakly to the chosen topic. Maybe the busy schedule was limiting the idea creation' (Observer 1B).

When asked about improvements to the workshops, some interviewees mentioned the small space and the background noise. In both workshops, groups were sitting close to each other and the room was inevitably quite noisy. This caused distraction in group work, because it was difficult to hear the discussion in your own group. These kinds of distractions may severely hinder the knowledge creation process if participants are unable to communicate with each other effectively.

Some participants in the first workshop complained that their educational background and experience were overlooked. One participant said: 'Because professionals were invited to the event, and the organisers were professionals as well, we could have started a bit further along than A' (A8). However, the expert opinions in some groups were often vocal, limiting the discussion to a narrow section of the topic: 'Politics and economics tended to direct the discussion' (Observer 1A). Strong expertise also disrupted the discussion: 'Some people were so much in their expert mode, which registered in their speech, that the discussion faltered' (A10).

4.5. Mobility of Futures Knowledge about Urbanisation

Interviewees were asked whether they shared the new knowledge in their own organisations after the workshop. Those who were more enthusiastic about the workshop said that they had shared the materials and notes and had discussions with their colleagues or superiors: 'I have discussed all these scenarios on several occasions' (B8). They had shared the knowledge with experts and influential officials: 'Yes, I have discussed [them] especially with the head of the planning department' (B11). One participant was extremely excited about the workshop: 'Of course, I sent the slides to our R&D department right after the workshop when … well, I had this flow (of inspiration) after the event' (B1). In particular, representatives of local governments stated that the futures knowledge gained in the workshop was useful and that some elements of the knowledge would be utilised in their organisations*:* 'We are developing sweeping visions of city development, and some details [from the workshop] were added' (B6). They were often interested in the megatrends and smaller developments discussed in the workshop that they felt were important for their organisations: 'We try to think how we can consciously be involved in this kind of development' (B11).

Some interviewees (B5, B7, B8 and B9) said that, even though they had not yet actively promoted or disseminated the new knowledge gained from the workshop, it would be used if the right moment arose. The thinking processes started in a workshop tended to continue: 'Reflections from group work will be refined at a later stage' (B11). The topics discussed in the workshop preoccupied the interviewees. They thought that the gained tacit knowledge or changed mental models will be utilised in practice later: 'When we leave the workshop to go to our own organisations, we think of these issues in our own work context and bring up the issues in one way or another' (B4). The participants pondered the workshop topics from their own perspective: 'How the forthcoming urbanisation processes influence our region is something that we need to consider now' (B2). It was suggested that this new futures knowledge would not become outdated very soon: 'Maybe we take a closer look in the spring time' (B10).

The topic and discussions in the workshop were important for many organisations: 'This is the first time we are thinking [about] these future issues on a larger scale' (B1). There was, however, some uncertainty regarding the utilisation of the knowledge in their own organisations: 'How the knowledge is channelled into the organisation is the next challenge' (B6). The individual's position in the organisation influenced the possibility of changing organisational behaviour. For some, it was clear that the knowledge would be used because they were making related decisions: 'Many future questions, if we talk about Finnish urban areas, are in our hands—what kind of cities, urban areas we want. This, of course, can be strongly influenced by our own actions' (A4).

Various channels were used to mobilise the knowledge gained. In most cases, this knowledge- sharing was informal, but a few participants stated that they had reported on the event in formal meetings: 'Yes, we discussed it in the last board meeting. We always do

that after we have been at different events. Our board has a good ability to use this kind of information' (B2). Participants also acknowledged the importance of informal meetings: 'Knowledge is usually more efficiently shared in coffee room discussions' (B9). If two or more participants came from the same organisation, they often discussed the experience together, but seldom shared the ideas more widely. The most influential factor for knowledge sharing was a positive personal experience of the workshop. All the interviewees said that, if they received documented results or conclusions after the workshop, they would share them in their organisation; these types of boundary objects would support their conversations and help to distribute futures knowledge more widely. As one participant stated, 'If we get the (workshop) summary before the holidays, I will go through it with my management group. Then, I could lecture on the content more widely' (B11).

5. Discussion

5.1. Workshop Factors

Five factors influencing the futures knowledge creation process in the futures workshops emerged from the analysis, which were evident in both the interviews and the participant observations: the structure of the workshop, facilitation, the composition of the groups, possible distractions, and personality types (or more specifically, how strongly participants expressed their expertise). Depending on their quality and intensity, all these factors, which were identified in the literature as important elements of workshops, influenced futures knowledge creation, either positively or negatively (Bonsu et al., 2017; Frith & Tapinos, 2020; Lauttamäki, 2016; Nygrén, 2019; van Vliet et al., 2012; Wright & Cairns, 2020).

