STRATEGIC FORESIGHT AND UTILIZATION OF FUTURE-ORIENTED INFORMATION IN FINNISH SMES

Reframing the intermediary role of Tekes

Master´s Thesis
in Futures Studies

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30.10.2016
Turku

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1   INTRODUCTION

1.1   Research setting

Future has always been and will always be uncertain. There might be elements that appear eternal or preconditions that appear deterministic, such as natural laws, but it is because of the complexity of the whole that it is impossible to ever perfectly know the future (Tuomi 2012, 736). The uncertainty of future has been tackled with various foresight practices by corporations already for decades (Daheim & Uerz 2008). Traditionally large enterprises have been more active in their strategic foresight activities than small and medium-sized enterprises (SMEs). Limited resources and lack of appropriate analysis tools have been recognized as the main disincentives for foresight practices in SMEs (Rinkinen & Mäkimattila 2015; Jannek & Burmeister 2007). Consequently, also most of the corporate foresight research has been done in the context of large companies (e.g. Rohrbeck 2011; Rohrbeck & Shwarz 2013; Vecchiato & Roveda 2010), while very little research has been done on foresight in SMEs.

However, during the recent years the economic importance of SMEs has been increasingly recognized throughout Europe. For example, in Finland 99.8 % of the 283,290 Finnish companies belong to the category of SMEs. SMEs also employ 65 % of the people who are employed in the private sector in Finland. (Federation of Finnish Enterprises 2016.) In the on-going economic recession and structural change SMEs are now seen as the agile cornerstone for the future of the Finnish economy. The increased interest on SMEs has created an increased interest on foresight in SMEs, too. For example, in Finland practical guidebooks for doing foresight have been written for SMEs (Hiltunen et al. 2014; Harmaakorpi et al. 2012).

Despite the increased economic emphasis on SMEs, the academic research on strategic foresight in SMEs has not yet caught up. This research aims at contributing to the filling of this research gap that exists in regard to strategic foresight in SMEs. The scope of the research is twofold, as the research studies also the role of Tekes - The Finnish Funding Agency for Innovation - as an intermediator of future-oriented information for the SMEs. Tekes is a state-owned innovation agency that grants subsidies and loans for Finnish companies, research organizations and public actors for the development process of novel ideas into marketable products. In addition to financial support, Tekes offers expert advice services, such as foresight services that provide future-oriented information for the Finnish companies. Yet, it has been recognized – in practice and in the academic literature - that intermediation of such future-oriented information is challenging for intermediary organizations, because of the sticky, abstract nature of information related to future (see e.g. Harmaakorpi et al. 2012, Uotila & Ahlqvist 2008).

This research tackles this challenge with the overall aim of designing a more effective foresight framework for Tekes and SMEs. The practice-oriented approach of the study can be defined as a design research approach. Design research aims at producing knowledge and novel artefacts for the solution of real field problems (van Aken & Ramme 2009, 6-7). The aim of designing a more effective foresight framework for Tekes and SMEs is pursued through following objectives:

- examining the previous academic literature on corporate foresight with particular focus on foresight practices in SMEs
- examining the previous academic literature on intermediation and utilization of externally produced future-oriented information
- finding out how the SMEs that Tekes is currently financing are utilizing future-oriented information in their business operations

Through these objectives this study aims at answering the main research question: *How can Tekes (The Finnish Funding Agency for Innovation) support more efficiently SMEs in their utilization of future-oriented information?* After the presentation of the research setting in the chapter 1 the research question and objectives will be approached through theoretical literature review in the chapters 2 and 3. The research design and processing of empirical data is presented in the chapter 4. The results from the empirical investigation are presented in the chapter 5. In the chapter 6 the results are further discussed and the new foresight framework for Tekes and the SMEs is outlined based on the literature review and empirical material. Final thoughts about the research are drawn together in the concluding chapter 7.

1.2   Empirical research context

The Finnish national innovation system acts as the background setting in the research because Tekes and SMEs both are key actors in the Finnish innovation system. Keeping the whole innovation system as the overall framework, this research focuses on studying one link and one function inside the innovation system: the diffusion of future-oriented information between Tekes to SMEs. Information diffusion is one of the key functions of innovation systems (Hekkert et al. 2007). The concept of *national innovation system* refers to national system of actors that influence in the production of innovations. According to Edquist (1997, 14) national innovation systems consist of *important economic, social, political, organizational, institutional and other factors that influence the develop-*

ment, diffusion and use of innovations. In the Finnish context the national innovation system is often considered to consist of private sector, various national public sector actors and regional actors such as regional science and technology parks and start-up communities (figure 1). Recently the concept of *innovation ecosystem* has gained popularity and to some extent began to replace the concept of innovation system. Consequently, also national innovation systems have been referred as *national innovation ecosystems* with the emphasis on the complex and dynamic character of the system (e.g. Frenkel & Maital 2014).
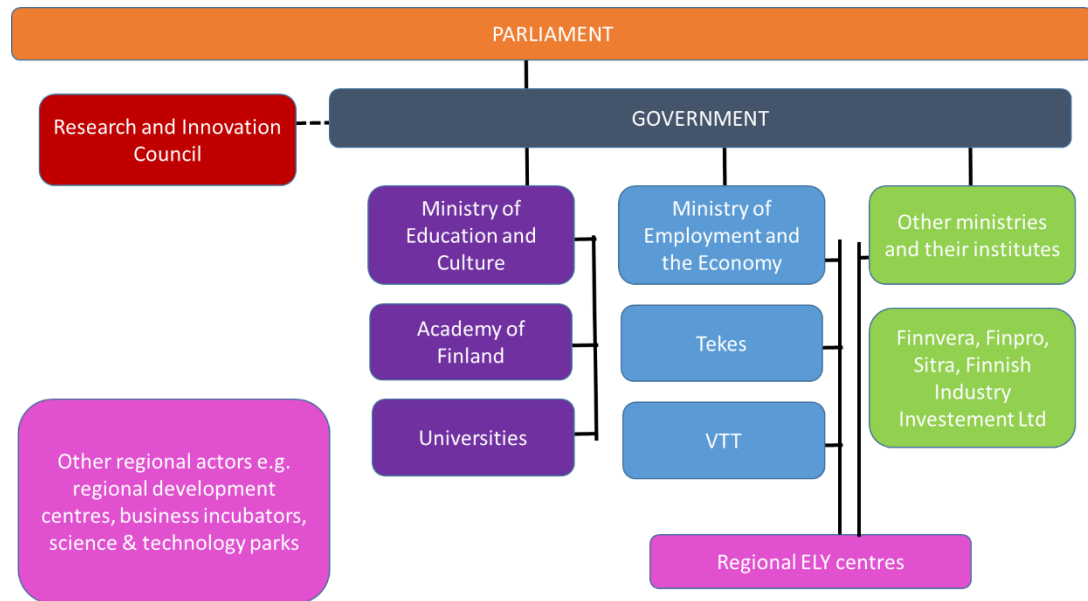
Figure 1   Public sector actors of research, development and innovation in Finland. Modified based on the information content of figure by Hyvärinen (2015).

Regardless of how the system is called, Tekes has a key role in the Finnish system financing research and development in companies, research organizations and public sector organizations. Tekes operates under the umbrella of Ministry of Employment and the Economy. The operational principle of Tekes is to support companies, research institutes and public sector organizations in developing good ideas to marketable innovations. In practice Tekes grants financial support in the form of supports and loans, and offers expert advice services. In 2015 the Tekes annual budget for supports and loans was 575 million euros. Tekes is also part of the Team Finland network that gathers together all the state-owned internationalization services for companies and supports Finnish companies to extend their markets abroad. (Tekes 2016.)

As part of the expert advice services Tekes offers foresight services, mainly in the form of Future Watch services. Future Watch services offer market insights around the world aiming at supporting the internationalization aims of Finnish companies. Future Watch

offers information about emerging market opportunities in foreign markets, thematically and geographically. This information is distributed as reports, events and through a new internet communication platform (for the time being still under construction). In addition to Future Watch, internal foresight is a continuous process inside Tekes aiming at integrating constantly the future-oriented information in the Tekes thematic funding programs (e.g. Bits of Health, 5th Gear, Smart & Green Growth) for the programs to further share the knowledge with the actors involved in the programs. (Tekes 2016.)

In this research the focus is on SMEs although Tekes supports also large companies, research institutes and public sector actors. In this research I follow the definition of SME set by the European Comission and followed also by Tekes. According to the definition, enterprises that employ less than 250 people and have an annual turnover less than 50 million euros and/or annual balance sheet total less than 43 million euros can be categorized as SMEs. SMEs can be further categorized as micro enterprises, small enterprises and medium-sized enterprises. Micro enterprises employ less than 10 persons and have an annual turnover and/or annual balance sheet total less than 2 million euros. Small enterprises employ 11-49 persons and have an annual turnover and/or annual balance sheet total less than 10 million euros. Medium-sized enterprises employ 50-249 persons and have an annual turnover and/or annual balance sheet total less than 50 million euros. (EU recommendation 2003/361.)

The time frame of the future-oriented information in the Tekes Future Watch services is 2-5 years in the future. The future-oriented information utilized in the Tekes strategic programs is researched with longer perspective: ranging from mid- to long-term time frame (up to 10 years). In this research I use the term *future-oriented information* when referring to any information that gives some signals about future. There are several terms to describe knowledge about future or knowledge produced through foresight processes. For example Dufva (2015) uses the term *futures knowledge*, Uotila (2008) and Uotila et al. (2005) use the term *future-oriented knowledge* and Rinkinen & Mäkimattila (2015) use the term *foresight information.* I use the term information instead of the term knowledge, because knowledge is often considered as information that a person has already processed, while the term information is considered to refer to unprocessed information (e.g. Melkas & Harmaakorpi 2008, 108). Drawing from this, Tekes offers future-oriented information that the SMEs need to process in order for it to transform into future-oriented knowledge. In Finnish the commonly used term is *tulevaisuustieto* and with the above-mentioned reasoning I consider future-oriented information as the most accurate translation to this Finnish concept.

This thesis is partly commissioned by Tekes, and partly based on on voluntary co-operation between me and Tekes. The thesis was started as commission work when I was

working at Tekes but majority of the thesis was finished as voluntary work after my employment at Tekes was over. My personal relation to Tekes and SMEs in this research has therefore been as an external observer with insightful information.

1.3 Research context within futures studies

Malaska (2013, 19-20) divides futures research into three different segments: syntactical, semantical and pragmatical segments of futures research (figure 2). Syntactical futures research focuses on studying the development of futures research methods; semantical futures research is content-centered and studies themes and issues that are relevant to the future; pragmatical futures research is action-oriented and aims at producing knowledge about future to decision-making. In addition to these three, Malaska also mentions fourth segment which is concept-analytical, speculative futurological research. He believes that each futures study contains features of all the segments but it is also possible that a futures study is mainly focused only on one of the segments. Out of these four segments, this research has a strong pragmatic orientation.

PRAGMATICAL
for deeds, action

- Management task, foresight
- Strategies, policies
- Planning, design
- Empowerment, understanding
- Other

What is the purpose to study the issue?

FUTURES RESEARCH /STUDY

SYNTACTICAL
for methods

- Systems
- Delphi
- Trends, scenarios
- Math, models
- Other

How to acquire information about the issue?

SEMANTICAL
for issues, contents

- 15 global issues of the Millennium Project
- Neo-growth
- Service society
- Technological trends
- Other

What is the issue at stake?

Figure 2   Research areas of futures research. Redrafted based on the information content of figure by Malaska (2013, 20)

The pragmatical segment of futures research is often called foresight (Söderlund & Kuusi 2003, 244). Malaska and Holstius (2009, 86) compare the role of foresight inside the academic field of futurology to the role of engineering in natural sciences: foresight is about applying futures approaches for practical purposes. According to Wilenius (2015) the most commonly used definition of foresight is the definition that originates from European Commission: *Foresight is systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilizing joint actions. Foresight arises from a convergence of trends underlying recent developments in the fields of policy analysis, strategic planning and futures studies. It brings together key agents of change and various sources in order to develop strategic visions and anticipatory intelligence.* (European Commission 2015.) Kuosa (2012, 16-17) distinguishes foresight from futures studies with two characteristics: Firstly, foresight has less emphasis on value rationality than futures studies. Secondly, the emphasis of foresight is more pragmatic and short-term than in futures studies. The timeframe in futures studies is in long-term future visions (10-50 years) while foresight focuses mainly on short- to mid-range futures (3-15 years). In other words, instead of theoretically contemplating the possible futures, foresight focuses on concrete actions that can shape the future (European Commission 2015).

This research is studying how futures are studied in SMEs. Therefore, future as such is not the actual subject of research in this study but the methods and information sources that are used in SMEs in order to acquire knowledge about future. Foresight in corporate context is not only studied by futures studies but there are also strong traditions to study corporate foresight from the disciplines of strategic management and innovation management (Rohrbeck 2011, 12-13). Therefore this study might also contribute to these disciplines.

2   CORPORATE FORESIGHT

2.1   Importance of strategic foresight

Information about future is substantial in all strategic decision making (Dufva 2015, 26). Strategic foresight has established itself as a field of practice in strategic business planning and public policy making during the last decades. Strategic foresight is practiced by multiple actors on multiple "layers" of society: on landscape layer concerning complex global issues, innovation system layer, organizational layer and individual layer (Dufva et al. 2011, 103). Foresight on innovation system layer acts as the background setting in this research, but the main focus is on strategic foresight on organizational layer in the SMEs. Rohrbeck (2011, 11) calls strategic foresight practiced by private firms as *corporate foresight*. By using the term corporate foresight he wants to distinguish foresight practiced by private firms from strategic foresight practiced by various other actors. Rohrbeck defines corporate foresight as *an ability that includes any structural or cultural element that enables the company to detect discontinuous change early, interpret the consequences for the company, and formulate effective responses to ensure the long-term survival and success of the company* (Rohrbeck 2011, 11). In this study the terms strategic foresight and corporate foresight are used interchangeably.

