Center for Knowledge and Innovation Research (CKIR)

Ecosystem Game

Managing innovation ecosystems

Heini Ikävalko
Linda Mattila
Patrik Tuokko

Aalto University
BUSINESS + ECONOMY
RESEARCH REPORT

Aalto University publication series
BUSINESS + **ECONOMY** 3/2022

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Abstract

This research report investigates the management dynamics and structures in Finnish innovation ecosystems and aims to pinpoint different value creation challenges that appear in innovation ecosystem management. Innovation ecosystems are looked at as a dynamic set of actors and activities, whose coordination needs focusing on the network of participants, a governance structure and a shared logic, to enable innovative performance. We focus primarily on how a network of participants in an innovation ecosystem is combined, how a shared logic is created and maintained, and what governance structures are suitable in both public and private ecosystems. In addition, we look at the use of 'innovation ecosystem' term, the alignment between a company's strategic objectives and innovation ecosystem participation and, Finland as context for innovation ecosystems.

The data of this report consists of 37 interviews with ecosystem representatives in Finland conducted between November 2020 and March 2021 and a supplementary survey with 50 respondents from February-March 2022.

The main findings are a list of recurring challenges related to the key attributes in innovation ecosystems in Finland and their suggested solutions. The term innovation ecosystem remains ambiguous and early conversations and sensemaking processes for ecosystem partners are imperative to build trust and help each partner clarify how the ecosystem activities could help in realizing their own company's business strategy. Top-down and bottom-up governance processes and their main concerns are also identified in this research report.

Keywords innovation ecosystem, value creation, management

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Tutkimusala innovaatioekosysteemit

Kieli Englanti

Tiivistelmä

Tämä tutkimusraportti kuvaa suomalaisten innovaatioekosysteemien arvonluontihaasteita ja johtamiskäytänteitä. Innovaatioekosysteemeitä tarkastellaan dynaamisina erilaisten toimijoiden kudelmina, joiden koordinointi edellyttää yhdessä toimimisen viitekehystä. Keskitymme toimijoiden välisen vuorovaikutuksen ja jaetun toimintalogiikan rakentumiseen sekä hallintamalleihin erilaisissa innovaatioekosysteemeissä. Käsittelemme myös innovaatioekosysteemi-käsitteen käyttöä, yritysten strategian ja innovaatioekosysteemitoiminnan yhteensovittamista sekä Suomea innovaatioekosysteemien toimintaympäristönä.

Tutkimuksen havainnot perustuvat 37 suomalaisen ekosysteemitoimijan haastatteluun ja verkkokyselyyn, johon vastasi 50 ekosysteemitoimijaa. Haastattelut tehtiin marraskuun 2020 - maaliskuun 2021 välisenä aikana. Kysely toteutettiin helmi-maaliskuussa 2022.

Raportissa esitellään innovaatioekosysteemeissä toistuvia haasteita ja ratkaisuja niihin. Innovaatioekosysteemi -käsite näyttäytyy aineistossa moniselitteisenä. Ekosysteemitoimijoiden yhteiset merkityksenluomisen prosessit mahdollisimman varhaisessa vaiheessa kuvataan ratkaisuina, jotka paitsi hälventävät mahdollista monitulkintaisuutta, selkeyttävät eri toimijoiden rooleja ja rakentavat luottamusta innovaatioekosysteemissä. Toimivia hallintamalleja voidaan luoda ohjatusti tai ne voivat syntyä matkan varrella toimijoiden kesken.

Avainsanat innovaatioekosysteemi, arvonluonti, johtaminen

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Foreword

This report presents insights from a study on innovation ecosystems, conducted as part the Ecosystem Game project. The Ecosystem Game project was funded by Business Finland and carried out by Aalto University School of Business during the years 2020–2022. The purpose of the project was to increase understanding on creating and managing innovation ecosystems. A special motivation for the project was Erkki Ormala's previous 'Innovation in Transition' (IIT) project, whose results stressed the role of innovation ecosystems for companies to gain knowledge about technological opportunities, engage in collaborative planning, and understand customer needs. These results encouraged to explore how innovation ecosystems are being managed. Tackling these will hopefully improve the competencies and competitiveness of Finnish firms involved in innovation ecosystems.

Since the activities of the Ecosystem Game project were broad, this report focuses only on reporting insights from the interviews and survey on Finnish innovation ecosystems. The authors are responsible for the analysis and reporting the findings, but we would like to thank the following partners' contribution during the Ecosystem Game project:

- Erkki Ormala, Aalto University, the principal investigator of the Ecosystem Game project, for continuous advice, guidance and leadership throughout the project
- Business Finland, for the funding and Teija Lahti-Nuuttila, Elise Ramstad and Jari Hyvärinen for support during the project
- Steering group members Erja Turunen (VTT), Mervi Karikorpi (Technology Industries of Finland), Kai Husso (Ministry of Economic Affairs and Employment of Finland), Mia Bengtström (Pharma Industry Finland), Antti Tahvanainen (Finnish Forest Industries Federation) and, Sami Nikander (Chemical Industry Federation) for insightful viewpoints in the steering group meetings
- Our former colleagues at Aalto University, Petra Turkama and Jukka Mattila, for participating in research planning and data collection
- Ilkka Lakaniemi, Aalto University, for supporting project preparation and implementation
- Pentti Launonen and Pekka Koponen, Spinverse Oy, for their contribution in data collection

We hope that this report can inspire new beginnings within innovation ecosystem management practice and literature.

Espoo, October 2022
Authors

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Introduction

Innovation has become one of the most important strategic tools to acquire and retain competitive advantage for companies and nations. Innovation is more interdependent than ever, and companies have adopted new tools such as open innovation, public-private partnerships, and innovation ecosystems. It has also been argued that innovation ecosystems are the dominating framework through which new solutions are created today (Rabelo et al., 2015). Conceptually, innovation ecosystems are still forming. Ritala and Gustafsson (2018) have argued that the conceptual direction and next steps for innovation ecosystem research include the collection of empirical evidence, the integration of ecosystem research into existing theoretical streams as well as the further clarification of the conceptual underpinnings, for instance by finding a useful metaphor to describe innovation ecosystems.

In innovation ecosystem research literature, an innovation ecosystem is defined as: *"the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors"* (Granstrand & Holgersson, 2020). This study follows the perspective that innovation ecosystems are dynamic, constantly transforming structures that take their form as a result of various actors' actions. Therefore, instead of merely adapting, these actors can also shape the structures (Visscher et al. 2021). Thus, we focus on how innovation ecosystems are being managed. To capture the management implications of the evolving nature in innovation ecosystems, this report draws from Thomas and Autio (2014), who emphasize three characteristics: a network of participants, a governance structure and a shared logic. Observing these characteristics separately, as well as together in an interplay, helps to pinpoint the different value creation challenges that appear in innovation ecosystem management. The research question of the study is: *What enables and hinders innovation ecosystem management?*

Methodology

Interviews

The primary data of this study consists of interviews with ecosystem representatives in Finland. The interviews were conducted over a period of five months, between November 2020 and March 2021. The interviews were semi-structured and based on a predefined interview guide. The interview guide also included numeric evaluations that are used to support the more detail-level qualitative analysis. If the interviewee gave their permission, the interview was recorded. The interview guide was divided into three themes: 1) Company strategy and its link to innovation ecosystem strategy, 2) Management challenges and practices in a selected innovation ecosystem, and 3) The Finnish context and how innovation ecosystem operations could be further encouraged and facilitated by the national authorities.

The interviews were held with representatives from 32 companies. The participating companies were responsible for leading or co-leading at least one innovation ecosystem in Finland. The companies' revenue varied between 100 000–10 000 000 000 €. The interviewees (N=47) represented top or middle management. Common titles included CEO, CTO, Head of Business Development, Vice President, and Ecosystem Lead.

The interview participants were R&D&I professionals with a median time of 14 years working in the company. 30 interviewees were responsible for the corporate-level ecosystem portfolio, and 13 managed one selected innovation ecosystem. On average, their companies had five ecosystems actively operating at the time of the interview. While the studied innovation ecosystems integrated actors across industries and technology domains, the most represented industry (35% of companies) was information & communication (TOL, Statistics Finland).

An in-depth qualitative analysis was conducted with the 37 interviews that were recorded. Fully transcribed interviews were imported into the data analysis software ATLAS.ti for qualitative examination. Any relevant insights were coded in the software, with the aim to identify challenges, good management practices, and cause-effect relations that emerged in the interviews. A typical code thus captures a challenge, a practice, or any other insight in the company's innovation ecosystem management. For example, we coded *"Challenge: motivating the partners; Solution: bonuses"* when the interviewees described that in his/her experience, one of the challenges in innovation ecosystem was to motivate the ecosystem partners and argued bonuses as one solution for this challenge. Another example of our coding is *"An innovation ecosystem is defined as the opposite of a project"*, which was used when the interviewee(s) characterized innovation ecosystems by

differentiating them from projects. In total the study gave 816 codes, which were then classified into themes.

The numerical evaluations were gathered and a gap analysis was conducted to map the responses.

Survey

To supplement the observations from the interview data, we conducted a survey in February–March 2022. An anonymous web survey was sent to 220 companies that were identified to act in innovation ecosystems. The survey included questions concerning e.g. the respondents' perceptions of their companies' innovation ecosystem strategies or their experiences of the governance practices in their innovation ecosystems.

We received 50 responses. The respondents represented senior management (22%), middle management (38%) or professionals/experts (38%). Their companies were large (74%), small (16%) or medium (10%), representing mainly manufacturing industry (48%). Other industries represented were education (16%), information and communication (14%) or professional, scientific and technical activities (12%).

Similar to the approach taken in the interviews, the survey respondents were asked to select one innovation ecosystem relevant for their company and answer the questions based on their experiences of the selected innovation ecosystem. For 67% of the respondents, their company's main role in the selected ecosystem was a member role. For 23%, the main role was leader and for 5% facilitator. The respondents reported that 65% of the (selected) innovation ecosystems were led by a private sector company and 35% were led by a partner representing public sector. These aspects (experiences reported by either leaders or members & observations concerning either ecosystems lead by private or public partner) were considered when analyzing the data.

Findings

I What is an innovation ecosystem?

This section lays the foundation of how the interviewees conceptualize an innovation ecosystem. Their perceptions of how an innovation ecosystem could be described is contrasted with conceptualizations from previous literature. The findings are structured according to the main dimensions identified in the study (Figure 1).

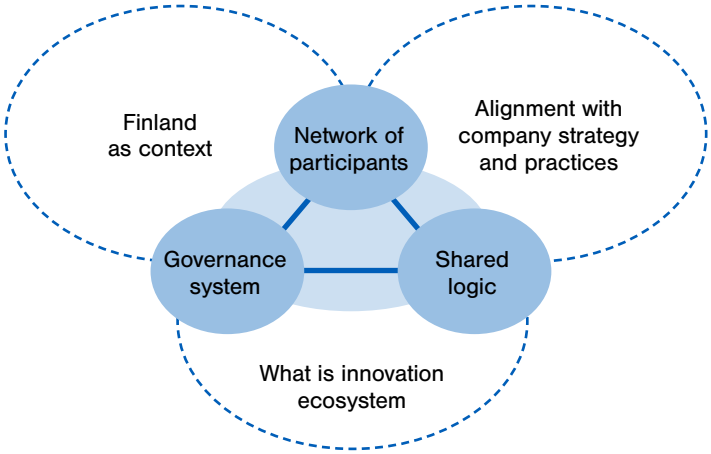


Figure 1. Main dimensions identified in the study.

Two types of ecosystems

Two types of innovation ecosystems were recognized in this study. In accordance with Adner (2017), they are referred to as ecosystem-as-affiliation (EAA) and ecosystem-as-structure (EAS). The former refers to an ecosystem formed around a focal firm, and is characterized as a more closed, privately led ecosystem with strict rules and leadership-followership dynamics. The latter is formed around a focal value proposition, often involving more public actors. While many findings and recommendations concern and may be applied to all innovation ecosystems regardless of the type, some of these suggestions must be specified to their ecosystem type. Hence, the dual classification was deemed appropriate. The two innovation ecosystems are characterized below (Table 1).

Table 1. Ecosystem-as-affiliation and Ecosystem-as-structure (Adner, 2017).

