region västerbotten

METRIC

Methodological book for the development of regional innovation ecosystems

This document describes the model and method of a "METRIC" for regional innovation ecosystems that have been developed in collaboration with Region Västerbotten.

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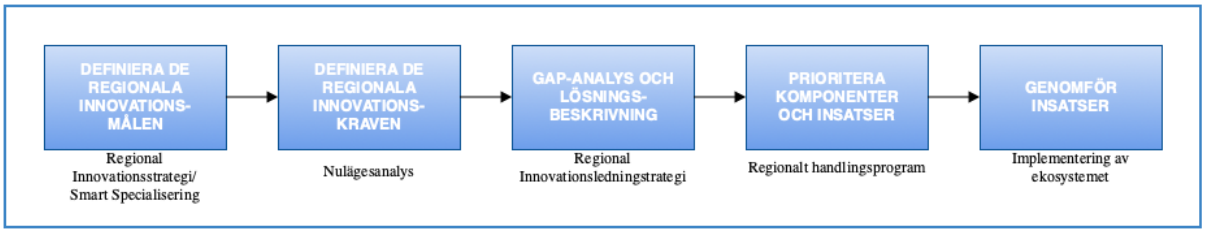
1 Introduction

This chapter intends to give the reader an overview of the perspectives that have been applied to its presentation and the ways in which they have been applied. The chaptershould be seen as a short tour of method and perspective.

1.1 Purposet of a method book

The purpose of thenna method book is to describe a model for measuring the innovation capacity in Swedish regionser that has been developed in a number of iterations during the period 2018–2023. The document describes the process, the selection method, and the criteria that have been chosen that will constitute the selection for how the region'sinnovation support system should look and develop, and how regions should work to be able to develop it.

By having an established framework, based on leading models in the field, the region gets a much clearer, clearer and more accepted picture of what the current situation looks like for innovation and can thus more efficiently further develop and refine it (Oksanen, 2014). The development of an innovation ecosystem traditionally goes through five phases from strategic objective to execution.



An architectural framework for defining innovation systems (Yawson, 2009).

This document is the basis for a qualified way of working for the second step, i.e. to have a starting model as a basis for current situation analysis and thus the regional innovation management strategy.

1.2 Why an innovation ecosystem?

1.2.1 What is an innovation ecosystem?

The concept of innovation ecosystems has emerged in the early 2000s to meet the demands of the new emerging knowledge-based economies. What used to be most commonly referred to as "innovation systems" grew in meaning and needed to take into account being more of dynamic, agile collaborative structures with a large dose of self-organization. Instead of establishing an innovation system as a linear process, it was realized that innovation can occur anywhere and needs to have multifaceted paths to grow stronger in a self-sustaining and dynamic way (Mercan, 2011; Skorodinskaya, 2017). These developments have also led to new approaches to innovation policies in many countries. An important change factor from the traditional innovation systems is the realization that innovations do not need

tocome from research. The older modles from the 1980s (Freeman, Lundvall, Nelson, etc.) onwards) were based on the fact that *basic* research created new knowledge, applied *research* built on this knowledge and created innovations, and from there development and commercialization arose (Wessner, 2005). These days, and with the advent of the Internet, distributed development, and open innovation, ideas can come from anywhere, which puts the old model in the corner and broadens the perception of how an innovation system needs to be designed. An innovation system now needs to support both collaborations (*collaboration*; between the actors of the innovation system) and *co-creation* with the end users of the innovation system. Hence the new perspective on innovationeco-systems. An innovation ecosystem could just as well be called a "collaborative innovation network". An ecosystem is characterized by five principles (Tsujimoto, 2018):

1. An ecosystem analyzes its organic network based on both positive and negative aspects; competition, erosion, cannibalism, etc.
2. Each actor has different purposes, attributes, principles of decision-making. This helps to create dynamics in the system.
3. The analytical boundary of the ecosystem is at the product/service system. It is not limited to national borders, agreements and contracts, relationships or customers/suppliers. This applies not only to the design of the system, but also to the results it performs.
4. Ecosystem analysis requires continuous observation of the development of the product/service system.
5. Ecosystem analysis includes finding patterns of system growth or decline under particular conditions.

According to Etzkowitz and Klofsten, an innovation ecosystem undergoes four life cycles (Oksanen, 2014). The first is the start-up phase when a region discovers a need to establish a new economic base and where the ecosystem is slowly formalized, the second is the implementation where the infrastructure comes into place, the third life cycle is the consolidation stage where the foundation begins to settle and fine-tuning takes place, and the fourth cycle is the self-driving one when the establishment is complete and stable growth is underway. This work aims to support both the first and third steps in Etzkowitz and Klofsten's model where there is both a certain new start of the innovation ecosystem in Swedish regions, but where there is already a functioning – if not fully formalized – ecosystem in place. The goal is to map and subsequently optimize the innovationecosystemto the extent possible.

1.2.2 The purpose of an innovation ecosystem

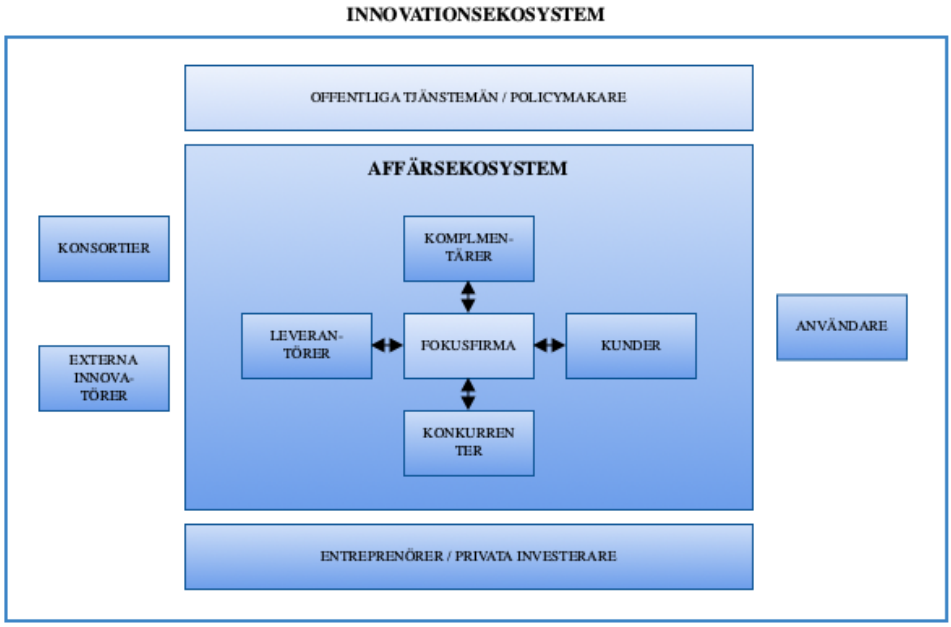
A region needs to have a well-developed innovation ecosystem to be nationally and internationally competitive. An innovation ecosystem assists in developing and supporting innovationcapacity and entrepreneurship in the region with the assets, resources and skills needed to deliver innovations that can create added value for the region and thus increased quality of life and welfare. The US Council of Competitiveness (Feinson, 2003) and the OECD (2010) describe a number of functions that an innovation ecosystem fulfills for the development of society.

- Toscape new knowledge.
- To support thegovernance of the search process.
- Toprovide resources such as capital and knowledge.
- To faciliter the creation of positive external exchanges.
- Tof aciliter the formation of markets.
- To create and provide the market with human capital.
- To create and convey technological opportunities.
- To create and convey innovations.
- To provide facilities, equipment and administrative support for incubation.
- To facilitate the regulation of technologies, materials and products in order to expand markets and facilitate market access.
- To create markets and convey market knowledge.
- To improve networking.
- To conduct technological research, market research, and partner search.
- To facilitate financeinthe ization of innovations.
- creating an adapted labour market;
- strengthening regional R&D;
- strengthening regional innovation capacity;
- To stimulate innovation in SMEs.
- To promote entrepreneurship and newbusiness.

In other words, it can be said by a good margin that the innovation ecosystem is extremely broad and comprehensive and tightly integrated with a region's business community.

1.2.3 The innovation ecosystem to support the regional business ecosystemsa

Organizations and companies do not function as isolated islands in a business ecosystem, but become more and more dependent on ensuring a high-quality and well-adapted network of partners, suppliers, sales channels, etc. Companies need to find their position in their own business ecosystem and strengthen their contacts. A "business ecosystem" focuses on the company's perspective for value creation (Tsujimoto, 2018). The business ecosystem is the companies' equivalent to the value chain and the value network from an ecosystem perspective. Thebusiness ecosystem describes what the collaboration structures look like, while the value network describes what the breeding process looks like. In principle, it can be said that the business ecosystem is the map image that shows the conditions and the value network is the practical application of this ecosystem to the specific value flows of individual organizations.



The relationship between innovation ecosystems and business ecosystems (from Tsujimoto, 2018).

A regional innovation ecosystem does not need to know what the different business ecosystems in the region look like, or understand the components of the different business ecosystems, but strives to create general conditions for as good - and many - business ecosystems as possible.

In addition to bringing together the actors who will contribute to the innovation ecosystem, a healthy ecosystem also needs to have mechanisms to build relationships between the actors in the ecosystem (Jackson, 2015). The two most important components of relationship building are to create the right and timely access to skills, capital, and other resources that can be acquired with the help of capital. The most important task of the innovation ecosystem is therefore to optimize the conditions for thessa asset.

1.2.4 Purpose of a measurement model for the innovation ecosystem

A good and precise measurement model is the basis for being able to develop a system. When we know which measurable factors are important for the success of the system, we can measure them, set goals for what values they should have, determine activities to improve them, and measure the results of the improvements and the effects they produce. The OECD/Eurostat has developed a conceptual framework that assesses *indicators* as the core components measurable for success. When the indicators are mapped, we see what *performance the* system actually has. This performance in the innovation ecosystem leads to the effects we want to get out of it.

OECD/Eurostat conceptual framework for policy-driven ecosystem development.

1.2.5 Innovation support schemes to support the innovation ecosystem

An innovation support system consists of actors who, with public funding, offer support to innovators, entrepreneurs and entrepreneurs (Norin, 2017). In a broader interpretation, we choose not to limit the innovation support system's actors to those who have public funding, which we will clarify further in future chapters. An innovation support system normally covers the whole of a region and plays a central role in the development of and within the smart areas of specialization. However, not all indicators in an innovation ecosystem are within the responsibility or control of the regional innovation support system. Decisions such as tax incentives for innovation initiatives are at the national government level, many decisions on various forms of establishment of support activities are at the municipal level, and establishments and development of many supporting commercial actors are at the business community. In fact, most indicators in an innovation ecosystem are at a decision-making level that is indirect for the regional innovation support scheme or at least for the regional lead actor. And since the operational management of the innovation support system is at the official level in the region, even the impact on the regional indicators becomes indirect, as these decisions are usually (if not always) political. Hence that it is essential what the design of the control model looks like.

1.2.6 Development of the regional innovation support system

In addition to the fact that there needs to be a regional innovation ecosystem in a region, there also needs to be a systematic approach to how the innovation ecosystem should be supported by the region. The first step to take is to initiate a process for the implementation of such an innovation support system (OECD, 2010). This does not describe the innovation support system itself, but the process of establishing and developing the innovation support system. There is already some form of existing innovation ecosystem in most regions and similarly an associated innovation support system – albeit mapped, structured, and formalised. What needs to be put in place is a systematic approach to how the innovation ecosystem and the innovation support system work so that the regioncan design a governance and development model to structure and purposefully improve the innovation support system.

Initiate a regional dialogue on innovation

The first step involves starting a dialogue on the part of the innovation ecosystem's responsible persons about the need for a developed and well-defined innovation ecosystem and then contribute to building the conditions needed for the ecosystem as such, i.e. start the work of working systematically with the innovation ecosystem. It is partly about creating the planning conditions for the establishment of the innovation ecosystem in the form of structures and connections, but it is also about building up an atmosphere and a culture in the long term that is conducive to creative thinking and creates conditions for challenging what already exists and daring to think more radically. There are many activities to do here and it is not a one-off, but it will need to happen continuously throughout the future you intend to stimulate your innovation ecosystem.

The groundwork is about building up the structure for the long-term work of the regional system that will support the innovative development of the region. In practice, it is about steering all elements that are part of a regional development strategy, and in particular those elements that focus on developing innovation capacity in the region. In order to optimize an innovation ecosystem, essential components cannot be left out, so everything from skills supply to internationalization and research collaborations come into play.

An essential part of it all is that culture and climate become innovation-promoting. This becomes normal if there is an incentive structure that is permissive and accepts experiments, which in turn can be stimulated in many different ways. As a vital part of system building, the cultural perspective needs to be worked on especially to also create the mental and cognitive conditions in the region.

Regional analysis of the innovation ecosystem
As a first step in developing the innovation ecosystem and its support systems, we need to explore where we are today. We do this by conducting a current situation analysis. An important part of this document is precisely to understand what we should measure, in what areas, which measurement points are relevant, and how we do the data collection. Here there are different ways and structures for how the whole thing should be done, but the most important thing is that you have a well-developed model that is adapted to what you want to achieve. The main purpose of a current situation analysis is to get a situational picture of where you are relative to where you need to find yourself in the areas you have selected. At this stage, it is important to have a very clear structure for what goals you are striving for (previous strategies), how you measure how you are relative to these goals (measurement model), and how this data should be collected so that it is accurate (measurement method).

Regional strategic innovation development work
The work on regional innovation development is no small matter. It is here that the conditions are concretized and the models are created. It is about coordinating the components of a RUS and understanding how they affect the innovation support system and the innovation ecosystem. Together with other regional strategies, governance needs to be integrated so that it creates maximum support for the innovation ecosystem. Consequently, the content of RUS and all parts of the strategy needs to be well synchronized and in line with the content of a RIS and an S3 if any.

In this work, the overall goal of the region's development and innovation work is described. As this must be integrated, the coordination of all strategic areas needs to be coordinated and uniform. All indicators that are relevant to the region's development are specified in the measurement model for the current situation analysis and here the goals for each area need to be documented. It also needs to be clear which indicators are within the framework of which strategic area, as well as which indicators in the different areas relate to each other and in what way. In this way, there will be a coherent overall picture of the different components of the innovation ecosystem, what goals they have, how they are interwoven, and finally who is responsible for ensuring that they develop according to the strategic goals set.

It also coordinates forms of collaboration, such as coordination structures with authorities, nearby regions, the region's municipalities, international collaboration partners, etc. It also describes the *internal* work with innovation management for the region, i.e. how to work partly to become more innovative themselves, but above all a governance model to drive the development of the innovation ecosystem, i.e. to fertilize the content therein.

