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Exploring knowledge creation, capabilities, and relations in a distributed policy foresight system: Case Finland

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ABSTRACT

In an uncertain and increasingly interdependent world, cross-sectoral policy foresight is needed to tackle complex phenomena. However, most existing foresight studies have focused on a single sector or domain. This article adopts a systems perspective and explores knowledge creation, capabilities, and relations in a distributed policy foresight system cutting across government sectors and national, regional, and local administrative levels. The article is based on empirical material collected in Finland in 2019, describing the Finnish policy foresight system's existing organizational and systemic foresight capacities. Our results indicate that policy foresight considers relatively narrow future horizons relying heavily on futures knowledge that is accessible in the immediate operating environment. The full potential of foresight is not utilized. Distributed foresight collaboration at the systems level is hindered by lack of coherence, coordination, and collaboration structures. We propose ways to improve the foresight system's performance and point to ecosystem literature as a productive direction for foresight research to further the paradigm of distributed foresight systems.

1. Introduction

Foresight has various objectives, roles, and functions in our societies. Recently, the wide-ranging societal impacts of the global Covid-19 crisis have highlighted the need for cross-sectoral and multi-level foresight in the face of ever more complex global challenges (European Commission, 2020). In the academic literature, Aguirre-Bastos and Weber (2018), Stratigea and Giaoutzi (2012), and Puglisi and Marvin (2002) have raised the need for multi-level foresight and integration of different levels of administration in foresight processes. However, most of the existing research on policy foresight has mainly examined individual foresight programs or processes instead of considering foresight as a system of networked and interrelated practices. The research on policy foresight methods and processes is relatively mature, but there is less research on connections between foresight exercises conducted by different actors. Further studies on systemic, interrelated policy foresight processes can broaden foresight research beyond studying particular foresight processes and their policy context. In particular, foresight research would benefit from engaging with *a distributed model of foresight* or *fourth-generation foresight,* where multiple organizations conduct foresight specific to their own needs but with a degree of coordination (Georghiou and Keenan, 2006). However, empirical research on systemic foresight remains scarce (Heo and Seo, 2021; Schmidt, 2015).

To address this gap in the empirical grounding of systemic distributed policy foresight, we explore Finland's multi-level system of policy foresight and analyze the existing organizational and systemic foresight capacities through an analytical systems lens that builds on previous foresight research. We offer empirical insight based on survey results, interviews, and workshops conducted in 2019 in Finland as part of the National Foresight 2020 evaluation project funded by the Finnish Government's joint analysis, assessment and research activities. The Finnish case study covers a diverse, cross-sectoral group of foresight practitioners from different public policy sectors (e.g., national security, business and innovation, skills and competence) and administrative levels (state, regional, local). We aim at answering the question: *How is foresight conducted in a distributed policy foresight system and how could its systemic operation be further developed?*

In this article, we adopt a broad interpretation of policy foresight and consider it to include all foresight work that serves public decision-making on national, regional, and local levels. Various forms of

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future-oriented work may serve decision-making. Some of this work may fall outside a strict definition of foresight as a process of systematic participatory exploration of alternative long-term futures (e.g., European Foresight Platform, 2010). Rather than applying strict criteria for foresight work, we employ a broad understanding of foresight work that includes various approaches. This broad understanding is essential for reaching a holistic overview of the distributed system beyond official summaries. However, this does not include all future-oriented work done in organizations. We consider two criteria, often present in foresight definitions, to be important in national foresight: 1) foresight needs to be a systematic and organized activity (European Foresight Platform, 2010; Piirainen and Gonzalez, 2015), which excludes independent trend analysis by individual employees, for example; and 2) foresight needs to explicitly consider the future (Dufva and Ahlqvist, 2015), meaning that novel organizing principles and process innovations, for example, are excluded, even though these are future-oriented activities.

From a more theoretical standpoint, research on foresight systems could benefit from closer engagement with complexity science and complex adaptive systems theory (Derbyshire, 2016; Samet, 2012). This direction has already been explored, e.g., for plausibility-based scenario planning (Wilkinson et al., 2013). However, scholarship on considering multi-actor foresight systems as complex adaptive systems is still emerging, and the scope for theoretical work is broad. Therefore, we focus on empirically investigating the Finnish distributed foresight system in light of existing foresight system and ecosystem approaches and leave further theoretical development to future research.

The remainder of the paper is structured as follows. In Section 2, we develop our conceptual lens by building on the literature on the systemic and distributed approach to foresight. In Section 3, we present our research methodology and the empirical data. Section 4 presents our empirical findings. Section 5 reflects on the empirical results against the previous literature and discusses the improvement of foresight performance at the systems level. Section 6 draws our conclusions on the theoretical implications for further foresight research.

2. Conceptual background

2.1. Case overview: policy foresight system in Finland

The context for the study in this article is the distributed policy foresight system in Finland. Finland has a relatively comprehensive and well-institutionalized foresight system compared with most other countries (e.g., Boston, 2017; Nováky and Monda, 2015). Note that here we use the term 'foresight system' because this is officially used in Finland. The use of the term is not intended to confirm that the Finnish case necessarily exhibits all the features of a foresight system, as it is understood in the foresight literature.

The policy foresight in Finland is intended to serve national, regional, and local decision-making and objectives. Finnish local administration at the level of municipalities and cities operates independently from central government and is extensive and well resourced, with various service provision obligations that require foresight. At the regional level, regional councils are consortiums of municipalities while 'centers for economic development, transport and environment' and 'regional state administrative agencies' represent central government at the regional level. The regional level has a long tradition of a legal obligation to conduct foresight related to competence and educational needs and formulate long-term land-use plans.

Fig. 1. Overview of key policy foresight actors in Finland.

The foresight system consists of several institutional actors and respective foresight processes at the national, regional, and local levels (Fig. 1). These actors and institutions are tied together with a loosely operating "national foresight network" coordinated by the Prime Minister's office. Some institutions are specific to Finnish administrative structures, and some categories, such as 'state research institutes,' include highly heterogeneous actors. In addition, other key foresight actors can be identified not directly connected to administration and policy-making (e.g., interest groups, higher education institutes). Furthermore, the foresight system includes smaller networks or clusters, such as the governmental foresight group, thematic foresight groups, and regional foresight groups.

Nevertheless, the systemic nature of Finnish policy foresight should be taken as a claim to be studied rather than a fact describing the current state of affairs. We turn to discuss the conceptual components of foresight systems next.

2.2. Systemic view on distributed foresight

The systemic approach to foresight is a newly emerging field of study. The key benefits of a systemic view are that it can help position foresight exercises in broader systems and understand system-level behavior and lock-ins that no actor intended (Dufva and Ahlqvist, 2015). A systemic perspective can also provide a broader knowledge and resource base through networks (van der Duin et al., 2014) and help tackle actors' goal alignment (Amanatidou and Guy, 2008).

Research on foresight systems can be summarized into three streams: micro-level, macro-level, and meso-level. First, foresight systems have been studied at the micro level: within organizations (e.g., Rohrbeck, 2011). In this case, the foresight system remains within the bounds of one organization, while our study focuses on the inter-organizational system formed by numerous organizations. Second, foresight systems have been studied on the macro level connected to national science, technology, and innovation policies (e.g., Amanatidou and Guy, 2008; Georghiou and Keenan, 2006). Within this stream, based on the exploration of various national foresight processes, Amanatidou and Guy (2008) have proposed a holistic model for foresight systems that promote a participatory knowledge society. Their model consists of 1) the foresight system's internal inputs, objectives, processes, actors, and outputs and 2) the system's external environment, such as socio-cultural context, governance culture, actors' institutional settings, and structures of innovation processes. Georghiou (Georghiou, 2003; Georghiou and Keenan, 2006), in turn, outlines a generational model where foresight actors are expanded from futures experts to industry and market actors and social actors and users, and ultimately to a distributed multi-agent model of foresight. Schmidt (2015), similarly, suggests a distributed dynamic foresight network with a central foresight agency and robust node-to-node connections, mentioning Singapore as an example. In turn, Heo and Seo (2021) point towards a relatively distributed but organized system where "future receptivity" is essential for foresight. In this line of literature, foresight tends to be approached as part of a broader innovation system (Andersen and Rasmussen, 2014; Dufva et al., 2015).