Strategic foresight is practiced for several reasons. The value that foresight brings to organizations has been discussed widely in the foresight literature. For example it has been recognized that strategic foresight enhances the capacity to 1) perceive change, 2) interpret and respond to change, 3) influence other actors, and 4) contributes to organizational learning (Rohrbeck & Schwarz 2013). Dufva et al. (2011, 101) categorize the contributions of foresight into three categories: knowledge, relations and capabilities. Firstly, strategic foresight produces new knowledge and insights about future into decision-making. Secondly, strategic foresight processes create new connections and networks, and enhance and restructure already existing networks. Thirdly, strategic foresight enhances the individual and organizational skills and capabilities that are essential for strong future orientation. In addition, in corporate context strategic foresight has been acknowledged to have three types of contributive roles to internal innovation activities: in strategist, initiator and opponent roles. In the *strategist* role foresight contributes to strategic management by providing strategic guidance, identifying new business models, assessing and repositioning innovation portfolios, consolidating opinions and creating vision. In the *initiator* role foresight triggers new innovation initiatives through identifying new customers' needs, emerging technologies and product concepts of competitors. In the *opponent* role foresight challenges the innovation process through challenging the underlying basic

assumptions, scanning for disruptions that might endanger company's innovations, and through challenging the high-end quality of current research and development projects. (Rohrbeck & Gemünden 2011, 240.)

Rohrbeck (2011, 2-3) has collected a comprehensive list of underlying reasons why companies are still struggling to notice and react to changes in their operational environment from previous academic literature. This list serves as a motivational tool for explaining the importance of foresight. Rohrbeck categorizes the reasons behind companies' struggling into three categories: 1) the high rate of change, 2) ignorance and 3) inertia. Firstly, it's challenging to keep up with the *the high rate of change* that can be observed in the shortening of product lifecycles, increased technological change, increased innovation speed and increased speed of diffusion of innovations. Secondly, *ignorance* might result from various reasons, such as too short time frame of strategic planning, corporate sensors that don't scan far enough to the periphery, overflow of information that blocks the capacity to evaluate the potential impact of the information, information not reaching the management level that has the power to decide on actions, or information getting filtered by middle management who has other interests than the top management. Thirdly, *inertia* can be caused by complexity of internal structures, complexity of external structures, lack of willingness to cannibalize current business, or cognitive inertia which blocks from seeing external technological breakthroughs. Rohrbeck's list is based on challenges of large companies but many of the factors can be applied to SMEs as well.

2.2   Foresight – embedded in structures or culture

The dominant way to perceive foresight is to consider it as a process constructed in the structures of an organization. This is what Rohrbeck (2011) calls the structural approach to foresight. He presents an idea that instead of structural foundations foresight can also be built on the cultural foundations of an organization. This is what he calls the cultural approach to foresight. Rohrbeck explains the difference between structural and cultural approaches as follows:

The structural approach, *in which corporate foresight is a task that is executed according to a process by dedicated units and in which the response to discontinuous change is achieved by linking the foresight process to other corporate functions through follow-up processes. The structural approach is composed of the dimensions on information usage, method sophistication, people, and elements of organizational capabilities.*

The cultural approach *builds on involving a much larger proportion of employees and making them accountable for detecting and responding to weak signals on discontinuous*

change. The organizational reaction is not triggered by dedicated foresight and follow-up processes but through traditional processes such as new business development processes and corporate entrepreneurships, in which individual employees are motivated to take the initiative to explore new business fields. (Rohrbeck 2011, 111.)

Structural and cultural approach together form Rohrbeck's framework of maturity model for organizational future orientation (figure 3). The structural approach emphasizes structural elements related to information usage, method sophistication, people, networks, and organization, such as methods for acquiring information about future and formal diffusion of insights. Cultural approach, on the other hand, emphasizes elements related to culture and organization, such as informal diffusion of insights and organizational attitude towards periphery. Together all of the elements form the maturity model which has been designed for measuring the maturity level of foresight culture in corporations. Rohrbeck emphasizes that structural and cultural approaches to foresight are not exclusive but rather complementary to each other. However, it is common that other of the approaches has a dominant role in an organization. Rohrbeck recommends companies to build a foresight system that suits best to their respective characteristics. (Rohrbeck 2011, 178.)
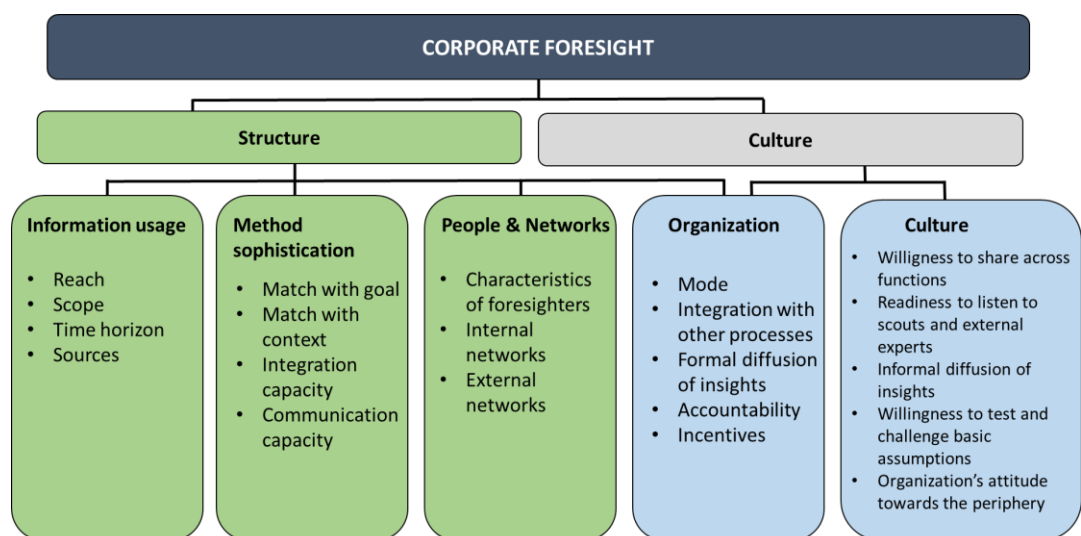
Figure 3   Maturity model of organizational future orientation. Redrafted based on the information content of figure by (Rohrbeck 2011, 112)

The cultural foresight approach of Rohrbeck builds on similar foundations as the idea of constructivist foresight discussed by Tuomi (2012) and Wilenius (2016). Tuomi dives deep into ontological and epistemic discussion of knowing about future for finding grounds for a new framework of strategic foresight which he defines as *constructivist*

foresight. Constructivist foresight is based on understanding future as construction that is constructed each day and is built on idea of continuous learning. Constructivist foresight builds on much similar capabilities as the cultural approach of Rohrbeck: continuous learning that doesn't necessarily require dedicated foresight processes but can happen intuitively and spontaneously through any business process or contact. (Tuomi 2012: Wilenius 2016.)

Constructivist foresight can be considered as a contrast to earlier pardigms of foresight, which Tuomi calls as the probabilistic foresight and possibilistic foresight. According to Wilenius (2016, 14-15) *probabilistic* foresight is the currently dominant foresight framework aiming at predicting probable futures with methods such as economical modeling. Probabilistic foresight is based on understanding future as continuum of the past. *Possibilistic* foresight emphasizes more artistic, narrative approach and aims at creating pathways of possible futures without evaluating the probability of them. Tuomi (2012, 744-748) criticizes probabilistic foresight approach by stating that predictive models are retrospective, reflecting mostly just past development. He also criticizes possibilistc approach by stating that all sorts of weak signals and seeds of future also emerge retrospective only after the "future is already here", in other words, the "thing" that will transform future has already been born. Tuomi and Wilenius both believe that the next wave of foresight will be one of constructivist foresight, and it will be built on embracing the creative potential of future by continuous facilitation of creativity and learning. Wilenius (2016, 15) adds that in corporate foresight the framework of constructivist foresight means preparing for future that will be different from what we are expecting with quick learning and deep collaboration with customers.

Similar idea of foresight as continuous embedded processes is presented also in the EROS model of entrepreneurial foresight introduced by Fuller and Warren (2006). The EROS model is built on principles of 1) experiments, 2) reflexive construction of identity, 3) organizing domains and 4) sensitivity to conditions. Firstly, experiments refer to thought experiments, visioning and discussion of ideas as well as small-scale prototyping projects. Secondly, reflexive construction of identity refers to continuous reflection of identity of the firm and ability to reshape this identity. Thirdly, organizing domains refers to capability to build efficient operations and agility to reshape them to fit to the changing operational environment. Fourthly, sensitivity to conditions refers to the sensitivity to detect change and the threshold of the company to react to the observed change. (Fuller & Warren 2006, 961-962.) Fuller and Warren (2006, 970) emphasize that foresight is embedded in entrepreneurial processes that happen in the level of an individual, the firm and inter-firm connections, and in the interactions between these levels.

2.3   Towards networked innovation foresight

The linkage between foresight and innovation has been widely recognized in the innovation and foresight literature. It is also recognized that innovation foresight has its special features: *Innovation foresight is different from science-oriented foresight and technology-oriented foresight because it demands more attention to socio-economic contextual forces interacting with emerging technical capabilities to affect commercial product and services* (Porter 2010, according to Andersen & Andersen 2014, 280). It is also recognized that the paradigm of innovation and the paradigm of foresight have co-evolved hand-in-hand since the era before World War II (Andersen & Andersen 2014, 278-279). The development of the paradigm of foresight is considered, however, always to have lagged a few steps behind the development of the paradigm of innovation. This is also considered to hold up for the current situation: the current paradigm of foresight is considered to still lag behind from the current paradigm of innovation (Andersen & Andersen 2014; van der Duin 2014; Heger & Boman 2014).

Andersen and Andersen (2014) suggest that the paradigm of foresight still needs to incorporate the systemic understanding of innovation. For this purpose, they introduce the concept of *innovation system foresight*, which emphasizes the systemic and process-like character of foresight and innovation. In innovation system foresight it is recognized that innovations and new knowledge is generated in systems of innovation which consist of actors, institutions and dynamics. They define innovation system foresight as: *Systemic, systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilizing joint actions to improve innovation system performance with the ultimate goal of improving desirable socio-economic performance* (Andersen & Andersen 2014, 281). Systemic view on foresight is introduced also by Dufva and Ahlqvist (2015) as a *systems view on foresight.* Their view emphasizes the importance of perceiving separate foresight processes as a functional system and understanding the dynamics between different elements in the foresight system.

Van der Duin (2014) and Heger & Boman (2014) believe that we are waiting for the next wave of foresight which will be the wave of "open foresight", following the paradigm of "open innovation". They call the idea of open foresight as *networked foresight.* Networked foresight is *similar to corporate foresight but as conducted in inter-organizational innovation networks with active contributions from the network partners and for the benefit for the network partners and the network itself* (Heger & Boman 2014, 2). Networked foresight is believed to create value particularly to SMEs that have limited internal resources for practicing foresight (Heger & Boman 2014, 16; Paliokaite 2010, 19). Networked foresight offers varying perspectives, diverse backgrounds and broader information base for the foresight practices (van der Duin 2014, 76).

The general benefits of being embedded in networks for SMEs are widely recognized in the strategic management literature. For example, Heger and Boman (2014, 2) argue that several studies show that organizations with complementary assets and co-operation partners outperform those who do their innovation processes completely "inside the house". Also Fuller and Warren (2006, 963-964) recognize the creative potential that involvement in networks – or what they call communities of practice - offers to companies. They argue that by being involved in several, diverse communities of practice, a company enhances its organizational capacity to construct and explore potential futures. Paliokaite (2010, 21) introduces some of the key networks for SMEs: 1) inter-firm cooperation with complementors, competitors and suppliers; 2) co-operation with academia offering access to university resources, such as testing equipment, academic courses or conferences; 3) Customers providing user experience and development ideas (user-driven innovation); 4) Other partners such as consultancies that can offer specialist support in certain substance areas.

Paliokaite adds to Rohrbeck's theory of foresight as structures or culture a third element: networks (figure 4).
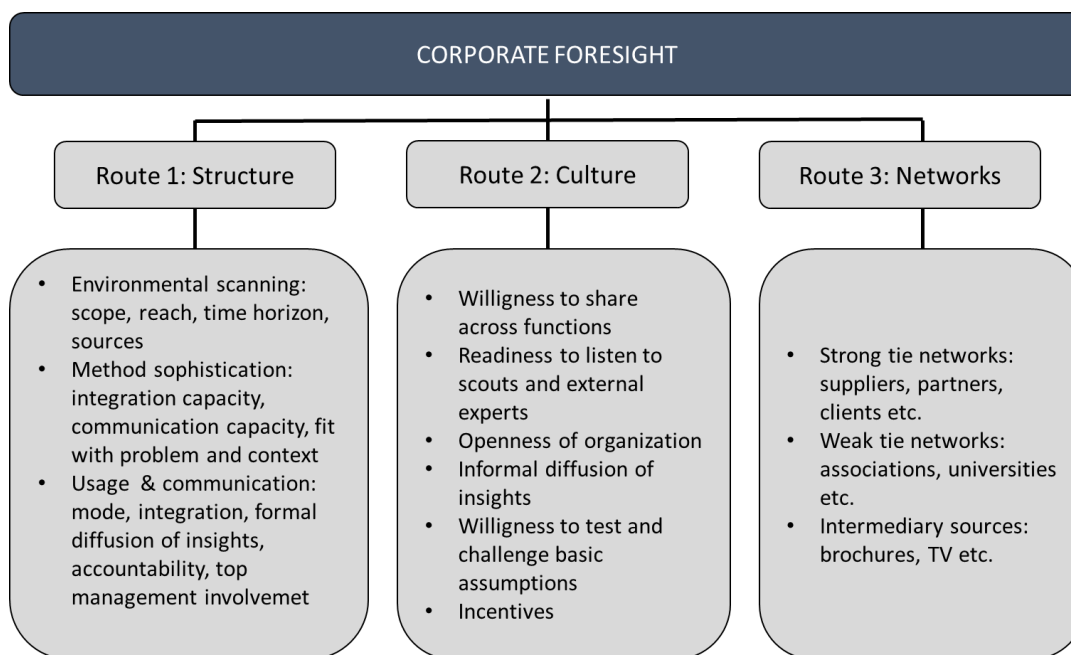

Figure 4   Approaches to corporate foresight in SMEs. Redrafted based on the information content of figure by Paliokaite (2010, 16)

Network-based foresight is built on idea of strong tie and weak tie networks[1]. Paliokaite (2010) categorizes networks as follows:

- Strong tie networks: clients, suppliers, subcontractors, financial institutions, competitors, strategic alliances
- Weak tie networks: government agencies, consultants, universities, colleges, industrial research centres, local associations of companies and business people, standardization agencies, sector-based associations (such as national or European technology platforms).
- Intermediary sources consisting of other formal and informal information networks: specialized publications, brochures, catalogues, newspapers, TV, radio, fairs and exhibitions

She suggests that weak tie networks are a richer resource for new ideas and information than strong tie networks. Strong tie networks tend to be composed of the same type of people and often serve only as confirming the opinions of their members and the information they can provide is often redundant or repetitive. Weak tie networks on the other hand are composed of different kind of people who are not used to working together which is why they facilitate the circulation of new ideas (Paliokaite 2010, 23.)