Selection of innovation support priorities
It is important to have support for making strategically significant decisions, including policy and political ones, that are important for the innovation ecosystem. Now priorities need to be set that will help make the implementation plan a reality. This includes making decisions about personnel, resources and funding, which usually requires solid anchoring upwards in the organization.

Implementation/development of the regional innovation support system
When the strategic planning is completed, work will begin on the introduction of the internal work system and the development of the innovation support system for the innovation ecosystem. Now it is about implementing direct operational structures and measures to create conditions for the innovation ecosystem according to the plans that have been set in the strategic goals. This is a process that can take several years, but which constantly follows the direction set in the overall and coordinated strategic objectives. These are activities that are included in the operational plans of the work of the region in the years necessary for the introduction of the system.

Continuous monitoring, evaluation, and development of the innovation ecosystem
As the innovation ecosystem and the innovation support system are put in place, the performance of the system also needs to be regularly evaluated. The normal procedure for doing this is to carry out new measurements according to the same model and method as the initial current situation analysis and see how the values have developed since the previous measurement. Then it also becomes visible how well the implemented efforts have had an effect, and it becomes visible which efforts remain to be made or which need to be strengthened to give better effect. After new measurements, an analysis is made after which proposals are made for adjustments to ongoing and future efforts. The new operations will then be decided so that they are given a competent mandate and then included in future business plans to ensure the necessary resources and implement decided operations.

1.3 Methodone's structure

This document consists of several parts, the first of which deals with what should be measured in a regional innovation ecosystem, i.e. what the refining process looks like in the system, which components should be included in such a system, and to some extent which should not . The second part deals with how the measurement method should be used to ensure that we measure what the model intends to measure. And the third part is about the management and management of the whole thing, including follow-ups and revisions. Taken together, the different parts lead to creating controlled control of the development of the innovation ecosystem.

1.3.1 1. Measurement model

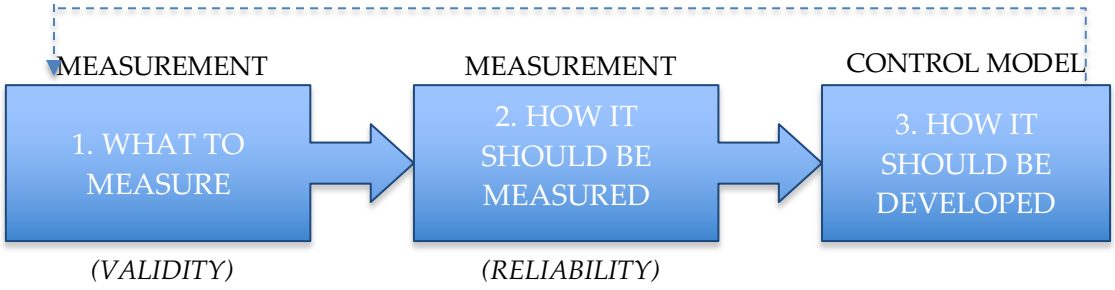
This is the first part that deals with *what* it is that should be measured in an innovation ecosystem. It intends to be a generic model that follows international principles and lessons learned and therefore should be applicable to any region but at the same time should be specifically adapted to Swedish conditions. Measuring the quality and effectiveness of an innovation ecosystem is very complicated, as it contains lots of interrelated factors that in difficult-to-diagnose ways influence each other, and are usually specific to the area in question (Frenkel, 2014). This makes it relevant to both review internationally proven models, other models for measuring regional innovation capacity, national measurement models for regions, and to find the speciika measurement points that are particularly relevantto the Swedish context. Models change (improve) over time, but there are strong reasons to do a solid job to qualify your model as far as possible right from the start, as it leads to less rework in the long run.

1.3.2 2. Measurement method

The second part of this model describes which measurement method to use, ie. *how* the data collection itself is done. It takes into account which data sources can and should be used to provide relevant and up-to-date results, which in turn provide reliability to the survey. It is essential that the survey is up-to-date over time so that surveys between years produce comparable results. It is therefore important to ensure that equivalent sources will also be available in the coming years. At the same time, it is important that the model is allowed to live and develop, so there will continuously have to be trade-offs between consistency and flexibility.

1.3.3 3. Control model

Finally, the third part concerns the clarification of how the mapped innovation ecosystem should be developed, what goals you want to achieve, what activities need to be carried out to get there, and what the management around it should look like. It sets out the responsibilities that need to exist to manage, drive and develop the innovation ecosystem.



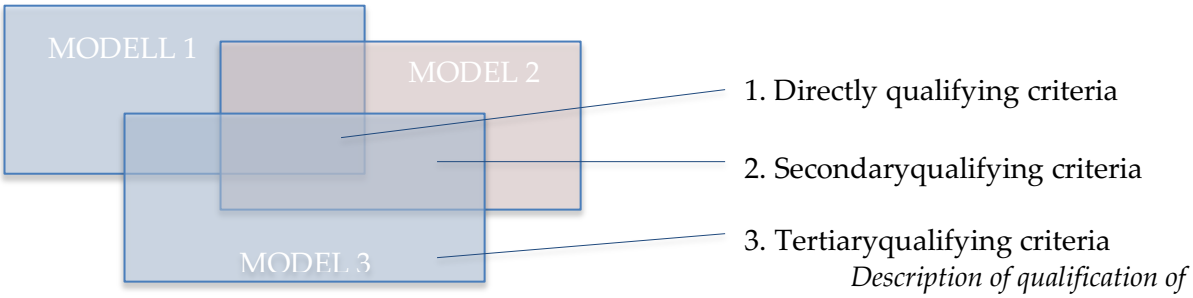
The relationship between the three parts of this document.

A region's governance model is directly linked to the innovation support system, which in turn is linked to the innovation ecosystem. It can be simplified to say that the governance model is the region's tool for influencing the innovation support system and the innovation support system is the tool that exists to influence the innovation ecosystem.

The relationship between ecosystems, support systems, and governance model.

1.3.4 Qualification of content in the measurement modelen

The method applied in this document based on the above has been to make a first step a data collection of the areas and measurement points (indicators) that the most accepted and credible measurements use. One of the purposes is to see how they have reasoned and through analysis find the reasons why different indicators are considered relevant. Anotherpurpose is to see if there are differences between the different models and therefore complement the understanding based on their different reasoning. This is to anchor the model in best practices. On top of this, a filter with a national and regional perspective is then added.



Description of qualification of measurement criteria from different measurement methods.

However, it is not enough to look at which criteria are common to different methods, as many of them have different aspects to why they have made the choices they have. Therefore, secondary a and tertiary criteria have also evaluated t s and qualifiedts against their relevance for measurements of Swedish regional innovation ecosystems. As a basis for defining these criteria, we have compiled and analyzed an extensive number of international and national models for measuring innovation and entrepreneurial ecosystems, including:

- Global Innovation Index (INSEAD, Cornell University, WIPO)
- The Oslo Manual 2018 (OECD)

- Global Competitive Index (World Economic Forum)
- European/Regional Innovation Scoreboard (European Commission)
- The Regional Entrepreneurship and Development Index (European Commission)
- Entrepreneurship Indicators Programme (OECD-Eurostat)
- Aspen Entrepreneurial Ecosystem Diagnostics Toolkit (ANDE)
- GIZ Guide for Mapping the Entrepreneurial Ecosystem (GIZ)
- Kauffman Foundation Entrepreneurial Ecosystem Model (Kauffman Foundation)
- Global Entrepreneurship Monitor (GEM/Babson College)
- Indicators to the Swedish inthe innovation strategy (Growth Analysis)
- Reglabs Innovation Index (Reglab)
- A Guide to Assessing Regional Development Resources (US Council of Competitiveness)

There has also been an analysis of all existing Swedish regional innovation strategies (RIS) and in the meantime it has carried outareview against the other regional strategies in order to find what is not covered, but should be covered, as well as what is already covered, but possibly should be covered by another area, such as regional digital agendas, smart specialisation strategies, etc. Ultimately, however, the essential thing is that regional development and innovation strategies work in symbios and support each other.

1.4 Relationship with other strategic areas

A measurement of an innovationecosystem has many related areas that it needs to take into account and consider. Innovation is not an isolated phenomenon, but takes place in constant symbiosis with the outside world. Therefore, it is important to understand approximately how the different areas relate to each other. It is important to understand that the underlying purpose of the innovationeco-system is twofold, where the primary main purpose is to create increased added value for the region's citizens, users and companies, and the secondary main purpose is to be competitive relative to the outside world, but where both go hand in hand. The secondary purpose underpinsthe primary. As a whole, innovation – just like generic development – aims to make the region an even better place to live, work, and live in.

1.4.1 Regional Development Strategy (RUS)

A RUS is a comprehensive strategy for the regional growth work in one or more counties. They will serve as an extension of national strategies and as a basis for regional Structural Fund programmes. A RUS is established on the basis of the development conditions for sustainable regional growth that are defined. A RUS takes greater responsibility for the overall development of a region and looks not only at innovation, but generally at development.

En regional developmentstrategy shall be the mother of the other regional strategies and ensure that there is coordination and logic between them. A RUS is usually only updated once per term, which means that the specific in-depth strategies can be more agile and thus in an adaptive way complement the RUS with a more agile approach. Where RUS stands for coordination, the specialization strategies stand for activities and application.

1.4.2 Regional Innovation Strategy (RIS)

En Regional Innovation Strategy is an in-depth study of the RUS that motivates the innovation focus to be pursued in the region. Above all, it is about which main areas to focus on, such as research and development, but perhaps even more which areas of activityto focus on - what is also smart specialization. In many regions, it has been decided that smart specialisation should be explored in its own in-depth strategy, a so-called S3 (Smart SpecialisationStrategy).

A RIS rarely goes into any details about how the current innovation ecosystemactually works or any details of how it should be developed and organized, but a traditional RIS describes at a fairly high strategic level where the focus should be. The main priorities of a RIS normally lie in the following areas (OECD, 2010):

- Att develop regionalR&D and innovation capacity.
- stimulating innovation in SMEs;
- To promote entrepreneurship and start-ups.
- Improving human capital for innovation.

A RIS normally provides a review of the main actors in the regional innovation ecosystem, as well as a picture of how the regional innovation process is conceived at the overall level. This is how a Regional Innovation Strategy (RIS) and a *Regional Innovation Management Strategy* (RILS) complement each other, where RIS describes *what* should be done and RILS describes *how* it should be applied. A RIS describes the goals and a RILS describes how to work to achieve the goals. A Regional Innovation Management Strategy also takes into account the internal processes for the operational and strategic management of the inn ovation support system and describes how these should be managed with a governance model.

1.4.3 Smart Specialisation Strategy (S3)

Smart specialization is generally about the region investing in what it is good at, but even more so about what it can be best at. Above all, it is a question of strengthening regional competitiveness by avoiding regions cannibalising in each other's specialist areas. Finally, it is about managing the conditions and potential for innovation and growth that already exist in the region, whether it is a traditional heritage or new opportunities. An additional purpose of smart specialisation is also for regions with complementary areas of strength to be able to collaborate and thus contribute to a more cohesive national innovation force.

S3 and RIS/RILS relate to each other so that RIS/RILS provides broad competence in innovation and innovation management, i.e. creates the general conditions for leading and quality assuring innovative development, while S3 provides cutting-edge expertise in the areas that are designated and ensures that innovations are developed. The methods come from innovation management, the focus areas come from the specialization. The interconnection between the two strategies is very important, as it is vital that all functions in

the innovation system cover the smart areas of specialization that have been chosen to be prioritized.

However, smart specialization is not only about innovations but also about continuous development, so for this reason this is a strategy that may deserve to be independent, albeit with naturally strong links to innovation.

1.4.4 Regional Digitalisation Strategy (RDS)

Just as the regional development strategy is an extension of the Swedish Agency for Economic and Regional Growth's national investments in regional growth, so RDS is an extension of the national (and also the European) digitalization strategy. The main purpose of an RDS, as for a Regional Innovation Management Strategy, is to support regional development and tocreate the conditions for innovation. Today, all areas are affected by the possibilities of digitalization and digitalization can both serve as a platform for innovations and leda to digital innovations. In other words, the digital can, should and should function as infrastructure, content and results.

Digitalisation should, but does not have to, be directly linked to smart specialisation. However, there are strong reasons to ensure strong integration between the regional digitalisation strategy and the other strategies. For example, the digitalisation strategy will focus on support for e-services. E-services themselves can be rudimentary, but in cases where they are innovative, the innovation support system is concerned and needed. And in cases where e-services spin out of research on innovations inthe field of e.g. health care, both RDS, S3, RUS and RILS come into play.

1.4.5 Other specialization strategies

In addition to the above-mentioned specialization strategies with the task of driving regional development, there are a number of other areas that also come into play. Not all regions have all of these, and may not need to have them, but there are all reasons to consider whether these might be worth the extra effort.

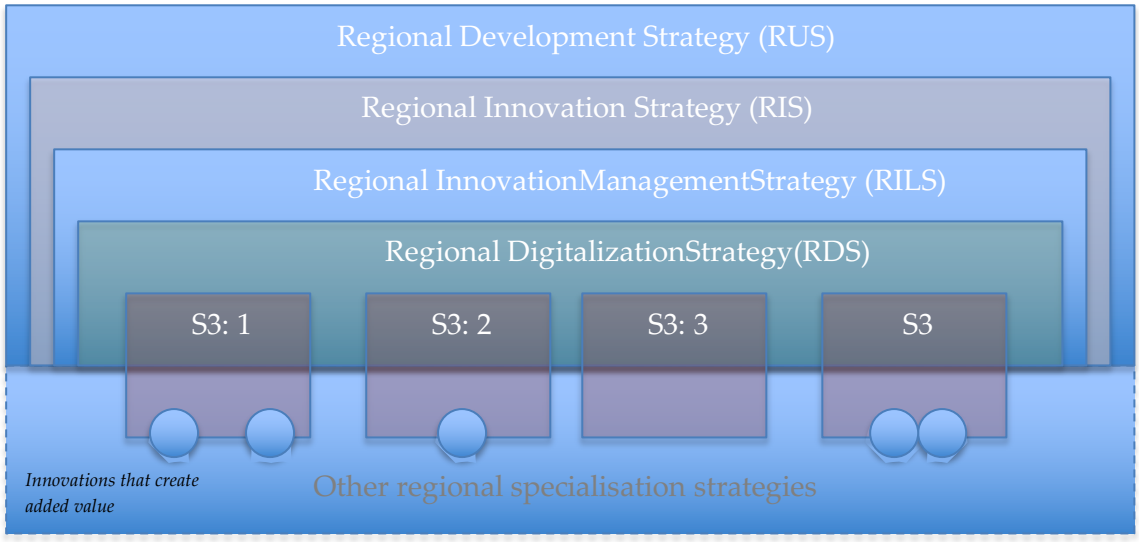
a. **Research and development strategy.** How are we going to ensure, support and stimulate the necessary research and development in the region?
b. **Investment strategy.** How do we recruit capital and establishments to the region?
c. **Skills supply strategy.** How do we ensure the long-term availability of relevant labour and skills in the region? How should we work to attract talent nationally and internationally? How should we conduct our education strategy so that it secures our future skills supply needs?
d. **Internationalization strategy.** How should we cooperate internationally to ensure collaboration with leading competence? How should we work internationally to support the export of our results?
e. **Place branding strategy.** How should we build our national and international brand so that the experience of our region supports the other strategies?

f. **Sustainability strategy.** How should we ensure that the region's operations comply with the three dimensions of sustainability, environmental sustainability and social sustainability?