Third, there is an emerging line of general theorizing on foresight systems on the *meso* level as ensembles of agents in particular contexts, organized around foresight processes (Dufva and Ahlqvist, 2015; Minkkinen et al., 2019). In this vein, Dufva and Ahlqvist (2015) have stated that instead of separate processes, foresight should be considered a system consisting of capabilities, relations, and process knowledge. They define a foresight system as a "transient ensemble of agents, set up to catalyse future-oriented insights, decisions and actions within a certain context." Minkkinen et al. (2019), in turn, suggest that foresight actors with different motivations and interpretative frames can form a collaborative foresight system where the different frames complement each other. In addition to these streams, Saritas (2013) develops a systemic foresight methodology, drawing on systems thinking, but this approach concerns systems thinking *in* foresight processes rather than multiple foresight processes and actors organized as a system.

In this article, we develop our conceptualization of foresight systems by drawing on the second and third streams, that is, integrating insights from macro-level views on distributed foresight (Georghiou and Keenan, 2006) and foresight systems as transient and contextual ensembles of agents (Dufva and Ahlqvist, 2015). Hence, we define a foresight system as *an interlinked set of actors, practices, and processes where coordination achieves the alignment of interests and the production of future-oriented insights, decisions, and actions*. Compared to Dufva and Ahlqvist's (2015) definition, our definition makes explicit the existence of different interests that require some level of coordination. However, we do not take a stance on the type of coordination, which may be, for example, self-organized or centralized. In addition, the definition does not take a stance regarding the transient or relatively permanent nature of the system.

Importantly, the conceptualization of a foresight system as an interlinked and coordinated set indicates the existence of multiple levels: national, regional, and local (Aguirre-Bastos and Weber, 2018; Stratigea and Giaoutzi, 2012; Puglisi and Marvin, 2002). The existing research on policy foresight at the national level has mainly focused on describing the application and results of particular foresight methods or processes (e.g., Cuhls et al., 2009; Rijkens-Klomp and van Der Duin, 2014) and suggesting frameworks for the evaluation of national foresight exercises (e.g., Major et al., 2001; Georghiou and Keenan, 2006; Sokolova, 2015). The emphasis has been on integrating foresight with national science, innovation, and technology policies and innovation systems (e.g., Andersen and Rasmussen, 2014; Dufva et al., 2015; Aguirre-Bastos and Weber, 2018; Vecchiato and Roveda, 2014), in examining national differences in foresight cultures and approaches (Alsan & Oner, 2004; Keenan & Popper, 2008; Andersen and Rasmussen, 2014) and the challenges of integrating foresight into political decision-making (van der Steen and van Twist, 2012, 2013). At the regional level, foresight has been found to have an essential function as a co-creative futures knowledge broker for local companies' innovation activities (Uotila and Melkas, 2007) in building a shared understanding of regional futures for public policy-making (Higdem, 2014), and in collective vision and strategy building (Gertler and Wolfe, 2004). Foresight practices at a local level – at the municipal or city level – have received less research attention. This might be due to a lack of experience in applying foresight methods and strategic futures thinking in local administration (Rijkens-Klomp and van Der Duin, 2014; Puglisi and Marvin, 2002). It may also indicate that local administration tends to be more reactive than proactive, operating in what Hytönen & Ahlqvist (2019) call vacuums of strategic planning.

The conceptual emphasis on multi-actor cooperation, limited coordination, and multiple administrative levels provide a suitable starting point for analyzing the Finnish foresight system described in the previous section. However, apart from some case studies on networked foresight (Heo and Seo, 2021; Schmidt, 2015), we could not find a literature stream elaborating on distributed foresight as a set of coordinated actors, practices, and processes in the context of policy foresight. Due to the lack of literature focusing on distributed, systemic foresight, we decided to draw on ecosystem theory. The concept of ecosystem originates from ecology and was first adopted in management literature to express the complexity of the business environment beyond the reach of existing network-based concepts (Gomes et al., 2018). In the scholarly business literature, the concept was first introduced by Moore (1993) and defined as a "loosely interconnected network of actors (a community) including companies and other entities, co-evolving their capabilities around an innovation, sharing knowledge, technologies, skills and resources, cooperating and competing." While network theories focus on explaining connections, the ecosystem construct introduces the additional dimension of value creation (Adner, 2017, 50–51). Ecosystems are not defined by regional proximity, like clusters and innovation systems, but by collective functionality, emphasizing the self-organizing nature of the system. Due to the emphasis on

collaborative, multi-actor value creation, this theoretical stream seems a good fit for analyzing the Finnish foresight system as an interconnected operative entity.

2.3. Analytical lens

In this article, we examine the distributed foresight capacities of Finnish public sector organizations through a systemic perspective. Starting from the conceptualization of a distributed and multi-level foresight system outlined in the previous section, we build our analytical lens based on Dufva and Ahlqvist's (2015) three interrelated components in a foresight system: knowledge, capabilities, and relations. This categorization is used because it succinctly captures the cognitive, competence-related, and social aspects of foresight, while each general component can also be complemented with further specific concepts. We elaborate on each component in the following sections, drawing on recent foresight and ecosystem research.

2.3.1. Knowledge

Dufva and Ahlqvist (2015) divide knowledge into knowledge that is produced and shared (articulated and codified knowledge) and knowledge embodied by the participants. Specifying the elements of foresight systems, they discuss memory objects (i.e., crystallized process outcomes such as roadmaps) and metaphors (heuristics for thinking about complex issues). While embodied knowledge and metaphors are likely to be important for the functioning of foresight systems, they are intangible and thus challenging to study, particularly in inter-organizational studies such as ours. Therefore, we focus on foresight knowledge as memory objects produced by foresight actors as well as the methods that enable the production and processing of such knowledge.

To evaluate futures knowledge creation, we utilize Rohrbeck's (2011) foresight maturity model, which examines five categories of capability factors: information usage, method sophistication, people & networks, organization, and culture (Rohrbeck, 2011). We use the knowledge-related parts of Rohrbeck's model (information usage and method sophistication) because of its relative simplicity, ease of operationalization for empirical inquiry, and because cultural aspects would require in-depth investigation of each organization, taking into account their administrative level (national, regional, local). In the model, information usage refers to the kind of information collected as input to foresight processes (in terms of reach, scope, time horizon, and sources), and method sophistication describes the ability to interpret, integrate, and communicate information (Rohrbeck, 2011, pp. 74–77). Even though Rohrbeck's model originates from corporate foresight, the knowledge-related factors are equally relevant for policy foresight. Rohrbeck's model was chosen because other comparable models of evaluating foresight, such as Amanatidou (2014) and Piirainen et al. (2012), are more complex and geared towards studying foresight processes rather than knowledge-related practices and maturity.

2.3.2. Capabilities

In Dufva and Ahlqvist's (2015) model, cognitive schemes capture the mental constructs of participating agents, such as the attitudes towards foresight and its purposes. Recently more attention has been paid to individual cognitive processes in the context of foresight and futures thinking (Ahvenharju et al., 2021; Miller et al., 2018). In the context of policy foresight, in order to understand the functioning of a foresight system, it is essential to investigate how and why agents conduct foresight. In the foresight literature, the purposes of foresight are usually connected to corporate needs, such as strategic planning, or the policy context, such as informing or advising (Amanatidou, 2014; Havas et al., 2010; Miles, 2012; Rohrbeck and Gemünden, 2011). To investigate foresight across different types of organizations, we require a more generic model of the purposes of foresight that can be empirically investigated as a characteristic of foresight work without delving into its complex organizational and policy context.