	Ecosystem-as-affiliation (EAA)	**Ecosystem-as-structure (EAS)**
Ecosystem Game findings	Closed (high barrier of entry)	Open (low barrier of entry)
	Strict contracts (NDAs, IPRs)	Flexible contracts (NDAs, IPRs)
	Private leader company (central orchestrator)	Public leader or multi-orchestration
	"How can we benefit from this ecosystem?"	*"What can we offer to this ecosystem?"*
Literature	Focal firm's centrality, bargaining power & network externalities as drivers	Compatible incentives to concretize shared value proposition
	(Closed) community of interdependent actors	(Open) set of all actors whose contribution the materialization of the shared value proposition depends upon
Literature stream	Moore (1993; 1996), Iansiti & Levien (2004)	Adner (2006; 2017), Jacobides et al. (2018)

Often it is easier to map innovation ecosystem characteristics as a continuum rather than as a strict classification (see Figure 2). Features such as openness, the focal firm's bargaining power and level of confidentiality vary between each ecosystem. However, a simplification is nevertheless useful in classifying the ecosystem's nature and its objectives, which is a prerequisite for understanding how a particular ecosystem should be managed. Importantly, each ecosystem type has its purpose, and neither approach is superior or inferior. As for instance, strict NDAs may play a crucial role in an innovation ecosystem in which IPRs cannot be openly shared. In contrast, an open innovation ecosystem with a low barrier of entry may be an effective way to maximize the use of external know-how.

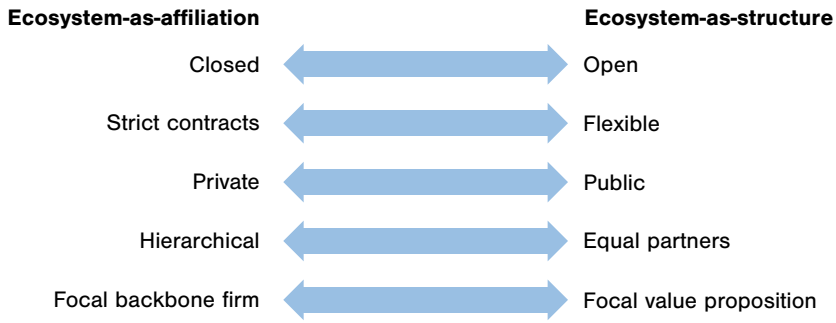


Figure 2. Ecosystem continuum.

Characterization of an innovation ecosystem

Literature characterizes innovation ecosystems through interdependence. An innovation ecosystem cannot be divided into bilateral relationships but is an outcome of interdependent value contributions (Adner, 2017). The mutual adaptation of these value contributions typically causes high adaptation costs, resulting in a high level of interdependence between players. This mutuality enables the ecosystem to create collective value that would be borderline impossible for a single player to create on their own. This is subject to the players' value contributions being complementary to each other, i.e., so that the inputs create greater value combined than produced apart (Thomas & Autio, 2014). In the study, the interdependent nature of innovation ecosystems was recognized. An innovation ecosystem was viewed as a combination of actors who design and implement projects within the ecosystem. In contrast to short-term projects, innovation ecosystems were described through long-term nature and sustainability. Importantly, it was noted that innovation ecosystems are too often viewed as projects, which was claimed to be a false perception by several executives. Overall, the ecosystem was about creating novel products and services in a project-like manner within a set of core partners.

> *"An innovation ecosystem must have a goal, but not necessarily an expiration date. [...] And I think the operational model is about creating something novel – new ideas, opportunities for progress. And from those ideas, projects may arise. It is about preparing and brainstorming what could be achieved together, and how to complement each other. And projects follow from it. At that point, it is time for contracts."*

A key characteristic was perceived to be a certain *"ecosystem mindset"* that the participants should embrace. It was suggested that clarifying the expected benefits, i.e., each partner's business case, is crucial when entering an innovation ecosystem. However, adopting a contribution-based approach was often deemed even more important for effective collaboration. This was especially true with the more open, structure-like ecosystems.

> *"The success of an ecosystem requires everyone to make an extra effort. Every partner should have a gift to share, instead of pursuing the benefits only."*

In accordance with literature (Moore, 1993; Autio & Thomas, 2014), innovation ecosystems were also defined through interplay, continuity, and complementarity. The differentiator to the word "network" was perceived to be a collectively designed roadmap for achieving mutual goals. According to our study participants, a part of the popularity of the term was experienced to stem from Business Finland who has embraced the term in recent years, yet the terminology of how co-creation activities were described varied. Words such as network, business ecosystem, co-creation, subcontracting, and partnerships

were used to describe innovation ecosystem-like activities. Some participants described the *"innovation ecosystem"* as a challenging and ambiguous term. For example, the term was perceived to refer to very high-level innovative disruptions in society, hence some participants did not feel comfortable to use it. Others linked the *"innovation ecosystem"* to public funding opportunities. Ecosystems were strongly associated with openness, even among those with strict selection criteria for new partners. However, openness was also seen as a challenge as it might bring complexity to IPR and confidentiality issues.

> *"If I wanted to create an ecosystem in which this carbon neutrality challenge [...] would be solved together with external partners, I already know a bunch of people who would tell me that we cannot do it openly like this. Because that would mean we cannot patent our products. If there is no patent, there is no competitive advantage."*

It has been argued that today, every organization participates in an ecosystem (De Vasconcelos Gomes et al., 2021). Despite the perceived challenges, innovation ecosystem terminology was also perceived to have helped the companies develop their innovative activities. It was largely recognized that a company must participate in an innovation ecosystem to remain competitive. Accordingly, the innovation terminology in many companies appears to have been updated. For example, the term *"supplier"* was deemed obsolete, and the term *"enabler"* was preferred instead in an innovation ecosystem. As each partner has their own value chain, a traditional value system approach where participants act only in their supplier-role was not deemed suitable for all cases in the current innovation environment.

Goals of an innovation ecosystem

Literature distinguishes between an innovation ecosystem and a business ecosystem, as the former refers to value creation and the latter to value capture (Valkokari, 2015; De Vasconcelos Gomes et al., 2018). However, the two concepts seem to be highly intertwined in managerial use. Among the studied innovation ecosystems, new business development was considered as the primary goal over research, and the "innovation ecosystem" term was rather associated with commercialization of innovation than with producing early-stage innovation. This is because it seems that the maturity level might change an ecosystem's objective. Several examples indicated that over time, an R&D-based ecosystem may transition into an innovation ecosystem and further into a business ecosystem where the focus is on commercial value and business rather than on the creation of new solutions. While for example Valkokari (2015) describes innovation ecosystems as integrating mechanisms between research and market, the findings suggest that the innovation ecosystem may become a business ecosystem at later maturity stages (see Figure 3).

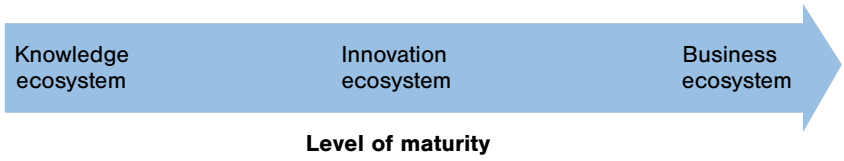


Figure 3. The ecosystem's transformation through maturity level.

In the interview analysis, the goals were aligned with the affiliation-structure dual classification (Adner, 2017). Typical goals were improving the focal firm's core offering (ecosystem-as-affiliation) or facilitating societal or business transitions around a focal value proposition (ecosystem-as-structure). The differences between ecosystem-as-affiliation and ecosystem-as-structure approaches are illustrated below (Figure 4).

Figure 4. Characterization of the two ecosystem types.

In our survey we asked if the development of new business or the improvement of existing business was more important as a goal for the 50 survey participants in Finland. The results were varied and can be seen in the Figure 5 below. We were especially interested in the differences between publicly led and privately led ecosystem and between the answers of ecosystem leaders and ecosystem members. We determined the private/public nature of the ecosystem by asking the survey participants if the ecosystem was led by a private or public partner. So, if the ecosystem leader was a public research organization, then we categorized the ecosystem as a publicly led ecosystem. This is however not exactly the same differentiation as the ecosystem as structure/affiliation division, as that one focuses more on what the ecosystem aims to achieve

(Adner, 2017) and not the partners that are included in the innovation ecosystem.

While in publicly led ecosystems it was more common to focus on improving the existing business (59% of respondents), in privately led ecosystems the results show that new business development (52%) and the improvement of existing business (48%) seemed to be pretty much equally important. A bigger difference was observed between the results of ecosystem members and leaders. Previous studies have found that companies most often do incremental innovation with external partners (in ecosystems) while the disruptive innovation is more often handled internally (Olsson & Bosch, 2017). This can be further discussed with Visscher et al. (2021), who distinguish an exploitative and explorative layer in innovation ecosystem strategy. The explorative layer focuses on variation, experimentation, and discovery of new innovations, whereas the focus of the exploitative layer is on selection, implementation, and materialization of the innovative opportunities (Visscher et al. 2021). Reflecting on the above findings, examples of both explorative and exploitative purposes can be observed in our findings.

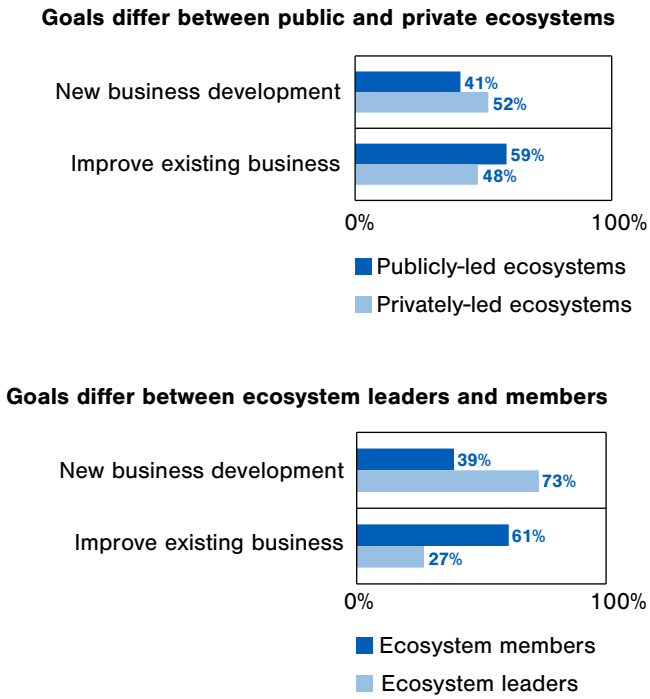


Figure 5. Comparison of innovation ecosystem goals amongst survey participants.

In addition, an objective emphasized by both types of innovation ecosystems was driving the industry development. Lobbying for legislative changes, and influencing public decision-making were perceived to be important objectives of the innovation ecosystem regardless of the type.

Success factors of an innovation ecosystem

A fundamental challenge of innovation is the lost output between stages of innovation, i.e., research and market. Differing incentives structures and efficiency perspectives between innovative actors, e.g., firms, academia, and the government, hinder the effectiveness of commercializing novel findings. Examples of these include cultural and organizational differences, issues of intellectual property protection, and varying incentives in publishing and distributing the research results (Ankrah & Al-Tabbaa, 2016; Sannö et al., 2019; Locatelli et al., 2021).

An innovation ecosystem can be viewed as a response to this lost value output – which is also known as the Valley of Death (Hudson & Khazragui, 2013) – as it aims to integrate all actors from academia and industry that the implementation of the focal value proposition depends upon (Adner, 2017). In the findings, practices to reduce the lost output were identified. Such measures include creating a concrete plan for commercialization, communication to external stakeholders to increase awareness and visibility of the ecosystem and its output, and inclusion of the customer in the ecosystem.

> *"The closer to the end customer one is able to innovate, the higher the probability of success."*

Transparent schedules and clear deadlines were also deemed important, as academic and industrial actors experienced challenges in aligning their scheduling preferences. To reach consensus on cultural differences, the results indicate that the go-to-market objective, i.e. the final output of the ecosystem, must be clear to all actors already in the birth phase. The role of the customer was deemed especially important. Concretizing the customer's needs through use cases was identified as a good practice.

> *" [...] We have these environments in which we do pilots. Our [partner] start-up companies are then able to target their solutions to these directly. Hence, we identify real customer problems by these 20 use cases, and can then attach a solution to them as a response."*

Previously recognized success factors of innovation ecosystems include – but are not limited to – clarity of purpose, attention to detail, innovation culture, openness to failure, systematic risk assessment, and trust (Durst & Poutanen, 2013; Autio & Thomas, 2014). This study suggests that regardless of the ecosystem type, the most important perceived value drivers are shared

interest, active and motivated partners, clear leadership, and R&D funding opportunities. In the qualitative analysis, trust and clear leadership emerged as key factors for the success of an innovation ecosystem.

The findings of this section are summarized in Table 2.

Table 2. What is an innovation ecosystem?