Many of these can be defined as sub-areas of the Regional Development Strategy and in such a case do not need to be dealt with as separate strategies. After all, the main thing is that they are looked after, so that they are measured and even developed. Many of them overlap with a Regional Innovation Management Strategy, at least in parts of their areas, so it therefore needs to be determined whether they should be formulated as separate strategies or managed in the context of the measurement of innovation capacity.

1.4.6 Summary

All of the above-mentioned strategies relate strongly to each other and have a great bearing on each other's results. In practice, all these strategies could be accommodated in one and the same strategy as different sections, but for focus and competence reasons, it is wise to break out parts of them into your own strategies as long as they follow the same goals and patterns. Who should be broken out, to what extent and in what way should be decided early and the organization that will develop, manage and follow up these should be strongly coordinated.



The relationship between the regional strategies from an innovation perspective.

You also want to avoid redundant work as far as possible, so the responsibilities for the areas should be particularly clear. For example, both research, investment and internationalization are important components of innovation management, so whether or not they should be included in the innovation management work becomes a key issue. It would be particularly unfortunate if several measurements are made in different strategic areas but with different measurement methods and different results are obtained for the same indicators. Then there will be ambiguity about what results should be valid and what strategic efforts should be made to develop them. A cohesive perspective is critical.

It is recommended that each area of responsibility be clarified, the relationship between them, and that a strategically responsible role be appointed for each area. However, it needs to be co-linguistic in a common strategy forum so that they function as a unit with several parts, not as different units.

1.5 Approach and perspectives

The measurement of the ability of an innovationeco-system can be approached from many different perspectives. We address here some of the perspectives we have chosen to clarify the approach chosen in this methodological book. One is to understand how to create the conditions (input) for an innovationecosystem, what actual results (outputs) the system generates, and how these factors then correlate with each other so that you can improve the system, i.e. how different inputs jointly optimize the value of output. Itis about how these are connected and can create values that give synergies to each other. The first is *the process perspective*, which looks at how these functions contribute to the value creation in the innovation process as they take place in phases. After all, an innovation process aims to gradually increase the value through different phases with the support of various functions until an innovation creates maximum benefit realization. The second is *the functional perspective*, which looks at what functions are needed – e.g. research or capital.

Thesystem can either be described from a "bottom-up" perspective where we start from the smallest components to show that they are also connected. It can also be described with a "top-down" approach to first give a picture of how things are connected and then delve into which components form the basis for this. In this methodbook, we have chosen a combination where we both examine the innovation ecosystem top-down from a process perspective and bottom-up from a functional perspective and then marry the two together in a logical structure.

1.5.1 The process perspective

A generic innput and output perspective has a "black box" approach to the components of the innovation ecosystem and classifies input as a collection of clustered functions that are more generally and generically added to the innovation ecosystem. Process and function perspectivestry to complement this by putting a certain refining structure around these. The basis is the innovation process, i.e. the value flow through which functions create input to innovations and thus refine them to the value that ultimately generates output. It is the ratio between the value of input and the value of output that shows the efficiency of the innovation ecosystem (Frenkel, 2014).

1.5.2 The functional perspective

The functional perspective manages them from a conceptual horizon and groups equivalent inputs, such as research functions (e.g. private, academia, institutes), business development functions, technology development functions, etc. This corresponds to the societal functions needed in a region to support the innovation ecosystem. The functions create the input that the innovation ecosystem needs in order for the refinement to be optimized. Often the functions can be linked directly to different actors in the innovation ecosystem, but to keep

the perspective clean, we initially focus more on function than on role. Then we can then locate existing actors that correspond to the right function(s).

1.5.3 Measurement dialogue

The actual measurement of interconnectede and (many times) qualitative data is relatively complex. It is not enough to just measure whether, for example, a function exists, it is equally relevant to measure how good that function is and subsequently what effect it has here both on the innovationecosystemand its outputs. And since each point exists in an intertwined system, it would also be necessary to measure what effects the different measurement points have on each other in terms of both positive and negative synergies. However, we consider thelatter to be too complicated for this model at this stage, but would like to warmly point out that it is an aspect to take into account for future models.

We can measure whether a certain function in the innovation support system exists (yes/no). In the event of a "yes", we can measure the degree of maturity of this according to the best principles of the market (e.g. 0-5). For this function, we can measure whether it generates expected input to the innovation support system (yes/no). In the event of a "yes", we can measure the amount of input it generates to the innovationecosystemin quantified numbers. Depending on the input, we can also (try) to measure the quality level of the input generated to the system. Finally, we need to try to estimate whether the input generated produces relevant refinement in the system, i.e. the value of the input. the result and effect. This is the most difficult part to measure, but also the one that gives the greatest correlation value relative to output. In the first pilot measurements that have been carried out, the focus has mainly been on obtaining the right forms of measurement values.

All in all, this gives an overall picture of whether the right functions are in place and whether they provide the support for the system as they should. Only then do we begin to get a picture of how well the system works, where any weaknesses are found, whether it is possible to set new goals for the system's input based on the correlations, and develop action plans for how the functions should be developed to generate according to the set goals.

1.6 Boundaries

Synergies

This model will not take into account trying to calculate how different indicators possibly affect each other, as this becomes too complex. This is left to the analysis stage of the work. Exceptions are only made in cases where the synergies are very obvious and clear.

1.7 Definitions

Innovation ecosystem

The system of components and actors that together constitute the region's innovation power by collaborating to create innovations that contribute to added value in the region.

Innovation support systems

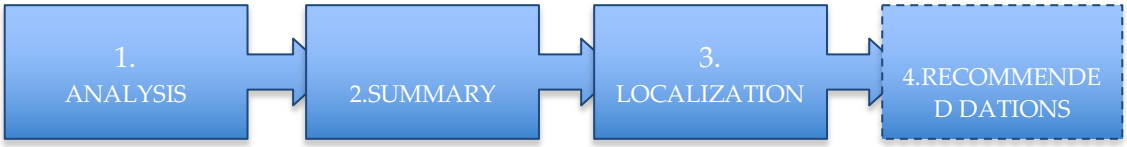
The system of functions that, through central coordination of a public party (the region), works to support and develop the innovation ecosystem. An innovationsupportedsystem consists of actors who offer support to innovators, entrepreneurs and entrepreneurs.

2 The innovation ecosystem process

2.1 Process model analysis

2.1.1 Method

The basis for process model analysis is the existing process models for innovationecosystems that already exist in society. We have started from the models that have been developed, analyzedthese for common factors and qualified justifications, and extract from there so-called "best practices" into a coordinated process model for regional innovation ecosystems. This generic model shall then be integrated with any existing regional model for a combined accepted and regionalised process.



Methodology used to design a recommended process model for regional innovation ecosystems.

As a basis for the analysis, we have compiled the leading process models for innovation ecosystems, entrepreneurial ecosystems, innovation processes, and incubators. From these, the main common factors have been developed as a basis for a recommended approach for Swedish regions. These have been included in the analysis work:

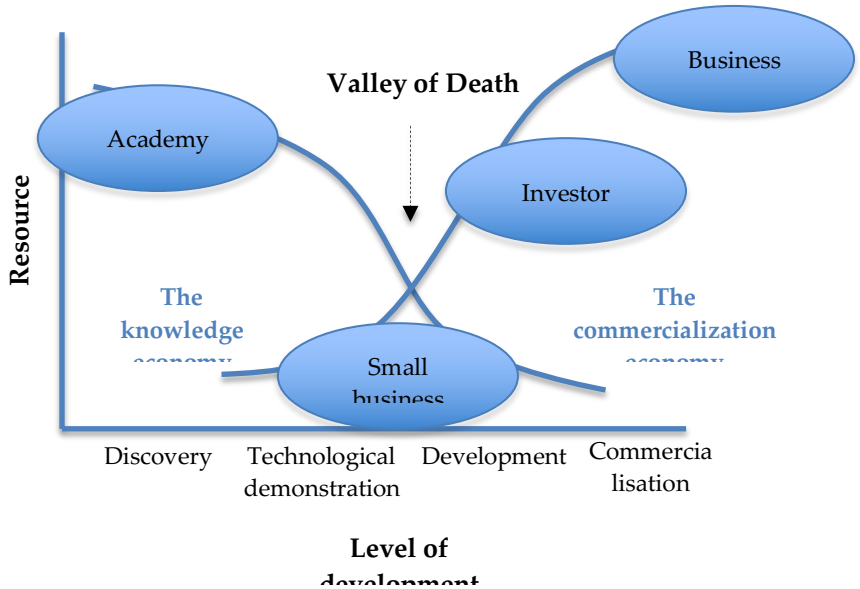
- UK Cabinet Office – a framework for innovation in the public sector
- The "Champion model" – a framework for regional innovation ecosystems in Australia
- Conceptual process framework for business ecosystems (Botswana Open University)
- The Fugle Innovation Process Model
- ISO 56002 – the standard for innovation management systems
- The entrepreneurial process
- Incubators' innovation process

2.1.2 The value stream of an innovation ecosystem

An innovation ecosystem does not consist of a singular and linear process, an ecosystem consists of a network of relationships, interactions, and subnetworks with different forms of pathways for different forms of desired outcomes (Yawson, 2009). So while we are aware that an innovation ecosystem does not consist of a linear process, there will always be a set of generic steps that an innovation will need to pass in order to progress according to the best format. It is the overall process we are referring to here, in order to later be able to map out the functions that are needed for this development to take place in the best way. This is to in turn see what functions are needed in an innovation support system to give the innovation ecosystem the best possible conditions. Therefore, we here maintain the concept of "process

model" because we refer to main flows in the value development in the innovation ecosystem.

As has been mentioned before,the critical components for the development of new innovations are competence and capital. These can take placein very many different forms, which we don't delve into yet. But to understand when this asset is at its mostliterary, we need to understand the principles behind how innovations arise. The basis is to create new solutions for needs with cutting-edge knowledge and make these commercially accessible. The gap between the sequence in which new knowledge is created and in which it is developed and commercialized is usually called *The Valley of Death* (Jackson, 2015).



Valley of Death ("D fate's Dal") in an innovation ecosystem according to Jackson (2015).

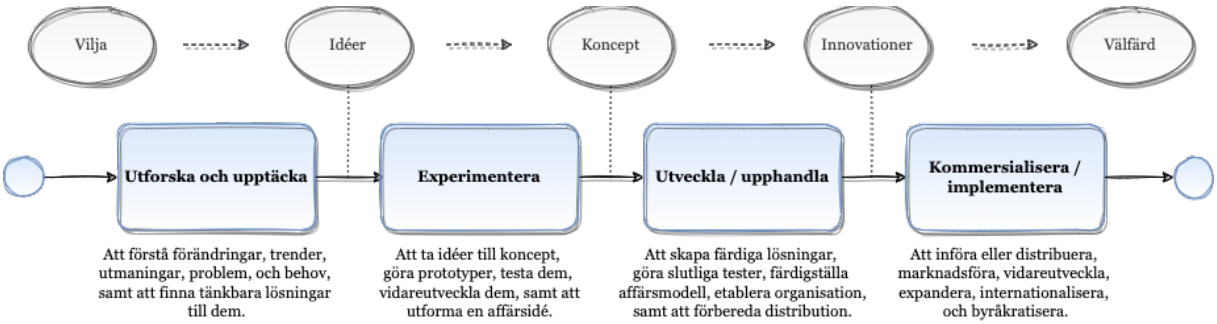
The challenge of Valley of Death is to bring the knowledge economy and the commercialization economy together. This is achieved by making the knowledge economy in the form of research and knowledge formation move more to the right and by making the commercialization economy in the form of development and commercialization move more to the left. This provides a more favorable innovation process and it is with the innovation ecosystem as support that this is better made possible. Without a good structure, technological innovations tend to get bogged down in the failure of type 1 or type 2 (Frenkel, 2014) where t yp 1 are technological solutions that receive large funding, but should in fact be phased out, and typ 2 are technological solutions that should be developed, but are phased out in the absence of funding.

2.2 The innovation process in regions' innovation ecosystems

What we see in both the international and national process models is that although there is a fairly large spread in the levels of detail, it is the same pattern in them. All of them are really based on the basic innovation process to refine something new from need to idea to finished solution to wide dissemination. Therefore, we have chosen the ISO process model to form the basis for the recommended approach we choose to use as a base because it is developed

over almost a decade by experts from more than 50 countries in collaboration and maintains the international and generic height needed for this type of model . Subsequently, it has supplementedts with best practices from the most common factors from other regional and national models, the entrepreneurial process, and the incubator process.

We are now delving into the four phases of the innovation process and what each process step contains for elements that are relevant to the success of the innovation ecosystem. It should also be mentioned that although the model is plotted in a flow, it is by no means linear. Rather, it only indicates the direction of some value development.

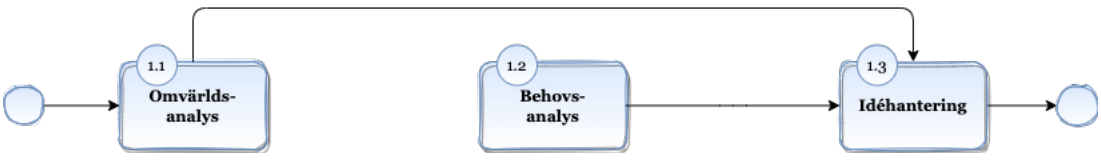


The innovation ecosystem process in regions

These four phases are in principle always followed in one way or another, although the application of the practical processes in each phase can – and will – differ between different occasions and circumstances. We are therefore now looking at different elements in each phase.

2.2.1 1. Explore and discover

The first phase is the most sprawling, as there are a huge number of different ways that thoughts, ideas and needs can arise. The most important thing about the entire phase is in practice to be able to find, manage and structure relevant information that shows what changes are taking place in the outside world and what challenges they entail that lead to opportunities. The exploration and discovery phase in practice consists of two partly sequential sub-phases – finding changes, challenges, problems and needs, and generating ideas for possible solutions to these challenges and needs.