In this vein, Minkkinen et al. (2019) propose six frames for policy foresight: predictive, planning, scenaric, visionary, critical, and transformative. According to them, these frames differ in the level of perceived unpredictability of the future, with the predictive and planning frames assuming more predictability, scenaric and visionary frames assuming a future amenable to designing discrete scenarios and visions, and critical and transformative frames assuming an unpredictable future with unforeseeable developments. The frames also differ on the level of pursued agency to influence the future: foresight within the planning, visionary, and transformative frames seeks to directly influence the unfolding future; foresight within the predictive, scenaric, and critical frames does not. The policy foresight frames are ideal types, deliberately simplified to capture a generic orientation to foresight work, akin to a cognitive scheme (Minkkinen et al., 2019; Dufva and Ahlqvist, 2015). We take these six foresight frames as our starting point for identifying different types of foresight work in a distributed foresight system.

2.3.3. Relations

The third category proposed by Dufva and Ahlqvist (2015) is relations between actors. Foresight actors and their interactions form a central part of foresight systems because foresight usually involves interaction at some points in the production of knowledge and its analysis. These relations are mediated by the aforementioned memory objects, by strategic objects such as policy programmes, and by mediating events. In our case, we can consider the national policy foresight system as the strategic object and the foresight actors as the agents of the system. Here we turn to ecosystem literature for further conceptualization of system relations in order to expand Dufva and Ahlqvist's (2015) embryonic concept.

The level of *coordination* is a crucial question in the relations between actors. Previous work on national policy foresight (Heo and Seo, 2021; Schmidt, 2015) indicates the positive role of a central foresight agency or a central coordinating body in successful policy foresight. This issue is complicated because, on the one hand, public administration is traditionally highly hierarchical. However, on the other hand, foresight tends to be seen as a participatory activity that can empower stakeholders (Amanatidou, 2014). Moreover, the model of distributed foresight (Georghiou and Keenan, 2006) moves away from centralization. Dufva and Ahlqvist's (2015) model is also silent on the coordination or leadership role, which suggests a commitment to a relatively decentralized model. On the contrary, in ecosystem literature, the role of coordination is emphasized. Typically, an ecosystem centers around an *orchestrator* who sets up the ecosystem, provides the 'platform,' and coordinates interactions (Walrave et al., 2020; Dedehayir et al., 2018).

Moreover, the ecosystem literature makes more explicit the diversity of *roles* in systems. In addition to the orchestrator, ecosystems include the end-user of the product (Walrave et al., 2018), information assemblers, champions who build connections, entrepreneurs who start new ventures, and sponsors who provide financial support (Dedehayir et al., 2018). Ecosystems are structured around an *operations model* that defines the dynamics of creating and delivering the value proposition, i.e. the benefits to members from being part of the ecosystem (Valkokari et al., 2020; Walrave et al., 2020; Dedehayir et al., 2018). The ecosystem literature recognizes also the importance of *collaboration structures*. In addition to formal contract-based collaboration structures, informal structures, such as relationships, facilitation, shared vision, and a physical platform for meetings, play a significant role in finding internal coherence and aligning activities towards a common goal (Ritala et al., 2013; Ketonen-Oksi and Valkokari, 2019; Valkokari et al., 2020, 49–51; Jacobides et al., 2018; Adner, 2017; Tsujimoto et al., 2018). We borrow these constructs from the ecosystem literature for our analysis of relations in the Finnish foresight system.

Next, we outline the research material and methods used to study the Finnish policy foresight system with the analytical systems lens described above.

3. Material and methods

We approached the research with an abductive (Timmermans and Tavory, 2012) and participatory (Bergold and Thomas, 2012) methodological orientation. The abductive approach allows an iterative process of continuously fitting our analytical understanding to a phenomenon where there are no comprehensive theories (Timmermans and Tavory, 2012), thus precluding a purely deductive approach. On the other hand, an explorative and inductive approach would be ill-suited to the theoretical preunderstanding of the components of foresight systems (Dufva and Ahlqvist, 2015) conceptualized in the previous section. Hence, abductive research was suitable for examining the Finnish policy foresight system. In abductive inquiry, anomalous, puzzling, and surprising findings are the basis for iterative theory construction (Timmermans and Tavory, 2012). However, in the case of our study, the aim is to generate initial theoretical insights for further analysis rather than fully-fledged scientific theory, easing some of the requirements of abductive research such as extensive familiarity with numerous existing theories (Timmermans and Tavory, 2012). In addition, we adopted a participatory orientation, where research is planned and conducted together with relevant stakeholders, fusing scientific and practical perspectives (Bergold and Thomas, 2012). From the outset, our study was designed to produce both new knowledge and practical recommendations for improving the Finnish policy foresight system.

In line with the abductive and participatory approach, the research process included three complementary components: a survey, interviews, and workshops, which fed into one another, as illustrated in Fig. 2. The first workshop provided input to designing the survey, while the interviews and second workshop deepened the knowledge gathered from the survey and allowed gathering insights from key stakeholders in a participatory manner (Bergold and Thomas, 2012). The individual elements are described in more detail below.

The first workshop, organized as a half-day roundtable discussion in April 2019, included 20 central actors from the Finnish national foresight network, including the Prime Minister's Office, other ministries, and the Parliamentary Committee for the Future. The aims were to clarify the scope of the planned survey, collect tacit knowledge about how actors make sense of the national policy foresight system in a confidential small group setting, and establish buy-in with project stakeholders.

The subsequent survey, conducted in May and June 2019, aimed to comprehensively map the current knowledge, capabilities, and relations in the Finnish policy foresight system. These components were introduced in Section 2 (cf. Dufva and Ahlqvist, 2015). The survey provided a foundation of background knowledge elaborated in interviews with key actors and explored in the second workshop. It was sent out to all Finnish ministries, regional councils, centers for economic development, transport and the environment, universities, universities of applied sciences, and public agencies where we could identify a person responsible for foresight. In addition, the survey was sent to selected recipients on the mailing list of the Finnish national foresight network. Some of these actors are peculiar to Finnish administrative structures, and it is beyond the scope of this article to exhaustively introduce those structures. Altogether, the survey was sent to 176 organizations, and we received 78 responses, giving a response rate of 44 %. Municipalities were covered by a separate questionnaire administered by the Association of Finnish Municipalities (n = 114). Because this questionnaire was a modified version of our survey, the data are not directly comparable.

Fig. 2. The phases of the research process and the aims of each phase.

The modified version of the survey was implemented for practical reasons, because the Association of Finnish Municipalities was conducting a study in parallel with ours, with partly differing goals and beyond our control (Jäppinen and Pekola-Sjöblom, 2020). Nevertheless, the modified survey included most of our survey questions. In this article, the municipal data is used to complement the primary survey material. The results of the two surveys have been merged except where that was not possible because of different question formats.

The total breakdown of respondents is shown in Table 1. The ministries replied primarily by preparing one collective response based on a mapping of the foresight activities in the ministry. Thus, in principle, the responses represent the whole ministry rather than a single individual's view. In the case of the other respondents, the survey was sent to foresight contacts identified in the organization. They were instructed to respond individually or together and distribute the survey to others in the organization if needed.