2.4 Strategic foresight in SMEs

Corporate foresight is currently practiced with various set of foresight methods: environmental scanning, trend-impact analysis, product and technology roadmaps, scenarios, Delphi studies, cross-impact analysis, real options, simulation modelling, game theory etc. (Vecchiato 2014, 1; Vecchiato & Roveda 2010, 1531). Vecchiato & Roveda (2010, 1531-1532) classify strategic foresight activities in corporations by *the time horizon* (short-medium-long perspective), *scope of analysis* (micro-meso-macro level) and *field of research* (analysis of the micro-environment or macro-environment). Scope of analysis varies from micro level when only a specific investment project or organizational unit is analyzed while at the macro level the whole industry sector is studied. Similarly the field of scanning varies from scanning the micro-environment which studies forces that originate from within the industry or macro-environment which includes also forces that originate outside the industry e.g. global megatrends.

Some corporations have an established foresight unit but more often corporate foresight is not a distinct entity itself inside the corporation but embedded in several corporate

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[1] Sociological theory of weak ties originally by Mark S. Granovetter (1973) The strength of weak ties. *American Journal of Sociology* Vol. 78 (6), 1360-1380.

operations (Rohrbeck 2011, 12; Vecchiato & Roveda 2010, 1531). Inside a company corporate foresight is often a combination of strategic management (guiding policy and shaping strategy), innovation management (exploring new products and services), corporate development or marketing (exploring new markets), and strategic controlling (detecting risks) (Rohrbeck 2011, 12). Corporate foresight can also be done as ad-hoc activities by temporary teams or external experts (Vecchiato & Roveda 2010, 1531).

It is important to note that most of corporate foresight research has been done in the context of large corporations. SMEs have a fewer resources than larger companies and therefore the focus of the company is often in the operative running of the business and there is no time to think about the future beyond the familiar horizons and short-term needs (Major and Cordey-Hayes 2000, 589). Lack of resources is widely acknowledged as the key challenge for implementing foresight methods in SMEs (Rinkinen & Mäkimattila 2015; Jannek & Burmeister 2007; Will 2008). It is also important to understand that *small business is not a small large business[2]* and the foresight methods applied in large corporations can't be transferred as such into SME context (Will 2008, 238).

There are only few openly accessible studies done on foresight culture and practices in SMEs. Some findings, however, can be presented from the previous literature. Jannek and Burmeister (2007) discovered that foresight as "future intelligence gathering system" is quite systemically conducted in German SMEs (it is worth noting that the used definition of SME was different and 34 % of the sample group consisted of companies that employ more than 1000 people). According to their findings, SMEs use simple foresight methods that aim gathering information for the support of strategic planning and product innovation. Most often foresight is perceived as environmental scanning through brainstorming, desk research and expert interviews, while more complex methods such as Delphi surveys and scenarios are applied more seldom. On the contrary, according to Ejdys (2014, 9) in 67.7 % of Polish SMEs planning of future actions is done spontaneously rather than systematically. Rinkinen and Mäkimattila (2015, 8) discovered that SMEs are mainly interested in short-term foresight information concerning their existing business operations, and not that much on future-oriented information that would require alternative or deeper interpretation before contributing to innovation development.

In addition to challenges related to sufficient resources, challenges related to information processing and utilization are widely recognized as another key challenge for foresight in SMEs. Jannek and Burmeister (2006, 3) recognize transformation of information into practical knowledge as one of biggest bottlenecks in the foresight practices of SMEs. Oikarinen et al. (2012, 516) note that SMEs attempt to assimilate future-oriented information although the information would require deeper analysis and transformation before implementation. Similar conclusion is done by Rinkinen and Mäkimattila (2015, 9) who

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[2] Original quote by Welsh, J.A. and White, J.F. (1980) A small business is not a little big business. *Harvard Business Review* Vol. 59 (4), 18-32.

note that the first interpretation of future-oriented information often leads to assimilation of information to existing business environment while it's only through deeper processing of the information that renewal and growth can be expected. In consequence, broadening of future scanning horizons is often recommended to SMEs (Oikarinen et al. 2012; Jannek & Burmeister 2006). In addition, Jannek and Burmeister suggest that SMEs should apply more complex foresight methods (e.g. trend analysis, roadmapping, scenarios) as they are more suitable for the complex and dynamic market environments that SMEs operate in.

3 UTILIZATION OF EXTERNAL FUTURE-ORIENTED INFORMATION

3.1 Intermediary organizations as information brokers for SMEs

In the previous chapter foresight is discussed on micro-level in the organizational context. In this study the focus is not only on the micro-level but also on macro-level aiming to define the role of Tekes as the intermediator of future-oriented information for SMEs. Therefore, it is important to explore also the previous academic literature on the role of intermediary organizations as knowledge brokers of future-oriented information.

Intermediary organizations (intermediaries) are organizations that act as intermediators between two or more parties in the regional and national innovation systems. There exists various types of intermediaries in the business support community, e.g chambers of commerce, trade associations, regional innovation and technology accelerators (Major and Cordey-Hayes 2000, 591). Three different types of intermediary functions can be recognized based on the approach how intermediaries support SMEs: 1) signposting, 2) facilitating and 3) contracting functions. *Signposting* intermediaries (e.g. business links, chambers of commerce) guide SMEs to right direction when they are looking for knowledge or contacts. *Facilitating* intermediaries (e.g. trade associations, innovation and technology centres) are organizations that SMEs interact regularly with. They offer SMEs advice and guidance on how to help themselves. *Contractor* intermediaries (e.g, universities) are organizations that SMEs don't interact as regularly with, but once they interact, they offer advice and guidance more directly than facilitating organizations. (Major and Cordey-Hayes 2000, 592-593.)

Recently the role of intermediaries as knowledge brokers has been emphasized in the innovation and foresight literature (e.g. Uotila & Ahlqvist 2008, Harmaakorpi et al. 2012). Sotarauta et al. (2002, 43) suggest that the so-called "knowledge activists" have a key role in distributing future-oriented information between different parties of a system. The knowledge activist role can be played by an individual, team or department of an organization. The knowledge activist has three key tasks: to catalyze creation of new information, to act as a link between different actors and activities, and to act as the "salesman" for the foresight processes and information produced in these processes. Uotila and Ahlqvist (2008, 54) apply the role of knowledge activists to intermediary organizations in regional innovation networks. They define intermediaries as knowledge brokers whose role includes: taking the dialogue between different actors forward despite differing interests, supporting sharing and transferring of the best practices among actors and organizations, creating analogies between divergent subjects and actors, and building synthesis

out of the very different types of information needs. These tasks require the knowledge broker - whether a person, department or organization - to have great social capabilities along with good understanding of the information available and equally good understanding of the information needs of the knowledge end users.

Major and Cordey-Hayes (2000) found an interlinkage showing that the more advanced SMEs' foresight practices are, the deeper is the co-operation with intermediary organizations. They categorize SMEs into three categories based on how future-oriented the managerial culture of the company is. *Reactive SMEs* have a short-term focus aiming at satisfying short-term needs of the owners. These SMEs are not interested in growth, new technology nor long-term future. *Responsive SMEs* are interested in growth but do not yet have a foresight culture of their own. These SMEs are eager to learn new methods of working but need support in initiating the change. *Strategic SMEs* are very advanced in their foresight activities and have a proactive approach to the long-term future. The categorization of Major and Cordey-Hayes is similar to the categorization of Godet (2007, 7) who presents five categories of different types of approaches towards future: passive (accept change passively), rective (react to change as it arrives), preactive (prepare for foreseeable change), proactive (act to provoke desirable change) and anticipative (anticipative approach that combines all the previous ones). According to Major and Cordey-Hayes it is the responsive SMEs that are the most receptive target group for intermediary organizations to aim their foresight support towards to. Reactive SMEs are not interested in building foresight practices and strategic SMEs already have them. Moreover, they found out that the reactive SMEs with no foresight-orientation only co-operate with signposter intermediaries while the strategic SMEs with advanced foresight practices co-operate most with contracting intermediaries (e.g. universities and professional institutes). Responsive SMEs, who are interested in foresight but don't yet have foresight culture of their own, are most frequent users of facilitating intermediaries. (Major and Cordey-Hayes 2000, 593-594; 599.)

3.2 Challenges in the utilization of external future-oriented information

It is recognized in the academic literature that for the information end users it is challenging to utilize future-oriented information produced by intermediary organizations. Several reasons for this can be found from previous research. One main reason is the lack of modification of the information to make it better suitable to the needs of the end users (Uotila & Ahlqvist 2008, 50). This leads often into a situation where the future-oriented information is presented on too general of a level which makes it difficult to grasp and utilize. New and exciting trends are brought up in foresight processes but because these

trends often lack any kind of connection to "the real world" it is difficult to comprehend the importance of the trends. Sotarauta et al. call this as the *missing creative tension between present and the future* (Sotarauta et al. 2002, 31). Lack of proper context might also be caused because foresight practices are too often held without paying enough attention to the actual knowledge needs or the competencies and reality of the participants (Andersen & Andersen 2014, 277).

Another key reason for the challenges in the utilization is the lack of sufficient competencies: the competencies of companies don't meet the requirements needed for utilization of the new knowledge. New signals and trends might be recognized, but companies don't know how to utilize this information in their business development. (Sotrauta et al. 2002, 32.) Oikarinen et al. (2012, 516) recognized that in futures signal workshops SMEs tend to dismiss signals that are too deviating or don't fit into their current knowledge structures. Instead SMEs favor signals that are somehow already familiar to them or fit into their current business context. Oikarinen et al. conclude that SMEs often try to assimilate future-oriented information although such information would require transformation before implementation.

Thirdly, related to the previous challenge, too little attention is paid to the communication and management of the new knowledge produced in a foresight process. This happens because it is assumed that the new future-oriented information itself is enough to inspire action. (Sotarauta et al. 2002, 32.) It might be that the methods that intermediary organizations use for communicating the future-oriented information are not suitable for the end users. Oikarinen et al. (2012, 516) found out that the typical intermediary approach of collecting various weak signals, writing a report about them and inviting SMEs to a workshop to discuss and interpret the signals is not working. SMEs are not interested in participating in workshops like these for several reasons. One identified reason was the reluctance of SMEs to discuss foresight openly as foresight is often considered very close to business strategy. Another identified reason was the lack of motivation: sometimes the offered future-oriented information might concern near-term future and therefore offer only very little new information to SMEs.

Fourth challenge in the utilization of future-oriented information is change resistance. Future-oriented information and the required changes in the company might be recognized, but if the organizational atmosphere towards change is hostile, single or even multiple change agents might lack the courage or persistence to drive the required changes through. (Sotrauta et al. 2002, 32.) In the case of SMEs, the transformations required by the new future-oriented information often need the CEO to act as the champion driving the required changes through (Oikarinen et al. 2012, 515).

Suggestions for more efficient intermediation of future-oriented information have been done. Oikarinen et al. (2012, 516) suggest that SMEs need more human capability training for better absorption of future-oriented information and intermediary organizations could

provide this training. Similarly, Rinkinen and Mäkimattila (2015, 9-10) suggest that SMEs need support in processing future-oriented information. They suggest that intermediary organizations could provide tools that would help SMEs to analyze and interpret the future-oriented information in their own business context. In practice they suggest this could mean offering communicative platforms that enhance creative thinking and continuous interpretation of produced foresight information. Oikarinen et al. (2012) also note that it might be more beneficial to focus on intermediating future-oriented information on ecosystem level than to single SMEs.

3.3   Information utilization capabilities

According to Uotila and Ahlqvist (2008, 54) intermediary organizations have a central role in increasing the absorptive capacity of the whole innovation system. From organizational perspective one key capability that determines how well an organization can absorb and utilize externally produced information is the organizational *absorptive capacity*. Absorptive capacity has been studied particularly in the context of company innovativeness and is widely recognized as the key element for utilizing new information in organization's internal innovation and development processes (e.g see Lau & Lo 2015; Leal-Rodríguez et al. 2014; Ferrares-Méndez et al. 2015). Absorptive capacity has also been recognized as an essential element in the utilization of future-oriented information in business development (e.g. Harmaakorpi et al. 2012).

   Absorptive capacity refers to organization's capability to utilize external information in developing its operations (Cohen & Levinthal 1990). Absorptive capacity consists of four sequential learning processes: acquisition, assimilation, transformation and exploitation of information (figure 5). *Acquistion* refers to a company's ability to recognize, identify and acquire external information that might have significance to its business operations. *Assimilation* refers to understanding this acquired information; routines and processes that the company uses for analyzing, interpreting and understanding the information. *Transformation* refers to combining the new knowledge with existing knowledge; a company's ability to build and develop routines of combining the knowledge. Finally, *exploitation* refers to a company's ability to exploit the existing and transformed knowledge into its operations. (Zahra & George 2002.)

Potential absorptive capacity   Realized absorptive capacity

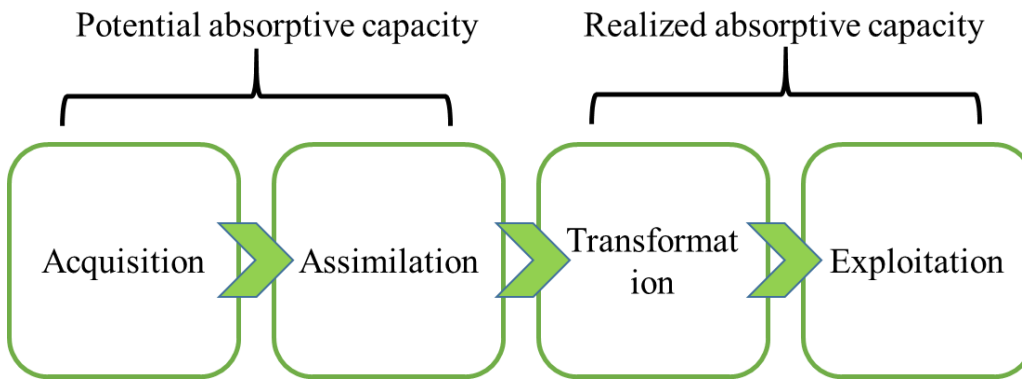| Acquisition | > | Assimilation | > | Transformation | > | Exploitation |

Figure 5   Elements of absorptive capacity

These four processes can be further grouped into *potential absorptive capacity* and *realized absorptive capacity*. Potential absorptive capacity consists of the two former ones - acquisition and assimilation of information – and refers to the company's capacity to value external knowledge and build up its stores of knowledge. Potential absorptive capacity requires a flexible, creative culture that is open towards change. Realized absorptive capacity consists of the two latter processes – transformation and exploitation of information – and refers to the actual utilization of the acquired knowledge into company's operations. This requires organizational culture of high stability, order and control. (Lau & Lo 2015, 103-104; Leal-Rodriguez et al. 2014, 764.) All in all, absorptive capacity is built on individual skills, prior knowledge, internal competencies and external linkages outside the firm (Leal-Rodriguez et al. 2014, 763). However, several cultural barriers might reduce the level of absorptive capacity in an organization: hierarchy and bureaucracy, language barriers, conflict and risk avoidance, incoherent paradigms, and a top-down management approach that underestimates the lower levels of the organization. (Leal-Rodriguez et al. 2014, 767).