Exploration and discovery phase

The first part of *trend analysis* is about understanding trends and changes in the outside world, how we think they will develop in the future, and how these will affect us and our contextual environment and thus what innovations we see that there is and will be a need for. It gives us an outside-in perspective on innovation. In practice, this is not so much a

process step as it is an ongoing and continuous work where accurate and up-to-date market information and market analysis are critical. Just like the second parallel part needs *analysis* where we also continuously try to understand the changes and needs of different target groups, which through an inside-out perspective gives us a picture of and insights into what types of innovations there is an existing need for. The first two parts provide a look at needs and development and create the conditions for then finding solutions that can satisfy those needs in innovative ways.

It can all be summed up by looking at changes that lead to new problems and needs arising. We then make an analysis of what it is about the existing solution that causes problems to arise and the need is changing. We then try to gain insights into what the actual underlying need is. We add a picture of how the outside world is changing, how trends are developing and how the future can meet the underlying need in a more satisfactory way. It is these solutions that arise as ideas in the third part of *idea management* in discovery. And this can be done both spontaneously and through systematized innovation work or as research.

In many parts of the phase, collaboration with other actors is needed, for example to make good external and future analysis, to interact with relevant needs owners and other stakeholders, and to generate ideas with diversified perspectives. It therefore makes sense to have links to many potentially relevant actors before they may be needed and then have good collaborations when they are needed. On many ongoing occasions during this phase, it also fits in well with various forms of entrepreneurial and innovation education that give the idea creators more knowledge about how to drive an innovation work forward.

1.1 Externalanalysis

Business intelligence is about collecting information about the outside world from many sources to create a basis for analysis. Such information gathering can be both of secondary sources with access to surveys that have already been made and they can be of primary sources, i.e. surveys that you do yourself. The data collection is done by many different types of actors such as consulting companies, market research companies, and researchers at universities and colleges. The trend analysis (often also called external monitoring or reconnaissance) includes many elements, such as initially defining and mapping the environment to be monitored, then identifying the sources to be monitored that have the most relevant value for the purpose of the external analysis, then processing the information that comes in, and then finally conducting the analysis itself and compiling the results in a relevant way.

With the right understanding of the changes in the outside world, important conditions are created for innovation. Since change leads to new needs for change, the innovation work is greatly facilitated when the right amounts of information become available and analyzed professionally. There are many different 'world s', lots of different data sources and data collection methods, and analysis can be done in lots of different ways, so any support with market information that can be given in interpreting the changes in the outside world is a good support for in the innovation ecosystem.

Since innovation is based on pre-empting the market's natural development and creating future solutions, there is also a great need to be able to understand and interpret future

developments. *Evolution* is about solutions naturally emerging as new steps, while *innovation* is about us adding information and intelligence to precede evolution and create the solutions of the future today. In order to add information, we need the same type of information and data sources as in external analysis. On the other hand, we also need knowledgeable experts who have the ability to see how the development looks and we need methods to analyze and interpret future developments and understand how they will affect the intended environment. Access to good market information, knowledgeable experts, and good methods for future analysis are thus essential components of an innovation ecosystem to be able to quality assure innovative thoughts, ideas and solutions.

1.2 Needs analysis

Needs analyses have great similarities in the process with external analyses, but mainly focus on a limited area, such as within an organization or a specific problem area within an industry. The first step is to define and map which problem area to monitor, e.g. the labor market in an area. Then identify the data sources to be monitored that have the greatest relevance to the purpose of the needs analysis. For example, it can be about statistics, support cases, complaints, etc. When a particular problem or need is discovered, it is processed and defined with what it is that is perceived as problematic. Analysis is then made, which is partly about which chains of causes have led to the problem having arisen, and partly about describing what effects problems lead to.

With good mapping of what problems and needs there are, an excellent basis is provided for the ways in which new innovations can solve the perceived problem. However, it is important that the knowledge of found needs and problems reaches relevant actors so that it is given the opportunity to come up with diversified and varied solutions to these problems. Therefore, it is essential with communication to either spread the needs picture to many actors who can contribute with perspectives or to invite some of many actors to contribute with perspectives depending on how open you can or want to be with the needs and insights you find.

1.3 Idea management

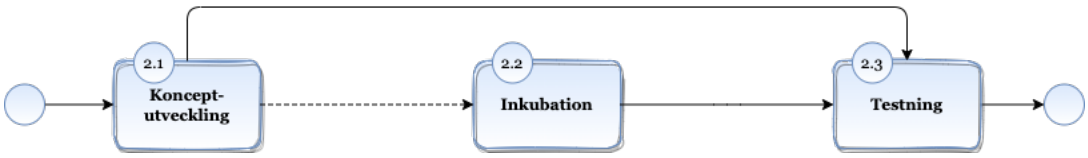
Idea management consists of finding and managing possible solutions to found problems and needs. Ideas need to be generated, cultivated, managed and managed in order for them to become a good embryo of something valuable. In order to create good conditions for idea generation and idea management, there needs to be access to good information, i.e. such that is compiled in the moments before, and diversification among those who will contribute with thoughts about the solutions. Such good generation of conceivable ideas arises from the availability of well-structured and well-analyzed information so that the idea creation gets the right conditions and that there is access to varied expertise in many different areas. Then the idea management consists of several stages in themselves, including the generation of ideas, the management of these ideas, the evaluation and merging of ideas, the validation of ideas, the elimination of ideas, the acceptance of ideas.

So for this, there needs to be methodology for the generation and management of ideas including access to premises and materials, possible agreements (NDAs, etc.), relevant software, etc. that may be needed depending on the chosen approach to the idea management. Along with relevant market information, industry knowledge, and business

development expertise, ideas should also be validated against the market early on for their feasibility and potential. Non-feasible ideas should be stopped or updated early so that they do not draw time and capital unnecessarily from enterprising innovators. In addition, the process is facilitated if initial risk management is made early on to quickly evaluate the potential consequences of the outcome for both the innovators and the target groups. It is usually at this stage that entrepreneurs turn to incubators for help in managing the process and support in how the idea can be taken further.

2.2.2 2. Experiment

Experimentation is about designing concrete solutions, reducing uncertainties by increasing the understanding of how solutions can work and are perceived, and thus reducing uncertainties about the possible outcomes of the solutions and thus being able to better control the risks of innovation. This is done by iteratively developing and testing solutions from the small to something progressively larger and more elaborate. Experimentation is critical to innovation and is precisely where the valley of death is, i.e. if the technological demonstrations do not succeed, it can become the grave even for good ideas.



The experimental phase

This is where much of the applied research comes in, both public and private. However, much of the experimental development takes place equally in companies without it being counted as research, but more is traditional innovation work. Much of this is also done by entrepreneurs, but their biggest challenge is precisely the lack of structure, systematics, and funding, unlike the innovation work that takes place in business and research.

2.1 Concept development

Concept development is the next step in the concretization of ideas. Here, the idea for a working concept is taken through an iterative number of steps. The concept is first developed 'conceptually', i.e. theoretically and in writing, then prototypes are made to be able to test the results and effects of the solution.

The first step is to clarify the original idea further and make it a more thoroughbred concept. This includes making a full description of the functionality and application of the idea. Common ways to do this include *user scenarios* – or "use cases" – that describe how the affected solution should actually work once it is available. These user scenarios provide a verbal visualization of the different situations in which the innovation is to be used and reflect both its use and its advantages relative to existing solutions. Although the solution does not exist yet, these scenarios reflect what it is supposed to look like when it exists. These scenarios are complemented by *feature* descriptions that complement the scenarios with descriptions of how things work and in what way. And in addition, there are also specifications of any requirements that may need to be imposed on a new solution, such as

special requirements for safety, usability, disabled access, etc. or external requirements that are e.g. legal or regulatory.

The second step is to start prototyping the solution to more clearly create knowledge about how the design of the innovation should look and work. This requires technical skills and some financial support. To be economically efficient, you usually start by initially making very simple prototypes with cheap materials that can be quickly put together. Concepts such as "quick and dirty" and "low fidelity" are usually used to describe the principle. The aim is not to make too large investments in the early stages when it is still not clear how the innovation will be designed or if it will even be something. Here, prototypes are now made of simple materials such as paper, cardboard, Styrofoam, wood, etc. Digital solutions are made on paper, whiteboards, or in simple tools such as Powerpoint. These prototypes should then be able to be used for simple tests in the way that it is described in the user scenarios.

The third step is to make more advanced prototypes. These should in the best way be able to reflect real use without costing as it does to develop a really developed solution. These so-called "high fidelity" prototypes should be able to simulate the functionality of the innovations so well that tests can make the experience as similar to the real solution as possible. Here, more real materials are now used, although no actual functionality is built. Final prototypes should normally be of such a simulation level that they can be presented to potential investors, financiers, or purchasers and be a sufficient basis for decisions on full financing.

It may also be the case that the concept is not based on *developing* something new , but can be based on *using* something new. Even then, the concept needs to be described so that it can be developed and applied. If it is a new business model for something that already exists, it still needs to be designed, worked through, and tested before it is introduced and put into use.

Competence in relevant technical areas is critical, as is competence in methodology for developing prototypes. Various forms of collaboration therefore become relevant. Some venture capital (mainly seed funding) is often also needed here.

2.2 Inncubation

Already early on, it also needs to be worked on the business. In parallel with concept development and testing, a value model needs to be developed. If you cannot show early on that there is benefit and value with a new solution, it will have challenges in obtaining financing. Many are prepared to invest in something that has the probability of being a market success, but few are prepared to bet on the opposite, therefore this needs to be calculated starting at an early stage.

But it is not only about the profitability of the individual solution, but also about issues such as ownership, organization, marketing, etc. A preliminary plan needs to be developed for the entire solution, including financing for development. If there's not already a team behind the idea, you start putting this together. Most entrepreneurs or intrapreneurs do not have the skills themselves at all, but need to surround themselves with excellent partners. Good

advice and business support with large contact areas are also needed here. It also requires good market information in order to be able to validate the development of the solution to the conditions in the market and for the business. For the parties involved, this is also a matter of priority whether it is this solution that you should invest your time and investments in or any of the other solutions that are trudging after available resources. Somewhere here, the entrepreneur(s) need to decide what effort to put in and whether to go into a full-time startup and leave a possible permanent position.

In addition, the supply of capital is a crucial moment in this phase because financing will be critical to finance the development and production of new innovations. Contacts with financiers and capitalists are (can be) crucial for the continuation, and the results of concept development and business planning create a crucial basis for proving the market conditions to potential investors. First, capital is needed, but that capital can then be acquired, such as technical knowledge, technology, machines, premises, licenses, etc.

2.3 Testing

Testing is not really a separate step from concept development from a sequential perspective, but tightly integrated and iterative. When the first simple prototypes are developed, various types of tests are immediately carried out, especially user tests in the early stages to get early input, feedback, and ideas for improvement. Then there are new tests for each new and upgraded version of the solution that arrives.

The first ones undergo very simple and quick tests and the choice of target audience in user tests is not so fussy. However, those who develop the solution are rarely also test subjects, but it is often people in its immediate vicinity who are allowed to stand up, of course depending on what type of solution it is and how general it is.

Tests need both a measurement model where it is clear what it is that is intended to be measured in the tests. There can be many different types of data you want to capture, such as how the solution works, how it could work, if you would like to use it, what you would like to pay for it, how you could imagine paying, and so on. In addition, the tests then also need a measurement method that further in which way / ways you intend to get the information. The measurement method will ensure that we receive data and information that we benefit from when we further develop the solution between the tests. Finally, the tests also need test subjects who match the target group for which the solution is intended. The accuracy of the selection increases as the solutions become more advanced and costly, but often need to be reasonably oriented already in the early tests.

2.2.3 3. Develop or procure

When the concept is then fully developed, it needs to be completed for the market. Depending on how the development has taken place, it may look a little different. It can be an innovation that needs to be produced, be it a product or service. If this is the case, the conditions may be a little different if it is an innovation that is developed within an organization or if it is an entrepreneur who wants to launch something on the open market. In the first case, there is often potential financing, structures and ownership in place. In the second case when it is an entrepreneur, most of it usually needs to be built from scratch. This

requires fairly proper business support with contacts and networks in order for it to be good and successful. This may involve finding new innovative technologies to import or license. If, on the other hand, it is not a question of it being an innovation to be produced in any way, but of using and introducing an innovation, then no production apparatus needs to be prepared in any way, however, the developed concept still needs to be incorporated by acquiring the innovation (s). In addition, there is also the need to complete everything businesslike from business planning to organizational management, as well as to prepare the innovation for market launch or implementation. In addition, issues of intellectual property, related patents, legal protection, etc. need to be dealt with.

Development or procurement phase

3.1. Production

With the approved concept as a base, the sharp solution should be made ready for production. This means that it needs to get its final design, which refers to functionality, color and shape, durability, etc. When any choice of materials, sizes, design, etc. is clear and consideration is given to what users want and need, height of innovation, there is a basis for how the solution will be produced and how much it will cost.

By production, this refers to all possible variants of manufacture and implementation such as:
means that innovations are completed and made available to their target group. For the manufacture of products, it can be about establishing a manufacturing process in the premises intended for the purpose or establishing contact with manufacturing subcontractors who produce solutions. For digital solutions, it can be about programmers developing systems based on design and concept information. For services, it can be about getting training and application in the right way so that the solution can be used flawlessly at launch. After all, much of physical production and manufacturing takes place in other countries, so contacts become important. The same applies to the development of information technology digital solutions.

3.2 Procurement or purchase

In this phase, it is often between producing yourself or acquiring. Already at the end of the concept phase, existing solutions have often existed, so here it is important to do a proper review of solutions to see how they match our intended solution and the needs that we have. It is important to find all possible solutions that then match the defined need and set them against each other so that the most suitable solution is acquired. Here, it is extremely important to have good channels for market knowledge, as not everything is published online. It can be about new patented technologies or new R&D solutions that have not yet been commercialized, in addition to what already exists and is available in ordinary ways.

3.3 Business development

In parallel with the completion of production or procurement, the launch economy needs to be completed, which requires a lot of planning. Launch and expansion may require large resources, which is why this planning needs to be completed when the insights into the economics of production or procurement are completed. After all, innovations are by definition something new and carry certain risks when commercialized or introduced, therefore business planning is essential. The same applies to issues of a legal or intangible nature. Investors and financiers will require or expect that there are detailed plans and calculations for commercialization and growth. The work with the supply of capital is therefore an essential part of business development. Already here, the work of drawing in the first customers so that sales are prepared and up and running when it is time for roll-out begins.