The survey covered five areas: 1) foresight work within the organization, 2) foresight knowledge and methods, 3) networks, 4) foresight competence within the organization, and 5) assessment of the Finnish national foresight system (see Appendix 1 for the full set of questions). In designing the survey questions, we relied on the analytical lens described in the previous section. Particular focus was on information usage and method sophistication from the foresight maturity model (Rohrbeck, 2011), different orientations to foresight work with different background assumptions (predictive, planning, scenaric, visionary, critical, and transformative; Minkkinen et al., 2019), and relations between foresight actors including questions of cooperation and coordination (Walrave et al., 2020; Dedehayir et al., 2018; Jacobides et al., 2018; Adner, 2017; Tsujimoto et al., 2018).

In order to enrich the survey findings, examine our working hypotheses and puzzling findings (Timmermans and Tavory, 2012), and develop new research ideas, we conducted 15 semi-structured interviews with key actors in the national policy foresight system. Three of these interviewees were from ministries, four from other state-level organizations, four from regional organizations, and four from universities. We utilized the mailing list of the Finnish national foresight network to find active foresight participants from these organizations. We also used personal contacts of the research team and the project's steering group to find key informants. This approach works in a small country such as Finland where foresight actors are likely to know one another. The themes covered in the interviews were foresight work in the respondent's organization and their views on policy foresight at the systems level. In particular, we aimed to deepen three themes indicated as potential problem areas by the survey results: roles of different foresight actors, cooperation across administrative levels, and the communication of foresight. The interview questions are provided in Appendix 2. With researcher interviewees, greater focus was given to a more general discussion of the policy foresight system in Finland rather than the interviewee's own foresight activities. The interview material was summarized into key themes (Braun and Clarke, 2006) and used as supplementary material to the survey results.

Table 1
Survey respondents.

Category	Number of respondents
Ministries	13
Other state actors	17
Regional foresight actors	22
Municipalities	114
Interest groups	5
Associations	4
Think tanks	1
Companies	4
Universities and universities of applied sciences	9
Others	3
Total	192

The second workshop, conducted in November 2019, aimed to co-create solutions, enable foresight dialogue, and disseminate project findings. The workshop was larger than the first roundtable, with 61 participants. Invitations were sent to all survey recipients and broader stakeholder groups. The workshop aimed to present initial results and collaborate on finding solutions to improve Finland's foresight system. Both of the workshops applied co-creation methods. The research questions, approaches, and materials were partly co-designed, co-produced, and co-disseminated with the stakeholders participating in the workshops to co-create knowledge about the policy foresight system in Finland (cf. Mauser et al., 2013; Gudowsky and Sotoudeh, 2017).

Data quality and response rate were likely improved by sending the survey, interview, and workshop invites through a research project funded by the Finnish Government. This official status assured that respondents were motivated or, in the case of ministries, required to answer the questionnaire. Nevertheless, assessing data quality is complicated and some potential issues need to be considered in the analysis. On the one hand, informants had incentives to answer truthfully because they could contribute to improving the foresight system by voicing their concerns. On the other hand, some respondents may be inclined to social desirability bias, i.e., giving what they expect to be the 'right' answer. In addition, survey respondents from ministries were instructed to prepare a joint response, which may hide potential internal tensions within ministries as complex organizations. In workshops, in turn, particularly junior participants may be hesitant to voice dissenting views, although generally, the discussion culture is relatively non-hierarchical in a small Nordic country such as Finland.

Data collection and analysis were designed to be linked so that the analysis of each phase fed forward to designing the next data collection phase. Hence, the initial workshop analysis informed the survey design, the survey results directed the questions asked during interviews, and the final workshop was influenced by the entire set of material collected at that point. The data analysis thus served both the purposes of practical intervention to improve policy foresight and scholarly analysis, as the participatory approach requires (Bergold and Thomas, 2012). In the analysis for this paper, we focus primarily on the survey material, supplemented with interview and workshop findings where relevant. The quantitative survey results were analyzed using standard descriptive statistics and cross-tabulations, omitting percentage results due to the small absolute number of respondents. Responses to open questions in the survey as well as interview and workshop transcripts were summarized and thematically coded by one author, while regularly discussing the findings and interpretations among the whole group of authors (Braun and Clarke, 2006). Meetings between the authors were also used to consider possible data quality issues such as social desirability bias in responses. The abductive methodological approach (Timmermans and Tavory, 2012) informed the data analysis, meaning that attention was paid to surprising and puzzling findings in iterative rounds of reading the material in light of the analytical lens.

4. Results

This section presents the main findings from our empirical material regarding the knowledge, capabilities, and relations in the Finnish foresight system. In the following analysis, the survey results are grouped into five categories: 1) ministries, 2) other state-level actors (e.g., Parliamentary Committee for the Future, state agencies, and research institutions), 3) regional actors (regional councils and centers for economic development, transport, and the environment), 4) municipalities and 5) others (e.g., universities, interest groups, associations, think tanks). The findings from the interviews and workshops are summarized in key points. We first present an overview of foresight in different actor groups (Table 2). In the case of multiple-choice questions, the table reports the two most common responses, except in cases where there was only one predominant answer or three common responses. On this basis, we proceed with our further analysis of the distributed foresight system,

Table 2
Overview of the characteristics of foresight among the different groups of actors.

Actor group	Ministries (n = 13)	Other state-level actors (n = 17)	Regional actors (n = 22)	Municipalities (n = 114)	Other actors (n = 26)
Most common time horizon (number of respondents/ total respondents)	4–10 years (12/13) Over 10 years (8/13)	4–10 years (11/17)	4–10 years (19/22)	Not comparable due to different question	1–4 years (18/26)
Most important sources of information (mean value)	Information produced in own organization (4.5) Finnish expert reports (4.3)	Information produced in own organization (4.4) Finnish expert reports, discussions with close associates (4.3)	Finnish expert reports (4.3) Discussions with people in own network (4.1)	Finnish expert reports (4.3) Discussions with people in own network (4.1)	Information produced in own organization (4.3) Finnish expert reports, discussions with close associates (4.1)
Most common foresight methods (number of respondents/total respondents)	Collecting drivers of change from their own domain (11/13) Expert surveys and interviews, scenarios, workshops (8/13)	Collecting drivers of change from their own domain (17/17) Collecting drivers from other domains (13/17) Workshops (13/17)	Statistical methods (21/ 22) Workshops (17/22)	Statistical methods (98/ 114) Collecting trends from their own domain (88/ 114)	Collecting drivers of change from their own domain (25/ 26) Collecting drivers from other domains, statistical analysis, workshops (18/26)
Perceived predominant role[a] (number of respondents/ total respondents)	User of foresight knowledge (12/13)	User of foresight knowledge (13/17) Producer of foresight knowledge (7/17)	Mediator of foresight knowledge (17/22) User of foresight knowledge (17/22) Producer of foresight knowledge (12/22) Enabler of foresight (9/ 22)	User of foresight knowledge (78/114)	User of foresight knowledge (18/26) Mediator of foresight knowledge (12/26)
Primary foresight outputs (number of respondents/ total respondents)	Internal documents for own organization (13/13) Reports targeted at policymakers (13/13) Publications targeted at the general public (10/ 13)	Internal documents for own organization (16/17) Publications targeted at a professional audience (12/17) Reports targeted at policymakers (11/17)	Internal documents for own organization (21/ 22) Reports targeted at policymakers (18/22)	Internal documents for own organization (108/ 114) Reports targeted at policymakers (100/114)	Internal documents for own organization (25/26) Publications targeted at a professional audience (16/26) Reports targeted at policymakers (14/26) Publications targeted at the general public (14/26)
Primary foresight focus areas (mean value)	Anticipating probable developments (4.0) Broad systemic investigation of phenomena (3.6)	Anticipating probable developments (4.1) Broad systemic investigation of phenomena (4.0)	Anticipating probable developments (4.3) Proactively influencing operational environment (4.0)	Anticipating probable developments (4.4) Proactively influencing operational environment (4.0)	Proactively influencing operational environment (3.9) Anticipating probable developments (3.8)
Position of foresight in the organization (mean value)	Neither marginal nor core (2.8)	Close to core activities (3.7)	Close to core activities (3.5)	Close to core activities (3.5)	Close to core activities (4.0)

[a] Producer, user or mediator of foresight knowledge, or enabler of foresight. The roles were not mutually exclusive, except in the case of municipalities where the roles were mutually exclusive in the separate survey.

using the analytical systems lens that builds on knowledge, capabilities, and relations (identified in Section 2).