Lau and Lo (2015, 109-110) have studied the four stages of absorptive capacity separately and analyzed if regional innovation systems as external environments can enhance the internal absorptive capacity of companies. According to their findings, 1) knowledge-intensive business services offered by intermediary organizations can shape the information acquisition capabilities of companies, 2) value chain information sources have influence on the information acquisition and assimilation capabilities of companies, 3) regional innovation initiatives can effect on the information transformation process inside companies. However, Lau and Lo conclude that no element of the external innovation system can enhance the final stage: a company's ability to exploit and apply the knowledge into its operations. This is because the final stage of absorptive capacity is tightly embedded in the culture and processes that are built inside the company, and therefore in the hands of the company's top management. However, Lau and Lo suggest that

innovation initiatives (public or private funding and technological partnerships) can contribute to the improvement of a firm's capability to combine existing and new information through supporting continuous human capital development inside the company. This then contributes to the advancement of the overall knowledge management culture inside the company.

In addition to organizational absorptive capacity, the ability of an organization to utilize future-oriented information depends much on individual capabilities of the management and personnel (see e.g. Major & Cordey-Hayes 2000, Uotila & Ahlqvist 2008; Harmaakorpi et al. 2012). Uotila and Ahlqvist (2008, 49) call this key competence as *visionary capability*, defining it as the capability to understand the occurring development and cause-effect relationships behind it. Visionary capability includes also strong interest and capability to proactively influence on the future and vision alternative futures. Scharmer (2001, 137) calls this competence as *self-transcending knowledge* which he defines as *the ability to sense and presence the emerging opportunities, to see the coming-into-being of the new*. Dufva (2015, 31) defines this competence as *futures capability* and defines it as *the ability to be aware of the context of futures knowledge and consider multiple perception.* Also Riel Miller's (2007, 347) concept of *futures literacy* is similar: *the capacity to think about the potential of the present to give rise to the future by developing and interpreting stories about possible, probable and desirable futures*.

4 RESEARCH APPROACH AND METHODOLOGY

4.1 Research approach

This research has a practice-oriented aim: to solve an existing problem by creating an action framework for more effective foresight co-operation between Tekes and SMEs. This kind of practice-oriented research approach can be called as a *design research approach.* Van Aken & Ramme (2009, 6-7) define *design sciences* as disciplines that aim at producing information for solving of real field problems in material or social reality. *Design science research*, on the other hand, they define as the research process that is based on the approach of design sciences, and aims at developing valid general knowledge for solving field problems.

It is the solution-oriented approach of design sciences that sets them apart from traditional sciences. While traditional explanatory sciences aim at finding the truth, design sciences aim at producing knowledge and solutions to existing problems with novel artefacts (van Aken & Ramme 2009, 7-8; Piirainen et al. 2012, 465). These produced novel artifacts can be constructs, models, methods or instantiations (Sangupamba Mwilu et al. 2016, 111). It is believed that design science research can be an important tool in bridging the gap between academic research and the practical needs of the surrounding world (e.g. van Aken & Ramme 2009, 7; Holloway et al. 2015, 1639).

Niiniluoto (2009, 63) suggests that futures studies as an academic discipline has a strong character of design science. According to Niiniluoto futures research doesn't always fit under the traditional descriptive sciences but has a stronger means-ends emphasis. According to Niiniluoto design sciences *do not tell how things are but how they ought to be in order to attain some ends*[3] (Niiniluoto 2009, 62). Commonly used example of design science is engineering (e.g. van Aken & Ramme 2009, 6). Engineering within the field of natural sciences was also used as an analogy to foresight within the field of futurology (Malaska and Holstius 2009, 86). This raises a question if foresight can be categorized as the design science approach of futures studies.

Nevertheless, it can be argued that this study has a strong design research approach. Design science research is interested in improving performance of existing systems or creating not yet existing systems (van Aken & Ramme 2009, 7). This is the precise aim of this research: to improve the performance of foresight system between Tekes and SMEs. The proposed foresight framework serves as the designed "novel artefact" of this research.

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[3] Originally quote by Simon, H. (1981) *The Sciences of the Artificial*. 2nd ed. MIT Press, Cambridge.

4.2   Data collection

In order to be able to formulate the foresight framework for Tekes and SMEs I needed to get a wide understanding of the foresight practices and use of future-oriented information in the SMEs currently using Tekes services. Therefore I decided to take a quantitative approach for the empirical data gathering and use survey as the data gathering method. Surveys are suitable when collecting data about same things from large numbers of respondents and when the researcher wants to avoid influencing the given answers by his own presence (e.g. as in interviews) (Saunders & Lewis 2012, 141). According to Malaska (2001, 230-231) any data or information gathering method used in scientific research can also be applied in futures research as long as the method is suitable for the future oriented research setting in question. The more future-oriented methods of futures studies such as Delphi survey were not considered suitable for the research setting, as the main aim was to understand the current situation of foresight in SMEs instead of future of foresight in SMEs.

The research survey was conducted through a web-based questionnaire platform Webropol. Careful planning of the survey is a crucial part of successful survey research (Saunders & Lewis 2012, 142). The questionnaire (see attachment 1) was outlined based on theoretical underpinnings of absorptive capacity and corporate foresight. Studies of Rohrbeck (2011) and Lau & Lo (2015) were used as a loose operationalization framework although neither of the operationalization used in these studies seemed to fully serve the knowledge needs of this research and therefore also Malaska et al. (1982) and a previous study conducted by Gaia Consulting Oy (Hjelt & Larvus 2015) to Tekes were used as examples when outlining the questions. The questionnaire was designed as a structured questionnaire with majority of the questions being pre-coded and only few open-ended questions (Fisher 2010, 176-177). Pre-coded approach was chosen in order to avoid confusion and misunderstandings because of the abstract nature of foresight vocabulary. Questions were divided into seven themes in order to give the questionnaire a clear structure: characteristics of the company, company outlook on future, sources of future-oriented information, content of future-oriented information, utilization of future-oriented information, company culture and concluding questions. The first two themes included several questions while the rest of the themes had 1-3 questions. The total number of questions in the questionnaire was 21. After the questionnaire was outlined I sent it out for review and comments to foresight officers at Tekes and my thesis supervisors and classmates at the university. I also asked a couple of friends who work as entrepreneurs to pilot test the questions. With this comment round I wanted to make sure that the questions were unambiguous and understandable. The language of the questionnaire was English in order to avoid inaccuracy in the analysis phase of the material due to the fuzziness of foresight vocabulary in Finnish and English.

The practice-oriented design research approach determined the selection of the research focus group. As the aim of the study is to improve foresight co-operation between Tekes and SMEs, the natural focus group for data collection were the SMEs that are currently receiving innovation funding from Tekes. At first Tekes provided me with a contact list of 626 SMEs that are currently running a Tekes funded project. However some of the SMEs had several Tekes-funded projects going on, so I eliminated all the double listings in order to make sure that the survey was only received once in each company. There were also a few semi-public organizations in the list and some of the SMEs were missing a contact info, so I eliminated all of these as well. After the elimination process the contact list was down to 478 SMEs. The contact list consisted of names of the people responsible for the Tekes funded project in the company. In smaller SMEs the person responsible for a Tekes project is often the same person who is responsible of the whole business and therefore it was assumed that these people are suitable informants to answer the survey. However, in larger SMEs different people might have these roles and therefore the recipients of the invitation email were asked to forward the questionnaire if they didn't feel knowledgeable enough to answer it themselves.

After all, invitation (see attachment 2) to the survey was sent to 478 SMEs as an email. The invitation email included a personal link to the questionnaire and a brief description of the research and the use of research results. Out of the sent email invitations approximately 20 came back undelivered due to changed email addresses or other delivery errors. Originally the survey was designed to be held open for three weeks but after three weeks the survey period was extended with five days in order to get full 100 responses. Two reminders were sent during this time, first reminder after two weeks and second reminder after three weeks. The original invitation email to the survey was sent by the foresight manager of Tekes, and the two reminders were sent by me. All in all, the survey received 102 answers in the 4-week time period that it was held open (May 20th –June 17th 2016). The total response rate for the questionnaire was 21.3 % if counted out of the all 478 recipients. However, if the 20 erroneous invitations that never reached their destinations are not counted, the response rate rises to 22.3 %.

4.3   Data analysis

Research data collected with structured questionnaires is usually used for descriptive research or explanatory research to test a theory (Saunders & Lewis 2012, 141). The approach of this study can be defined rather as descriptive than explanatory. Descriptive research is used when an accurate representation of person, event or situation is needed (Saunders & Lewis 2012, 111). In this research the data collected with the survey is used to get a description of the current state of utilization of future-oriented information and

foresight methods in the SMEs. This collected data is then further used for developing the action framework for foresight for Tekes and the SMEs. Due to the descriptive approach of the study also the analysis of data on descriptive level was considered sufficient.

The total number of answers to the questionnaire was 102. In order to make sure that all responding companies fulfilled the criteria of being an SME, respondents were asked about the number of people their company employs and company's annual turnover.[4] After going through the answers one respondent was eliminated because it exceeded the SME criteria in regard to number of people employed. Therefore, the number of responses analyzed went down to 101 responses. There were also two respondents representing companies that didn't fit into the three categories of micro, small or medium-sized companies, but still fulfilled the requirements for being SMEs. For the analysis, these two outlier respondents were categorized based on the number of people they employ, although their annual turnovers exceeded the limit set for the sizegroup in question.

The data collected with Webropol platform was analyzed in Microsoft Excel and IBM SPSS. The majority of the questions in the survey were pre-coded and therefore majority of the data was in a numerical form. For each question, validity of the responses was checked and defective responses (e.g. missing information) were eliminated in order to keep the responses comparable. Majority of the questions were optional and therefore the total number of valid responses varies between questions. Because of the variation the total number of valid answers is reported in the context of each question in the following empirical analysis chapter 5. The quantitative data was analyzed using descriptive statistics (frequencies, distributions, percentages, mean values, median values, standard deviation). Cross-tabulation was used in some of the questions in order to see if there is variation in the answers of different sized SMEs (micro, small and medium-sized companies). The qualitative data produced by the open-ended questions was analyzed with a thematic classification. The overall analysis approach of the study can be categorized as abductive which refers to an analysis approach guided by theory but allowing also interesting elements from the empirical material to rise (Tuomi & Sarajärvi 2009, 95-97).

4.4   Limitations of the study

This research has its limitations. The design research approach limits the focus group of the study to SMEs that currently receive innovation funding from Tekes. Therefore, the respondents of the questionnaire can not be considered as a representative sample of all

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[4] According to the European Commission's definition of SME (EU recommendation 2003/361) also the value of annual balance sheet can be used when categorizing SMEs. However, the value of balance sheet was left out of this study, because the annual turnover and the number of people employed were considered sufficient criteria for the scope of this study.

Finnish SMEs, because the SMEs that have passed the Tekes evaluation criteria for innovation funding are likely to be more future-oriented and pro-active in their operations than an average SME in Finland. There is also a chance that SMEs that are familiar with foresight might have found it more motivating to answer the questionnaire than SMEs that are not as familiar with foresight. This might cause an over-positive representation of the role of foresight in SMEs. There is also a risk that the role of Tekes as a financial authority might twist the relationship and tempt the respondents to give more optimistic than realistic answers to the questionnaire.

Taking these aspects into consideration, it can be argued that this research provides a weak basis for generalization. However, this research offers a valuable view on current state of utilization of future-oriented information and foresight practices in Finnish SMEs. In addition, the design research approach of this study provides an applicable foresight intermediation framework, which can be utilized not only between Tekes and SMEs but also in other similar contexts.

5 EMPIRICAL INVESTIGATION

5.1 Characteristics of the respondent SMEs

Out of the total of 101 respondent SMEs 49 respondents (48.5 %) represented micro companies, 39 respondents (38.6 %) represented small companies, and 13 respondents (12.9 %) represented medium-sized companies (figure 6). The distribution of respondent SMEs is quite representative of the overall distribution of different sized SMEs in Finland. Currently 93.5 % of Finnish SMEs are micro companies, 5.5 % small companies and 0.9 % medium-sized companies (Federation of Finnish Enterprises 2016). Due to lack of sufficient comparison data it wasn't possible to compare the distribution of different sized respondent SMEs to the overall distribution of different sized SMEs that Tekes is funding.
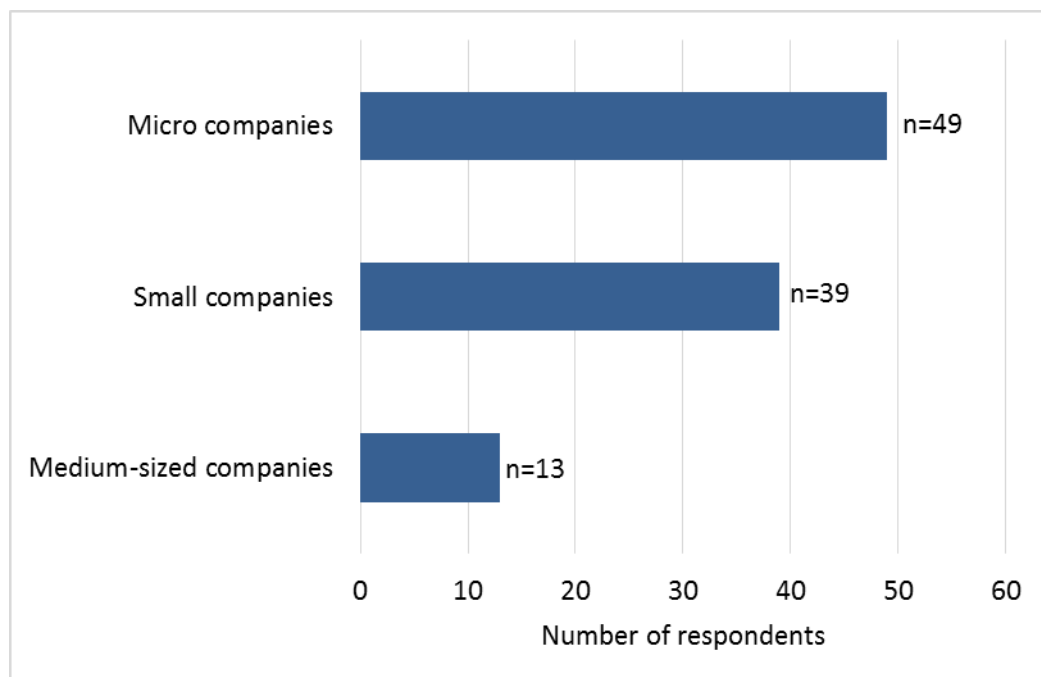
Figure 6   Division of the respondent SMEs into micro companies, small companies and medium-sized companies (n=101)

Respondents were asked to categorize their field of business following the Standard Industrial Classification TOL 2008 by Statistics Finland (table 1). Respondents come from various fields of business with the largest business group represented being information and communication (21.8 % of respondents), second largest group manufacturing (15.8 %) and third largest group accommodation and food service activities (10.9 %). According to Rohrbeck (2011, 74) the business sector where a company operates explains

a lot about the applied foresight practices in the company, as for example the industry clockspeed (rate of introduction of new products, processes and organizational structures) varies significantly between industries.