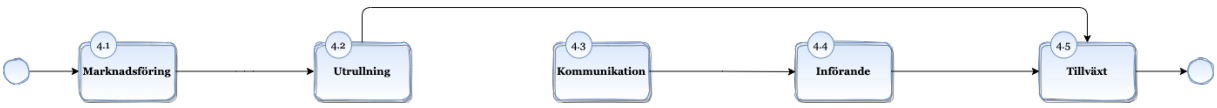
3.4. Testing

If a new solution has been produced, many tests will need to be done. Partly technical tests to see if the innovation works as intended, and partly different types of integration tests to see if the innovation works as intended in the environment for which it is intended. Then there usually needs to be final user and market tests to ensure that the solution you have developed or acquired is really ready for launch or implementation.

This type of test is often handled in the form of pilots and can often need relatively extensive resources because many times there is a lot at stake whether the whole thing will work after launch or not. In recurring innovation testing, it is not rare that you choose to set up a reusable structure for your testing, a so-called test bed. These normally need future-oriented technology to be able to reflect or simulate the cutting-edge world in which the solution should be prepared to operate.

2.2.4 4. Commercialize or implement

The last phase differs relatively much depending on whether it is an innovation that is to be commercialized or if it is an innovation that is to be introduced into the company's own operations. Both options are of great importance for the innovation ecosystem, as regional innovation power is both about creating commercialization and being innovative themselves, although innovation ecosystem theory usually focuses primarily on the commercialization perspective.



Commercialization or implementation phase

Commercialization requires good networks and contacts in different regions and countries that can help create new sales and distribution channels. Both commercialization and implementation of new innovations are usually initially launched on a small scale to gradually grow as the use base increases, the market matures, and sales increase. Often it

starts with the local and regional market and then expands nationally and then internationally, but it can just as easily be from a narrow, specialized market that then broadens. And in order for the local market to be a good breeding ground for innovations, it is of course assumed that they are good at implementing innovations. What in the commercialization phase is marketing takes place internally with communication (and change management) to make employees aware that new innovations will come to their benefit. After that, the introduction takes place, which also takes place just like in a market launch, takes place in stages and is gradually expanded. Both elements intend to create new added value and increased growth.

4.1 Marketing

Starting to bring innovation to market is a delicate task. On the one hand, it is about creating knowledge and curiosity in the market for potential customers, and on the other hand, it is about establishing access to the innovation in the right channels. Depending on what form of innovation it is, it may need special distribution channels, it may also need to establish itself in relevant retail chains, etc. This needs to be prepared and any contracts established. In addition, information needs to be disseminated and knowledge created about the innovation to initiate the market launch, so advertising and other market information towards relevant target groups needs to get started.

4.2 Roll-out

In practice, a roll-out means an introduction into the market, i.e. a market launch and initiated market establishment. The roll-out needs to ensure that the innovation is made available on the market and that the use gets started. This means starting sales, increasing production, and continuous expansion of distribution and sales provided that the initial steps have gone well. Gradually, access to innovation is established and dispersed, and the market matures. Here, ample access to market contacts is required that can contribute to market launch and establishment, unless the business already has fully established market channels.

At the same time as the innovation establishes itself, you can always count on the fact that there may be initial problems and 'teething problems' with a new solution that you want to find and update early on. Therefore, it is important to have systems that continuously monitor, measure, and evaluate how the innovation works and give the innovator the opportunity to make market or product adjustments as soon as possible.

4.3 Communication

When introducing innovations in one's own business, the big challenge is to manage change and often places great demands on change management. If the testing in the previous phase has been successful, the technical integration of an innovation is not the problem, but it may lie in the fact that the employees and any other stakeholders do not see the value of the change we intend to implement. The cognitive unwillingness to change is very common because employees appreciate feeling secure in the ways of working, tools and methods they already have, which affects the entire organizational culture. But through good change management – which is usually based on good communication – you can reduce friction and facilitate transformation.

4.4. Introduction

Communication can certainly also be seen as the early stage of the introduction, but we have chosen to distinguish them here to further clarify the importance of communication and change management when introducing innovations. This of course continues throughout the implementation process so even when the new innovation is now introduced into the business. Depending on the solution and approach, innovations are often introduced to a limited extent first to evaluate the results and then gradually expanded to the rest of the business.

4.5 Growth

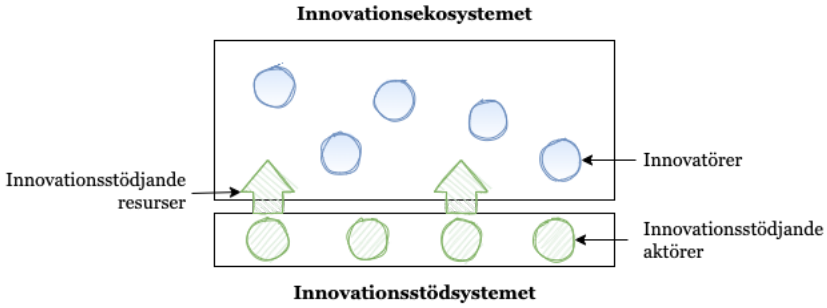
When the innovation is rolled out and initially established, it is about increasing growth. In terms of the innovation adoption curve, it's about moving forward through the "early adopters" phase and into the "early majority". In practice, this means moving beyond your first initial clientele and expanding to both new geographies and new target groups by further developing your initial solution. At this stage, there is a great focus on sales and all links to national and international forums are welcome. Any technologies need to be further developed, including machines, robots, and IT systems so that increased production volumes can be managed. The organization and business management need to be updated and reorganized in order to be able to handle the new conditions with strengthened competence and developed responsibilities and routines. The roll-out phase thus takes place in several rounds to new markets where new channels will be established and new customer groups will be reached with market information.

3 Innovation support system for the innovation ecosystem

3.1 Purpose and function of the innovation support system

The term "innovation support scheme" refers to organised support for innovation, as well as support for actors working with innovation support. In order for the innovation ecosystem process to be carried out, resources are needed to support the implementation at every stage. The main resources, which we can deduce from the indicators in the innovation ecosystem process are skills, capital, and networks, where networks can provide contacts that lead to skills and capital, and capital can acquire skills, but also other types of necessary assets. Such resources are held by different types of innovation *support* actors that may have different characteristics in the innovation ecosystem process, therefore it is essential to provide a clear picture of which actors contribute in what way to creating value in the development of innovations. No single actor can cover all the needs of an innovation ecosystem in isolation, which is why we are talking about an innovation system and analyzing how the actors in the innovation support system add value to the innovation ecosystem process.

Such actors are those who assist innovators and innovative organizations with various forms of resources that facilitate the execution and adoption of innovations. The innovation support actors are not the innovators in question, but have the main task of assisting them in various ways that directly or indirectly benefit them. They can be private or public and regional and municipal as well as state. With insights into the functions of the innovation support system's actors, the region can quality assure the development process and specify exact efforts that the region can make to improve the innovation support system and thus the support for the innovation ecosystem.



The relationship between an innovation support system and innovation ecosystem.

A challenge for a regional innovation support system is to be able to be a support for an innovation ecosystem that in turn consists of an undefined number of innovation systems. This means that there needs to be support for a set of different needs, although much of the business support is generic for many innovation systems and the industry support has a conscious focus on the region's stated areas of strength and smart specialization. Consequently, one of the most important functions of the innovation support system is also to coordinate the right innovation support resources to the right innovators at the right time.

3.2 Innovator roles in the innovation ecosystem

After all, innovators are the most critical raw material in an innovation ecosystem and they can come in slightly different forms.

Experts / Professional Professionals

After all, human capital is at the heart of an innovation ecosystem. Experts with specialist and technological skills are therefore critical to the development of innovation. In most cases, it is these that create the innovations. Knowledge together with passion, determination, and courage to dare to take risks is central and the lack of the same can be disastrous. Recruiting and developing experts and specialists are thus vital functions of a regional innovation ecosystem.

Startups

A startup is usually a company with current innovation as its primary business idea. Success is not a given and a startup is surrounded by great uncertainties. They are initially run by passionate entrepreneurs with limited capital and high hopes for the future. Due to their austere size, they are flexible and adaptive to change, which increases the likelihood of success – especially when compared to large companies. And with "little to lose" on taking big risks to take market share, they create the conditions to raise the level of innovation, increase creativity, and add healthy competition to an ecosystem.

Private companies

Innovation is done not only by entrepreneurs, but also by existing companies. They can conduct applied research, develop new technologies, possess super-sharp talents, and often have the resources themselves to launch innovations. Often they already have their own established networks within the innovation ecosystem with partnerships with other actors such as research institutions and development agencies.

3.3 Innovation support actor roles

The literature shows a number of functions and roles that are innovation-supporting in an innovation ecosystem. However, there is a further need for a standardization of the categorization of these roles and there are clear overlaps and similarities between several depending on the context in which they act. However, it gives a fairly good indication of what the actor image looks like in the innovation support system. At the same time, we can state that there will be room to further refine and granulate the actor roles when we carry out mapping of the existing actors in future innovation support systems and adapt these to the specific circumstances and environment of different regions.

3.3.1 Research institutions

Researchers fulfill (at least) two functions in the innovation ecosystem, one of which in the innovation support system – on the one hand, researchers act as knowledge creators where they build new knowledge that creates the conditions for innovations, which can be used by innovators, and on the other hand, they can act as knowledge creators and innovators when

they wish. It is not always researchers choose to become entrepreneurs just because they have created new innovative knowledge in a field, but the opportunities are there and they have helped to create them. Different research institutions also fill different roles, with some focusing on long-term basic research and some applying more short-term market-oriented research. All levels are relevant for innovation work.

Research institutions often provide training based on the lessons learned from their research results, which makes them critical to the levels of knowledge in a region. With higher levels of knowledge about different areas, the conditions for innovation in these areas increase significantly.

These most often consist are a number of types of main actors:

1. **Universities and colleges**. Who conducts traditional basic research.
2. **State ResearchInstitutes**. Public industrial research institutes engaged in applied research.
3. **Private non-profit research institutes**. Private research institutes engaged in applied research, most often in a specific industry or specialization.
4. **Private research actors.** Most often in-house or co-owned by several private actors in the same industry.

3.3.2 Financiers

Financiers can enter different parts of the innovation process depending on their willingness to risk and their capital strength. Their purpose is to provide capital for the resources needed to develop, commercialize, or accelerate innovations. Often, financiers not only stand with capital but also with knowledge, contacts, and experience to ensure that their investments go well. But this is in practice another function of the innovation support system.

Business angels

Business angels often play an important role in getting fast-growing small businesses to overcome the valley of death, i.e. the step from research and development to commercialization. They are often more risk-averse than traditional venture capitalists and often actively enter the companies with equity, board position, advice, contacts, and possibly channels for further financing. There are also business angel networks that bring together several private investors with available capital and match them with entrepreneurs.

Venture capitalists

Venture capitalists are primarily investors who invest in startups and growth companies with the aim of jointly creating a profitable business for all parties involved. Venture capitalists dare to invest in innovation and between turns take some losses, but can handle it thanks to good portfolio management in their investments. Most often, their capital assets are substantially larger than those of business angels and assist with financing in various ways, such as through company shares or special loans that are repaid only when the company enters profitability.

Incubators and accelerators

Incubators and accelerators play an important role in the overall innovation ecosystem through their supportive environment for startups and new business ideas. This typically implies physical space for office work and interaction with peers in the same situation through shared assets. This usually also means access to technical and business advice from senior mentors who can help with issues related to product development, financing, marketing, law, manufacturing, etc. They often assist with networks to relevant contacts in such areas, such as manufacturers, distributors, financiers, etc. All incubators do not assist with their own venture capital, but many collaborate primarily with various venture capitalists.

Investment companies
Investment companies manage large funds from varied sources, for example from pension funds, with the aim of creating growth in their investments. Unlike venture capitalists, you are not as risk-averse in the early stages, but rather come in with large investments in more mature companies with an established market where you see that you can actively contribute to economic development. Unlike venture capitalists who prefer to go in as co-investors, investment companies prefer to buy 100% of the shares so that you get full control. You also buy up companies that are not doing well, but where you see that new capital and new skills can lift the business and make it profitable.

Development agencies
Development agencies work to stimulate and support innovators, often with seed capital in the early stages for them to test their ideas. They can be both private and public and often seek solutions in specific social or economic areas. Innovation competitions are often launched to address specific needs and some take on a role as a venture capitalist, but with a particular focus on startups that have come out of the start-up stage but are too small for investment companies.

Crowdfunding
For almost a decade, there has also been the opportunity for innovators to apply for funding from the public for their projects. By posting his idea on a platform, an entrepreneur can manage to raise small funds, but from many investors, which can be summed up to all the capital needed. In return, investors are usually offered a share, some of the first copies of the innovation, or similar.

3.3.3 State and authorities

The state and authorities play a major role in the conditions for innovation and entrepreneurship through policies, regulatory environment, tax incentives, research support, etc. They also play a major role in creating practical and communicative conditions for innovation, such as broadband, real estate, access to electricity, transport, etc.

In addition to the government, parliament and ministries, most of the innovation-creating conditions are created by authorities, boards, and councils. These are:

1. **Mission-oriented authorities**. These are authorities, boards, and agencies that may be responsible for areas such as research funding, business development, infrastructure, etc.

2. **Research councils and foundations**. These often define the direction that research should have within their respective areas of responsibility and allocate grants accordingly. The advice is often linked to the areas of different authorities.

3.3.4 Civil society organizations (non-profit organizations)

These are often non-profit organizations that work to promote various functions of society. They are often counted among NGOs (non-governmental organizations) and are available at local, regional, national and international level. They are often non-profit organizations with great public confidence to speak up and drive the development of their cause. They are formally counted as "idea-driven sector" and which is mainly based on their legal form, which includes non-profit associations, faith communities, communities, foundations and funds, as well as limited liability companies with a special profit distribution restriction (SVB). Thus, they can act as a strong proxy for their cause in an ecosystem and drive development issues towards, for example, authorities.

3.3.5 Intermediates

Intermediates play an essential role in an innovation ecosystem as their primary role is to connect organizations within the ecosystem and to contribute to the facilitation of ideas, technologies, and other resources to support commercialization and growth. In practice, they match needs owners with resource owners. There are usually three different types of intermediaries: 1) intermediaries for problem solving - getting together needs owners with innovators, 2) intermediaries for technologies - getting together technology developers (IP owners) with commercial actors, 3) intermediaries as network coordinators - bringing together different types of actors in the innovation ecosystem (Agogué, 2017). They are characterized by their "neutrality" in the innovation ecosystem as they do not represent any particular role but have the function of supporting the process. Often they act as brokers between functions of the innovation ecosystem.

Science/business parks

These are environments where successful research and/or companies are put in the same area to create conditions for planned and spontaneous fertilization between the actors in the innovation ecosystem.

Incubators

Incubators have several roles in an innovation support system, both as intermediaries, as business support, and as coordinators of financing. Sometimes, for example, incubators do not have their own venture capital, but act as intermediaries between entrepreneurs and investors, attributing multiple functions to them.