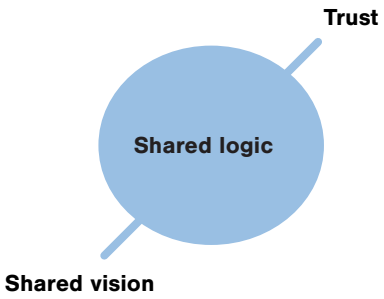
What is an innovation ecosystem?		
	Ecosystem Game insights	**Research literature**
Characterization	Set of partners implementing project-nature solutions	*"The evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors"* (Granstrand & Holgersson, 2020)
	Opportunity to leverage various skill sets of different actors	
	Long-term collaboration, sustainability	
	Complementarity	*"An integrating mechanism between the exploration of new knowledge and its exploitation for value co-creation in business ecosystems"* (Valkokari, 2015)
Goal	Develop implementable solutions for the market	Integrate research (exploration) and commercialization (exploitation)
	Improve focal firm's offering (Ecosystem-as-affiliation)	
	Materialize focal value proposition (Ecosystem-as-structure)	
	Develop industry / lobbying	Create value beyond a single firm's capabilities
Success factors	Shared interest	Clarity of purpose
	Clear leadership & trust	Innovation culture
	Funding & support for experimentation	Openness to failure
	Inclusion of customer in the ecosystem	Systematic risk assessment

II How to drive collective value creation?

This section describes the main findings concerning innovation ecosystem management. Collective value creation, the interaction between the ecosystem partners, is structured by three characteristics suggested in previous literature (Autio & Thomas, 2014): Shared logic, Network of participants, and Governance system.

Shared logic

This section shows findings related to the social and cognitive 'glue' that binds the ecosystem partners together. Collaborative reasons motivate partners to join ecosystems. We also discuss the role of shared vision and trust as fundamental binding elements for innovation ecosystems.



The shared logic can be characterized as the glue that binds the ecosystem partners together and enables their co-existence. The shared logic is built by legitimacy, trust, and mutual awareness between the partners (Thomas & Autio, 2014). Legitimacy includes questions such as what is considered appropriate and accepted, and what the ecosystem is about. Thus, the process of building legitimacy includes processes of sensemaking, and activities defining and maintaining identity.

Reasons for participation

The various participants of an innovation ecosystem may have different reasons for their participation in the innovation ecosystem. These reasons emerge for example through the expectations partners have for ecosystem activities and play a role in the formation of the collective identity. Nevertheless, all innovation ecosystem actors remain their own economic actor with their own goals and agendas (Lingens et al., 2021). This suggests that innovation ecosystems need to be integrated in each ecosystem actors' corporate strategies. Some participants indicated that ecosystems are not sufficiently integrated in their core business, either strategy or operations, causing a barrier for leveraging innovation ecosystem resources properly.

The findings of this study show that main reasons for participating were collaborative purposes. Participating in an innovation ecosystem was seen as a way of learning, building competences, and gaining experiences regarding the ways of working and acting in an ecosystem. It was acknowledged that participating in an ecosystem needs practice, and some of these ecosystem settings provide a good opportunity for this.

> *"It is a way to gain perspective, experiences, and contacts". And: "Practicing solutions to the main challenges through the ecosystem's model contracts [...] on a neutral playground where the business risk does not exist."*

Shared vision

An important element in building the shared logic in an innovation ecosystem is the process of creating a shared awareness of what the ecosystem is about, and what it seeks for. The findings of this study align with previous studies that emphasize the role of shared vision (e.g. Kania & Kramer, 2011; Könnölä et al., 2021). In this study, the role of the shared vision was mentioned from many perspectives. It was considered the most important enabler of success in the innovation ecosystem. Different agendas and interests were seen to hinder cooperation between partners. The lack of common and shared goals was considered the most challenging issue in implementing the ecosystem strategy. One can conclude that a clear and appropriate vision among partners enables shared direction.

Trust

Similar to shared vision, trust was also considered crucial for the success of innovation ecosystems. The role of trust has been frequently acknowledged by previous literature (e.g. Iansiti & Levien, 2004; Thomas & Autio, 2014).

> *"All of this is based on trust which must be built through collaboration and consistent dialogue – sometimes over a long period of time. We learn to trust that we are partners, and that ideas are not stolen from each other. This transparency requires trust which requires building together."*

The findings of this study show that trust in innovation ecosystems appeared mainly through trustworthy partners, or trustful interaction processes between partners. In many cases, when creating an innovation ecosystem, it is a natural way to look for partners among those that you already know and trust. Further, trust can also be looked on the level of the ecosystem. However, in this study, trust at this level was not often mentioned. An example of deliberately building ecosystem-level trust was an ecosystem, which had created a trust index – to measure and follow trust in the ecosystem. Building ecosystem-level trust takes time. Shared vision and agenda, as well as measures to follow

this development, can support this. Sharing common knowledge among the partners can positively influence learning and adoption potential, and thus, value-creation potential in the ecosystem (Ritala & Hurmelinna-Laukkanen, 2009).

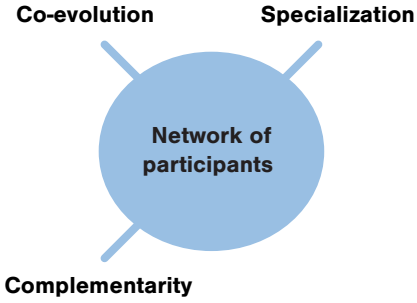
> *"This ecosystem was not built to be a talking shop. We aim for concrete progress. Yet, for the first eight months, it remained a talking shop, as trust building took its time. But then new fields of development started to emerge, and now we have been completing projects."*

Table 3 summarizes the challenges and solutions for shared vision and trust.

Table 3. Challenges and solutions for shared logic in innovation ecosystems.

Shared logic		
Attribute	**Challenges**	**Suggested solutions**
Trust	How to build ecosystem-level trust?	Create measures focusing on ecosystem activities, e.g. collectively created measure of trust in the ecosystem
	The role of trust in individual partners or in shared processes as prerequisite for ecosystem-level trust	Build on previous trustees & partnerships
		Participate in ecosystem's shared activities (planning & other discussions)
	Building trust takes time	Ongoing dialogue among partners
	Passiveness inhibits trust-building	
	Misaligned activities hinder trust-building	Agree on 'rules of the game' with other ecosystem partners
Shared vision	Clarity of the vision	Clearly defined vision and purpose
		Mutual understanding of the focus
		Shared agenda for implementation
	Appropriateness of the vision	Common understanding of the logic of value
	The process of collective vision building	Define a time horizon for vision building
		Decide on the participation

Network of participants



In defining the innovation ecosystem, Thomas & Autio (2014) emphasize that ecosystems are characterized by collective value creation, derived from the unique interactions between members. Extending the concept of value chain, ecosystems combine the individual value contributions into a coherent, joint input (Iansiti & Levien, 2004). Combining each contribution into a collective one causes high adaptation costs, resulting in a high level of interdependence between players. Interdependence has two important implications for the ecosystem:

1. It allows the participants to create collective value that would be impossible for a single actor to create on their own (Thomas & Autio, 2014).

2. Contrarily, interdependence causes that a failure or a withdrawal of a partner may cause significant challenges for the ecosystem (Lingens et al., 2021).

According to Thomas & Autio (2014), the collective value creation is dependent on three attributes: specialization, complementarity, and co-evolution. The findings of the study are discussed through this conceptual framework and the main insights are presented at the end of the section (Table 4).

Specialization

Specialization is a prerequisite for a functioning innovation ecosystem. In contrast to traditional value chain thinking, in accordance with Lingens et al. (2021), it was deemed challenging to define and measure each partner's contribution to the ecosystem. The findings suggest that to maximize the benefits of specialized inputs, it is crucial for the ecosystem to agree on the tasks and responsibilities in early phase meetings – or in case of a new partner's entry, through an extensive onboarding process – where each partner's contribution and gains are defined and agreed upon. Typically, a partner's share of the potential IPRs and financial resources provided for the ecosystem

reflect their level of activity in the ecosystem. Finnish innovation ecosystems are required to have clearly defined tasks and roles to be eligible for Business Finland funding, and roles are typically decomposed into work packages. However, while work packages bring clarity to the ecosystem operation, this approach alone was found to be working only moderately. Clear objectives, effective steering and trust were viewed as the backbones of ecosystem operation.

Besides defining and measuring the inputs, a major challenge was coordinating the individual contributions. While clear leadership was viewed as vital for the ecosystem, both single-orchestration and multi-orchestrator forms of leadership were present. However, for most ecosystem-as-affiliation cases, single orchestration was the only solution as closed innovation ecosystems typically require strict contracts, NDAs, and IPR provisions. The coordination in such ecosystems was often managed by a new business unit, new appointed ecosystem manager, or a business incubator. In contrast, in the more open ecosystem-as-structure ones, a neutral facilitator company was found to be a potential resource for coordinating the inputs (Figure 6). Among these ecosystems, experiences of neutral coordinators were positive. Such facilitators were found to ensure that the ecosystem focuses on shared objectives instead of the focal actor's goals, thus increasing the level of trust between the actors. Through the focus on shared objectives, a neutral coordinator was seen as an effective way to attract new partners, funding, and resources, since it might help the ecosystem profile itself as an advocate of the industry instead of the focal actor. Reasons for hiring a coordinator included lack of ecosystem knowledge, lack of resources to manage the ecosystem, and in some cases, a gap between the company's ecosystem functions and core business. For the coordinator role, a consultative project management organization was preferred over a research organization due to the project-like nature of operations within the ecosystem.

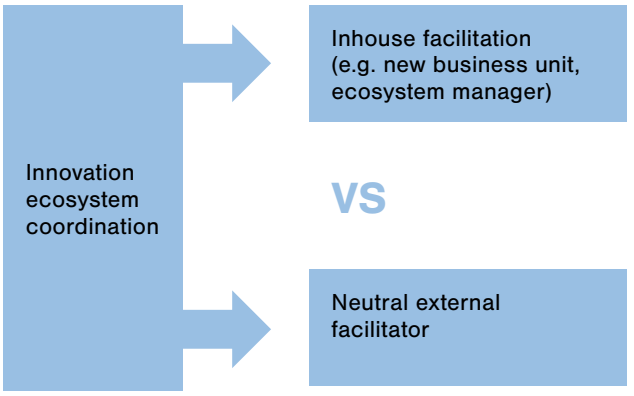


Figure 6. Inhouse vs neutral external facilitator.

Complementarity

We have already discussed how the specialized inputs of the participants should be complementary. The main challenge, however, is finding measurable complementarities to ensure maximized benefit from the collaboration. On a high level, the results suggest that complementarities can be found through early discussions on the resources and skills that partners may provide for the ecosystem.

Complementarity presents two types of risks for the ecosystem: interdependence risk and integration risk. The first one is associated with the failure of a partner. When several firms participate in a project in an ecosystem, the success of that project depends on each partner delivering their commitments within the agreed time frame. One actor's failure thus suggests a purely mathematical risk for the partners – the more actors involved, the higher the probability of failure (Adner, 2006). This risk was recognized, and it was mitigated through diversification of resources, i.e., by co-developing and co-experimenting a technology with several partners of different ecosystems. This approach allowed the actors to recognize the potential of an innovation in the early development phase and continue the development of successful ones.

The second risk caused by the interdependent nature of ecosystems is integration risk. Adner (2006) referred to it as the likelihood and consequences of others not being able to – or not being willing to – adopt the solution. In practice, participants in an innovation ecosystem may cause failures to others if the goal alignment is inadequate, i.e., if the ecosystem lacks a shared vision (Adner, 2006; Adner & Kapoor, 2010). According to the results, lack of shared vision may be detrimental for the ecosystem. As the leadership and control of priorities was shared in many ecosystems, establishing a clear vision and shared objectives were deemed as especially important risk management tools. Moreover, it was viewed as crucial to update the vision regularly.

Co-evolution

Thomas & Autio (2014) proposed that each player must constantly co-evolve within the ecosystem as well as externally by responding to the changes in the market environment. The findings suggest a link between an optimal co-evolution and minimized conflicts. For interdependent partners to respond to unexpected changes, a high level of trust between the partners is needed for conflict prevention. To establish this, the data suggest IPR agreements in the early phase. This is true especially for the ecosystem-as-affiliation ecosystems that are typically closer to market. In contrast, those with ecosystem-as-structure features often postpone the IPR agreements until the project begins in order to lower the barrier of entry for potential participants. In addition, a neutral ecosystem coordinator may be used to balance out the power dynamics.

A neutral coordinator may position all partners as closer to equals, as the management is not centralized for a single partner who "owns the ecosystem".