Table 1   Respondent SMEs categorized by their field of business (N=101)

Field of business	n	% of all respondents
Information and communication	22	21.8
Manufacturing	16	15.8
Accommodation and food service activities	11	10.9
Other service activities	9	8.9
Professional, scientific and technical activities	9	8.9
Something else	9	8.9
Arts, entertainment and recreation	8	7.9
Human health and social work activities	6	5.9
Transportation and storage	3	3.0
Education	2	2.0
Water supply; sewerage, waste management and remediation activities	2	2.0
Electricity, gas, steam and air conditioning supply	1	1.0
Financial and insurance activities	1	1.0
Real estate activities	1	1.0
Wholesale and retail trade; repair of motor vehicles and motorcycles	1	1.0
Total	**101**	**100.0**

According to Rohrbeck (2011, 74) another factor explaining company's motivation and objectives for foresight is the type of competitive strategy the company is following. Therefore SMEs were asked to define their competitive strategy (following the classic categorization by Porter [2010]) with which they aim at gaining competitive advantage over competitors. Majority of the 101 respondent SMEs (77.5 % of the respondents, n=79) follow *qualitative differentiation strategy*. With a qualitative differentiation strategy a corporate aims at superior product or service quality which makes its products stand out from the similar competitive products. Second largest group of the respondents (14.7 %, n=15) follow *focus group strategy* which aims at differentiating from competitors by focusing on particular narrow buyer group, segment of the product line or geographic market, in order to serve this target group better than competitors. A few SMEs (3.9 %, n=4) have an alternative competitive strategy and a few (2.9 %, n=3) are following *cost leadership strategy* which aims at providing customers price value by selling the products or services with a lower price than competitors.

SMEs were also asked about the level of education of their company's employees. The number of employees with a higher academic degree i.e. master's degree or doctoral degree or equivalent was considered as an indicator of tendency for strategic thinking (figure 7). However, most of the SMEs have less than 50 % of employees with a higher academic degree (56 % of respondents). A slight polarization was visible as the two largest groups were the two far end categories: SMEs with only 0-25 % of employees with a higher academic degree (35.6 %, N=36) and SMEs with 76-100 % of employees with a higher academic degree (27.7 %, N=28).
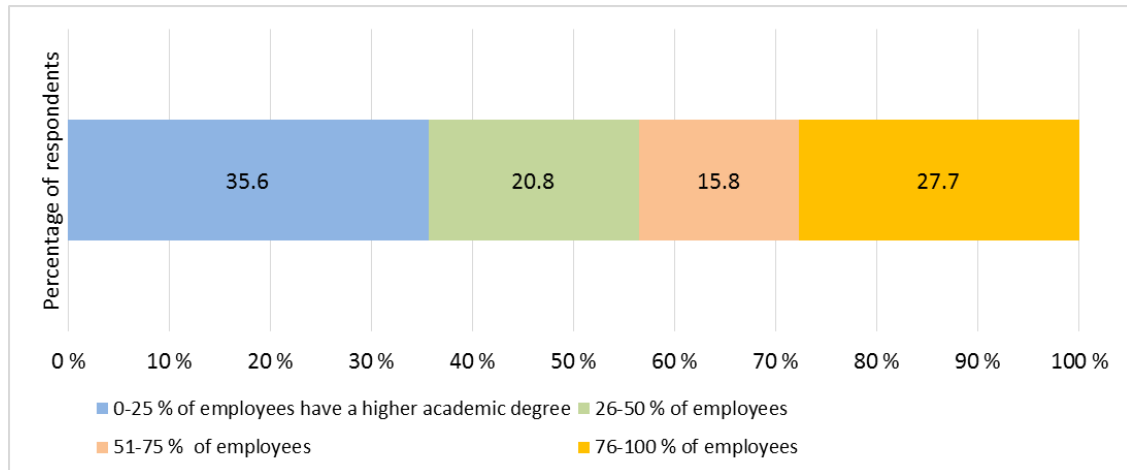

Figure 7   Percentage of employees with a higher academic degree in the company. (N=101)

5.2   Future orientation in the SMEs

The most commonly used time frame in strategic planning in the respondent SMEs is 2-5 years ahead (61.4 %, n=62). Even shorter time frame of less than 2 years into future is used in 24.8 % (n=25) of the SMEs. Only 13.8 % of the SMEs consider future further ahead than six years: 7.9 % (n=8) use time frame of 6-9 years, and 5.9 % (n=6) use time frame of 10 years or more. Closer examination shows that in all of the SME categories (micro, small and medium-sized companies) the time frame of 2-5 years is the most used time frame. For medium-sized companies the next most commonly used time frame is 6-9 years, while for micro and small companies the next most commonly used time frame is less than 2 years. The dispersion of answers was highest in the group of micro companies, which have the highest percentage of companies that plan less than 2 years ahead, but also the highest percentage of companies that plan 10 years or even further ahead (table 2).

Table 2   The most distant time frame for future conditions considered in the stra tegic planning processes of the company (N=101)

		Less than 2 years	2-5 years	6-9 years	10 years or more	Total
Micro companies	Count	17	25	3	4	49
	%	34.7 %	**51.0 %**	6.1 %	8.2 %	100.0 %
Small companies	Count	7	28	2	2	39
	%	17.9 %	**71.8 %**	5.1 %	5.1 %	100.0 %
Medium-sized companies	Count	1	9	3	0	13
	%	7.7 %	**69.2 %**	23.1 %	0.0 %	100.0 %
All the SMEs	Count	25	62	8	6	101
	%	24.8 %	**61.4 %**	7.9 %	5.9 %	100.0 %

Respondents were asked to rank the foresight competence of their company on the scale of 1 to 5, with 1 referring to not having foresight practices at all and 5 referring having excellent foresight practices (table 3). Majority of the respondents (37.6%, n=38) classify their company's foresight competence into mid-level or slightly above mid-level (36.6%, n=37), while 6.9 % (n=7) consider their company's foresight competence excellent. Only 1 % (n=1) of respondents admitted that their company doesn't have any foresight practices, and 17.8 % (n=18) of respondents consider their foresight competence slightly below average. The total mean grade given to own company's foresight competence is 3.3. When comparing the grades of different sized SMEs, there is no significant differences in the rankings, except that micro companies seem to be slightly more confident in their foresight competence than small and medium-sized companies.

Table 3   Ranking of the company's foresight competence on the scale of 1 to 5
                 (N=101). 1= We don't have any foresight practices; 5= We are excellent
                 in our foresight practices

		1	2	3	4	5	Mean	Stnd dev.	Total
Micro companies	Count	0	10	14	20	5	**3.4**	0.9	49
	%	0.0 %	20.4 %	28.6 %	**40.8 %**	10.2 %			100.0 %
Small companies	Count	1	6	18	12	2	**3.2**	0.9	39
	%	2.6 %	15.4 %	**46.2 %**	30.8 %	5.1 %			100.0 %
Medium-sized companies	Count	0	2	6	5	0	**3.2**	0.7	13
	%	0.0 %	15.4 %	**46.2 %**	38.5 %	0.0 %			100.0 %
All the SMEs	Count	1	18	38	37	7	**3.3**	0.9	101
	%	1.0 %	17.8 %	**37.6 %**	36.6 %	6.9 %			100.0 %

SMEs use various foresight methods (table 4). SMEs were asked a multiple choice question where they could pick all the methods that are used in their company of the given options. The most used method is collecting signals and trends within company's own field of business (86.1 % of the SMEs) followed by scenario building of possible futures (60.4 %) and collecting signals and trends outside one's own field of business (45.5 %). It is worth noting that majority of companies are using more than one method.

When the applied methods are examined more detailed through micro-, small and medium-sized classification some differences can be noticed. Scenario-building seems to be more common in micro companies (69.4 %) than in small (51.3 %) and medium-sized (53.9 %) companies. Also, collection of signals and trends outside own field of business is more common in micro companies (53.1 %) than in small (41.0 %) and medium-sized (30.8 %) companies. Econometric modelling and other mathematical forecasting methods are less used in medium-sized companies (7.7 %) than in micro (18.4 %) and small (20.5 %) companies. On the contrary, future workshops are used more in medium-sized companies (30,8 %) than in micro (20.4 %) and small (17.9 %) companies.

Table 4   Foresight methods applied in SMEs (N=101). Percentages represent the count within the own size group of SMEs, e.g. 18.4 % of respondent micro companies do econometric modelling or other mathematical forecasts

	Econometric modelling or other mathematical forecasts	Scenario building of possible futures	Simulations of future conditions	Collecting signals and trends within our own field of business	Collecting signals and trends outside our own field of business	Future workshops to open up traditional thinking patterns	Other methods
Micro companies (n=49)	n=9 18.4 %	n=34 69.4 %	n=3 6.1 %	**n=41 83.7 %**	n=26 53.1 %	n=10 20.4 %	n=4 8.2 %
Small companies (n=39)	n=8 20.5 %	n=20 51.3 %	n=1 2.6 %	**n=35 89.7 %**	n=16 41.0 %	n=7 17.9 %	n=2 5.1 %
Medium-sized companies (n=13)	n=1 7.7 %	n=7 53.9 %	n=1 7.7 %	**n=11 84.6 %**	n=4 30.8 %	n=4 30.8 %	n=0
Total of all SMEs (n=101)	n=18 17.8 %	n=61 60.4 %	n=5 5.0 %	**n=87 86.1 %**	n=46 45.5 %	n=21 20.8 %	n=6 5.9 %

5.3   Sources and networks of future-oriented information

SMEs were asked to evaluate the importance of listed information sources when acquiring future-oriented information. The evaluation scale was of 1-5, with the numbers symbolizing following statements: 1=We never use this, 2=We rarely use this, 3=We use this sometimes, 4 = We use this often, 5=This is one of the most important sources for us. The following table (table 5) shows the number of answers on the evaluation scale 1-5 for each information source. In addition, mean value for each information source was calculated, as it was considered that the mean value gives a realistic indication of the importance of each information source (the higher the mean value the higher the importance).

Moreover, standard deviation for each group of answers was calculated in order to see if there are large differences in the dispersion of answers. However, dispersion of answers seems to be quite similar with slightly higher dispersion in the answers for "having active network of people in academic world" and "collecting opinions form other external experts" (1.2 for both) indicating that these are the two sources that SMEs have most diverse importance that mostly divide the SMEs. Lowest dispersion was in the answers for "customer feedback" (0.7) and "discussions with colleagues and business associates" (0.8) which indicates that these are the two sources that SMEs unanimously consider important.

Table 5   Importance of information sources for acquiring future-oriented information (N=90). 1=We never use this, 2=We rarely use this, 3=We use this sometimes, 4 = We use this often, 5=This is one of the most important sources for us

Information source	1	2	3	4	5	Total	Mean val.	Stnd dev.
Customer feedback	0	1	9	30	**50**	90	4.4	0.7
Discussions with colleagues and business associates	0	3	15	**48**	24	90	4.0	0.8
Benchmarking with competitors and similar actors	3	5	21	**41**	20	90	3.8	1.0
Conversations with suppliers in our value chain	2	10	25	**35**	18	90	3.6	1.0
Social media & blogs	3	15	19	**37**	16	90	3.5	1.1
Newspapers & magazines	2	18	31	**32**	7	90	3.3	0.9
Professional literature	3	21	**31**	21	14	90	3.2	1.1
Collecting opinions from other external experts	9	15	**30**	24	12	90	3.2	1.2
Public seminars with more practice-oriented approach	8	17	**37**	22	6	90	3.0	1.0
Government and other public sector reports	6	24	**30**	24	6	90	3.0	1.0
Having an active network of people in the academic world	9	24	**33**	12	12	90	2.9	1.2
Events organized by Tekes	5	29	**42**	9	5	90	2.8	0.9
Intermediary organizations that provide information	14	**38**	27	11	0	90	2.4	0.9
Consulting services providing processed and customized information	20	**33**	27	9	1	90	2.3	1.0
Academic conferences	20	**36**	27	5	2	90	2.3	0.9
Organizing events which aim at collecting new information	27	**28**	27	7	1	90	2.2	1.0
Marginal & underground press	23	**41**	17	7	2	90	2.2	1.0
Collecting information about patents	**34**	26	20	7	3	90	2.1	1.1

In the search for future-oriented information SMEs seem to favor information sources within their current business environment, or what Paliokaite (2010) calls as strong tie networks. The four most important sources – customer feedback (4.4), discussions with

colleagues and business associates (4.0), benchmarking with competitors and similar actors (3.8), conversations with suppliers in our value chain (3.6) – are all sources that primarily offer information on the micro-environment (forces within own industry) of the SMEs. As for sources that scan the macro-environment (forces originating also outside the own industry) social media and blogs (3.5), newspapers and magazines (3.3) and professional literature (3.2) are considered the most important. These are all what Paliokaite (2010) categorizes as intermediary sources. Instead sources that Paliokaite categorizes as weak tie networks are not utilized that much by SMEs: collecting opinions from external experts (3.2) and having an active network of people in academic world (2.9) are the most used ones.