Technology transfer offices

These are organizations focused on helping technology developers find partners to commercialize their findings. Often, these are located in universities and research institutes to help technological researchers create meetings with commercial actors for their research results with the aim of jointly bringing these to market. These technology transfer offices

usually do not function as incubators but just as an extended contact area for IP owners to find the right partners.

Matchmaking Services
Online services that help to bring together different actors in the innovation ecosystem with the right conditions at the right time. It can be to create meetings between entrepreneurs, to create meetings between problem holders and problem solvers, it can be to create meetings between idea bearers and developers, it can be to create meetings between entrepreneurs and producers, or it can be to create meetings between innovators and financiers. This is done through registration and addition of information on a digital platform, which then helps to create relevant contacts, as well as to facilitate the contact so that it feels safe for all actors.

Neating plant coordinators
Intermediaries such as network coordinators can also be temporary organizations, such as conferences, trade fairs, or pure network meetings. In an ecosystem, these aim to increase the conditions for creating useful meetings between actors in the innovation ecosystem that can lead to innovations and commercialization of innovations.

Co-working spaces
Collaboration places are areas where many actors with diversified orientations can sit in common areas and thus create conditions for spontaneous meetings and collaborations. Often, such surfaces are designed to maximize the conditions for this particular type of networking.

4 Measurement model for regional innovation ecosystems

Based on the recommended process model for regions, as well as on indicators from international and national measurement models for entrepreneurial and innovation ecosystems, we have developed a model to measure the ability of the innovation ecosystem in a region. This model provides a degradable structure that takes into account all the areas that need to be measured for a successful regional innovation ecosystem. The measurement model is based on the value development process and then looks at selected indicators, and then matches the two. The purpose is to be able to clearly determine which factors contribute to the value development in what way and when. Thus, we get a clear picture of what efforts are needed when, can compare it with what the existing innovation support system looks like, and then see how it can be developed in the best way. Here we describe the structural structure of the measurement model and the indicators (metrics) that are most relevant to give valid results in the measurements.

Based on the dimensions, i.e. the highest level, for which functional areas we need to find measurement points, these have definedts down a degree of concretization to functional areas (subdimensions) within which we need to measure the efficiency of the innovation ecosystem. In order to measure the effect of the subdimensions, we have then defineda number of indicators per subdimension. Here it is important to be able to identify and classify indicators that fit in and that can be used in a measurement model. According to the OECD, there are mainly three factors that need to be considered when appointing your indicators.

1. *Relevance*. Will the metric show what we want it to show? Is the indicator relevant to what is the purpose of the innovation ecosystem and the reason why we measure it?
2. *Precision*. How accurate will the indicator give us the value that we are aiming for? Is that exactly what we want or is it "roughly"?
3. *Availability*. Is it possible to get hold of data that is useful for the metric we want? Are there any existing data sources where we can find the values? Do we need to produce the data ourselves and if so, is it possible?

For each indicator, we summarize below 1) the importance of the indicator for the innovation ecosystem and 2) the appropriate measure for the indicator.

4.1 Dimensions and indicators for measuring regional innovation ecosystems

As mentioned earlier, there are already a large number of different models for measuring innovation capacity in countries and regions. We have made a solid analysis that has resulted in a verified and adapted model that is adaptable to the needs of Swedish regions to develop their innovation ecosystem.

As discussed in the first chapter, the Council of Competitiveness (Feinson, 2003) and the OECD (2010) describe a number of functions that are essential in an innovation ecosystem for it to fulfil its higher purpose. These are:

- To create new knowledge.
- To support the governance of the search process.
- To provide resources such as capital and knowledge.
- To facilitate the creation of positive external exchanges.
- To facilitate the formation of markets.
- To create and provide the market with human capital.
- creating an adapted labour market;
- To create and convey technological opportunities.
- To create and convey innovations.
- To provide facilities, equipment and administrative support for incubation.
- To facilitate the regulation of technologies, materials and products to expand markets and facilitate market access.
- To create markets and convey market knowledge.
- To improve networking.
- To conduct technological research, market research, and partner search.
- To facilitate financeinthe ization of innovations.
- strengthening regional R&D;
- strengthening regional innovation capacity;
- To stimulate innovation in SMEs.
- To promote entrepreneurship and newbusiness.

We have these functions as a starting point for the measurement model. They are driving the areas an innovation ecosystem needs to cover. If you go through d a collected literature because you see a number of dimensions that are key areas for measuring and developing an innovation ecosystem. All of these relate to Feinson's functions in different ways.

4.1.1 Technology

New technology is a foundation in the majority of successful innovations – and especially richinnovations. Therefore, an innovation ecosystem needs to have a systematic and structured approach to how to stimulate the development of and access to new technologies in different ways. Here, both systematics and infrastructure, but also regulations and policies play a role.

4.1.1.1 Logical focus

Acquisition of foreign technologies

It is possible to acquire foreign technologies in four ways: to imitate foreign innovations, to attract foreign direct investment, to license foreign technologies, or to import foreign technologies. The innovation ecosystem here has the opportunity to contribute human and social capital to evaluate, select, implement, and modify foreign technologies. The most normal practice is to import foreign technologies, either for resale or as components of their own products and services.

Development and improvement of technologies

Developing completely new technologies is often about research and development (R&D), which can be both private and public/academic. Often formal R&D is needed.laboratories with which the whole purpose is to carry out experimental development. Often so Fill companies' R&D functions and research institutes sucha roleyour, which overlaps with our next dimension.

Use and dissemination of technologies
To ensure that developed and acquired technologies are of practical use, the innovation support system can support competence in the use of new technologies.

4.1.1.2 Indicators

1.	High-tech imports as a percentage of total imports to the region. Total import costs of high technology relative to total imports.
2.	High-tech production as a percentage of total production in the region. The percentage costs of the production of high-tech products in the region relative to the total cost of production in the region.
3.	Number of organizations where the use of high-tech products and advanced digital tools is considerable. An estimate of the percentage of work performed with the support of advanced tools relative to the total amount of work.

4.1.2 Research and development
Research and development aims to build up the regional knowledge base and to construct experimental innovations.

4.1.2.1 Logical focus
Investment in research and development
Public and private investment is directly crucial for the development of innovations. Public investment in research and development is, in the vast majority of cases, about contributing to new, non-proprietary innovations where the results can benefit many actors. Private investment is primarily about developing proprietary innovations that increase the value for intended target groups and benefit the growth of the developing organization. Public investment in research and development often produces results on which private investment can build.

Research and education
In academia, knowledge building is closely linked to education, which means that good applied research leads to stronger regional human capital. Research basically aims to create new knowledge and when new and certified knowledge is also allowed to become an integral part of human capital development, the region builds up as a stronger knowledge cluster.

Experimental development
Research for development can take many forms. The most common is private R&D in the research departments of companies, collaborations between research and business, and

academically driven experimental research often at research institutes. The purpose is always to find new technological solutions that do not already exist. Funding is usually provided directly by collaborating companies or by public research funds.

Patents and intellectual property

Granted patents are proof ofsuccessful technical innovation. Although a patent in itself does not actually have to lead to successful success in the market, it is still an enabler for thesame. After all, a patent is a certificate that a technological solution that does not already exist has been developed in addition to protecting the investment in developing the solution that has been made from intrusion and plagiarism for a certain period of time.

4.1.2.2 Indicators

4.	The total amount of investment in R&D in universities, colleges and research institutes in the region as a share of GDPR. The percentage revenue in R&D as total revenue in KSEK divided by GDPR in KSEK.
5.	The total amount of investment in R&D in private companies in the region. Total amount of KSEK invested in R&D of regional companies during the previous financial year.
6.	The amount of collaborations between universities, colleges, research institutes and regional companies. Average number of collaborations (or projects) that responding regional organizations have with research institutions.
7.	Number of qualified research publications by researchers from organizations based in the region. Number of research publications of the region's universities and colleges in the last available year.
8.	Number of people in the private sector who for the majority of their working hours work professionally as researchers. Number of people who work more than 50% of their time to create innovations and innovation-based knowledge.
9.	The proportion of researchers, out of the total number of researchers, who conduct research in the region's areas of strength. Number of researchers employed by universities, colleges, or research institutes in the region who conduct research in the region's areas of strength (indicated by SNI codes).
10.	Number of newly graduated doctors at universities and colleges in the region. Number of doctoral degrees registered at universities and colleges in the region during the previous financial year.
11.	The share of early startups that base their turnover on high or medium-advanced technology. Number of companies started in the last 3 years with fewer than 100 employees who build their business idea on newly developed high- or medium-advanced technology ("tech startup" in "deep tech").
12.	The share of companies in the region that have launched new product innovations incorporating new technology in the last three years. Number of product innovations with new technology that have been launched to the market over the past three years of operation.
13.	Number of patent applications in the region filed by regional companies or persons. Number of patent applications received from companies or persons in the region in the previous financial year.

14.	Number of international patent applications filed by regional companies or persons. Number of international patent applications to WIPO from municipalities in the region during the previous financial year.
15.	Number of trademark applications made by companies based in the region. Number of trademark applications from people and companies in the region in the previous financial year.
16.	Number of national design applications made by people and companies in the region. Number of design applications from persons and companies based in the region in the previous financial year.
17.	The relative value of intellectual property licensing agreements accruing to companies within the region as a percentage of total revenue. The average total revenue for licensing agreements and other revenues from intellectual property as a percentage for companies in the region as part of the total revenue.

4.1.3 Human capital

A foundation for being able to produce successful innovations is that there is leading expertise available. Where researchers build new knowledge, experts apply such knowledge. It can be about competence in all kinds of areas from entrepreneurship and business acumen to technical excellence. In any case, for an innovation ecosystem to be successful, it is necessary that such competence is available in all its forms. It is human capital that stands for the creativity and ideas of an innovation ecosystem, so in all parts of the innovation process, creative, managerial competence is a critical core component.

As companies are always looking for talented human capital, good talent availability also contributes to increased foreign direct investment in a region. If there is human capital, capital and technology are attracted.

4.1.3.1 Logical focus

Technical competence

In order to be able to create innovations, in most cases advanced knowledge is required that is technical from both a business and technological perspective. It is important that a large part of the workforce is knowledge-intensive, that they assimilate knowledge, and that they apply it well.

Highlevel of education

The higher the average level of education in a region, the higher the average level of competence for innovation. This is usually measured by, for example, seeing what percentage of residents have studied at a higher level.

Goodquality of education

A high level of competence can not only be measured in how many years you have studied an education, but of course also depends on the quality of the education provided. Logic says that high quality of education leads to higher competence in those who have completed the education because the whole purpose of an education is to raise the level of competence of those who read it. But the educationalcontent also needs to be relevan t and applicablet.

Talent attraction
Competence needs to exist and thus both want to stay and want to move in. A region must therefore actively make itself attractive for qualified skills, which means both getting highly skilled residents to stay and not wanting to move to another place. And it also means actively working to get skilled workers to want to move to the region to have a better life.

4.1.3.2 Indicators

18.	The percentage of knowledge-intensive workers out of the total labor force in the region. The total number of employees in the region in professional fields 1 to 3 according to SSYK (SCB).
19.	Number of companies in the region offering higher-level technical or advanced skills development for their full-time employees. The measure is based on a self-estimate between 0 and 5 where 0 is "we offer nothing" and 5 is "there are great opportunities for all our employees to get funding for skills development and to do it during working hours".
20.	Number of people with qualified professional certifications in the region. Number of persons as a percentage of the total workforce of responding companies in the region holding one or more qualified professional certifications.
21.	Number of citizens of the region who have graduated from university, polytechnic, or equivalent level of education of the total population of the region. The percentage of regional citizens aged 25 to 64 who have a tertiary level of education aged two or more is two years old.
22.	The percentage of citizens in the region who have graduated with a higher degree who have done so in the STEM fields. The percentage of the region's citizens aged 25–64 who have a post-secondary STEM (science, technology, engineering, mathematics) education that is two years or more.
23.	The quality of education of post-secondary education in the region according to official evaluations. Average value of official assessments made in the last fiscal year of post-secondary degree programs in the region.
24.	Accessibility to entrepreneurship education and entrepreneurial elements in higher education in terms of number and scope. The number of courses within SUN 2020 training area 34 ("Business Administration, Trade and Administration") that started during the previous financial year.
25.	The diversification among researchers in the region in terms of international recruitment. Internationally recruited researchers at universities and colleges in the region in the previous financial year.
26.	The time it takes to find and contract relevant skills to key roles for companies in the region. The average time in days it has taken in the last fiscal year for regional companies to contract key competencies for their operations.

4.1.4 Entrepreneurial ability
The entrepreneurial ability is essential in an innovative region. It reflects whether there are driving forces, culture, willingness and courage to invest in innovation by taking the step to

become an entrepreneur. It shows not only the willbut also the results of the efforts in terms of increased revenue streams and employment.

4.1.4.1 Logical focus

Renewal rate

Because therenewal rate shows whether entrepreneurship is increasing, i.e. whether the number of new companies is increasing and whether there are more new entrepreneurs. If entrepreneurs fail in their ventures, they will shut down, but many start new again and many others start new businesses. Ifentrepreneurship increases, the renewal rate is high.

Growth rate

In addition to wanting more companies that provide opportunities for growth, they also want to see that growth works. We are therefore looking at whether companies are growing in their turnover and whether they are creating more jobs.

Innovation

Then, of course, both large and small organizations need to be able to demonstrate entrepreneurial ability, which can be measured in their ability to be innovative and work structured with innovation work. Many times, innovations emerge by pure chance, but in most cases they arise through conscious systematic work.

4.1.4.2 Indicators

27.	Number of start-ups in the region in the last year. Number of new business registrations based in the region in the previous financial year.
28.	Number of corporate bankruptcies in the region over the past year. Number of registered bankruptcies with the Swedish Companies Registration Office during the previous financial year.
29.	The share of growth companies in the region based on staff growth. Number of companies based in the region that in the last three years of operation have increased their workforce by an average of at least 20% per year.
30.	The share of growth companies in the region based on revenue growth. Number of companies based in the region that in the last three years of operation have increased their turnover by an average of at least 20% per year.
31.	Number of companies in the region that have a systematics based on innovation management in their innovation work. Number of companies in the region that state that they apply innovation management methods in their innovation work in a self-assessment between 0 and 5 where zero means that they do not do it at all and 5 means that they have a fully developed innovation management system according to ISO 56002.
32.	Number of companies that to a considerable extent involve users / customers in their development work. The number of organizations in the region that state that they involve their target groups in their development work own a self-assessment on a scale 0 to 5 where zero means "not at all" and five means "in every single step from idea to test".