4.1. Overview of foresight at different levels

Summing up the predominant foresight approaches at the different levels, state actors (ministries and other state-level actors) tend to conduct foresight with a 4–10 year horizon, using their own organization's information and Finnish expert reports, and primarily collecting drivers of change from their own domains, while secondarily also using expert knowledge, workshops, and knowledge from other domains. The main self-identified role is user of foresight knowledge, and foresight is seen to focus on broad systemic investigation in addition to anticipation of likely developments. In light of these findings, ministries and other state-level actors seem similar in terms of their foresight work, apart from the fact that foresight is more central to the work of other state-level actors than ministries. The rationale for differentiating these groups despite their similar responses is the importance of ministries as parts of the executive branch of government.

Regional actors tend to conduct foresight on a similar time horizon (4–10 years), also relying on Finnish expert reports supplemented by discussions with people in their own network. However, in contrast to state-level foresight, statistical methods are considered the primary method. Unlike all the other groups, many regional actors view themselves primarily as mediators of foresight knowledge. Moreover, foresight is seen to involve proactive influencing of the operating environment. Municipal actors emphasize statistical methods, like regional actors, and they consider proactive influencing a key part of foresight. In turn, most municipal actors view themselves as users of foresight knowledge, like state-level actors. Furthermore, knowledge from citizens and participation with citizens was more central to the foresight work of municipal actors compared to regional and state-level actors. This corroborates the relative proximity of municipalities to inhabitants, at least in the Finnish system.

Finally, other actors are difficult to summarize because they include a heterogeneous set of organizations including think tanks and interest groups. Compared to the other groups, respondents in the 'other actors' group provide a less representative view of the respective actors,

because the 26 responses do not represent the broad set of foresight actors. Nevertheless, it is interesting that the most common time horizon was rather short (1–4 years) and foresight was relatively close to core activities within this group (median 4.0).

4.2. Knowledge

The most common time horizons used in foresight are 4–10 years, over ten years, and less than one year. The most common combination was 4–10 years and over ten years (15 % of all respondents), meaning roughly a combination of mid-term and long-term foresight. Interviewees expressed the need for more alignment and dialogue between foresight processes at different timescales. For instance, long-term futures discussions on the national level and shorter-term regional foresight are not necessarily aligned.

The most common foresight method was collecting drivers of change from the organization's own domain: this can be considered the baseline for foresight work. In regard to other methods, there were some differences between the respondent groups, with regional actors and municipalities predominantly using statistical analyses. This reflects the legal requirement to conduct quantitative and qualitative skills and education foresight on the regional level. Other state-level and regional actors are most active in organizing participatory futures workshops and preparing alternative scenarios. Quantitative or qualitative modeling was only conducted by a minority of respondents, although statistical analyses possibly cover partly the same ground. Gamified methods were the least common method, indicating the potential for experimentation with newer foresight methods.

The primary sources of knowledge tended to be relatively close to the organization. The most significant sources of futures knowledge were Finnish expert reports, information produced within one's organization, and discussions with close associates and people in the respondent's network. Knowledge gathered from citizens, foreign media, social media, and foreign conferences were considered the least important sources of futures knowledge. However, the use of international foresight knowledge varied widely: the responses from ministries ranged from 2 to 5 (on a scale of 1–5). On the regional level, the median was lower than average (3 compared to the overall median of 4). In addition, the dispersion of results on organizing foresight events is interesting. Many respondents viewed it as one of the most important sources of knowledge (37 % gave a 5 on a scale of 1–5), while some viewed it as important (23 % gave a 4). We can hypothesize that some actors in the system have the role of organizing foresight events. These actors naturally consider them an important source of knowledge, while others rely on other sources. The least common source of knowledge was knowledge gathered from citizens, which can be considered problematic from the perspective of participatory democracy and the common underlying foresight goal of increasing participation and promoting democratic processes (Amanatidou, 2017).

According to the survey, a unanimously recognized strength of the Finnish foresight system is the high quality and vast amount of futures information produced. However, the information was considered fragmented and not always easy to locate. Finding relevant information is a challenge, particularly for regional and local actors, whose primary foresight method is statistical analysis. Various organizations distribute statistical information in Finland and it is scattered to numerous databases. This supports earlier findings by Puglisi and Marvin (2002), who observe that there is a particular lack of appropriate futures information to support the decision-making of local and regional actors. Consequently, according to the survey responses, developing a common digital information platform was considered significantly more important by local and regional than state-level actors (median for regional actors 5, ministries and other state-level actors 3 on a scale of 1–5). However, the workshop participants across levels and sectors stressed that shared digital platforms and other digital tools would help integrate foresight information from different sources for meta-level synthesis and actions.

4.3. Capabilities

Our survey results indicate that for most respondents, foresight work serves primarily their own organizational goals: the main motivation for conducting foresight is to serve internal strategy and development work. Consequently, the primary output of foresight exercises is internal documents for own organization, followed closely by reports targeted at policymakers. The institutional position of foresight varies: all the other actor groups listed foresight as close to their organization's core activities (mean values 3.5–4.0 on a scale of 1–5) but ministries considered foresight “neither marginal nor core” (2.8). Closest to core activities foresight is considered in municipalities (4.0).

To further explore the rationales for and framings of foresight work in the system, we asked respondents to indicate the importance of five issues in their foresight work on a scale of 1–5, where 1 represents ‘not important at all’ and 5 represents ‘very important to us’:

1) Anticipating probable developments based on knowledge
2) Bold visioning and opening new opportunities
3) Proactively influencing the operational environment
4) Agile innovation and new experiments
5) Broad systemic investigation of phenomena
6) Anticipating surprising and unexpected events (e.g., black swans)

These questions were derived from the six foresight frames model as rough indicators of the dominant framing of foresight (Minkkinen et al., 2019). In the survey responses, the greatest emphasis was placed on anticipation of probable developments (86 % of respondents gave a value of 4 or 5), followed by proactively influencing the operational environment (71 % gave a value of 4 or 5), bold visioning and opening new opportunities (65 % gave a value of 4 or 5) and a broad systemic investigation of phenomena (60 % gave a value of 4 or 5). The least weight was given to agile innovation and new experiments (56 % gave a value of 4 or 5) and anticipation of surprising and unexpected events (40 % gave 4 or 5). See Fig. 3 for a full summary. The emphasis on probable developments is unsurprising as it represents a base level of foresight. In turn, the low salience of anticipating surprises and relatively low emphasis on innovation and experiments support the previously mentioned finding that foresight work tends to rely on collecting drivers of change from the organization's own domain and from sources close to the organization.

To aid analysis, we consolidated the issues into two axes based on correlations between the variables in responses as well as conceptual coherence:

1) Considering systemic issues and surprises (broad systemic investigation and anticipating surprising events)
2) Visioning, proactivity, and innovation (visioning, proactive influencing, and agile innovation)

‘Anticipating probable developments’ was excluded from these axes because it was almost universally considered important and could not be used to differentiate between respondents. The axes roughly correspond conceptually with the ‘perceived unpredictability’ and ‘pursued change’ axes of the six foresight frames model (Minkkinen et al., 2019). The first of these axes indicates the level of unpredictability considered in foresight work. In contrast, the second indicates the level of proactive agency, that is, the foresight actor's intention to influence future events (Minkkinen et al., 2019).