The co-evolutionary nature of innovation ecosystems was also linked to challenges of knowledge transfer. Effective management of knowledge and information transferred between partners is vital for innovation ecosystems (Bacon et al., 2019). Interdependence often causes delays, i.e., for a partner to provide their value contribution, they may have to wait for other partners' results. Moreover, it seems that knowledge and skills do not always fully transfer between the organizations. The findings show that in some cases, competitive settings present barriers for knowledge flow between participants. To alleviate the barriers of knowledge transfer, results suggest adopting a physical co-creation approach. It is also important to note that once the ecosystem has effective processes for information flow, the company's ability to disseminate the knowledge internally is crucial for the success of knowledge transfer (Bacon et al., 2019).

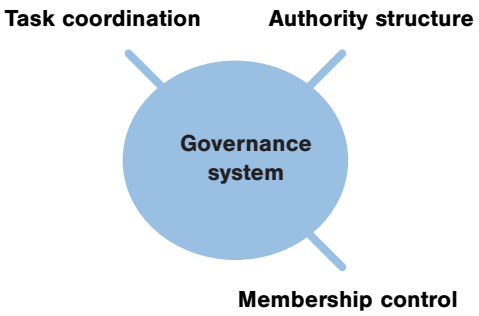
> *"Sometimes an internal project would be ready for the next step, but you have to wait for the partner's results. [...] And how to mitigate this – you can do it through formal contracts, but there are also soft measures to expedite the progress. One that we apply is sending the person over to work with the partner. This is also a mitigating principle for knowledge exchange barriers – when the partner is completing their tasks, the know-how may not transfer to our organization."*

Finally, while innovation ecosystems may have a clear vision and goals, some of them lack clarity of how the objectives should be pursued. The principles that emerged from the data to improve the alignment are for instance member agreement on the features of the final solution, and early-stage discussions on their contributions and expectation of each partner. These will be more discussed under governance and the creation of a common operating model. The findings of this section are summarized below (Table 4).

Table 4. Challenges and solutions for Network of participants in ecosystems.

Network of participants		
Attribute	**Challenges**	**Suggested solutions**
Specialization	Passive partners	Expectation management
	Risk of opportunism	Expectation management
	Determine (and measure) each value contribution	Early-stage agreements of responsibilities and benefits
		Work packages
	Coordinating the specialized inputs	Neutral facilitator (EAS)
		Clear leadership role (EAS, EAA)
		Single- and multi- orchestration (EAA)
		New business unit, new ecosystem person, business incubator (EAS, EAA)
Complementarity	Experimental nature of innovation / uncertainty	Flexible roadmaps
	Interdependence risk / failure of a partner	Participate in many ecosystems
	Integration risk / inadequate goals	Clear vision & goals in the early phase
		Update vision and goals
Co-evolution	A partner's failure to co-evolve	Update roadmaps regularly
		Define ecosystem's flexibility
	Conflicts	Early IPR agreements (EAA)
		Neutral facilitator (EAS)
	Knowledge transfer	Contracts
		Co-creation in physical proximity
	Competitive settings	Define the go-to-market objective
	Misaligned perceptions of output	Clarify every partner's business case in early discussions
		Agree on end user solution
		Integrate customer in the ecosystem

Governance system



This section shows findings related to the governance system in innovation ecosystems, as summarized in Table 5. Main challenges relate to the development of a clear management and operating model that would provide enough structure when hierarchy structures are fluid (top down processes) as well as the initiation of practices to align member interests (bottom up processes). Please see Figure 7 below for a summary of some of these practices that are discussed in this section. We examine authority structure, membership control and task coordination.

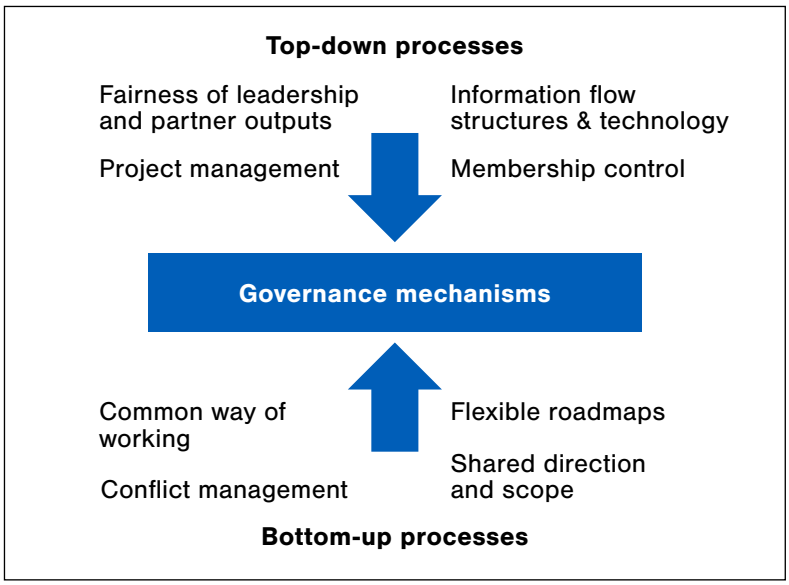


Figure 7. Top-down and bottom-up governance processes.

Authority structure and leadership

Due to a varying extent of resources, engagement, and ownership, a certain level of hierarchy and asymmetry of controlling power tends to naturally emerge in an ecosystem setting. This typically correlates between a firm's size, interest, funding resources, and portion of IPRs. The key variable concept in this is the amount of stratification (Gulati, Puranam & Tushman, 2012), which creates the social structure and determines how decisions are made, and which goals get pursued. Stratification in an ecosystem can range from being high, meaning that there exist clear hierarchical lines of decision-making, to low stratification, a situation where no partner has the power to enforce hierarchical decision-making.

The amount of stratification is correlated to the leadership in an ecosystem, and the type of ecosystem: ecosystem-as-affiliation (high stratification) and ecosystem-as-structure (low stratification). In open, usually publicly led ecosystems, leadership may be shared, and orchestrating tasks may be redistributed (i.e. more fluid decision-making structures). In the more closed innovation ecosystems, where NDAs and tight IPR agreements were presented in the early phase, the traditional leadership role of the backbone organization is strong.

Steering groups are commonly and actively used amongst the study participants' ecosystems. It was common to have monthly steering group meetings with action-point lists, and follow-up mechanism. The most important consideration is, who is present at these steering group meetings (i.e. one representative per firm), and how information-sharing is facilitated. Nevertheless, most issues were clarified before they would be discussed in steering group meetings, as this was seen as a last resort option.

Besides the direct structure and leadership of the ecosystem, stratification can also be influenced through the provision of stable assets (e.g. Business Finland funding), cultural norms or even through the possession of a fundamental technological element (Gawer & Cusumano, 2002). The findings show how the percentage of Business Finland funding strongly influences the amount of work a partner should put into the project but also how further costs are shared.

> *"How did we then decide about sharing the development costs? Of course, it went according to the funding instruments, so the amount will be divided by partners in relation to the amount of work to be done. [...] The workload is negotiated in advance at the beginning of the project. Yes, on a high level these are all agreed."*

These and other similar procedures can be (and should be) purposefully introduced into the ecosystem (Gulati, Puranam & Tushman, 2012), which is especially necessary in low stratification ecosystems (i.e. open, publicly led ecosystems). In these, hierarchical decision-making is often impossible, so the normative expectations of partners are created through a peer-based approach (Gulati et al., 2012). This means that in low stratification ecosystems (e.g. ecosystems-as-structure compositions) the ability to create a common operating model that aligns the work of partners is of crucial importance, because these expectations – of a partner's own work and that of others – is what holds the social structure together and gives legitimacy to decision-making.

Our findings support this observation. The most often proposed changes to improve the performance of the ecosystems are related to the clarity and common agreement of the social structure: achieving a clearer management model, having deeper partnerships, improving communication and managing expectations. This suggests that finding a common working style is still at the forefront of ecosystem challenges, with a direct improvement to performance.

Project management supported by a clear management model

When it comes to developing a clear management model, the current thinking is to rely on project management structures. An ecosystem is built on many layers and in different stages, from individuals to units, companies, ecosystems, and across ecosystems (De Vasconcelos Gomes et al., 2021), so individual projects fit nicely to drive deliverables forward. A common goal is to get successful projects out of the ecosystem. Nevertheless, as seen in the quote below, there is a possibility of a gap between the conceptualization of projects from the innovation ecosystem and the actual feasibility of the projects. In this sense, there has been a tendency to facilitate decision-making from a steering group to a project management level, and make sure that the project managers are included in the planning process as well as in leadership meetings.

> *"[The ecosystem] was developed passionately – what it would require, who would take on the leadership role, who could join, what the common vision would be... We even did a test project, and the disappointment was huge as we realized that the specific project was not ready to do it – it was not feasible."*

When it comes to the actual projects in an ecosystem, and their leadership, only core partners were included in the project groups. In these groups then, IPRs, data sharing, and other project specifics were arranged because it is easier and more efficient than negotiating these in the wider ecosystem community. Moreover, it was deemed very important that projects had clear leaders and that the information from project groups was communicated back to steering group meetings, by having project managers represented in these meetings. A

key finding was to facilitate information flow and strategic input between the steering group level and the project management level.

While projects bring structure and familiarity to innovation ecosystem members, there was also a sentiment that innovation ecosystems are not just efficiently coordinated projects. So, on the one hand, project management skills are crucial, yet there is uncertainty of how fixed they make the governance of ecosystems on different levels, i.e., steering, coordination and production levels (Hemilä et al. 2021) and how experimentation could be supported in these.

> *"If there are projects and external service providers, the ecosystem will too easily turn into a subcontracting value chain. It will become an automatic billing machine. And this has been a major challenge. We must be capable of guiding the ecosystem well enough so that the things we do will benefit the customer. In this group of engineers, if product or project management does not work, our operations will not create customer value – which will increase our costs, especially in digitalization-related matters".*

Membership control

Membership control is a means of control to achieve the value specialization and complementarity described in the section on network of participants. It is about developing a structure and delineating the rules of membership which help to align the interests of members. The survey results show the importance of different membership control practices between ecosystem members and leaders and can be observed in Figure 10. Figure 11 then showcases that the biggest challenge with partners has been finding alignment regarding different agendas and interests as well as establishing a common way of operating. Our interviews show that this was realized by tweaking the level of openness, by hands of onboarding processes and by thinking about rewarding and responsibility mechanisms.

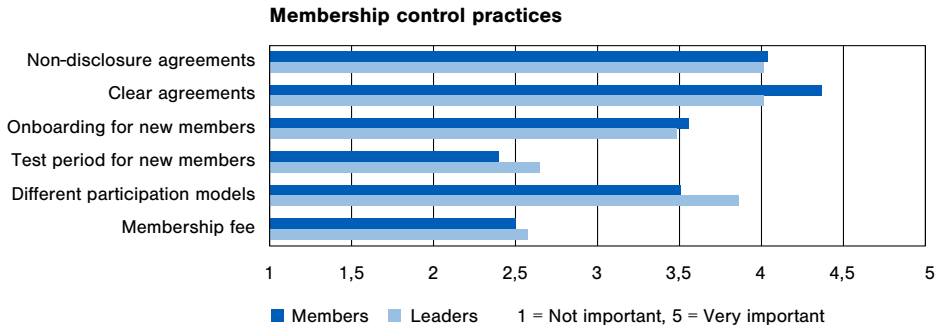


Figure 8. Membership control practices for ecosystem members and leaders.

Our survey participants were asked to rank the following membership control practices according to their importance (1 = not important to 5 = very important). As can be seen in Figure 8 above, the most important practices for all were clear agreements, NDAs, and different participation models. These practices can be solutions to addressing the challenge of finding alignment between ecosystem partners. For leaders, different participation models and a testing period were slightly more important concerns, while members valued onboarding practices and clear agreements higher. Additionally, a membership fee was slightly more important in publicly-led ecosystems with an average ranking of 3,5 (slightly important), than in privately-led ecosystems (average 2,6: between not particularly important to slightly important).

When establishing the level of openness in an ecosystem, two aspects need to be considered (Thomas and Autio 2014). First, what type of ecosystem it is, does it work on an open industry standard or a proprietary standard? And second, how much additional value each new member can bring. Open industry ecosystems and ecosystems-as-structure constructs are less sensitive to technological appropriation risks and can therefore have higher levels of openness to new members.

Our survey results show that most participants considered their ecosystem to be open for new members. Nevertheless, our study results suggest that ecosystems aim to clearly determine the additional value of each new member, which becomes more challenging the closer the innovation ecosystem is to market entry, and the narrower the vision and roadmaps becomes. One case company describes their process and challenges below.