In another question SMEs were asked to name their most important partners and networks in acquiring future-oriented information. SMEs named as their most important foresight partners the following: 1) business partners within own value chain, 2) customers, 3) universities and research institutes, 4) internet, media and written expert publications, 5) other companies outside the immediate value chain and intermediary organizations (e.g. Tekes, Finpro, trade organizations). Answers to this question also highlight the role of strong tie networks and immediate business environment as the primary source for future-oriented information. However, the role of weak tie networks in the form of universities and research gets more emphasis in these answers than in the previous question.

5.4   Utilization of Tekes foresight services

When acquiring future-oriented information respondents are not very familiar in utilizing foresight services and information provided by Tekes. Events organized by Tekes got the mean value of 2.8 on the scale 1-5 when asked about the importance of different sources of future-oriented information (see chapter 5.3). SMEs were asked more detailed question on the utilization of Tekes foresight services (figure 8). Answers to this question show that events and specialist support are the best known and utilized foresight service of Tekes. Future Watch services (sessions and reports) have only been utilized by few SMEs and majority of SMEs have never heard of these services. To those that had used Tekes foresight services it was also asked if the services provided their company with new valuable information. Out of total of 37 responses 73 % of respondents thought that the Tekes services had provided them with valuable information, 16.2 % had gotten some useful information and 10.8 % hadn't found the information useful.
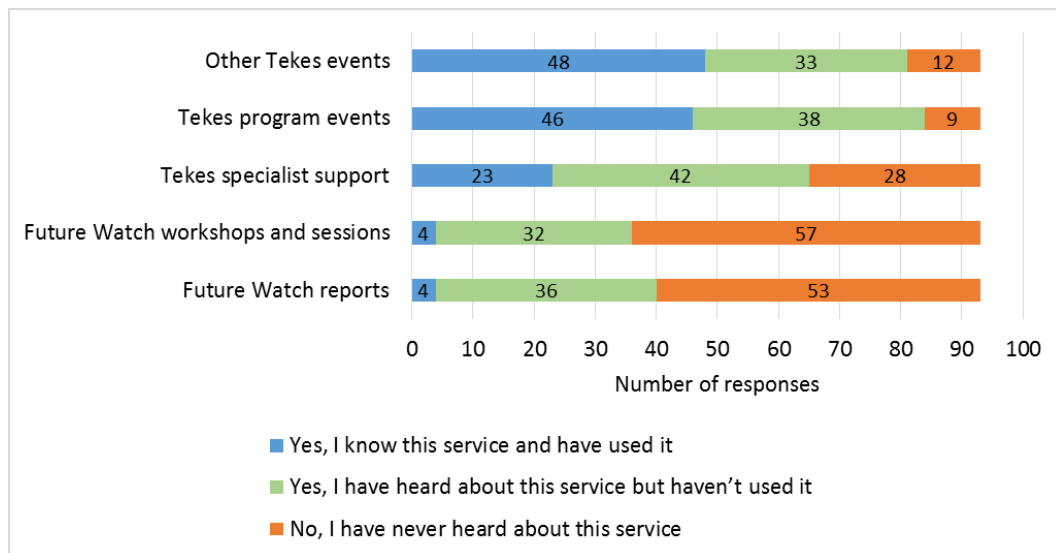
Figure 8   Familiarity with Tekes foresight services (N=93)

5.5   Content of future-oriented information

SMEs were also asked to evaluate the importance of different types of contents of future-oriented information on the scale of 1-5 (table 6). The most important content that SMEs look for in future-oriented information are future trends in technology development (4.0) and new potential market segments (4.0). These are also the two categories that SMEs were most unanimous in. The next quite equally important contents are upcoming changes in the competitive situation (3.8), ideas on new business models (3.7), new potential market areas (3.7) and information about consumer behavior (3.7). Least important (below 3) were surprising and unexpected events (2.9) and upcoming ecological and environmental changes (2.7). Answers to this question enhance the strong primary interest of SMEs' on their immediate micro-environment. Answers also enhance earlier findings claiming that technological and economic futures are studied carefully by SMEs while socio-cultural, political and environmental futures are not receiving as much interest (Rohrbeck 2011, 96).

Table 6   Importance of different types of content of future-oriented information evaluated on the scale 1-5 (N=98). 1= this is not important at all to our company; 5= this is extremely important to our company

Content of future-oriented information	1	2	3	4	5	Total	Mean val.	Stnd dev.
Future trends in technological development	1	4	18	**46**	29	98	4.0	0.9
New potential market segments (new target groups)	0	10	13	**45**	30	98	4.0	0.9
Upcoming changes in the competitive situation	0	8	24	**45**	21	98	3.8	0.9
Ideas of new business models	2	6	26	**46**	18	98	3.7	0.9
New potential market areas (new geographical areas)	1	12	26	**36**	23	98	3.7	1.0
Information about consumer behaviour	4	16	17	**31**	30	98	3.7	1.2
Future trends in societal and cultural development	7	22	26	**27**	16	98	3.2	1.2
Upcoming changes in the political and regulative environment	4	23	**34**	27	10	98	3.2	1.0
Upcoming environmental and ecological changes	11	25	**36**	18	8	98	2.9	1.1
Surprising and unexpected events	11	30	**38**	17	2	98	2.7	1.0

SMEs were asked to name the most relevant driving forces that they consider influencing the future of their business. Answers to the question were classified following the PESTEC-framework into political, economic, social, technological and cultural themes. However, as many of the mentioned driving forces are embedded to several categories (e.g green values is partly ecological and partly cultural) I decided not make any quantitative analysis of this question but rather highlight some primary findings that rise from the material.

Digitalization was the one single most commonly mentioned driving force. All in all, the most commonly mentioned driving forces were forces related to technological development. Another strong theme in the thematic category of technology was the development of smart sensing technology and the related phenomena e.g. internet of things. Economic, socio-cultural and environmental forces got approximately equal number of references. In the class of environmental forces development and trends related to energy production were most commonly referenced. Also themes of climate change, recycling and rise of green values were mentioned several times. In economic driving forces the most referenced themes were the overall development of world economy, investment trends and consumer trends. In socio-cultural driving forces the clearly most referenced theme was changes in customer values and behavior. Two other dominant themes were health and aging of the population.

Political-legal driving forces got clearly fewest references. In the class of political-legal driving forces the future development of different laws and regulations were mentioned. A few respondents had also named more endogenous driving forces that rise from their own competence rather than from the external world e.g. high level of ambition, high level of knowledge or excellent foresight skills.

5.6   Utilization of future-oriented information in business development

SMEs were also asked to evaluate the importance of future-oriented information in different internal processes on the scale of 1-5, when 1 symbolized "not important at all" and 5 symbolized "extremely important". Table 7 shows the distribution of answers, mean values and standard deviations. Future-oriented information is regarded most important in strategic decision making and long-term planning (4.2) followed by triggering of R&D projects in innovation management (3.9) and reorganization of the product portfolio (3.8). Next, quite equally important future-oriented information was considered in providing early warnings or identifying weak signals of disruptive change (3.6), in monitoring and questioning the preconditions for the success of the company (3.6) and in enhancing the image of the company for customers and investors (3.5). Least importance future-oriented information was considered to have in organizational learning inside the company (3.3), in influencing other companies (3.2) and in influencing general policy making outside the company (2.5).

The answers indicate that SMEs consider the most important role of future-oriented information to be in the strategist role: in strategic decision making and long-term planning. This was the answer respondents were most unanimous in. However, the importance in initiator role – in triggering R&D projects and reorganizing product portfolio - is considered nearly as important. Also the importance of future-oriented information in the opponent role is recognized by the SMEs: in providing early warnings and in monitoring and questioning the preconditions of success of the company. It is also worth noting that the least important functions of future-oriented information were the functions related to influencing other actors and organizational learning.

Table 7　　　Importance of future-oriented information in different internal processes of the SMEs evaluated on the scale of 1-5 (N=97). 1= Not important at all; 5= Extremely important

Business operation	1	2	3	4	5	Total	Mean val.	Stnd dev.
In strategic decision making and long-term planning	0	2	13	**49**	33	97	4.2	0.7
In triggering R&D projects in innovation management	0	5	23	**45**	24	97	3.9	0.8
In reorganizing the product portfolio	0	9	20	**46**	22	97	3.8	0.9
In providing early warnings or identifying weak signals on disruptive change	2	7	30	**46**	12	97	3.6	0.9
In monitoring and questioning the preconditions for the success of the company	1	8	32	**46**	10	97	3.6	0.8
In enhancing the image of the company for customers and investors	2	12	29	**41**	13	97	3.5	0.9
In organizational learning inside the company	3	14	**39**	34	7	97	3.3	0.9
In influencing other companies (e.g. customers and suppliers in the value chain)	6	16	34	**38**	3	97	3.2	1.0
In influencing general policy making outside the company (e.g. public opinion, legislation)	15	**37**	25	18	2	97	2.5	1.0

5.7   Features of cultural approach to foresight

Corporate foresight can also be built on cultural foundations of the company instead of particular foresight processes. Rohrbeck (2011, 103-112) has listed several indicators for measuring the maturity of cultural aspects of organizational future orientation. Three indicators were chosen from Rohrbeck's model and asked from the SMEs.

Firstly, SMEs were asked if there are defined employee responsibilities in the company for detecting signals of change (table 8). This is a key element indicating whether the company has grounds for continuous cultural foresight or more dedicated foresight processes. Out of all the SMEs, in 39.8 % every employee is responsible for detecting change signals, while in 21.4 % of the SMEs there is no defined responsibilities to detect change signals. In 19.4 % of the SMEs only top management has the responsibility, and equally in 19.4 % of the SMEs a certain group of people inside the company have the responsibility to detect signals of changes.

When the answers were analyzed more closely for different sized SMEs, differences can be noticed in whether the responsibility is assigned to everyone or only to a certain group inside the company. In 53.2 % of the micro companies the responsibility of collecting signals is assigned to everyone, but it seems that as the company size grows the level of structures grows equally: in 31.6 % of the small companies and in 15.4 % of medium-sized companies the responsibility of collecting signals is assigned to everyone. Moreover, the detection of signals is assigned to a certain group in the company in 46.2 % of medium-sized companies, 18.4 % of small companies and 12.8 % of micro companies. Small companies seem to have the most dispersion in the practices, as they have the largest share of companies where the responsibility is assigned only to top management, and on the other hand, have also largest share of companies where there exists no defined responsibilities.

Table 8   Responsibility to detect change signals (N=98)

		Only top management	Certain groups in the company	Every employee	No defined responsibilities	Total
Micro companies	Count	8	6	25	8	47
	%	17.0 %	12.8 %	**53.2 %**	17.0 %	100.0 %
Small companies	Count	9	7	12	10	38
	%	23.7 %	18.4 %	**31.6 %**	26.3 %	100.0 %
Medium-sized companies	Count	2	6	2	3	13
	%	15.4 %	**46.2 %**	15.4 %	23.1 %	100.0 %
All the SMEs	Count	19	19	39	21	98
	%	19.4 %	19.4 %	**39.8 %**	21.4 %	100.0 %

SMEs were also asked whether employees are encouraged to think big and bring in new ideas to the company (table 9). SMEs seem to be very supportive for the idea of employees bringing in new ideas. In 96 % of all the SMEs employees are encouraged to think big and bring in new ideas. However, only in 37.8 % of SMEs there exists incentives for employees who bring in new ideas and in 58.2 % of SMEs employees are encouraged to think big but are not given any incentives for doing so. Only in 3.1 % of the SMEs employees are not encouraged to think big and 1 % of respondents didn't know the situation in their company. Micro companies seem to be the most eager in encouraging employees to bring in new ideas with incentives (44.7 % of the micro companies), followed by small companies (36.8 %), while medium-sized companies are much less eager encouragers with incentives (15.4 % of the medium-sized companies). In 76.9 % of medium-sized companies, 57.9 % of small companies and 53.2 % of micro companies employees are encouraged to think big but no incentives are available.

Table 9   Level of encouragement for the employees to think big and bring in new ideas (N=98)

		Yes, and there are incentives for doing this	Yes, but there are no incentives	No, employees are not encouraged	I don't know	Total
Micro companies	Count	21	25	1	0	47
	%	44.7 %	**53.2 %**	2.1 %	0.0 %	100.0 %
Small companies	Count	14	22	1	1	38
	%	36.8 %	**57.9 %**	2.6 %	2.6 %	100.0 %
Medium-sized companies	Count	2	10	1	0	13
	%	15.4 %	**76.9 %**	7.7 %	0.0 %	100.0 %
All the SMEs	Count	37	57	3	1	98
	%	37.8 %	**58.2 %**	3.1 %	1.0 %	100.0 %

SMEs were also asked about the willingness to challenge the basic assumptions that their company's business is built on (table 10). Ability and willingness to challenge the prevailing conditions is crucial precondition for successful foresight and renewal of business (Rohrbeck 2011, 110). In almost half of the companies (45.9% of respondents) the basic assumptions are well understood and tested occasionally. In 25.5 % of the SMEs the basic assumptions are explicitly known and frequently challenged and in 23.5 % of the SMEs some of the basic assumptions are known but not challenged. Only in 5.1 % of the SMEs the basic assumptions are not known or challenged. Most frequently basic assumptions are challenged in micro companies (in 76.6 % of micro companies assumptions challenged once in a while or frequently), followed by small companies (in 68.4 % of small companies assumptions challenged once in a while or frequently). Medium-sized companies seem to be more reluctant in challenging the basic assumptions, as in none of the medium-sized companies basic assumptions are challenged frequently, in 61.5 % of medium-sized companies assumptions are challenged occasionally, and in 38.5 % some of the assumptions are known but never challenged.