4.1.5 Business support

Having a good idea for an innovation is not enough, a driven innovator also needs to be supported with how to take the innovation further and create maximum conditions for it to become a market success. For that, there needs to be support and infrastructure to back up the innovator when advice and access to contacts and resources are needed.

4.1.5.1 Logical focus

The simplicity of starting and running a new business

Registering, starting up, and running a new business can be an administrative hurdle that makes entrepreneurs shy away from starting. This threshold needs to be low and is an international measure of how authorities can make it easier for entrepreneurs in an innovation system.

Legal support and financial services

Almost all new businesses need help getting through the administrative jungle. Important such services that are needed when a new innovation is to be launched are partly legal advice on e.g. intellectual property, agreements, contracts, etc. The company itself also needs to work, so they may need similar advice in terms of accounting, tax planning, salaries, etc. This is something that can cost a lot of money, which a newly started company that does not yet have any business or profitability can have difficulty managing.

Incubators and accelerators

Both aim to be support for developing innovators' strategies and business models with the big difference that incubators have as their primary driving force to help in the early stages, while accelerators have the drive to increase the pace of work that is already underway with a ready-made solution and existing customers. Both assist with senior business advice, contacts, and connections to capital and the market.

Growth and internationalisation

One of the most important parts of the innovation work is to create the broad impact and achieve growth. This is done as soon as an innovation is established and one can focus on the growth. Maximum growth will of course be achieved if you succeed well with your internationalisation. But for this to happen, you need help contacts and networks. This applies to both entrepreneurs and established organizations, although the latter often acquire such skills internally.

4.1.5.2 Indicators

33.	Number of regional companies admitted to regional incubators and accelerators. Number of companies based in the region admitted to regionally established incubators or accelerators at the time of the survey, i.e. in the current year, regardless of phase.
34.	Number of companies that are profitable five years after the start of the program participation. The number of admitted regional companies that today show

	profitability. (Either in the most recent annual report or in the current earnings report.)
35.	Number of companies in the region that participate in regional export cooperation with e.g. Almi, Business Sweden, the Swedish Export Credit Corporation, EEN, or similar. The percentage of regional companies surveyed that use the support of specialized public organizations for exports.

4.1.6 Actors and links in the innovation ecosystem

Human capital is found within the ecosystem in the form of different roles that fulfill different functions in the system. These roles take place in the form of the actors that exist in the innovation ecosystem and the system itself forms the connections that exist between these actors. The couplings aim to coordinate the right competencies at the right time to increase speed, precision and quality in the innovations that the innovation ecosystem produces.

4.1.6.1 Logical focus

Actors

The actor map may differ significantly between different innovation ecosystems, but the OECD sees that the core of a system consists of five actor roles.

1. **Public sector.** Local, regional, national or international actor who has a key role in setting the policy direction.
2. **Intermediates.** Which serve as bridges between, for example, authorities and research or research and business.
3. **Private companies.** Includingderar privately financed R&D; and research institutes funded by the business community.
4. **Universities and colleges.** And other related institutions that provide the innovation ecosystem with key competences and skills.
5. **Other private and public organizations** that have an important role in the innovation ecosystem, such as patent offices, incubators, educational organizations, technology transfer offices, innovation consultants, etc.

The important thing in the innovation ecosystem is that all actors are represented, qualified and committed to their worke, and have clearly found their roles in it.

Connectors

The connections are the touch surfaces that make the innovation ecosystem a system. The structure of the links depends on the ways in which knowledge and assets flow within the innovation ecosystem. These connections can be both formal and informal, but the more loose connections that exist, the more established connections it can lead to, which in the long run strengthens the ecosystem.

Of course, links in a regional innovation ecosystem also extend beyond the boundaries of the regional system. Of course, the regional connections are the first priority, but for an innovation ecosystem to reach its full potential, national and international connections are

also essential. Both to be able to access the right skills and partnerships, but also to be able to create good dissemination, growth and exports in the later phases of the innovation process.

Examples of connections are through industry organizations, clusters, science parks, networking events, etc.

4.1.6.2 Indicators

36.	Number of students at universities and colleges in the region. Number of students registered at the latest available opportunity (semester) at universities and colleges in the region.
37.	Number of employees of research institutes established in the region. Total number of employees at the offices of research institutes in the region.
38.	The amount of interaction with intermediaries in the region. The average number of intermediaries that the region's companies interact with, in terms of both physical actors and digital platforms.
39.	Number of actors with key functions in the region's innovation ecosystem. The total number of actors holding key functions in the regional innovation ecosystem according to selected actor models.
40.	Regional companies' membership in regional, national, and international industry and network organizations. The proportion of regional companies surveyed that are part of relevant industry and network organisations for them.
41.	The number of co-owned structures in the region. the average number of co-owned structures in which regional organisations participate or co-finance;
42.	Number of networking activities and events in the region organized by the innovation ecosystem actors with the aim of creating networking for innovation. Number of completed networking events in the region during the previous financial year with the aim of creating contact areas between actors in the innovation ecosystem.

4.1.7 Financial capital

Transforming ideasinto innovative products and services and bringing them to larger markets requires resources, which in turn requires access to financial capital. Although established companies can often finance their own launches of innovations, it is normally difficult for the individual entrepreneur. Therefore, financial capital will be needed in the various phases of the innovation process, especially to get out of the Valley of Death. These can be venture capital companies, business angels, corporate loans, government loans, etc. The important thing is that there is available capital that is made usable in ways that benefit both the innovator and the investor.

4.1.7.1 Logical focus

Rice capital including business angels

Access to start-up or growth capital from commercial or public venture capital firms, private business angels, other private funds (FFF – Family, Friends, and Fools), or crowdfunding.

Lriver
Access to loans for new innovations and start-ups with committed participation, which means minimal guarantees to relatively favorable agreements regarding interest and amortization. The loans may come from banks, institutions, credit institutions, commercialor government, etc.

Bidrag
access to public investment in innovation; For example, it can: be innovation funds or research funds. In principle, it is always about some form of application that needs to be made and if it meets the requirements, the recipient can receive a certain amount of capital that is not repayable.

4.1.7.2 Indicators

43.	Number of venture capital companies and business angels in the region. The total number of venture capital companies and business angels active in the region at the time of the survey.
44.	The sum of the amount of venture capital investments in the region. The total amount of venture capital investments in regional companies by venture capitalists established in the region.
45.	Return on invested venture capital in the region (ROI). Average return measured in ROI on invested venture capital from venture capitalists and business angels to companies in the region in the previous fiscal year.
46.	Percentage of early-stage venture capital investments (so-called seed funding). Percentage of seed funding of the total venture capital investments in the region.
47.	The size of foreign direct investment in the region. The total amount of capital in KSEK invested in the region for growth purposes from foreign companies during the previous financial year.
48.	The sum of disbursed government innovation loans to regional small businesses. The total loan amount from state loan providers to small businesses (less than 50 employees and less than SEK 100 million) based in the region during the previous financial year.
49.	The simplicity of finding and assimilating public grants for innovation work. The companies' perceived simplicity to apply, be granted, and report back grants on a four-point scale from very difficult to very simple.

4.1.8 Infrastructure
Both the physical and virtual infrastructure are essential to support regional innovation development. Good communications, stable broadband deployment, regular and structured shipping facilities, etc. can be crucial for the success of an innovation in the larger markets. It also affects the willingness of human capital to operate in the region. For example, a lack of housing or office space will definitely negatively affect both talent attraction and foreign direct investment .

4.1.8.1 Logical focus

Buildings and physical infrastructure
Fixed and physical infrastructure such as housing, offices, energy and electricity, water, etc.

Communication and transport
Telephonein, roads, railways, ports, airports, etc. needed for products, capital, people, and other resources to be moved to and from a region.

Digital infrastructure
Broadband, mobile networks, their breadth and quality, as well as public digital services that the public and organizations can use.

4.1.8.2 Indicators

50.	Access to premises and offices in the region. Number of available square meters of office and premises by type and location at the time of the current question.
51.	The perceived quality and density of regional operations for road transport, rail transport, and air transport. Regional operations' average satisfaction or quality assessment of road, rail, and air transport according to official measurements.
52.	The availability of high-speed broadband in the region. Number of establishments in the region with access to fixed broadband of at least 1 Gbit/s or fibre.
53.	The availability of fast, stable mobile data speed. The geographic surface coverage of the region for mobile data rate above 10 Mbit/s as a percentage of the entire region's area.

4.1.9 Legal and regulatory environment

This includes factors that can be crucial to the success of an innovation ecosystem. For example, it can be laws and regulations that govern what is allowed and what is not, but can also be tax control to facilitate conditions for innovation, butit can also be about other types of regional political factors such as labor market policy measures, education strategies, etc. (Council of Commerce, 2005).

4.1.9.1 Logical focus

Taxes, tax policies and tax incentives for innovation and entrepreneurship
If the effective level of taxation is too high, it discourages incentives for entrepreneurship, research and development and reduces competitiveness against other regions. This can be facilitated by various tax breaks that companies can apply to benefit from investing in and investing in innovation.

Other public governance
Public innovation strategies and governance, development of innovation eco-systems and public support for entrepreneurship and innovation.

4.1.9.2 Indicators

54.	The effective level of taxation in the region. The average municipal tax level in the region in the current financial year.
55.	The sum of granted amounts in tax incentives in the region for innovation and start-ups. The sum of granted amounts in SEK thousand in tax incentives to companies in the region for research and development and start-ups during the previous financial year.
56.	support for regional leadership for regional innovation strategies; Average level of ambition and commitment to innovation from the region's responsible management persons on a scale of 0 to 5.
57.	The level of satisfaction with regional services and programs for innovation. The degree of satisfaction with the support for innovation work that regional companies from receive regional and municipal actors in the region on a scale from 0 to 5.
58.	Number of innovation-friendly procurements in the region. Number of innovation procurements carried out by the regions and municipalities in the region during the previous financial year.

4.1.10 Culture

Culture is fundamental to the entire region and reflects their will and intentions to be open to new things and innovations, as well as to dare to think new and take calculated risks.

4.1.10.1 Logical focus

Culture for change

Innovation is about change and an innovation ecosystem needs to consist of a desire to create change and to change. It also includes a culture of daring to accept change and thus take risks. It is also about seeing and understanding changes that are taking place in the outside world in order to be able to predict future changes and needs as a basis for new innovative solutions.

Samarbetculture

An important cultural part is also the willingness and ability to cooperate cross-functionally. There is a need for openness that allows the sharing of thoughts, ideas and information and therefore requires a certain amount of courage.

Diversification

Another important cultural area is diversification. Innovation arises when people with different skills, experiences and backgrounds are given the opportunity to contribute with different perspectives on problems and needs. Therefore, there needs to be a receptivity to thoughts and input from people from other areas of expertise, gender, geographies, generations, and cultures.

4.1.10.2 Indicators

59.	Total entrepreneurial activity (TEA) in the early stages. The percentage of residents aged 18–64 in the region who are entrepreneurs or own and manage a new business.
60.	Number of residents of the region who do not consider that the fear of failure prevents them from starting their own business. Percentage of the population aged 18–64 who state that fear of failure prevents them from starting a business.
61.	Openness of regional companies to cross-functional collaborations. The regional companies' own assessment of how they assess the importance of openness to cross-functional collaborations with other companies and industries on a four-point scale from completely unimportant to very important.
62.	Labour migration to knowledge-intensive professional roles. A self-estimated proportion of the number of knowledge-intensive labor migrants relative to the total number of employees in the region's organizations.

4.1.11 Markets

Innovations should be brought tomarket to create benefit and value for their target groups, and to create growth and jobs for their creators. This makes knowledge and access to markets a critical function for its success.

4.1.11.1 Logical focus

Marketaccess

Access to the domestic market and channels to reach it. Also accessto foreign markets and channels to reach thessa, for example through export councils and chambers of commerce.

Access to market information

In order to qualify their innovations, innovators need to understand the market and its development well. This means that they need to have access to various forms of information about the market in large and small. Knowledge and familiarity with its target market is particularly crucial, what categorizes it, where it is located, etc. This is a critical basis for an innovation to have any impact.

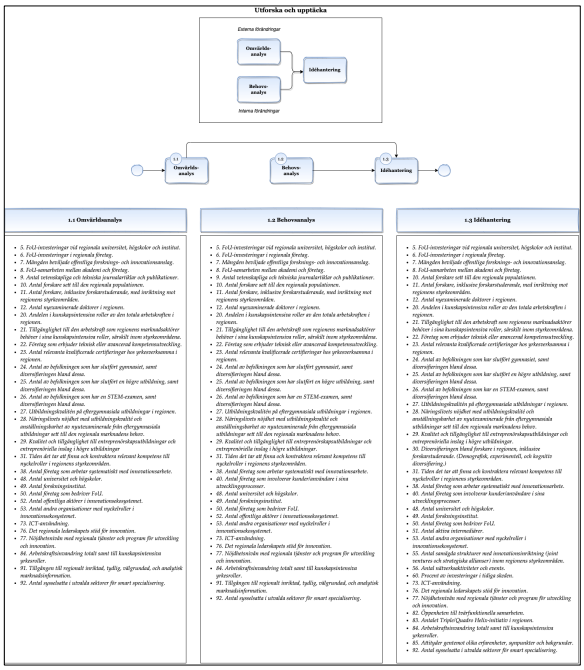
4.1.11.2 Indicators

63.	Sales size in the form of turnover of innovations (services and products) to customers in the national market. Sales size in terms of turnover of innovations (services and products) to customers in the national market in the previous financial year as a share of total turnover.
64.	Sales size in the form of turnover of innovations (services and products) to customers in the markets of other countries. Sales size in terms of turnover of innovations (services and products) to customers in other countries' markets in the previous financial year as a share of total turnover.

65.	Number of regional establishments for the region's areas of strength. Number of establishments in the region's areas of strength (key markets) in the region at the time of the survey.
66.	The regional market share of the national market for the region's areas of strength. Regional turnover for the region's areas of strength as a share of national net sales in the last financial year.

4.2 Qualification of the measurement model's indicators in the innovation ecosystem process

The indicators of the measurement model have been fitted into the innovation ecosystem process to reflect the ways in which they create value in the value development of innovations. It is then clear when in the process such as different forms of venture capital, different forms of advisory services, different types of infrastructure, different forms of contact creation, etc. contribute best to the development of innovation. Together, they provide an overall picture of how the innovation ecosystem process works and which factors matter.



Examples of indicatorss positioning in the innovation ecosystem process

For reasons of space, we don't list all the indicators in every process step here, but it can be good to know that a solid such material exists.

With the indicators positioning in the innovation ecosystem process, we can define which actor roles in the innovation support system are relevant to support the development of the indicators.

5 Measuremethodology for regional innovation ecosystems

Here we describe the measurement method, i.e. measurementprocess that it is recommended that a region applies to collect the data needed for the innovation ecosystem and its development.