While we initially expected differences between respondent groups (ministries, other state-level actors, regional actors, and municipalities), no clear pattern was distinguishable. On the other hand, there was significant divergence within respondent groups in their consideration of systemic issues and proactivity. In addition, the consideration of these issues was positively correlated with less common methods and sources of foresight knowledge. Interestingly, ministries are widely distributed

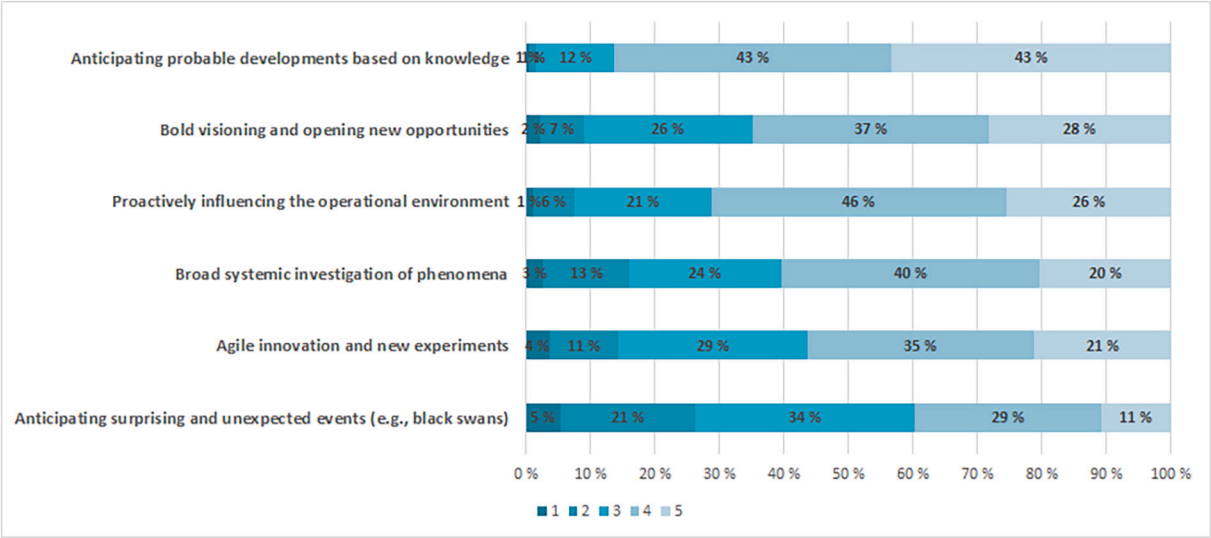

Fig. 3. Importance of different aspects of foresight work (1 = not important at all, 5 = very important).

along these axes, suggesting varying priorities in foresight work. This finding indicates that foresight practitioners in Finnish ministries do not have uniform cognitive schemes (Dufva and Ahlqvist, 2015) about what is important in foresight. Moreover, explorative analysis of the data suggests that those respondents who had high scores on the axes considered knowledge gathered from citizens more important. These respondents also used game-based methods more frequently. This may suggest the existence of a set of 'foresight high performers' that utilize diverse methods and sources of foresight knowledge, including participatory foresight (cf. Amanatidou, 2014). However, the absolute numbers of such responses are low, and more research is needed to examine and challenge these potential linkages.

4.4. Relations

In the survey, to address organizations' roles within the foresight system, we asked organizations to self-identify as producers, users, or mediators of foresight knowledge or as enablers of foresight. These categories are mutually non-exclusive, and respondents could select more than one. Ministries, other state-level actors, municipalities, and other actors described themselves predominantly as users of foresight knowledge, while regional actors considered themselves predominantly mediators. However, these self-identified roles may hide the production and refinement of foresight knowledge, which are not immediately apparent. Moreover, the distinction between discrete roles contains embedded assumptions about the flow of foresight knowledge.

Furthermore, respondents were asked four open questions about networked foresight processes:

- Does your organization participate in shared foresight processes with multiple organizations?
- Which processes?
- Which are your most important foresight partners on the regional, national, and international levels?

The open responses were categorized according to actor type and coded into a table with the respondent in the first column and collaboration partners in subsequent columns.[1] The data were analyzed using Gephi network analysis software for heuristic network exploration. The most common partners overall were regional councils (25 mentions), higher education institutions (23 mentions), centers for economic development, transport, and the environment (22 mentions), schools (22 mentions), the Ministry of Economic Affairs and Employment (22 mentions), the national foresight network (21 mentions) and the Finnish Innovation Fund Sitra (21 mentions).

A complementary image to networked foresight is provided by betweenness centrality calculations, which indicate nodes in the pathway between many collaboration relationships (Hanneman and Riddle, 2011). Betweenness centrality describes how many of the shortest paths between two nodes go through a particular node (Borgatti and Halgin, 2011). The highest betweenness centrality figures were found for regional councils (107), the Prime Minister's Office (84), and research institutions (78). The long tradition of the legal obligation of competence and skills foresight is visible in the central role of regional councils (25 mentions in the questions on networked foresight), higher education institutions (23 mentions), centers for economic development, transport, and the environment (22 mentions), and schools (22 mentions). Research institutions have an expert role as distributors of research knowledge to various parties. Furthermore, most actors have only few and mainly occasional collaborative relations with international actors. The workshops and interviews also highlighted the need to expand the borders of the foresight system through deeper integration of the private sector, third sector, and citizens in general into the foresight system.

Nevertheless, opinions in the survey, interviews, and workshops were divided over the need for stronger coordination of the foresight system: some preferred a self-organized system, and others advocated stronger coordination, goal setting, and a more systematic approach to the collective exploration of futures. The workshop participants stated that self-organization had produced quite a loose network system, arguing that hierarchy was needed to coordinate and facilitate some of the work but not for forming visions, views, or actions. They stressed that the foresight system should be understood not as a passive structure that forms part of a national 'master plan' but as a dynamic network evolving according to its particular members and their views.

Concerns about the abstract and detached nature of current foresight practices were raised in the survey, interviews, and workshops. Futures knowledge was considered to lack impact and to fail to turn into concrete decisions and actions, either at the organizational or societal level. According to the survey results, the most critical next step for the foresight system should be improving the integration of futures knowledge

[1] The responses from the municipal survey were not included for reasons of clarity. If included, municipalities would outnumber the responses from other actor groups and make interpretations more difficult.

with political decision-making. Supporting van der Steen and van Twist's (2013) earlier findings, the workshop participants stressed the importance of proper timing in creating impact and delivering futures knowledge to decision-makers. The interviewees pointed out that the organizations that produce future-related information often lack the resources to communicate the knowledge to external parties. It was also unclear to whom this communication should be directed. On the other hand, the interviewees highlighted that foresight should not be considered only in terms of external information production but recognized as an integral part of collective decision-making processes. Foresight should be firmly embedded in long-term decision-making processes rather than adopted in short one-off projects. The Prime Minister's Office was considered to have a crucial role in strengthening the legitimacy and integration of foresight into political decision-making processes. The role of the parliamentary Futures Committee was also stressed in this context.

Regarding collaboration structures in the Finnish foresight system, it was unanimously agreed in the survey, interviews, and workshops that at the core of the system is the openly and loosely operating national foresight network that brings together diverse foresight actors from different fields. The existence of such a network is considered an achievement, as it requires broad consensus about the importance of foresight. In a relatively small country like Finland, people working within administration and policy tend to know each other quite well, making it easier to create trust and collaborate. The network's main strength was considered to lie in its openness and capacity for creating cooperation. Supporting the earlier findings of Ketonen-Oksi and Valkokari (2019), particularly the annual and monthly seminars for collective discussion, sharing, and processing of futures knowledge were considered essential activities of the national foresight system. On the contrary, existing digital communication platforms were not thought to have much value: the electronic communication platform used by the network, Yammer, was seen as the least essential mode of operation, although it could in principle allow for cooperation outside of meetings.