> *"We treat this [partner selection] almost as a recruitment process. We expect to see evidence of past achievements. And then we do an extensive analysis of whether a certain partner should be allowed to join. However, universities and research organizations are special cases. [...] We thought that ecosystem operations would be more challenging, but it is quite straightforward – in contrast to partnerships with industry players with similar goals that are prone to conflicts.*

During the interviews it was also stated that competitors should not exist in a closed, affiliation-type ecosystem. In a structure-type ecosystem such settings were seen to be possible, yet not straightforward, as some conflicts were caused by competitive settings. However, in our survey results (Figure 9) 66% of respondents stated that competing companies are involved as partners in innovation ecosystems, but that this competitive setting has not resulted in significant conflicts. Only 12% of all respondents have declared that they agree that a significant conflict has arisen because of the competitive setting, and interestingly this group consisted mostly of ecosystem leaders. Every fourth leader that filled in this survey would agree to the statement that a competitive setting causes significant conflicts.

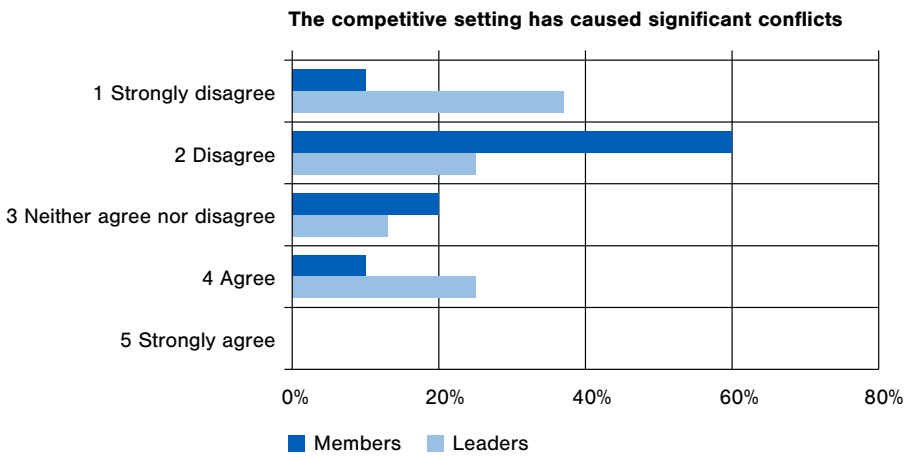


Figure 9. Conflicts caused by the competitive setting.

To mitigate conflicts caused by competition, a "veto right" could be provided for all partners to prevent the entry one's closest competitors into the ecosystem. Furthermore, onboarding practices emerged during the interviews to incorporate new members quicker into established ways of operating. These can be for instance using technological solutions, as described in the quotation below, to speed up the process and share rules of conduct and ecosystem guidelines.

> *"The onboarding process, how things technically work, must be continuously improved. It must be easy to go into the portal, click x – y – z and there you have the contract open. All paper contracts must be replaced with electronic ones. While this happens, the operation must turn into a joint offering that creates customer value. Ease of such processes is the be-all and end-all for a win-win ecosystem.*

The interview results furthermore propose that the innovation ecosystem should have a package scheme of incentives for the executives. Performance evaluations and KPIs were recommended to be linked to the innovation ecosystem activity for the executives responsible for ecosystem operation. However, it was viewed as difficult to design such indicators for measuring how the responsible person's contribution affects the performance of the innovation ecosystem. As value in innovation ecosystems is created through complementary processes, measuring the impact is challenging (Lingens et al., 2021). Examples of indicators of the success of the innovation ecosystem were number and quality of users, revenue (more appropriate for affiliation-type ecosystems as publicly led ecosystems may not aim for profit), and number of new partners.

"I think that we should never underestimate an incentive scheme's effect on people's behavior. And because of this, the ecosystem's incentive packages for the ecosystem responsible should be highly aligned with the ecosystem partner firms' incentives. If an ecosystem partner should succeed, and this success is measured, and this ecosystem has either positively or negatively affected this partner's success, the people responsible for the ecosystem operations should either get a bonus or get fired, depending on the success of the ecosystem.

Task coordination

Task coordination is concerned with governing collaboration through legal and operational measures. The findings shows that in operational coordination, the most important challenges were creating a common operating model as well as determining a common scope for ecosystem partners. On the legal coordination side, challenges concerned IPR negotiations and the sharing of knowledge and ecosystem results. In the Figure 10 below, the most relevant factors in ecosystem management relate to operational coordination i.e., common agenda, continuous communication, partners joining the planning process and steering groups. Legal coordination practices, such as IPR rules and data management practices, have been identified as most challenging, while being moderately relevant. In the interviews, legal coordination practices were dealt with case-by-case, making them time-consuming.

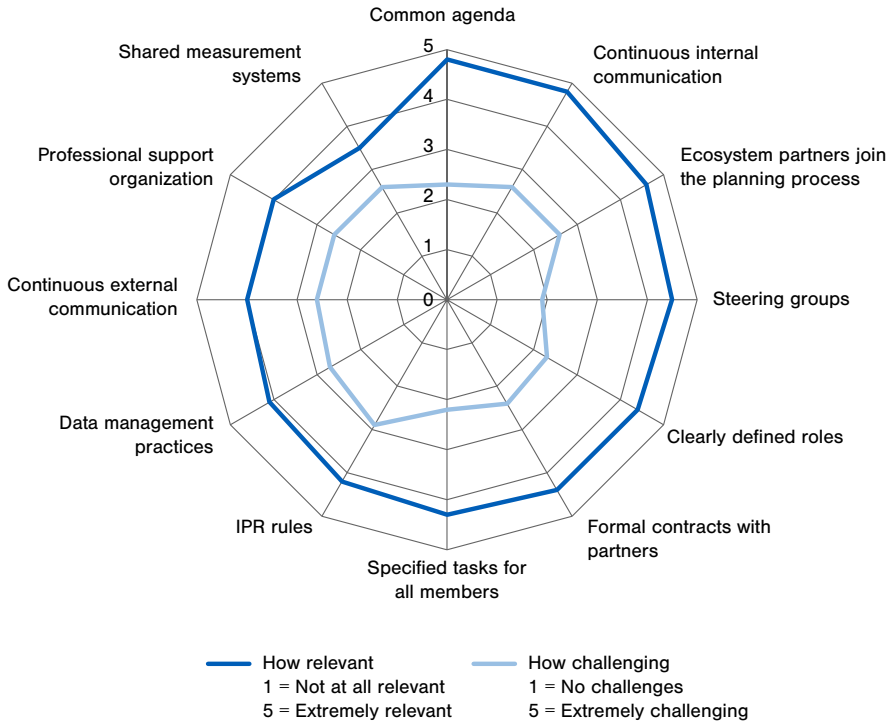


Figure 10. Relevant and challenging factors in ecosystem management.

Creating a common operating model

The suggested solutions when it comes to creating a common operating model were similar from the numerical averages as well as the in-depth analysis. The first suggestion was to include ecosystem partners in the planning process. This importance of planning was highlighted throughout as this gives the momentum and rhythm for the rest of the endeavor, as is well described in the below citation. Having the critical members engaged from the start helps to form and have all members onboard with the roadmaps and vision.

The runner up is open and continuous communication on all levels and throughout the projects. Communication is key when the ecosystem is reliant on informal networks to cooperate. This is a solution that is often highlighted, yet challenges such as secrecy due to a competitive setting, differences in industry standards, or just not enough communication easily occur. Below a citation that shows how just adding more dialogue could create an open space for innovation.

"I would not change the management model necessarily. Instead, I feel like a firm's contribution in the ecosystem is highly dependent on the person who represents the company. We have a couple of [professionals, who] are not very prone to active dialogue. [...] Improving the level of dialogue would create more engagement and more ideas. [...] We have also had cases when a partner firm's ecosystem responsible had been replaced by a new person. This new person was not familiar with the ecosystem's history and culture, even though their predecessor might have been very active and open. This is maybe something that I crave for ecosystems. More disruption in these discussions – making sure that the space is open."

In the survey we further asked participants if they considered value in the ecosystem to be created through individual contributions or through a collective effort (Figure 11). To this, most participants replied that value was created equally through individual and collective efforts. Yet, in privately-led ecosystems there were more responses that favored value-creation through collective effort with even 6% of respondents stating that value is created completely through collective effort.

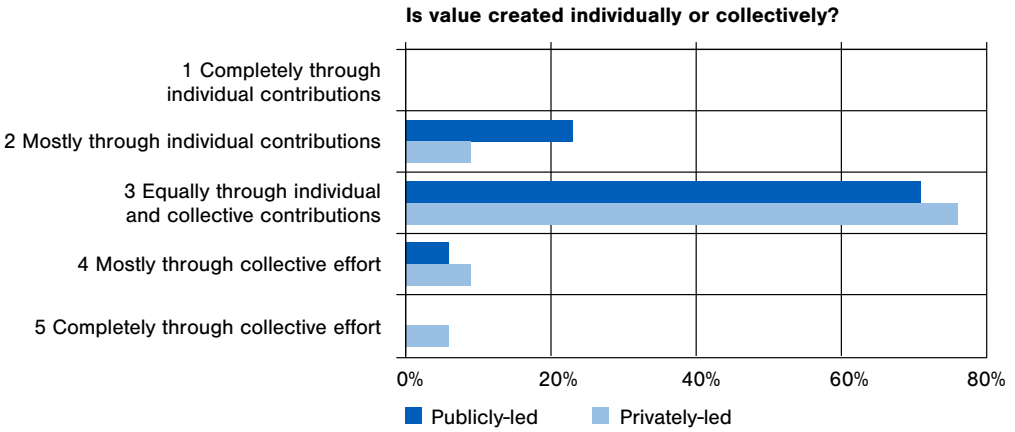


Figure 11. Value-creation in innovation ecosystems.

Determining common scope and roadmaps

The elements that arose as most important when it came to setting a common scope or agenda for projects was dealing with roadmaps and making sure that the business incentive is clear for the project as well as the individual partners. In addition, our survey results show which task alignment practices are being employed in innovation ecosystems (Figure 13). Practices that support this is an appropriate vision, agreed cost allocation, transparent coordination and communication channels ranked highest.

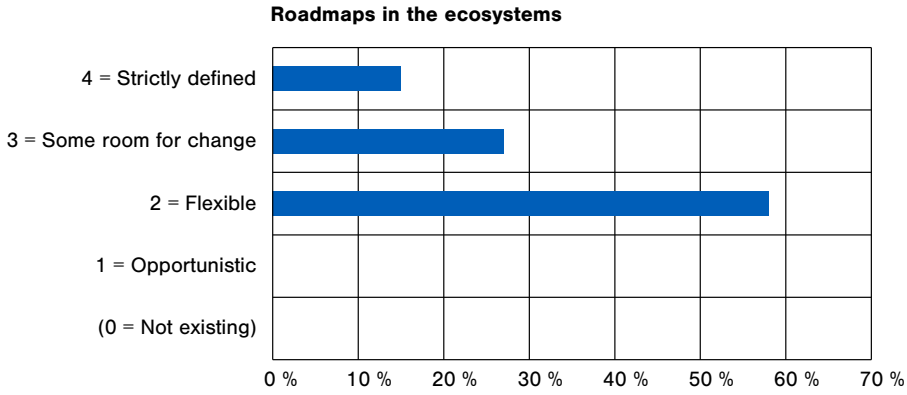


Figure 12. Flexibility of roadmaps in the studied ecosystems.

Half of the ecosystems had flexible roadmaps and the rest were more fixed structures (Figure 12). None had opportunistic or non-existing roadmaps. Important insights from ecosystem managers were to have similar levels of ambition in goal setting as well as be able to realistically negotiate action points. Updating the ecosystem's roadmap regularly is an essential measure to keep the ecosystem viable. Moreover, the level of flexibility in the entire ecosystem should be defined and agreed upon in the beginning.

An important finding was to make sure that the business case is clear for all members that participate. This included three different levels: overall business viability, members' business case and clarity about cost division. So first, the ability to recognize the business case of the idea and if there's none, terminating the project in time. Second, every ecosystem member needs to clarify for themselves why they are in the ecosystem and what they can gain from it. And the third aspect was to arrange project costs early-on in the ecosystem work.