5.1 Challenges in measuring the ability of aninnovation ecosystem

There are a number of challenges in defining the data sources that are relevant for measuring the capabilities of the regional innovation ecosystem. One challenge is that some *data is not public* and may well even want to be kept secret by some actors. For example, companies may not be able to publish their recipes for success for their innovation work because it may then be copied by their competitors. It is also difficult to measure the success of an innovation effort due to the *time aspect*. Innovations rarely become a success overnight but may need several years of growth before they reach good profitability (as we see in the innovation ecosystem process). This means that the innovation work that is being done today may not show how successful it is for several years, sothere is a delay effect for innovations that makes it extraordinarily difficult to link good innovation work with good innovation results. A further challenge is that there are different *definitions of innovation*. How do we really define what is an innovation and what is just a "new" solution? Or should all new solutions – even improvements – be classified as innovations? There is also a challenge in that different factors (our "indicators") are of completely different *classes*. How do you compare the existence of good rail transport with the region's cultural attitude to risk? How do you put values on these that are both comparable to each other and comparable to themselves over time? Some of the indicators show qualitative values and some show quantitative values and these need to be able to be set on an equivalent scale in some way. A further challenge is *the availability of relevant data sources*. The indicators in the measurement system are based on the factors that have the greatest relevance for successful performance in an innovation ecosystem, where can we get data on thessa factors? In some cases, there are already existing studies that are done with some regularity by different actors and there you can obtain good secondary data from these sources. In other cases, such sources are lacking and you need to secure the data supply yourself in order to be able to emerge from values that give an accurate picture of the innovation ecosystem. An additional challenge is the *relative relevance* between different data sources. Does the existence of political stability have as much weight for the ability to innovate in the region as it is for there to be plenty of venture capital or for good business advice? Is a symbolic "five" in political stability worth as much as a "five" in access to good business advice or is it really less important for entrepreneurs and companies to create innovations? Are high-tech imports as important as access to key roles in the areas of strength or may it differ? A final challenge is the *accuracy of* the data sources used. When we use secondary data sources, data has not necessarily been collected with our indicators for purpose, so they may be related, but not exactly the results desired for this measurement. This may mean that it may need to be spliced in the interpretation of the available data, which of course risks impairing the reliability of the results. In our own surveys, there are also potential challenges, such as the response rate being low and we are not told what results they have that refrain from responding, etc. Own surveys also need to reach a number of different target groups

because the indicators extend over such wide areas. This expands the complexity of the survey. Also because of the breadth of the question battery, questions would actually need to be asked to many different roles within responding organizations.

We have tackled several of these challenges with a proposed approach, but at the same time we want to highlight that there will always be room for improvement because what we intend to measure is a very dynamic and varied body of data.

5.2 The use of data sources to measure the innovation ecosystem

There are many existing data sources available to determine the current value of the indicators at any given time. Important for external data sources is their *regularity* and their *quality*. Regularity is important as the measurement should be made at regular intervals to be able to reflect the intended development of the innovation ecosystem. After all, in most cases we need fresh data for the measurement to give us any value. Some surveys are only done about every three years and thus lose interest in measuring an innovation ecosystem. Quality is obviously important as it is essential that validity and reliability are high so that we can be sure that what we intend to measure is measured and that there will be the same type of result every time we measure it. Recommended data sources are therefore initially those made by responsible authorities and those who own currentdata, such as Statistics Sweden, the Swedish Agency for Economic and Regional Growth, PRV, the region's own sources, etc. Some relevant studies are already being carried out regionally by the region itself and, for example, the Federation of Entrepreneurs, chambers of commerce, etc. At the organizational level, there are also other relevant documents that may be of value, such as annual reports and other types of internal reports, but giventhat in 2021, according to Statistics Sweden's Business Register, there were just over 43,000 workplaces in Västerbotten, it can be an enormously resource-intensive task to go through the accounts to get reasonably statisticalt valid result. In selecting companies to investigate, the OECD recommends focusing on the UN's International Standard Industry Classification (ISIC) Rev 4 and industries B-M, and choosing to ignore areas such as education, public administration, the healthcare sector, etc. The same applies to the size of companies and organizations where there are different conditions for innovation activities in large and small companies. Depending on the region's conditions, there may be reason to disregard, or at least minimize, the number of micro-enterprises with 0-1 employees since many of them are engaged in passive business activities.

It is also often a challenge to add relevant metadata for the data sources used. To be able to make full-scale analyzes, large amounts of supplementary data are needed, such as that it is not enough to know how many companies work with innovation management, we would also like to know in which industry you operate, how long you have existed, what the growth has looked like over time, etcetera. With larger such data sets, we get a better basis for doing data analysis that can show causes, effects, similarities, good practices, etc. It also provides a significantly better basis for understanding the development over time between surveys and which factors correlate with new results.

5.3 Data sources for innovation ecosystem indicators

It is relevant to ensure that the sources available are safe and reliable. The data sources are normally primary or secondary where the primary sources are those where the region itself does surveys and measurements to collect data and the secondary ones are existing surveys done by other organizations.

Policies for secondary and primary data sources

The frequency of surveys should be annual, depending on the complexity of the survey and the ease of access to relevant data. The main purpose of carrying out the measurements is to provide up-to-date information on the innovation ecosystem's capabilities and to follow up on how the region's efforts to develop the innovation ecosystem fall out. Without follow-up, we cannot see if the efforts have the expected effect. The measurement itself should not last for too long so that measurement results have time to become outdated. There will always be some delay effect, especially when many secondary data sources will be used. But the goal should be to reduce the delay to as much as possible. To the extent that data collection becomes complex and the timeliness of the data sources has too great a delay effect, it should be considered to carry out the measurement every two years instead.

When using secondary sources, it is important to evaluate the formulations and references in existing surveys so that what is measured in the secondary source is what is sought in the own measurement. Phenomena such as homonyms or different interpretations of similar words can create confusions in the measurement results, especially between different industries. Questions in own measurements for primary data should be short and concise and avoid potential misinterpretations from respondents. It should therefore also avoid questions that specifically use the term "innovation" as it can often be interpreted in different ways by different respondents. It is better to use questions that focus more on working methods or results of work that can lead to innovation results. Since the own questions will in all likelihood be exclusively digital questionnaires, long explanatory texts for different concepts should be minimized and there is thus little room to explain concepts and formulations, but short notes that clarify concepts are recommended. For the same reason, it should also be avoided to questions with several questions in the same sentence, so that the respondents do not really know which of the questions to answer.

5.4 The phases of measuring the innovation ecosystem

Theassessment of the capacity of the regional innovation ecosystem needs to be done with some regularity so that there is room between measurements to also develop the ability. The whole purpose of the measurements is to focus on the right activities that will be able to increase the innovation capacity in the region in order to in turn have positive effects on welfare in the region. With a high capacity for innovation and competitiveness, good employment and quality of life follow. The measurements therefore need to be in line with the business planning for each year so that the development efforts can be in line with the rest of the business.

5.4.1 1 – Planning a measurement

In the first phase, the procedures to be implemented for the measurement of the innovation ecosystem are established. The starting point is the measurement method for innovation

ecosystem measurements specified in this document. Added to that are the additional specifications on selection, question design, etc. specified by theregion's project team for the measurements. With this as a basis, detailed planning is then carried out for each measurement. These are the main steps that are relevant in a measurement:

1. **Set scopes for the measurement**. Determine the scope of the measurement. Normally, it should follow the scope defined in the measurement method.
2. **Define expected results**. Determine the types of results expected from the measurement as a basis for which target groups and indicators to apply.
3. **Define indicators**. Define the overall issue and conduct a review of the measurement indicators and whether they are still current, whether they may need to be updated, whether they can be measured in alternative and improved ways, etc. If necessary, also review and update any weighting criteria, etc.
4. **Define audiences**. Decide which areas, groups, organizations, roles, etc. will be investigated, as well as which secondary surveys and data sources will be included.
5. **Define data collection method**. Conduct a review of the measurement method and whether there are updates in the method that can improve the measurement results.

Planning should be quick, taking into account that most things in the implementation should be predefined in the method, but as with all systems, the measurements follow a self-evaluation principle that allows them to be re-evaluated before each measurement. The basis for this is based on lessons learned from the most recent measurement, as well as a new analysis to re-examine any weaknesses in previous measurements.

5.4.2 2 – Data collection

With the scope of the measurement defined, the measurement process itself begins. Depending on the availability of resources, the recommendations are usually to start with desk research of secondary data sources to form an overall picture and then go into the primary data sources when it is clear which indicators need to be supplemented to give a coherent accurate result. In practice, the two processes become parallel, but it depends on the availability and quality of available secondary data sources.

1. **Sekundärdatasamling: deskresearch**. Review all secondary data sources in the measurement model and verify their validity for the current measurement. Collectall relevant data and compile them in the tools of the measurement model. At the same time, prepare the collection of primary data to evaluate whether additional data sources may need to be moved to the primary data measurement or if new secondary data sources have been added that can replace primary data sources.
2. **Primary data collection: regional survey**. Since primary data collection is often more time- and resource-intensive, these surveys should primarily be done when secondary data is missing or not sufficiently accurate. The basic model for conducting digital surveys with a representative sample of selected target groups, who have selected the planning phase. The keyis to let the region's investigative experts take care of this or outsource it to an agency.

5.4.3 3 – Data analysis

The data analysis is fairly straightforward. Here it is exclusively about compiling and presenting data. When several measurements are carried out, the value of the measurements also increases as it is possible to see changes over time and how they can be related to different efforts made and their effects.

1. **Data compilation**. First, all data needs to be compiled in good formats so that it is clear to see what they look like, what values they have, whether good or bad results are shown, and whether they can be compared with any previous values.
2. **Analysis of actors and functions**. When we have the values of the various indicators, the essential work begins with understanding what is *behind* the values. We then map the results of the measurement of the indicators and try to gain knowledge about what they are based on. For example, if we get an answer that there are a certain number of venture capitalists, we want to know who they are, where they are, how they work, and above all the reason why they have established themselves here.
3. **Visualization of the innovation ecosystem**. With the measurement results and function mapping completed, the innovation ecosystem needs to be visualized in an educational and visually appealing way. The visualization should provide a good overview of the dimensions (and possibly subdimensions) of the innovation ecosystem, indicators, values, and actors.
4. **Compilation of hypotheses**. Finally, a n compilation of conclusions is made to reasons why the current situation is as it is, where strengths exist, where areas for improvement are located, etc. This is important input to the later planning for the development of the system. This compilation should provide an overall picture of the current state of the innovation ecosystem.

5.4.4 4 – Data validation

Data validation is a short process that only aims to validate the results of the analysis and compilation with the support of the visualization. The procedure is most effective in the form of a presentation and a workshop together with regional people who are knowledgeable, knowledgeable, and have influence in the region's innovation ecosystem. Validation is most easily carried out in three steps.

1. **Written data validation**. Relevant actors receive a written summary sent out that provides an overview of the results of the measurement. This target group is welcome to be larger than the participants who will participate in the upcoming workshop so that additional people also have an opportunity to take part in and give views on the results.
2. **Data validation workshop**. The data validation workshop needs to have the most relevant actors, especially from the public sector, as participants and will go through the measurement's model, implementation, and results, followed by discussions. What is desired to be obtained are reflections on the received data - whether they are correct or may need to be adjusted (this time or time future times), thoughts about actors and functions, as well as feedback on the current situation and proposed hypotheses.

The results from the data validation should lead to an improved and anchored measurement.

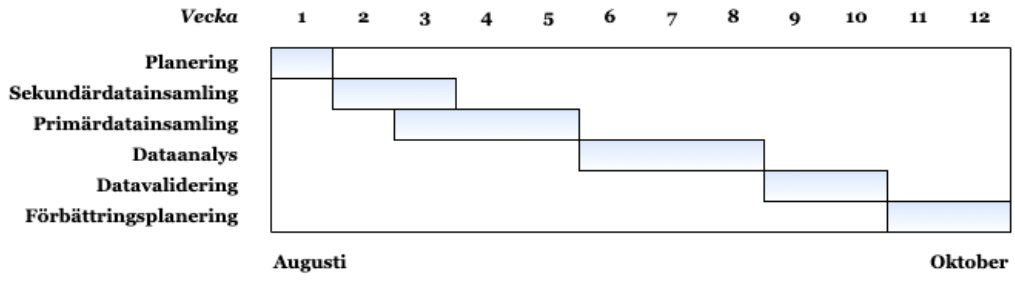
5.4.5 5 – Planning improvement activities

This planning strives to set ambitions for how the values should be raised (or lowered, in due cases) based on the current situation from the measurement, together with concrete activities to do this. But the overall phases are:

1. **Analyzeyour goals for the innovation ecosystem**. Review of the measurement results and the current situation to set ambitions for the innovation ecosystem. It is about finding maximum, yet realistic, ambitions for each indicator that the region sees as reasonable to reach and at the same time greatly developing for the region.
2. **Define preliminary activities to reach the goals**. When the goals are set, it needs to be looked at what types of activities may need to be done in order for the goals to be achieved, who should do this, as well as what resources and what time it may take. For example, it can be about new actor roles that need to be established or expanded or political efforts that need to be adjusted.
3. **Prioritera set goal**. It is important to take set goals and activities and prioritize the implementation of these so that the efforts have the optimal effect possible. It may be necessary to set up decision criteria for how goals should be prioritized for the development of the innovation ecosystem, which should be part of the region's governance model.
4. **Plan for its implementation**. Then it's time to developan implementation plan that allocates responsibilities and time guidelines for each activity to be carried out to raise the indicator values. These activities need to be coordinated by the region's representatives to ensure that they take place as planned and achieve the results that have been set in the goals.

5.5 Timeline for measurement projects

An annual implementation of a measurement of the innovation ecosystem needs to relate to the region's opportunities to be able to work on developing the system. Proposals and recommendations for initiatives therefore need to fit in with the region's annual operational planning. Since proposals for the coming financial year are usually planned around October-November, input needs to be ready to be presented no later than the end of October.



An example of an annual timetable for measuring a regional innovation ecosystem

Depending on the scope and resource availability, we estimate that a complete measurement of the innovation ecosystem from planning to recommendations to activities takes about 12 weeks. This means that measurements of the regional innovation ecosystem need to begin early in the autumn to fit into the regional calendar. However, the exact times for implementation will need to be done during each spring.

However, it should be added that the more that is prespecified in the measurement model, the faster the implementation will go. This means that if the preparations for the first measurement are really thoroughly completed, the measurement will be able to be carried out in 8-10 weeks. It is very likely that the measurements from years 2-3 will be able to be carried out in around 8 weeks.

Having a good systematics for the development of your innovation ecosystem to maximize the welfare of your region is always a good idea! 👌

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