Outside seminars, foresight collaboration was considered still fragmented, isolated, and non-systematic. In the survey and interviews, hierarchical thinking and lack of transparency were considered core challenges of the foresight system. Both horizontal silos among ministries and vertical silos between different administrative levels hinder the system, but the results highlighted particularly the vertical communication gaps between different administrative levels. Regional actors lack visibility and do not have channels for systematic dialogue with state-level foresight actors. Municipalities have an even weaker connection to state-level foresight, but they often collaborate with the regional level. Correspondingly, the state level lacks awareness of foresight work at the local and regional levels. At the same time, informants recognized that sometimes foresight practitioners have to compete for the same resources and do overlapping work. Interviewees and workshop participants demanded more transparency about the power structures, goals, and interests underlying the policy foresight work. They called for courage to tackle more radical and sensitive issues and undertake bold experimentations and visions, including a firmer focus on scanning and analyzing weak signals.

5. Discussion

Our empirical material shows that in contrast to the increasingly complex operating environment, the policy foresight conducted in the Finnish distributed system is still rather uniform and static. For the majority of actors, foresight is still based on forecasting likely developments rather than exploring potential surprises or new opportunities. Also, the radar of horizon scanning is narrow, focusing heavily on futures knowledge that is accessible in the immediate operating environment and close networks rather than looking into the outer horizon. Only a small number of foresight actors place a strong emphasis on surprises, experiments and proactively influencing their operating environment in their foresight work. The same actors also tend to favor more unusual methods (e.g., games) and sources of knowledge (e.g., knowledge collected from citizens). However, it is particularly this kind of broad view of foresight that is needed in national, regional, and local decision-making in order to tackle the upcoming 21st-century challenges.

Moreover, our results raise the question of whether foresight is approached differently at different system levels, coming closer to standard statistical predictive work at the regional and local levels. We could argue that there is a need for stronger alignment in working towards a mutual understanding of the positions and complementarities of foresight processes with different time horizons in the broader system. This is relevant because the results indicate that a great deal of current foresight work provides value to individual organizations but does not directly tie into the national policy foresight system. Moreover, the different foresight functions in the system could be matched more explicitly: this applies, for example, to short-term statistical analysis of employment and education needs at the regional level and the megatrends and transformations explored in state-level scenarios. In the context of scarce resources, it makes sense for actors to focus on core foresight activities relevant to their domain, such as scanning their operational environment and analyzing statistics on future education needs in the case of regional councils, or considering bolder future visions in the case of innovation actors. From this perspective, foresight competencies can be seen more as a diverse set of skills that may take different forms rather than a set of competencies on a scale from low to high (Minkkinen et al., 2019). Building on the idea of the various functions of foresight (e.g., Minkkinen et al., 2019; Miller et al., 2018; Rohrbeck and Gemünden, 2011), we propose that the distributed policy foresight system should more precisely categorize foresight for different purposes: 1) planning-oriented foresight that aims at preparedness building 2) scenario and vision-based long-term foresight and 3) innovation and novelty-aiming foresight that builds on experimenting and challenging existing frames of reference. These complement each other and some degree of coordination would be needed.

Furthermore, our empirical material indicates confusion about the roles and operations model at a systems level. Therefore, we suggest that the foresight system would benefit from *a stronger orchestrator*. The Finnish foresight system is strongly self-organized and only loosely coordinated by the Prime Minister's Office. According to our data, this is considered not only a negative feature. Nevertheless, it means the system lacks a strong enough orchestrator with the resources to coordinate futures knowledge flows and incorporate them into political decision-making at the state level. A stronger orchestrator would also help to facilitate dialogue across the system's current vertical and horizontal communication silos. In addition, a further indication of *roles* would benefit the system. Ecosystem alignment, agreeing on positions and flows, and who hands off to whom have been raised as critical issues in the ecosystem literature (Adner, 2017). Currently, the Finnish system lacks overarching internal coherence (Tsujimoto et al., 2018) as several actors struggle to understand their role and the directions of knowledge flows in the broader foresight system. It could therefore be more clearly indicated which organizations play the role of suppliers (producers of futures information), assemblers (intermediaries who compile futures information), champions (intermediaries building connections between actors), experts (deep expertise), and sponsors (funders of foresight work) in the distributed foresight system. As our empirical data indicates, most organizations in the system use and produce futures knowledge primarily for their internal processes rather than for the broader system, which causes overlapping work, communication gaps, and a fragmented knowledge base. Therefore, also, a clearer indication of what futures knowledge is needed at the system level (political decision-making at the state level) and sub-system level (regional and thematic systems) would help define the roles and knowledge flows within the system. Our results indicate that in the Finnish foresight system the regional councils and the Prime Minister's Office could act as

intermediaries in regional and state-level foresight, respectively. The mediating role of regional actors, supported by their self-identification as mediators of knowledge, is consistent with the literature on regional foresight as a knowledge broker (Uotila and Melkas, 2007). Regional intermediaries can also be considered to have an essential role in bringing together the futures dialogue at the state and local levels. The Prime Minister's Office could take a stronger coordinating body role (Heo and Seo, 2021) in managing the whole Finnish foresight system instead of only coordinating foresight activities at the state level.

Finally, the Finnish policy foresight system would benefit from clarifying the *operations model, collaboration structures,* and the *shared value proposition*. The atmosphere of trust for simultaneous collaborative and competitive relationships, as proposed by Ritala et al. (2013), appears to be at a high level of maturity in the Finnish system. Although the challenges stemming from competing for the same resources are widely recognized, the existing networks and collaboration within the foresight system are highly valued. In particular, the seminars are recognized as essential platforms for collective knowledge creation, which emphasizes the importance of mediating events in systems (Dufva and Ahlqvist, 2015). However, the Finnish foresight system consists of professionals from different sectors and administrative levels with different approaches and motivations for doing foresight. This makes it challenging to find a shared purpose and value for foresight system collaboration, which undermines the motivation of some actors to participate. The interconnectedness of system members (Scaringella and Radziwon, 2018) varies: some are tightly interconnected while others have no connection. This influences formal and informal collaboration mechanisms (Ritala et al., 2013). The shared value and synergies of collaboration (Ketonen-Oksi and Valkokari, 2019; Valkokari et al., 2020) are more evident to some members than others. Therefore, the foresight system would benefit from a clearer indication of the collective vision, purpose, and value proposition for the actors. In addition, the development of common platforms and means of sharing knowledge would be crucial to avoiding overlapping work and decreasing competition for the same resources. From a geographically scattered foresight system's perspective, the non-use or infrequent use of digital communication platforms between physical meetings can be considered a severe barrier to collaboration development.

6. Conclusion

Existing research on the systemic approach to foresight is still relatively scarce. This article grounds the discussion by empirically investigating foresight knowledge creation, capabilities, and relations in a distributed foresight system. Through examining the case of the Finnish foresight system, we aimed to understand how the distributed network of foresight actors, functions, and roles could be welded together into a better-functioning foresight system. More broadly, our analysis asks whether an ecosystem-based approach to building national policy foresight structures could lead to more widespread futures literacy and resilience-building in the face of 21st-century challenges compared to strictly centralized structures or loose self-organized networks. We suggest that ecosystem theory could provide a productive direction for foresight research to further the paradigm of distributed foresight systems.