> *"Everyone must make their business case clear. If this is unclear, or the partners' goals are not aligned, problems will emerge."*

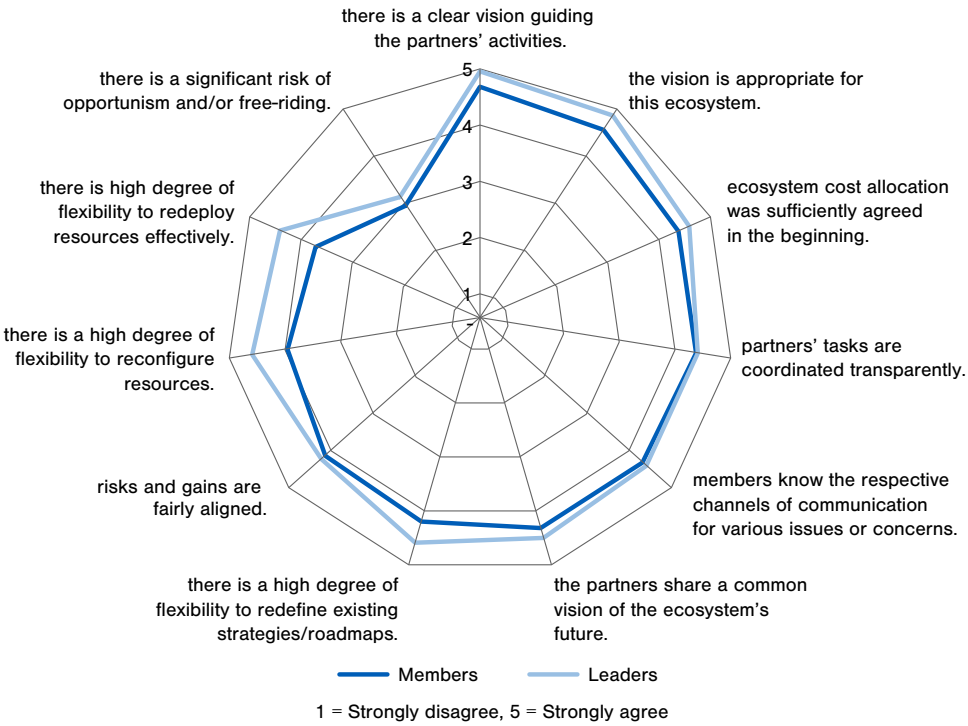


Figure 13. Innovation ecosystem practices supporting a common scope and task alignment.

Figure 13 shows the survey responses by members and leaders when it came to stating if these practices were employed in their respective ecosystems. Interestingly, all except the risk of free riding/opportunism were higher than a 3 on our scale (3=neither agree nor disagree), meaning that respondents were more likely to agree to having these conditions. The figure is organized according to ecosystem member preference, meaning that the top practice (clear vision guiding the partners' activities) was most agreed to and then descending in clockwise order. The themes most agreed to were thus having an appropriate vision, agreed cost allocation, transparent coordination and knowledge about communication channels. In all of these practices, leaders had a slightly higher agreement or optimistic assessment of these practices being used in the ecosystem.

Legal coordination

When it comes to legal coordination practices, the results were much more varied. In some ecosystems, (more of the type of ecosystems-as-affiliation) contracts were signed immediately, and partners knew immediately what they needed to accomplish, and what they could hope to gain from the ecosystem.

This was especially important when there were uncertainties in the ecosystem e.g., in the left quote in Figure 14, the ecosystem representative is reflecting if the competitive setting resulted in disturbances for the ecosystem. It didn't, as the ecosystem had a strict project structure, and every company had their specific roles, and focus.

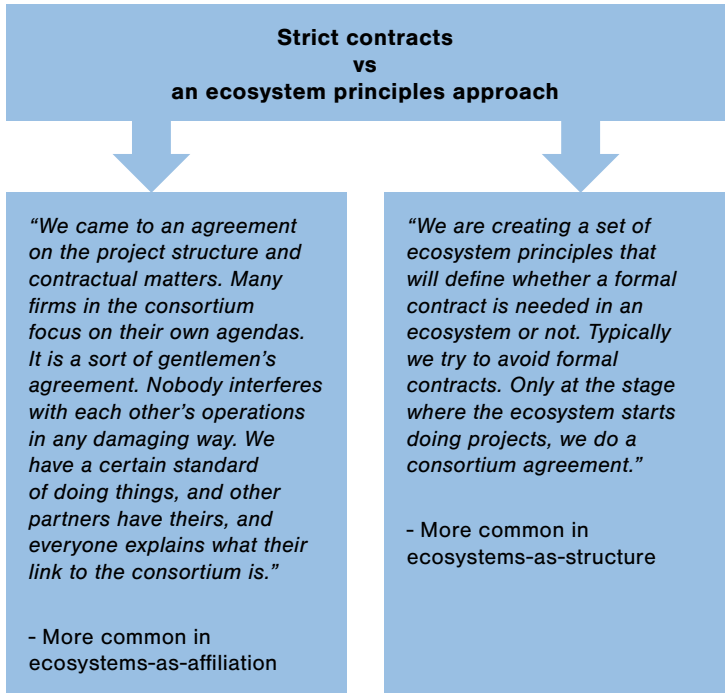


Figure 14. Formal contracts and ecosystem principles.

Nevertheless, other ecosystems (quote on the right above in Figure 14) were wanted to be kept more open and have looser structures and regulations, especially when it comes to IPRs and NDAs. This was seen as a method to keep the ecosystem activity more open and get more partners along, in the sense that they can come along first and then later decide which projects to join. Nevertheless, latest in the project consortiums, legal coordination took place. IPRs were rarely shared, and the common practice was to negotiate these case by case. Below an example of how IPRs were handled. In this example, everybody kept their part of the work and that what was commonly created, is then freely available. The guiding principle is that nobody should profit from the IPR above others.

"Usually we avoid doing shared IPRs. It may present some challenges, but every partner does their own IPRs and manages them in their project tasks. Shared IPRs have turned out to be heavy and challenging, as you have to consider IPR on many levels, even IPR payments for employees. This is why we have given up shared IPRs. [...] And since there are not many competing firms in the ecosystem, every partner may create their own IPRs from their own work. And what is done collectively, will be accessible to everyone. [...] And if we make a co-offering product, we have a rule that says nobody will commercialize those IPRs behind other partners' backs – those rights will be available with fair conditions."

Table 5. Challenges and solutions for Governance system in ecosystems.

Governance system		
Attribute	**Challenges**	**Suggested solutions**
Authority structure	Fairness	Leadership perceived as fair
		Every company has 1 voice in leadership meetings
		Expectation management: transparency and clearness in negotiations
		Partnership considerations
	Developing a clear management model	Dual structure: project groups with core partners and wider participation with all ecosystem members
		Decision-making facilitated for project management
		Information flows between projects and steering group level
Membership control	Level of openness to new members	Determining the additional value of each new member
	Onboarding new members	Systemic onboarding process + ecosystem rules of conduct
	Rewarding and responsibility	Possibility of bonus/layoff for the ecosystem responsible
		KPIs possible through formal contracts
		Membership fees paid to the ecosystem coordinator (esp. in EAS)
Task coordination	Creating a common operating model	Ecosystem partners join the planning process
		Continuous communication on all levels
	Determining common scope	Flexible roadmaps
		Business case clear for all
	Negotiating IPR	Negotiating IPR case-by-case
	Sharing knowledge and findings	Ecosystem coordinator or responsible facilitating knowledge flow

III. Alignment with company strategy and practices

This section describes how company-level practices align with innovation ecosystem management and is summarized in Table 6. Companies rarely have an explicitly articulated innovation ecosystem strategy. We discuss this and the observations of how strategy is realized.

Articulation of an innovation ecosystem strategy

To ensure adding value to the company's competitive advantage, firms can develop and articulate strategies for innovation ecosystems. Deliberate or not (cf. Mintzberg, 1985), they can have a role in the management of activities related to innovation ecosystems.

The perspective, which focuses on how firms align their internal activities, such as strategy, with innovation ecosystems, has not been a primary interest in previous innovation ecosystem literature (Bosch-Sijtsema & Bosch, 2014). In this study, it was interesting to see how innovation ecosystems were integrated in companies' strategy. The researchers approached this by seeking understanding of whether companies had articulated innovation ecosystem strategies, and if they do, what they are like, and how they are realized. When asked – Do you have an explicitly articulated innovation ecosystem strategy? – most of the interviewees said that their companies did not have an explicit innovation ecosystem strategy.

Our survey results (Figure 15) corroborate this finding. Most respondents answered below a 3 (neither agree nor disagree) in our survey and closer to a 2, meaning to disagree with the statement of having an explicitly articulated innovation ecosystem strategy. However, partner companies of privately-led ecosystems were a bit more likely to have an explicitely articulated innovation ecosystem strategy, as well as clear and appropriate KPIs to measure the success of participating in the innovation ecosystem.

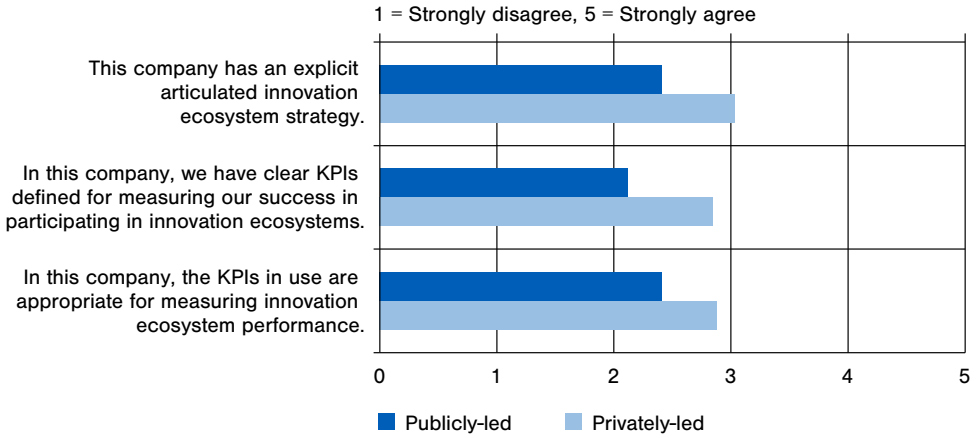


Figure 15. Innovation ecosystem strategy and KPIs in companies in privately and publicly led ecosystems.

However, not having an explicit innovation ecosystem strategy, or, using the word innovation ecosystem *strategy* does not mean that strategy does not exist. Strategy can exist in an organization without being articulated. For example, as explicated text or behavior guiding the organization or a plan to be implemented. Strategy may exist as a pattern in a stream of actions (e.g. Mintzberg & Waters 1985) or in the flow of activities (e.g. Whittington, 2006). According to the findings of this study, though not explicit, innovation ecosystem strategy was often perceived being linked with or part of the company's business strategy. This connection was often built implicitly, for example so that the company strategy was seen guiding all activities in the company, including innovation ecosystem activities. Further, interviewees described how some of the contents of their explicit business strategies or roadmaps included activities that were linked with innovation ecosystems, although the primary perspective was not the innovation ecosystem. The connection between innovation ecosystems and strategy was also built through capabilities or partnerships that were explicit in companies' strategies. For example, innovativeness was pursued as part of company strategy, and this was seen to support innovation ecosystem initiatives.

> *"In our strategy, innovativeness [...] is one of our ways of working. And one of our tools to improve in this constantly changing environment. [...] Competence management and ecosystem building are explicitly stated in our strategy."*

Often the intention related to innovation ecosystems was conceptualized while enacted. Different areas or units of the company were responsible for strategic thinking in their own area or of making their own plans regarding innovation ecosystems. Nevertheless, our survey results (Figure 16) show that leaders had higher estimates about there being an explicit innovation ecosystem strategy, and defined KPIs. This speaks for the need to communicate the strategy to all members of the ecosystem, especially when it is being conceptualized while being enacted.

> *"Ideas for ecosystem development and new strategic initiatives come from the business units. A frame of what fields to concentrate on comes from the top management, but within this frame, strategic thinking happens elsewhere too."*

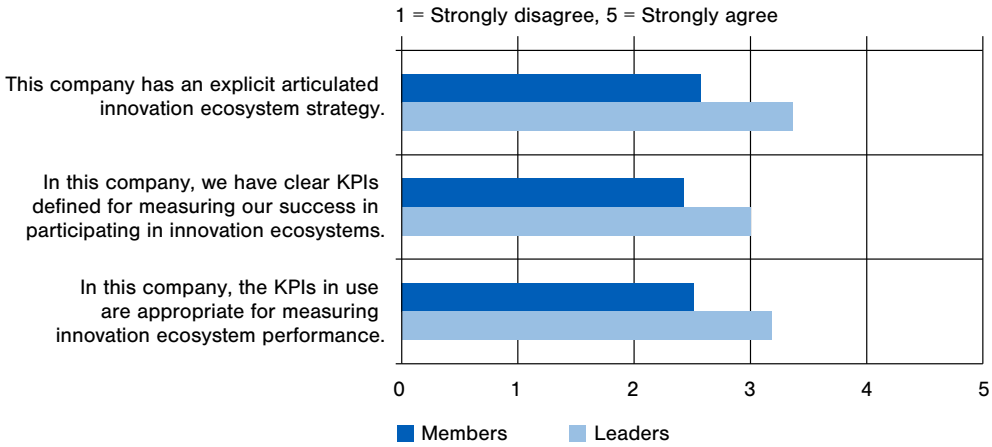


Figure 16. Leaders' and members' perceptions on innovation ecosystem strategy.