The participant selection seemed to be appropriate in both workshops and all participants seemed to be open to other viewpoints; thus, participants' expertise advanced

futures knowledge creation (Burt et al., 2017; Carlsson-Kanyama et al., 2008; Lauttamäki, 2016). In some cases, strong expertise created difficulties for discussion, when other group members were unable to understand the expert jargon that was used. These results further supported the idea presented in the conceptual framework (Figure 1) that participant selection, the structure of the workshop, facilitation, personality types, a safe space (without distractions), and adequate time (accounted for in the workshop structure/schedule) are important factors for futures knowledge creation.

5.2. Knowledge Creation Processes

The social dynamics facilitated futures knowledge creation in both workshops (Ibert, 2007; Rutten, 2017) because they were smooth and all the observed groups worked well. In most of the groups, all the members actively participated in the discussion, thus allowing the interaction of their thoughts and mental models (Chermack & van der Merwe, 2003; Mitchell & Nicholas, 2006). Regarding the future orientation of the discussions, some differences were observed between the groups: two of the observed groups (one from each workshop) initially had difficulties in leaving present issues behind and discussing the future, but they clearly focused on future issues as the workshop progressed. These differences may have been due to personal characteristics (Burt et al., 2017), that is, how easily the participants could envisage the future. Producing futures knowledge requires liberation from the current situation (Balcom Raleigh & Heinonen, 2019).

The interesting finding of this study was that the stepwise generation of ideas led to new futures knowledge, as suggested in earlier studies (Dufva & Ahlqvist, 2015; Mitchell & Nicholas, 2006). In most of the observed groups, the stepwise idea generation improved toward the end of the workshop, indicating that stepwise knowledge building requires the time and effort needed to increase the cognitive proximity (Boschma 2005). This was

particularly evident in the second workshop, in which futures knowledge was often produced. The workshops participant were unfamiliar with one another and needed time to interact and accumulate knowledge. When participants were able to listen and understand others, they could further develop the ideas and, in the end, co-create futures knowledge. Stepwise knowledge creation also leads to the emergence of new futures knowledge in the form of 'weak signals' or 'wild cards', as was observed in the second workshop.

The various steps of the knowledge creation processes in the workshop (Figure 1) were all necessary for futures knowledge to evolve. When all the necessary steps were taken, it was possible to gain futures knowledge. In the first workshop, the knowledge creation in the groups only reached the first two levels (i.e., knowledge accumulation and interaction), while the next levels (i.e., the analysis and creation and integration of new knowledge) remained incomplete (Mitchell & Nicholas, 2006). Consequently, individual knowledge creation processes were also hindered; the sensemaking and altering of mental models were lacking for some participants (Bowman, 2016; Chermack & van der Merwe, 2003). Interpretation and sensemaking processes are vital for futures knowledge to emerge.

Another interesting finding of this study was that the reinterpretation of co-created knowledge became futures knowledge later. Interviewees often attempted to remember specific types of futures knowledge that was created in the workshops, but many also stated that the workshops developed their own thinking. This shows that further interpretation became futures knowledge and that these processes can continue after the workshop events. These results indicate that futures knowledge was created collaboratively and interpreted individually and that futures knowledge goes beyond mere bits of information (Hautala, 2018; Ibert, 2007; Rutten, 2017). When the participants' mental models diverged too greatly and the interaction and integration of knowledge was not adequately facilitated,

the next steps of interpretation and sensemaking were not achieved (Bowman, 2016; Hautala, 2018; Mitchell & Nicholas, 2006). Futures knowledge was observed in individuals' practices and understandings but was difficult to articulate when they were questioned. A change in mental models is one of the key results of futures workshops (Frith & Tapinos, 2020; Tapinos & Pyper, 2018); nevertheless, social construction is indeed necessary for futures knowledge creation (Dufva & Ahlqvist, 2015; Fuller & Loogma, 2009; Rutten, 2017), which was confirmed by observations and interviews.

5.3. Mobility of Futures Knowledge

One interesting finding was that a variety of channels were used to mobilise futures knowledge (Alavi & Leidner, 2001). Face-to-face situations were commonly used by the interviewees to share ideas and results after the workshops, and interviewees considered these situations to be the most effective ways of mobilising knowledge (Paraponaris & Sigal, 2015; Torre, 2008). Knowledge-mobilising situations included both formal and informal meetings, and emails were also sent and workshop material distributed. Futures knowledge became mobile through processes and individuals when they thought, discussed and acted in their own organisations (Weller, 2017). Some participants reported that they had already used the futures knowledge in their organisations, for example, in strategic planning.

The results of the study show that futures knowledge became mobile through participants' understandings and practices. Following cognition, participants position this futures knowledge in their actions and decisions (Mitchell & Nicholas, 2006). In this phase, the futures knowledge created in the futures workshop is mobilised and utilised as a constructing element of the future; enactment is the final stage of sensemaking (Tapinos & Pyper, 2018).