Table 10   Willingness to challenge the basic assumptions that the company's busi-
                ness is built on (N=98)

		The basic assumptions of our business are neither known nor challenged	Some basic assumptions of our business are known but not challenged	There is a good understanding of basic assumptions of our business and they are tested occasionally	Basic assumptions of our business are explicit and frequently challenged	Total
Micro companies	Count	3	8	20	16	47
	%	6.4 %	17.0 %	**42.6 %**	34.0 %	100.0 %
Small companies	Count	2	10	17	9	38
	%	5.3 %	26.3 %	**44.7 %**	23.7 %	100.0 %
Medium-sized companies	Count	0	5	8	0	13
	%	0.0 %	38.5 %	**61.5 %**	0.0 %	100.0 %
All the SMEs	Count	5	23	45	25	98
	%	5.1 %	23.5 %	**45.9 %**	25.5 %	100.0 %

6   DISCUSSION

6.1   Synthesis of the empirical findings

The objective of the empirical section of this research was to produce information on current foresight practices and utilization of future-oriented information in the SMEs that Tekes is currently financing. The empirical material indicates that SMEs are active, confident foresight practitioners, but their radar for acquiring future-oriented information is relatively short-sighted and narrow, targeted primarily towards their immediate business environment. As their most frequently used information sources SMEs favor strong-tie networks such as customers, colleagues, business associates, value chain actors, and external sources such as social media, blogs, newspapers and magazines. The empirical material indicates also that SMEs are mostly interested in future-oriented information regarding technological development and developments in their immediate business environment. These findings raise a question whether the information that SMEs are considering as future-oriented information in this research is actually information that is usually considered as market information. Market information can be defined as *"information about a firm's market environment comprised of competitors, customers, suppliers, distribution intermediaries, and sales personnel"* (Business Dictionary 2016). Utilization of market information is equally important for business development, but for in-depth foresight or radical renewal of business it would be essential to pay attention to information that originates also outside the company's micro environment. However, majority of the SMEs consider future 2-5 years ahead in their strategic planning which indicates that their scope of information scanning probably goes further than regular market intelligence scanning. Nevertheless, these findings support previous research, e.g. Rinkinen and Mäkimattila (2015) discovered that SMEs prioritize short-term foresight information that concerns their existing business operations.

The empirical material indicates also that SMEs value future-oriented information mostly in long-term strategic planning and in renewing the product portfolio, but also the value of future-oriented information in challenging prevailing assumptions is recognized. These findings are in line with previous research, for example, also Jannek and Burmeister (2006) found out that SMEs value foresight mostly in strategic planning and product innovation. Collection of signals within own field of business, scenario building of possible futures, and collection of signals outside own field of business are the three most commonly used methods for gaining future-oriented information according to the empirical findings of this research. Jannek and Burmeister (2006) also found out that SMEs usually consider foresight as environmental scanning. Yet, this research shows that also more complex methods such as scenario planning are frequently applied in SMEs, while

Jannek and Burmeister argued that more complex methods are seldom used in SMEs. This might indicate that the foresight practices in SMEs have matured in the 10 years between the two studies.

All in all, the findings of this study mainly support the findings of previous research related to strategic foresight in SMEs. Moreover, this study offers an interesting new insight into the academic discussion on strategic foresight in SMEs by showing that the same theoretical frameworks that are originally created in the context of large corporations (particularly Rohrbeck's [2011] maturity model of organizational future orientation) can also be applied partly to SMEs. Findings of this study offer an insight on the cultural approach of foresight (Rohrbeck 2011) as the empirical results indicate that SMEs indeed have a relatively mature characteristics of cultural approach to foresight: In nearly all of the SMEs employees are encouraged to think big and bring in new ideas. In majority of the SMEs also the basic assumption that the business is built on are challenged frequently or once in a while. In assigning the responsibility to detect change signals the practices of SMEs are more diversified but still assigning the responsibility to everyone in the company is the most common practice. According to Rohrbeck's maturity model this kind of practices represent mature cultural and organizational dimensions of future orientation in a company.

However, as the empirical research material was gathered through a survey, the results of this research are non-specific by nature. In order to gain a more profound understanding of foresight and utilization of future-oriented information in SMEs, a deeper study is needed. Therefore, a closer study on strategic foresight practices in the SMEs is suggested for future research. Deeper understanding of the utilized foresight practices in SMEs can be gained e.g. through interviews or observational research. For example, elements of Rohrbeck's maturity model could be studied more comprehensively in the context of SMEs. Another suggestion is to compare the responses of the focus group of this research into a responses of a different focus group of SMEs, for example, into a random selection of SMEs from the National Register of Companies in Finland.

This study was conducted with a selective focus group and therefore the results can not be generalized into all Finnish SMEs. However, as Major and Cordey-Hayes (2000) argued, not all SMEs are interested in future and are rather reactive in their actions. Therefore, it can be suggested, that the results of this research give a significant insight on the future-oriented thinking in those SMEs that actually are future-oriented (the responsive and strategic SMEs). In addition to the academic contributions, this research offers also practical implications. The introduced foresight framework (see chapter 6.2) is applicable also in other contexts and can be applied between other types of intermediary organizations and SMEs. Moreover, the information produced in this research offers managerial inspiration to any SME interested in developing their futures capabilities.

6.2   Foresight framework for Tekes and SMEs

The main research question of this research concerned the role of Tekes and how Tekes can more efficiently support SMEs in their utilization of future-oriented information. From the perspective of Tekes it is important to support the future orientation of Finnish SMEs, because with active foresight it is possible to enhance creativity and grasp potential innovation opportunities (Andersen & Andersen 2014), but also build up organizational resilience towards changing market conditions (Rohrbeck & Schwarz 2013). These are crucial assets for companies that aim succeeding in the turbulent world markets today.

However, the empirical results of this research show that currently SMEs are not very familiar with the foresight services (particularly the Future Watch services) provided by Tekes, and the importance of Tekes as an information source for future-oriented information is considered below average. Moreover, majority of the SMEs regard their company's foresight competence as mid-level or above mid-level. This raises a question if foresight support and services from Tekes are even needed. However, as argued earlier, it can be assumed that the SMEs that answered the survey are probably those that are most familiar with practicing foresight. In addition, although SMEs felt relatively confident about their foresight competence, more detailed questions indicated that SMEs scan future-oriented information mainly from their immediate business environment. Therefore, it can be argued that there exists demand for Tekes supportive foresight services, but a reformulation of the foresight approach of the services is required.

Based on the classification by Major and Cordey-Hayes (2000) Tekes can primarily be considered as a contracting intermediary that provides direct advice and guidance when interacted with. However, Tekes has recently taken actions that can be considered as facilitating, e.g Tekes has taken a more active role in enhancing the networking of companies and other actors. This can also be considered as Tekes strengthening its role as knowledge broker, as the role of knowledge broker includes e.g. building bridges and analogies between divergent subjects and actors. Another role of knowledge broker is to support dialogues and sharing and transferring of best practices among actors. It is this type of a role that is considered as the foundation for the proposed foresight framework for Tekes. Drawing from the empirical findings of this research and recommendations done in previous research (e.g. Rinkinen & Mäkimattila 2015; Oikarinen et al. 2012), it is suggested to Tekes to take a culture-based constructivist approach to its intermediating foresight operations.

The suggested culture-based constructivist foresight approach is based on the idea of Tekes supporting the rise of constructivist foresight culture in the SMEs. Constructivist foresight understands future as a construction that is continuously constructed. Constructivist foresight considers companies as organic systems that have the capability to adapt to the surroundings they find themselves in. In order to have best capabilities to face the

future, companies need to have a culture that is continuously alert to changing horizons through intuitive learning. (Wilenius 2016; Tuomi 2012.) The empirical findings of this research indicate that SMEs have some mature characteristics related to continuous, cultural approach to foresight. Therefore it is suggested that Tekes should design the foresight services in a way that they support the development and growth of these endogenous futures capabilities of SMEs, also in those SMEs that are not yet as mature in their cultural foresight foundations as the respondent SMEs of this research. Therefore, Tekes is seen as the "futures facilitator" that helps SMEs to build up their endogenous capacity to practice strategic foresight and utilize future-oriented information (figure 9).
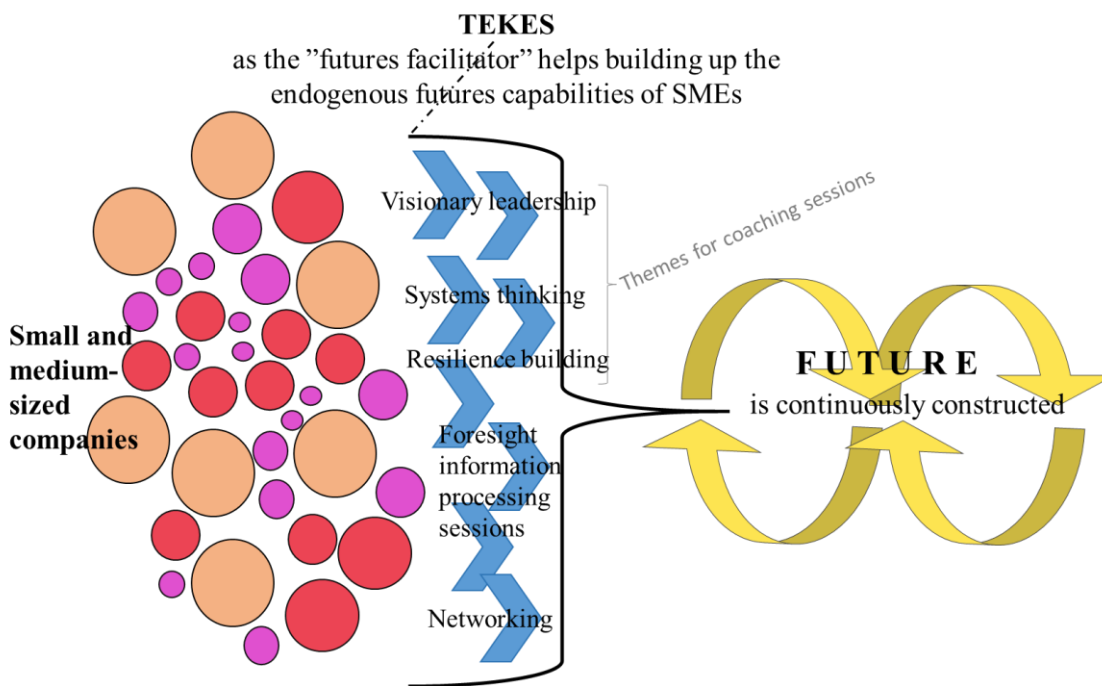
Figure 9   Theoretical perspective on the suggested foresight framework between Tekes and SMEs

The constructivist foresight framework of Tekes and SMEs can be built on the empirical and theoretical underpinnings presented in this research. In practice the new foresight framework is built on three functions: 1) disseminating future-oriented information from the periphery areas where the future radars of the SMEs don't scan, 2) giving support and tools for the utilization of future-oriented information, and 3) encouraging future-oriented thinking in the SMEs through thematic coaching sessions. With these three functions Tekes can give SMEs the opportunity to gain the three types of contributions that Dufva et al. (2011) see as the key contributions of foresight processes: new knowledge and insights, new capabilities and new networks. The function 1 is targeted to complement the future-oriented information needs of SMEs, while functions 2 and 3 are targeted to support the endogenous foresight competencies (absorptive capacity, cultural and structural

foresight processes) of the SMEs (figure 10). All the three functions will bring the bene-fits of networked, open foresight to SMEs, as they get access to a wider information base and opportunity to build new networks and weak-tie connections. The suggested frame-work can also be considered as Tekes creating a foresight community of practice that "*creates and exchanges knowledge, and develops individual capabilities*" (Fuller & War-ren 2006, 969).
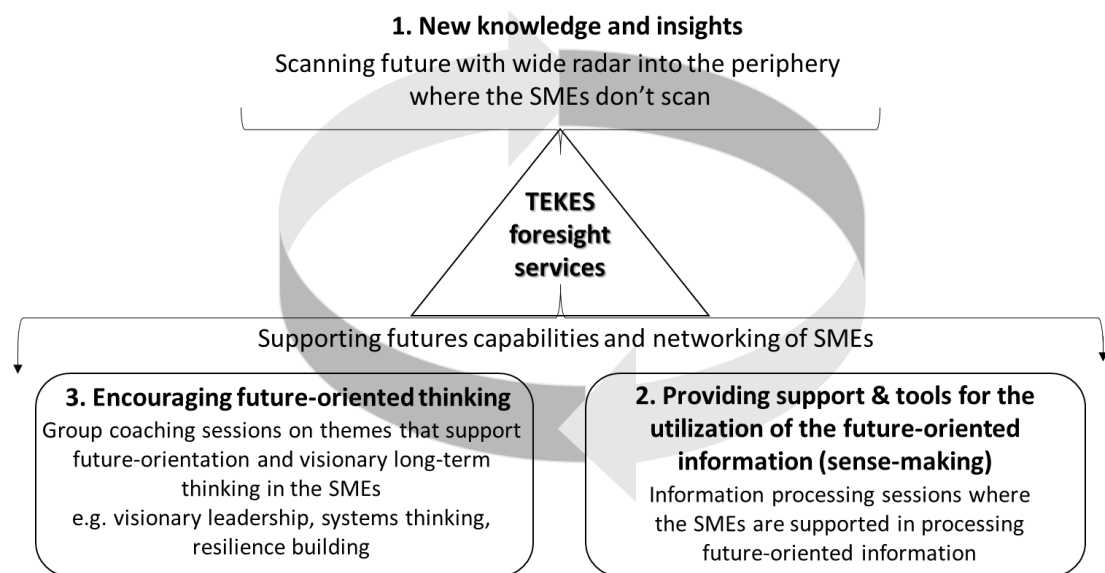
Figure 10   Systemic perspective on the suggested foresight framework between Tekes and SMEs

Next, the three functions of the foresight framework are introduced in more detail. All the three functions together form the Tekes foresight system, in which the different func-tions are overlapping and easily combined.

1) *Disseminating future-oriented information from the periphery:* The empirical re-sults of this research show that SMEs look for future-oriented information with relatively narrow radar from their immediate business environment. This is the gap where Tekes can step in by providing information from the periphery where the radars of SMEs don't reach. Tekes could focus on gathering future intelligence with a wider radar targeted on mid- to long-term social, cultural, technological, environmental, political and economic developments. The empirical material showed that in addition to their immediate business environment, SMEs are fol-lowing closely the technological developments that might affect their business. Therefore it might be useful for Tekes to emphasize other topic areas in its future intelligence gathering than the topic areas that SMEs are scanning actively them-

selves. In disseminating the gathered future-oriented information it is recommended to use diverse channels of communication, such as the Team Finland internet platform Opportunity Space.

2) *Providing support and tools for the utilization (sense-making) of future-oriented information:* Previous literature on the role of intermediary organizations suggests that more emphasis should be put on training the competencies and skills in SMEs related to the utilization of future-oriented information. SMEs have a tendency to assimilate future-oriented information into their existing knowledge base although the information would often require more throughout transformation. (Rinkinen & Mäkimattila 2015, Oikarinen et al. 2012.) In other words, SMEs need support in enhancing their organizational absorptive capacity – particularly in the processes of transforming and exploiting the future-oriented information (Rinkinen & Mäkimattila 2015, Oikarinen et al. 2012). Therefore, it is suggested to Tekes to provide regular intensive and active information processing sessions where the gathered future-oriented information could be discussed, challenged and interpreted together with the SMEs in order to support the SMEs' transformation process of the information. This type of signal sessions have already been part of Tekes foresight services, but it is now suggested that in these sessions increased emphasis should be put on processing the information together instead of just disseminating future-oriented information (Rinkinen & Mäkimattila 2015, 10). These sessions can be founded on the previous function of disseminating future-oriented-information from the periphery to SMEs.