Table 6. Challenges and solutions for Alignment with company strategy and practices.

Alignment with company strategy and practices		
Attribute	**Challenges**	**Suggested solutions**
Innovation ecosystem strategy	Innovation ecosystem strategy not articulated	Define the intentions related to innovation ecosystems and the links with your competitive advantage
		Make explicit the implicit connections with company or business strategy
	Implementation of innovation ecosystem strategy	Articulate innovation ecosystem strategy – implementation dependency
		Map the challenges in aligning resources and goals and different interests (company-ecosystem)
		Promote the desired way of ecosystem participation within your company
Company practices	Appropriate organizational structure for innovation ecosystem activity	Innovation ecosystem activities under top management
		Innovation ecosystem activities in innovation or partnership function
	Organization's support functions aligned with innovation activities	KPIs aligned with innovation ecosystem activities
		Competence development aligned with innovation ecosystem activities
		Making explicit the changes in the ways of operating and thinking about innovation ecosystems, e.g. mapping key partnerships
		Align resource allocation between internally contributing vs. ecosystem contributing activities

Strategic objectives and benefits of innovation ecosystem participation

When discussing strategies, objectives are a natural element. Typical reasons to join an innovation ecosystem include the ability to share risks and development costs, gain an access to valuable information, resources and capabilities, an increased ability generate innovations, and improved market entry opportunities (Autio & Thomas, 2014). In line with previous findings, highlighted reasons to join an innovation ecosystem in the study were new business opportunities, technologies, networking opportunities, and knowledge. Our survey results (Table 7) further distinguish when ecosystem participants expect to gain their benefits of participation.

The benefits in rows 3, 6, 7, 9, 10 in the Table 7 below show the benefits that a large amount of participants have already gained by the current amount of ecosystem participation. These are: networking opportunities, the improvement of a company's innovation culture and public image as well as the access to new knowledge, and improved understanding of future trends. All in all, most benefits of innovation ecosystem participation are expected in the short-term of 1–5 years (column 4). Nevertheless, the development of new business, technology, products or services, which can be considered an explorative purpose (Visscher et al. 2021), is considered to have a longer time horizon than other expected benefits. This new development benefit (row 2) is expected in 1–5 years in amongst half of participants, with even 37,5% believing this benefit to be gained only in 5–10 years.

Table 7. Expected benefits from innovation ecosystem participation (short- and long-term).

Expected benefits from innovation ecosystem participation	Does not concern this ecosystem	Benefit already gained	In the short-term (1–5 years)	In the long-term (5–10 years)	Benefit uncertain	No benefit
Increase in sales	12,2%	10,2%	38,8%	32,7%	6,1%	0,0%
New business, technologies, products, or services	2,1%	4,1%	52,1%	37,5%	4,2%	0,0%
Networking potential and new partnerships	0,0%	53,1%	36,7%	4,1%	6,1%	0,0%
Research and development costs shared among partners	2,0%	28,6%	38,8%	8,2%	16,3%	6,1%
Gaining new patents and IPRs	10,0%	6,0%	34,0%	12,0%	30,0%	8,0%
Improvement of company's innovation culture	0,0%	32,6%	32,7%	14,3%	18,4%	2,0%
Understanding future trends	0,0%	32,0%	44,0%	20,0%	4,0%	0,0%
Gaining new talent and employees	2,0%	20,0%	46,0%	12,0%	12,0%	8,0%
Enhanced company image	0,0%	42,0%	38,0%	8,0%	10,0%	2,0%
Access to new knowledge	0,0%	36,0%	58,0%	4,0%	2,0%	0,0%
Access to new customers/markets	0,0%	10,0%	48,0%	22,0%	18,0%	2,0%

Challenges in implementing innovation ecosystem strategy

An integrative definition of strategy implementation is the interplay between conceptualizing and enacting (Weiser, Jarzabkowski & Laamanen, 2020). Aligning resources and objectives with the strategy was perceived as challenging. Misalignment in this may result in failures in achieving the desired actions. Further, conflicts between internal (company-level) and external (ecosystem-level) objectives may produce tensions that result in an implementation challenge. One major reason for implementation challenges comes from the situation described above, that is, the non-articulated strategy. If a strategy is not clearly articulated, it may show as a challenge in the implementation. The ambiguity of the innovation ecosystem as such, which was described earlier in this report, increases the challenge. Table 8 summarizes the identified strategy implementation challenges.

Table 8. Identified strategy implementation challenges.

Implementation challenge	Illustration from the data
(Mis)alignment of resources and objectives	"Whenever we take part in an ecosystem, we experience endless resourcing challenges. There is just not enough time. My perspective is that when allocating resources for participating in an ecosystem, the link to everyday operations often remains too weak. These projects that are done in networks are often too disconnected. They also tend to be highly ambitious which begs the question: will these goals really be achieved?
Unclarity of innovation ecosystem strategy	"An innovation strategy that defines innovation, open innovation, what they have, what it enables, what the process is, what the time span can be, and at which point it becomes business – where NDAs and contracts are needed – is a foggy concept for everyone. They don't know how to operate, they don't trust, they don't know their roles, and there is a lack of open discussion and thus a lack of ideas. It would be good to have one. But then firms say that they already have a strategy, and one strategy is all they need. And in this strategy, there is no room for innovation ecosystems."
Tensions between company's internal and ecosystem activities	"It is extremely difficult to get our internal product development units to understand it. As there are internal goals for them, external responsibilities like ecosystem reporting and so on – constantly bring challenges.
Cultural conflicts	"Internally, as well, we should understand that there are no subcontractors. It is deeply in many people's thinking that nothing can be given out as that would result in lost IPR. [...] Getting rid of this culture might be the biggest challenge."
Different/conflicting interpretations of innovation ecosystems	"The challenge [...] was clarifying the ecosystem's operating model. It felt like for smaller companies, what an ecosystem is, what drives it, and how it works, were complete mysteries. [...] When you go and tell them about ecosystems, the competence and interest might not be there. You may have to explain and educate them over and over again that an ecosystem is often confused with a project or something else, even though we are talking about a larger umbrella."

Alignment of innovation ecosystem activities with other organizational practices

When building or participating in innovation ecosystems, companies need to configure the boundaries between their organizations and the ecosystems, in order to ensure the required resources, competences and the knowledge flow. Successful management of this boundary includes firstly the question of how to structure the relation between the company, and the innovation ecosystem. The question, whose task is to take care of innovation ecosystems, seemed to be case-specific as different solutions were identified. The solution of having innovation ecosystem activities organized directly under top management was

seen positively due to the close relation with top management's agenda. Indeed, this solution brings legitimacy to innovation ecosystem activities within the company. Other working solutions were identified, such as positioning innovation ecosystem activities within the innovation function. In some cases, the responsibility for innovation ecosystem activities was given to the organizational unit that was responsible for partnerships of the company.

How to organize a company's support functions so that they support the ecosystem activity? This question was answered by the interviewees both numerically (Figure 17) and verbally. The interviewees were asked to evaluate the listed practices from two aspects: whether they use these practices and how they work in supporting ecosystem participation, and effective utilization of the results. The most often mentioned practice was team or unit level KPIs. It was mentioned that finding the right measures for innovation ecosystem activities was challenging. The measures that were used at the corporate level were for example, the number of new partners, the number of new contacts, the amount of acquired funding, and new business generated, the onboarding time of new partners, the number of patents from the innovation ecosystems.

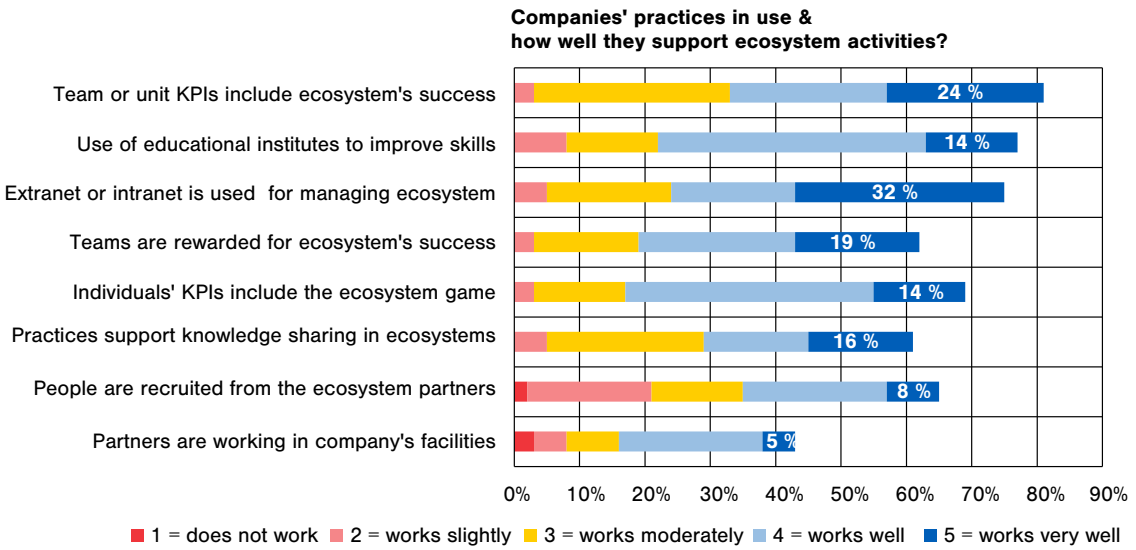


Figure 17. Practices in use and how they support ecosystem activity.

A challenge that emerged was knowledge transfer, and the incorporation of new knowledge into the respective firms. It was deemed important to nurture the companies' ability to absorb new knowledge through direct involvement and address the innovation challenges relevant for the organization (cf. Mazzucato & Robinson, 2018; see also Cohen & Levinthal, 1989). In case this was not achieved then all the activities seemed like a waste of time:

> *"If you are not able to integrate it [ecosystem knowledge] in the organization, it is a waste of time. It may be easy to outsource, but then you may not benefit from it as much. [...] If you don't get your own people in it, it is a waste of time."*

IV Finland as a context

This section discusses Finland as a context for innovation ecosystems and is summarized in Table 9. In general, Finland was perceived as a good environment for innovation ecosystems with a good amount of trust between players. The funding instruments and the legislative environment were scrutinized and are discussed in this section. Figure 18 visualizes the perceived current conditions in Finland amongst research participants, and how high they deem these in selecting the ecosystem's location. The highest gaps exist for a rich fabric of partners, favorable market conditions, and access to top-level research. Especially, the rich fabric of partners is an issue that can be addressed through changes in the funding instrument design.

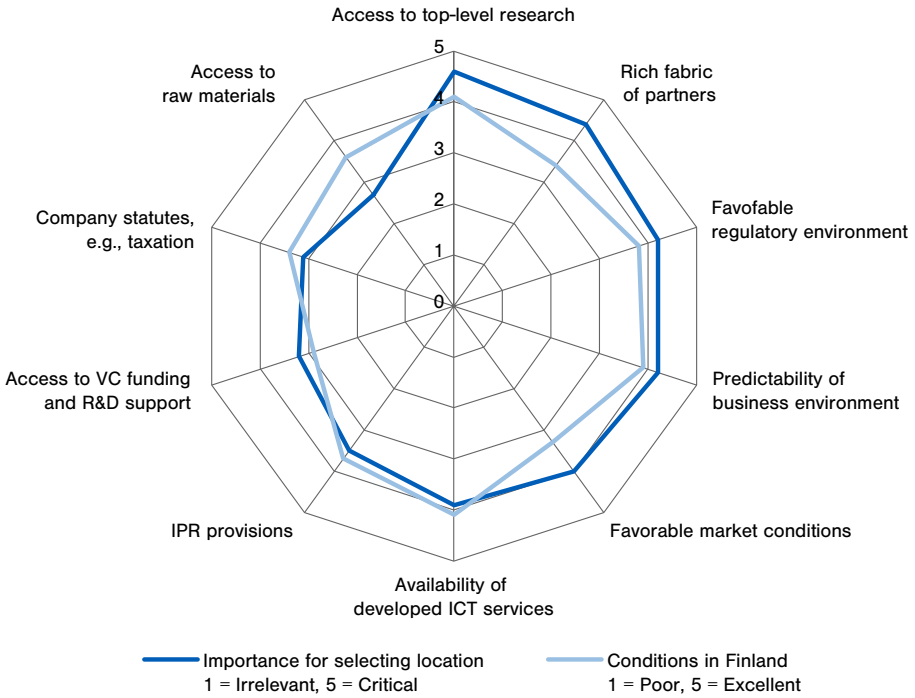


Figure 18. Importance of factors in selecting ecosystem's location and current conditions in Finland.