The findings of the study show, however, that many participants expected some documented conclusion or results from the workshop to support the dissemination of knowledge. This kind of boundary object would have benefitted futures knowledge mobility in the organisations of the workshop participants (Bowman, 2016; Paraponaris & Sigal, 2015). In addition, individuals' position in the organisation influenced futures knowledge mobility. Those who were in the top positions could easily act and make decisions according to their changed mental models, whereas those in lower position needed to first convince their superiors and colleagues to enact new futures knowledge.

Ultimately, the overall experiences of the workshops related to the mobility of futures knowledge were as follows: more enthusiastic participants were more likely to discuss and share the acquired knowledge in their home organisations. In addition to enthusiasm, an individual and organisational ability to absorb the futures knowledge influenced knowledge mobility (Baškarada et al., 2016; Kazadi et al., 2016). Absorbed knowledge can change the thinking and mental models of an individual, as seen in their choices and actions, and this change in individual mental models can influence the organisational level (Chermack & van der Merwe, 2003; Rhisiart et al., 2015; Tapinos & Pyper, 2018); however, organisations' capacity to assimilate and use new knowledge is vital (Baškarada et al., 2016). Further discussions and sensemaking processes are needed in order to utilise futures knowledge in particular contexts (Bowman, 2016; Hautala, 2018). However, these organisational processes were out of the reach of this study.

6. Conclusion

The purpose of the current study was to determine how futures knowledge is created in futures workshops, which elements influence futures knowledge creation, and how the knowledge is mobilised following the workshops. Understanding this process is vital

for organising useful futures workshops and managing the resulting futures knowledge (Kaivo-oja, 2012; Nygrén, 2019). This study contributes to our understanding of the futures knowledge concept, as well as how it is created in futures workshops and mobilised after the workshop.

Futures knowledge creation and mobility were studied in two phases: first, during a workshop in the knowledge construction phase, when new futures knowledge was created collaboratively, and subsequently, following the workshop, in the individual cognition and knowledge mobility phase. Futures knowledge was often created during group discussions, which are a vital tool for all foresight and futures research activities (Borch et al., 2013). Interaction, integration and interpretation/sensemaking processes are vital for futures knowledge creation (Bowman, 2016; Chermack & van der Merwe, 2003; Mitchell & Nicholas, 2006). This finding further supports the conceptual framework of the study and increases the understanding of the futures knowledge creation process. The individual sensemaking processes continue after the workshop and can formulate new futures knowledge later. Futures knowledge can be described as personal beliefs or changed mental models justified by social processes (Chermack & van der Merwe, 2003; Mitchell & Nicholas, 2006; Nonaka, 2013; Rutten, 2017); thus, futures knowledge relates to agreement about plausible future developments.

Explicit forms of futures knowledge, such as written workshop results or scenarios, could be used as boundary objects to support knowledge mobility (Bowman, 2016). Participants may leave the workshop with diverse understandings of the created knowledge, because they interpret the knowledge according to their own perspectives: part of futures knowledge is always related to individuals' own experiences (Voros, 2008). Boundary objects can support individuals in explaining their thoughts and modifying the futures

knowledge in a new context. The mobility of created futures knowledge requires a new interpretation and sensemaking process in a new context by new individuals (Bowman, 2016; Hautala, 2018). Therefore, futures knowledge is mobilised by the practises and choices of the individuals.

The findings of this study confirmed that several workshop factors presented in the conceptual framework influence knowledge creation in futures workshops: the structure of the workshop, facilitation, composition of the groups, possible distractions, and individual capabilities. These can be managed before and during the workshop to some extent. The results thus confirmed the findings of earlier studies and filled the research gap indicated by Nygrén (2019): workshops can better fulfil the expected outcomes by taking in to account these factors. One limitation of this study lies in the short-term perspective, which hindered studying futures knowledge utilisation. A much longer perspective would be needed to study knowledge utilisation following futures workshops.

These findings provide the following insights for future research: futures knowledge co-creation is a complicated process and should be examined empirically, knowledge management measures can influence success in creating futures knowledge, futures knowledge mobility requires further examination and longer perspective would aid in studying knowledge utilisation following futures workshop.

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Table 1. Interviewees and their representation

Interviewee	Representation
A1	Government housing agency
A2	City district association
A3	Consultancy company
A4	Regional development organisation
A5	Regional Council A
A6	Ministry of the Environment
A7	City A
A8	Transport Infrastructure Agency
A9	NGO
A10	City district association
A11	Ministry of Economic Affairs and Employment
A12	Regional Council B
B1	Construction company
B2	City district association
B3	Real estate organisation
B4	Regional council A
B5	City B
B6	City D
B7	City E
B8	City E
B9	City F
B10	City G
B11	City H
B12	Regional Council C
B13	Ministry of Economic Affairs and Employment

Table 2. Themes and their definitions

Theme	Definition
Challenges	Elements disrupting knowledge creation
Productive elements	Elements benefitting knowledge creation
Futures knowledge	What futures knowledge was created during workshop and its subsequent influences
Mobilites	How futures knowledge was mobilised after the workshop