To sum it up, our data paints a picture of rather heterogeneous foresight practices, capacities, and focus areas across administrative levels and domains. Our examination indicates that the distributed policy foresight system in Finland is currently a loose self-organized network lacking ecosystem-like features that would enable coherent operation for shared value creation. The principles of collaborative and distributed multi-level foresight are still in their infancy in the Finnish case even though the existing networks among foresight practitioners are highly valued. Our data indicate significant communication and alignment gaps between and inside the municipal, regional, and state levels of foresight. We propose that in regard to knowledge creation, wider use of knowledge sources and foresight methods would be applied. Overall, a more nuanced understanding of foresight and its multiple functions would help overcome the challenges related to different framings and cognitive schemes prevailing in the system and inside organizations. Regarding the system relations, the system would benefit from more robust orchestration, development of the operations model, and identification of roles and the value proposition.

This study has its limitations. Foresight is always dependent on its context. Therefore, our analysis of the Finnish foresight system cannot be generalized to other countries and their respective national foresight systems. Each national policy foresight system will likely look different, colored by cultural features, institutionalized structures, and historical path dependencies. What may be considered overly hierarchical in one country may be standard practice in another. However, despite its limitations, our empirical material offers a valuable view of the current state of organizational foresight capacities in national, regional, and local administration in a northern European country. Furthermore, our analysis of the foresight system through the threefold systems lens provides new insights into the principles, challenges, and opportunities of constructing distributed foresight systems.

In further research, it would be interesting to explore the systemic dynamics of foresight systems more closely. Repeat interviews and ethnographic work (cf. van Asselt et al., 2007) could give valuable insight into how foresight is conducted and how collaborative relationships are established and maintained. The real-world foresight problems may be different from the methodological issues discussed in textbooks and much of the academic literature. Subsequent research could also address a contemporary dilemma in foresight work: On the one hand, foresight work is professionalized, and growing emphasis is placed on formal methods and training, as we have done in this study. On the other hand, there are pressures to democratize and demystify futures work and to recognize the 'mundane' future-oriented work that already takes place in organizations (e.g., Ahlqvist and Rhisiart, 2015). Given these contradictory tendencies, what are desirable structures for foresight systems from utilitarian and ethical perspectives? This paper has sought to contribute to this ongoing discussion through an empirically grounded case study.

CRediT authorship contribution statement

Laura Pouru-Mikkola: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing. **Matti Minkkinen:** Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Maria Malho:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Aleksi Neuvonen:** Conceptualization, Methodology, Investigation, Writing – review & editing.

Data availability

Some of the data is confidential. On request, the authors will investigate which data can be shared.

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Appendix 1. Survey questions

1. Name of organization
2. Sector or industry
3. In which category does your organization belong? (ministries, other state actors, regional foresight actors, municipalities, interest groups, associations, think tanks, companies, universities and universities of applied sciences, others)
4. What is your job role in the organization?
5. Does your organization conduct foresight work (yes/no)?
6. What kind of foresight work is conducted in your organization?
7. What are the aims of foresight work in your organization?
8. Who is responsible for foresight work in your organization (top management, distributed responsibility, designated to particular persons/team/unit, responsibility is not designated)
9. If your organization has a dedicated foresight team or unit, how large is it?
10. Please assess how much resources you allocate to foresight each year (Euros per year, excluding wages)
11. Please assess what percentage of your organization's foresight work is 1) done as internal continuous processes, 2) done as projects, 3) done in networks, 4) outsourced from external providers
12. You may elaborate on your answer to the previous question
13. How central is foresight work in your organization (1 = marginal position, 5 = part of core activities)
14. What time horizon is used in foresight in your organization? (less than a year, 1–4 years, 4–10 years, over 10 years)
15. Which foresight methods do you use?
    a. Statistical analysis and forecasts
    b. Expert-based methods
    c. Alternative scenarios
    d. Collecting drivers of change from your own domain
    e. Collecting drivers of change from other domains
    f. Futures workshops and other participatory methods
    g. Game-based methods and simulations
    h. Modeling (quantitative or qualitative)
    i. Other methods, what?
16. What kinds of foresight-related tools, platforms, and software do you have in use?
17. How important are the following aspects in your organization's foresight work (1 = not important at all, 5 = very important)
    a. Anticipating probable developments based on knowledge
    b. Bold visioning and opening new opportunities
    c. Proactively influencing the operational environment
    d. Agile innovation and new experiments
    e. Broad systemic investigation of phenomena
    f. Anticipating surprising and unexpected events (e.g., black swans)
18. My organization is primarily a
    a. Producer of foresight knowledge
    b. User of foresight knowledge
    c. Mediator of foresight knowledge
    d. Enabler of foresight (e.g., funder)
19. Where do you find foresight knowledge? (1 = never used, 5 = one of the most important sources)
    a. Domestic media
    b. Foreign media
    c. Social media, blogs
    d. Scientific research and literature
    e. Information produced in own organization
    f. Finnish expert reports
    g. Foreign expert reports (e.g., EU)
    h. Discussions with colleagues and close collaboration partners
    i. Discussions with other people in your own network
    j. Finnish conferences, seminars, and conventions
    k. Foreign conferences, seminars, and conventions
    l. Benchmarking other similar actors
    m. Information collected from citizens
    n. Hearing external experts
    o. Conducting foresight events, e.g., workshops
    p. Other, what?
20. What kinds of outputs have resulted from your foresight work?
    a. Internal documents for own organization
    b. Reports and discussion papers targeted at policymakers
    c. Publications targeted at a professional audience
    d. Publications targeted at the general public
    e. Something else, what?
21. In your view, how well is foresight knowledge taken into decision-making? (very poorly, rather poorly, average, rather well, very well)
    a. In your own organization
    b. On a regional level
    c. On a national level
22. Does your organization participate in foresight processes involving several organizations? (if yes, which processes?)
23. Who are your key foresight collaboration partners and networks on a regional level?
24. Who are your key foresight collaboration partners and networks on a national level?
25. Who are your key foresight collaboration partners and networks on an international level?
26. Please assess how many people involved in your organization's foresight work have undertaken foresight training
27. How would you assess the level of foresight competence in your organization in relation to foresight needs? (totally insufficient - totally sufficient)
28. How should your organization's foresight competence be developed? Do you need, e.g., foresight training?
29. What are your organization's greatest strengths in foresight?
30. What are your organization's greatest challenges in developing foresight competences?
31. Has the proposal on a common operating model for national foresight (2014) influenced your organization's foresight work? (If yes, how?)
32. How important do you consider the following national foresight activities?
    a. Foresight Friday events
    b. Annual Finnsight forum
    c. Annual regional foresight seminar
    d. Yammer discussion forum
    e. Foresight.fi website
    f. The Government Foresight Group
    g. Online training offered by the national foresight network
    h. Something else, what?
33. In your view, how well is foresight knowledge transferred between national foresight actors? (very poorly - very well)
34. What are the greatest strengths in national foresight?
35. What are the greatest challenges in national foresight?
36. What are the most important development points in national foresight?
    a. Improving the network's overall foresight competence
    b. Building a common digital futures database
    c. Discussion events for refining and understanding foresight knowledge
    d. Utilization of previous work and removing overlaps
    e. Better integration of foresight work into political decision-making
    f. Facilitating the sharing of foresight knowledge between actors in the network
    g. Better communication about foresight knowledge
    h. Strengthening the coordination of national foresight

i. Something else, what?

Appendix 2. Interview questions

Foresight in the respondent organization

- How does foresight work in your own organization? What are its strengths and development areas?

National foresight in Finland

- What is your role in national foresight?
- How do you see the division of roles in national foresight? Is the current division working?
- How do you see the role of regional foresight in the national foresight system?
- What is your overview of national foresight? What are its strengths? What about its development areas?
- How could the communication of foresight be improved? How could the work of regional actors be integrated better?

Questions for regional councils

- How does regional foresight work in your region? What are its strengths and development areas?

Questions for ministries

- How does foresight cooperation work in your ministry's domain? What are its strengths and development areas?

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