Funding instruments: long-term, non-siloed and supporting international partners

According to the in-depth qualitative results, the most significant impediment in the policy environment was the short-term nature of Finnish R&D funding instruments, which are perceived as siloed, unrealistic, and which enforce a project-like structure. Several participants made benchmarks to countries such as Sweden, the U.K., and Germany, indicating that more consistency and continuity is needed from Business Finland instruments to secure a more sustainable innovation ecosystem game. The nature of innovation ecosystems seems to demand a more longitudinal policy approach, as building the foundation for a scalable ecosystem is a time-consuming process. The suggested instruments were closer to 10 years than the currently prevalent 2 years. Several references to the Strategic Centers for Science, Technology and Innovation (SHOK) initiatives were made to illustrate the inconsistency of policies. The SHOKs had time spans of 5–10 years, were largely funded by TEKES (former Business Finland) and were terminated in 2015 due to the economic crisis, and decreased confidence in the R&D policy at the time (Laasonen et al., 2020; the Finnish Government, 2015).

> *"Putting an end to the public support after two years is not very motivating. The financing should be based on continuity. Of course, that does not mean automatically funding innovation projects over the long term – methods of performance measurement could be included as a mitigating principle for the risk. [...] Like in SHOKs they used to do, financing decisions were based on who had the highest performance. Just before the SHOKs were terminated, TEKES funding had improved a lot."*

It was found that support instruments are directed to different stages of innovation, which was perceived to hinder effective ecosystem operation. Some executives suggested an integrative innovation ecosystem funding instrument(s) that would consider the ecosystem as an entity, instead of through project-nature funding where the ecosystem is created through subcontracting. In doing so, Business Finland would reduce the lost output that was currently experienced to be caused by the siloed instruments.

> *"In Finland, the design of policy instruments creates fragmentation in ecosystems. In basic research, there is academia, which is untouchable and independent, and they work towards their objectives. In open innovation ecosystems we focus on our goals, as we have our own policy instruments. Experimenting and piloting is done in the business ecosystem that has its own financing instruments. [...] There are clear silos in between [stages of innovation], where produced output is lost."*

Moreover, more flexibility when it comes to ecosystem partners (passive + international) is desired. As Business Finland largely supports innovation ecosystems through a B2B instrument, the number of partners is fixed and unalterable after the funding decision has been made. This was claimed to not incentivize replacing a passive partner, since the funding will be cut accordingly in the case of a partner's withdrawal. A further important issue raised by some participants was the exclusion of international players from publicly funded innovation ecosystems. According to the interviews, Business Finland ecosystem funding is directed to Finnish companies and organizations, meaning that global innovation partners may not participate in certain ecosystem activities. This was perceived as a limiting factor as in some industries there is a perceived skill shortage in Finland, and innovation ecosystems require the best available know-how to remain competitive.

> *"The most challenging part of operating in an innovation ecosystem environment is that while we talk about these global players, the criterion for national funding is that the participants come from Finland, and that it benefits Finnish stakeholders. Unfortunately, including international companies in these consortia does not work very well in this context.*

Legislative proposals: experimentation, industry perspective in policymaking and upfront subsidies

Many participants indicated that as Finland and the EU have traditionally focused on supporting academic research over commercializing the findings, more intermediate-stage support is needed from the policymakers. This was especially since due to its size, resilience, and high level of trust, Finland was perceived to be a near perfect environment for experimenting and piloting. Hence, improved facilities for experimentation were expected.

> *"For the ecosystem to be relevant, it should be able to utilize governmental sponsoring – like NASA does in the U.S. If a technology seems promising in the development phase, it should be provided with facilities for experimentation where the state could be involved. This is what we are lacking in the Nordics and Finland."*

Another challenge was the lack of industry perspective in legislative drafting. Especially the medical industry was not pleased with the current level of legislation. Recently, Deschryvere et al. (2021) concluded that in addition to involving a wide spectrum of public decision-makers across policy domains in innovation policy discussions, a long-term innovation policy success requires the involvement of players across industries as well.

Finally, some executives pointed out that upfront subsidies may be a more motivating instrument for innovation than tax incentives, as subsidies can

often be tailored so that they guide the process of innovation. One executive had been asked by the Ministry of Finance if taxation would be considered a potential motivator. A negative reply was given because tax incentives were not considered clear and concrete enough. In addition, the level of financing contributions was also brought up for discussion. The currently typical 40% contribution may not sufficiently incentivize high-risk innovation.

> *"Subsidy is a more incentivizing and effective instrument in contrast to a tax relief because the latter take place once the work is finished, and these organizations – and the people who take part in this co-creation – will never see the money. It will show up in the balance sheet later. Tax instruments do not actively guide the operation to the desired direction."*

Table 9. Challenges and solutions for the Finnish innovation policy environment.

The Finnish innovation policy environment	
Challenges	**Suggested solutions**
Short-term funding hinders continuity of innovation ecosystems	Long-term instruments (5–10 years instead of 2 years)
Lack of industry perspective in legislation	Include actors across industries in policy discussions
Instruments directed to different stages of innovation, lost output between stages	Integrative funding instrument for innovation ecosystems
Financing directed to a fixed set of partners	
Funding does not allow replacing passive partners	
Reimbursement rates (40%) may not incentivize high-risk innovation	Potentially increase funding contributions
Excessive focus on early-stage support	Create facilities for intermediate-stage experimentation
Global players excluded from innovation ecosystems	Discuss ecosystem friendly IPR legislation for global players
	Include international actors in the R&D funding scheme
Tax incentives do not actively guide innovation	Upfront subsidies preferred

Conclusion

Tackling the ambiguities of innovation ecosystem

An innovation ecosystem appears to be perceived as a larger umbrella under which partners implement and complete project-nature solutions. Going beyond terms such as "network" and "value chain", an innovation ecosystem integrates the specialized inputs of partners through a roadmap that should be designed and updated regularly with all partners. At the ecosystem level, terminology to describe co-creation activities remains rich in variety, hence a high level of ambiguity about the "innovation ecosystem" is still present. It is therefore suggested that partners focus on the sensemaking and clarification processes within the innovation ecosystem. When building an ecosystem consortium, these sensemaking processes include discussions on what the ecosystem means to the partners, and what the ecosystem intends to accomplish. The importance of a shared vision has been noted in previous literature, and the current study strengthens the argument that a clear and shared vision among the partners enables a shared direction for the ecosystem. At best, such early conversations are efficient tools to reach the same wavelength about the collaboration model and are likely to bring clarity to the time span, roles, and level of dialogue among the partners throughout the ecosystem life cycle. This collective conceptualization of the "innovation ecosystem", and its objectives creates the foundation for a shared vision and roadmap. Overall, collaborative purposes were emphasized over competitive ones regarding the binding logic for participating in an innovation ecosystem. Trust is also a crucial building block for innovation ecosystems, mostly built through relationships among the partners. Although the relevance of ecosystem-level trust was acknowledged, it was perceived as slower to build than trust on a personal level between ecosystem partners.

Leveraging top-down and bottom-up governance mechanisms

Governance in an innovation ecosystem is organized through top-down and bottom-up processes simultaneously, and knowledge flow needs to be facilitated between these levels. Top-down governance is concerned with developing a clear management model and structure for the ecosystem. Here fairness, information flow, and the facilitation of projects are main concerns. An innovation ecosystem's success requires that the specialized responsibility is well-defined. A resource-based discussion in the birth stage is recommended to clarify the expertise and skills that each participant brings to the ecosystem. In clarifying the value contributions and ensuring motivation, a crucial factor is expectation management, i.e., delivering what is promised. Currently, projects are an effective method to bring structure into innovation ecosystems,

and decision-making needs to be facilitated for the project level. In the findings, there is not yet a common understanding how projects should be ideally linked to the broader innovation ecosystem work, but there is indication that certain tasks such as ideation processes and experimentation testbeds could be governed more openly.

Bottom-up governance, on the other hand, is concerned with developing a shared operating model for the ecosystem and enabling co-evolution. To remain active and competitive, ecosystem partners must co-evolve with the requirements of the ecosystem, and its environment. The study indicates that a major part of co-evolution has to do with proactive conflict management. Early-stage IPR agreements, use of a neutral facilitator to balance the hierarchies and improve communication, and flexible roadmaps are potential tools to ensure co-evolution. Furthermore, agreeing on the features of the end solution in the early phase may help the partners adjust and align their operation with the ecosystem. Integrating the customer in the ecosystem is also of great importance and brings clarity to the desired outcome.

Strategic implications of innovation ecosystems

The companies in our study rarely had an explicitly articulated innovation ecosystem strategy; innovation is rather a part of their business strategy. Supporting innovation ecosystems can be achieved by different paths and activities of companies. Thus, the suggestion is not to force the articulation of an innovation ecosystem strategy but rather to support the actors' sensemaking of the innovation ecosystem's purpose, and to clarify its role in realizing the company's business strategy. Clarifying a company's intentions related to innovation ecosystems and related activities will enhance consistency-building and enable it to overcome implementation challenges.

The integration of and alignment between a company's own practices and those of an innovation ecosystem remains challenging. Main challenges relate to the clarification of suitable KPIs and the support of knowledge absorption mechanisms. It is common to use KPIs related to innovation ecosystem activities, however, being able to determine relevant indicators appears challenging. Knowledge sharing and new knowledge creation across the ecosystem-company boundary was also recognized as relevant but an area for further development.

The future of innovation ecosystems in Finland

From the innovation ecosystem perspective, several impediments for effective co-creation were raised for discussion. As short-term policies and funding instruments seem to hinder continuity and viability of ecosystems, policymakers were recommended to shift from the current 2-year funding periods towards 5 to 10-year periods. As building the foundation for an innovation ecosystem consumes time and resources, longer-term thinking

is required from the public support. Moreover, global players should not be excluded from innovation ecosystem funding in Finland. While the rationale of directing the spillover effects of innovation back to the nation is valid, our results suggest that losses resulting from exclusion of international ecosystem partners – in the form of networking, financing, or knowledge – are significant and hinder the scalability of ecosystems. Hence, inclusion of global players in the R&D funding scheme is suggested.

Finland was perceived as a suitable environment for innovation ecosystems and a near perfect pilot environment for experimentation and pilot projects. As Finland's public innovation support has traditionally focused on the research side, i.e., the early innovation stage, some executives called for an update. Because Finland's high degree of trust and resilience, and its relatively small size, a call for more intermediate-level support for experimentation, e.g. through governmental sponsoring of projects with high scalability potential, was made by several executives. Furthermore, the complexity of shared IPRs emerged as a hindering factor for innovation ecosystems.

All the identified best practices – as is a shared interest in the beginning, and a co-evolving mission throughout – did emerge as vital success factors for innovation ecosystems. However, while defining each partner's business case is crucial for the success of an ecosystem, a "what can we offer to this ecosystem" approach may be of even higher importance, as indicated by several participants. Innovation ecosystems are transitioning entities that can successfully transform from a research ecosystem to a business ecosystem over time and increased maturity level, requiring different tools and support throughout the process. Our executives have learned from their experiences with innovation ecosystems and have shared their key learnings with us. When establishing the next innovation ecosystem, they will: "have clearer goals, move faster, and ensure the support of leadership and customers".

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Innovation is more interdependent than ever, and companies have adopted new tools such as open innovation, public-private partnerships and innovation ecosystems to acquire and retain competitive advantage. This report focuses on innovation ecosystems and their management, making observations on the network of participants, creating and maintaining a shared logic, as well as governance systems in innovation ecosystems.

This report helps to pinpoint different value creation challenges that appear in innovation ecosystem management. It discusses

1. how the term innovation ecosystem is rich in variety, and to tackle the potential ambiguity requires focusing on sensemaking and clarification processes,
2. how both top-down and bottom-up governance mechanisms are needed to facilitate knowledge exchange between the innovation ecosystem actors,
3. how aligning company strategies and innovation ecosystems can take different paths,
4. how a supportive environment for building innovation ecosystems demonstrates both long-term thinking and flexibility.

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