3) *Encouraging future-oriented thinking through coaching sessions:* Thirdly, the most essential element of the foresight framework is to encourage SMEs for future-oriented thinking. The empirical results of this research show that majority of SMEs still consider future the furthest 3-5 years ahead in their strategic planning. Future-oriented thinking can be supported through coaching sessions that provide SMEs with intellectual and practical tools. For example, Tekes can organize intensive group sessions on selected themes that support long-term thinking in the SMEs, e.g. long-term vision building for the company and systems thinking as a conceptual tool in business development. The main goal of the coaching sessions is to strengthen the endogenous capacity of the SMEs for future-oriented thinking. Important part of the coaching sessions is atmosphere of trust that enables discussion and sharing of thoughts and best practices. Coaching sessions provide also support for those who act as organizational change agents in their own company and might meet change resistance when pushing forward the changes that the future-oriented information requires in their company (Sotarauta et al. 2002). In addition to offering intellectual inspiration and practical support, the aim of coaching sessions is SMEs to have an opportunity to build networks.

To sum up, the suggested framework emphasizes the role of Tekes as a platform that offers coaching and practical tools for the improvement of the futures capabilities of SMEs, offers future-oriented information from the "periphery", and supports network-building among SMEs and other actors. Arguments to support the suggested foresight framework can be found also outside this research. In an extensive Tekes survey conducted to approximately 900 companies in 2015, it turned out that among most desired services from Tekes were coaching services. Companies were wishing for more personal expert advice coaching, with one aim being long-term discussions of the future of the company. (Tekes 2015.) The SMEs need of future-oriented advisor services was also recently recognized in an editorial writing of the largest newspaper in Finland, Helsingin Sanomat: *There are plenty of financial support opportunities around for SMEs but there isn't enough advisor support around – the kind of financial support services that would offer advisor services in addition to money, e.g. in developing the business idea and building networks* (Nyhtökaura oli liian -- 2016). According to Wilenius (2016, 115-116) the role of public sector is in the process of transforming from a managing role into an enabling and consulting role. It is this kind of consulting role as a futures facilitator for Finnish SMEs that is suggested to Tekes in this research.

7   CONCLUSION

Future might have always been uncertain but if possible, today future seems more uncertain than ever. We live in an increasingly complex and interconnected world that is characterized by groundbreaking technological breakthroughs changing our daily lives, serious signals of global ecological crisis worldwide, and growing global inequality and social tensions resulting in conflicts and global population movements. In order to succeed in these turbulent, complex circumstances individuals, SMEs and states need to adopt a new kind of mindset that is built on resilience towards uncertainty and continuous learning and adaptation to the rapidly changing operational environment.

This study was conducted with a design research approach aiming at developing a more effective foresight framework for Tekes and SMEs. Empirical information about the current use of foresight and future-oriented information was gathered from 101 SMEs that currently receive innovation funding from Tekes. Based on the empirical findings and theoretical literature review on strategic foresight and utilization of future-oriented information a new foresight framework for Tekes and SMEs was designed. The designed framework emphasizes the coaching role of Tekes in supporting future orientation and boosting endogenous futures capabilities of the SMEs. The overall aim is to help SMEs to establish a constructivist foresight culture that builds on continuous learning and adaptation. This kind of culture is considered essential in order for Finnish SMEs to have the necessary agility to compete in the future global markets. It is also considered that with the suggested framework Tekes can take a leading role in facilitating the growth of resilient future-oriented culture in entire Finnish innovation system.

I conclude this research with words by an American wilderness explorer Christopher McCandless. His words reflect the wisdom that raises from the ability to continuously renew one's mindset about future and adapt to ever-changing circumstances. This can be considered as an example of the kind of adventurer spirit that is required from those – whether a state, an SME, or an individual – who want to stay at the forefront of future in the world characterized by uncertainty, complexity and unprecedented phase of change.

In reality nothing is more damaging to the adventurous spirit within a man than a secure future. The very basic core of a man's living spirit is his passion for adventure. The joy of life comes from our encounters with new experiences, and hence there is no greater joy than to have an endlessly changing horizon, for each day to have a new and different sun.

(Christopher McCandless)

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APPENDIX 1   WEBROPOL QUESTIONNAIRE

Ennakointikysely / Foresight survey 2016

We are doing a research on future orientation of small and medium sized companies in Finland. Our aim is to improve our foresight services and offer better support to SMEs in sensing the future business opportunities.

We hope that you will take 10 minutes and answer our brief survey.

The survey consists of 7 pages of questions. The first page has several background questions while the rest of the pages have 1-4 questions per page.

Feel free to answer the open-ended questions in either Finnish or English.

We kindly thank you for your answers!

Characteristics of the company

What is your company's field of business? *

○ Accommodation and food service activities

○ Activities of extraterritorial organisations and bodies

○ Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

○ Administrative and support service activities

○ Agriculture, forestry and fishing

○ Arts, entertainment and recreation

○ Construction

○ Education

○ Electricity, gas, steam and air conditioning supply

○ Financial and insurance activities

○ Human health and social work activities

○ Information and communication

○ Manufacturing

○ Mining and quarrying

○ Other service activities

○ Professional, scientific and technical activities

○ Public administration and defence; compulsory social security

○ Real estate activities

○ Something else

○ Transportation and storage

○ Water supply; sewerage, waste management and remediation activities

○ Wholesale and retail trade; repair of motor vehicles and motorcycles

How many people does your company employ? *

○ Less than 10

○ 11-49

○ 50-249

○ 250 or more

What is the estimated annual turnover of your company (€)? *

_____

What is the estimated annual investement in research and development in your company (as a percentage of annual turnover)? *

_____

Please indicate which of the following describes best the nature of your company's competitive strategy: *

○ To be successful we must sustain or attain <u>a cost leadership</u> position in the markets

○ To be successful we must sustain or attain a <u>unique qualitative differentiation</u> of products or services in our industry

○ To be successful we must <u>focus on a particular</u> buyer group, segment of the product line or geographic market, in order to serve this kind of narrow strategic target more effectively than competitors who are competing more broadly.

○ Something else?
  _____

What is the estimated percentage of employees with a higher academic degree in your company (master's or doctoral degree)? *

○   0-25%

○   26-50%

○   51-75%

○   76-100 %

Outlook on future

What is the most distant time frame for future conditions that is considered in the strategic planning process of your company? *

○   less than 2 years

○   2-5 years

○   6-9 years

○   10 years or more

On the scale of 1-5, how would you rank the foresight competence of your company? *

Foresight competence = ennakointiosaaminen

	1	2	3	4	5	

We don't have any foresight practices ○ ○ ○ ○ ○ We are excellent in our foresight practices

Please mark the foresight methods that are used in your company:

☐ Econometric modelling or other mathematical forecasts

☐ Scenario building of possible futures

☐ Simulations of future conditions

☐ Collecting signals and trends within our own field of business

☐ Collecting signals and trends outside our own field of business

☐ Future workshops to open up traditional thinking patterns

☐ Some other methods?
_____

What do you consider as the most relevant driving forces that will influence the future of your business?

Driving force = yhteiskunnallinen, taloudellinen, kulttuurinen, luonnontieteellinen tms. muutosvoima, muutosajuri

_____
_____
_____

Sources of future-oriented information

Future-oriented information (tulevaisuustieto, ennakointitieto) = any information that might give signals and hints about opportunities, threats or changes in the future This is the most extensive question in the survey.

Where do you usually find future-oriented information that is relevant to your business? Please evaluate the importance of the following information sources:

	We never use this	We rarely use this	We use this sometimes	We use this often	This is one of the most important sources for us
Newspapers & magazines	○	○	○	○	○
Social media & blogs	○	○	○	○	○
Marginal & underground press	○	○	○	○	○
Professional literature	○	○	○	○	○
Government and other public sector reports	○	○	○	○	○
Collecting information about patents	○	○	○	○	○
Benchmarking with competitors and similar actors	○	○	○	○	○
Customer feedback	○	○	○	○	○
Conversations with suppliers in our value chain	○	○	○	○	○
Discussions with colleagues and business associates	○	○	○	○	○
Academic conferences	○	○	○	○	○
Public conferences and seminars with more practice-oriented approach	○	○	○	○	○

	1	2	3	4	5
Events organized by Tekes	○	○	○	○	○
Having an active network of people in the academic world	○	○	○	○	○
Collecting opinions from other external experts	○	○	○	○	○
Consulting services that provide processed and customized information	○	○	○	○	○
Intermediary organizations that provide information (e.g. chambers of commerce, regional development companies)	○	○	○	○	○
Organizing special events with third parties which aim at collecting new information	○	○	○	○	○
Other sources, what kind of? _____	○	○	○	○	○

Content of future-oriented information

What is the most important content that future-oriented information can provide to your company? Please evaluate the importance of the following content on the scale of 1-5.

1= This is not important at all to our company 5= This is extremely important to our company

	1	2	3	4	5
New potential market segments (new target groups)	○	○	○	○	○
New potential market areas (new geographical areas)	○	○	○	○	○
Information about consumer behaviour	○	○	○	○	○

	1	2	3	4	5
Ideas of new business models	○	○	○	○	○
Future trends in technological development	○	○	○	○	○
Future trends in societal and cultural development	○	○	○	○	○
Upcoming changes in the competitive situation (kilpailutilanne)	○	○	○	○	○
Upcoming changes in the political and regulative environment	○	○	○	○	○
Upcoming environmental and ecological changes	○	○	○	○	○
Surprising and unexpected events	○	○	○	○	○
Something else? _____	○	○	○	○	○

Utilization of future-oriented information

How important is future-oriented information in the following processes of your company? Please evaluate the importance on the scale of 1-5.

1= Not important at all 5= Extremely important

	1	2	3	4	5
In reorganizing the product portfolio	○	○	○	○	○
In triggering R&D projects in innovation management	○	○	○	○	○
In strategic decision making and long-term planning	○	○	○	○	○
In monitoring and questioning the preconditions for the success of the company	○	○	○	○	○
In providing early warnings or identifying weak signals on disruptive change	○	○	○	○	○
In organizational learning inside the company	○	○	○	○	○
In enhancing the image of the company for customers and investors	○	○	○	○	○

In influencing general policy making outside the company (e.g. public opinion, legislation)

○　○　○　○　○

In influencing other companies (e.g. customers and suppliers in the value chain)

○　○　○　○　○

Some other ope-rations? _____

○　○　○　○　○

How challenging are the following processes of utilizing future-oriented infor-mation to your company? Please evaluate the level of challenge on the scale of 1-5.

1= This is very challenging 5= This is not challenging at all

	1	2	3	4	5
Finding the information: Recognizing, identifying and getting the relevant information that might have significance to the future of our company's business	○	○	○	○	○
Understanding information: Analyzing, interpreting and understanding how the future-oriented information will influence our company's business in practice	○	○	○	○	○
Integrating the information: Integrating the new in-formation with the already existing information in our company's operational planning processes	○	○	○	○	○
Implementing the information: Putting the new in-formation into practice in our company's operations	○	○	○	○	○

Company culture

In your company, do you have defined employee responsibilities for detecting and acting on signals of change in the operating environment?

Signal of change (muutossignaali) = Signal of an emerging change that is likely to have an impact on the future in the long run

○ Only top management has the responsibility to detect signals of change

○ Certain groups in the company (e.g. middle management or R&D department) have the responsibility to detect signals of change

○ Every employee is responsible for detecting signals of change

○ There is no defined responsibilities to detect signals of change in our company

○ I don't know

Are employees in your company encouraged to think big, bring in new ideas and plan for the future?

○ Yes and there are incentives available for doing this

○ Yes, but there are no incentives for doing this

○ No, employees are not encouraged to do this

○ I don't know

How would you describe the attitudes in your company towards challenging the basic assumptions that your business is built upon?

○ The basic assumptions of our business are neither known nor made transparent

○ Some basic assumptions of our business are known but not challenged

○ There is a good understanding of basic assumptions of our business and they are tested once in a while

○ Basic assumptions of our business are explicit, much talked about, and frequently challenged

Concluding questions

Are you familiar with the following Tekes foresight services?

	No, I have never heard about this service	Yes, I have heard about this service but haven't used it	Yes, I know this service and have used it
Future Watch reports	○	○	○
Future Watch workshops and sessions	○	○	○
Tekes specialist support	○	○	○
Tekes program events	○	○	○
Other Tekes events	○	○	○
Other services, please describe _____	○	○	○

If you have used the services listed above, did they provide new valuable information to your company?

_____

_____

_____

Who are the most important co-operation partners and networks to your company when it comes to finding and utilizing future-oriented information?

_____

_____

_____

Do you have comments, thoughts or ideas how to develop Tekes foresight services? What kind of future-oriented information and services would be most useful to your company?

_____

_____

_____

APPENDIX 2   EMAIL INVITATION TO THE QUESTIONNAIRE

Hyvä asiakkaamme,

Lähestymme teitä, koska olemme kiinnostuneita kuulemaan miten yrityksessänne suhtaudutaan ennakointityöhön ja hyödynnetään Tekesin tarjoamia ennakointipalveluita. Tavoitteenamme on ymmärtää paremmin pk-yritysten tulevaisuusajattelua ja kehittää ennakointipalvelujamme osana kasvavaa Team Finland-yhteistyötä.

Toivomme, että käyttäisitte 10 minuuttia ajastanne vastaamalla lyhyeen kyselyymme. Toivomme, että välitätte kyselyn eteenpäin yrityksessänne, jos ette koe olevanne oikea henkilö vastaamaan kyselyn kysymyksiin.

Kyselyyn pääsee täältä:<linkki kyselyyn>

Kysely on englanniksi, mutta avoimet vastaukset voi antaa suomeksi. Kyselyn tuloksia ei analysoida eikä esitetä yksilöidyssä muodossa. Kyselyn tuloksia hyödynnetään oman työmme lisäksi tulevaisuudentutkimuksen pro gradu –tutkielmassa. Lähetämme kaikille vastanneille tiivistelmän tutkimuksen tuloksista. Arvostaisimme todella paljon, mikäli pystyisitte vastaamaan lyhyeen kyselyymme pe 17.6 mennessä.

Lisätietoja kyselystä antaa gradutyöntekijämme Laura Pouru xxx@utu.fi / puh. xxx