

ProVaHealth

PRODUCT VALIDATION IN HEALTH

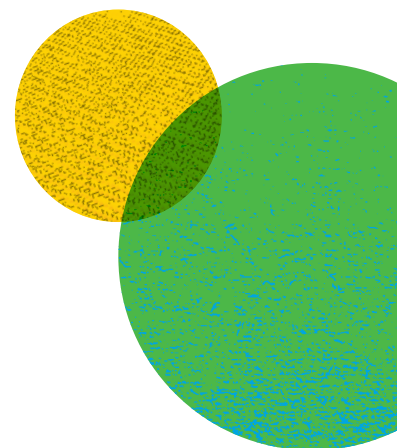
— Transnational Living Lab concept development
with Baltic Sea Region Living Labs

 **Interreg**
Baltic Sea Region



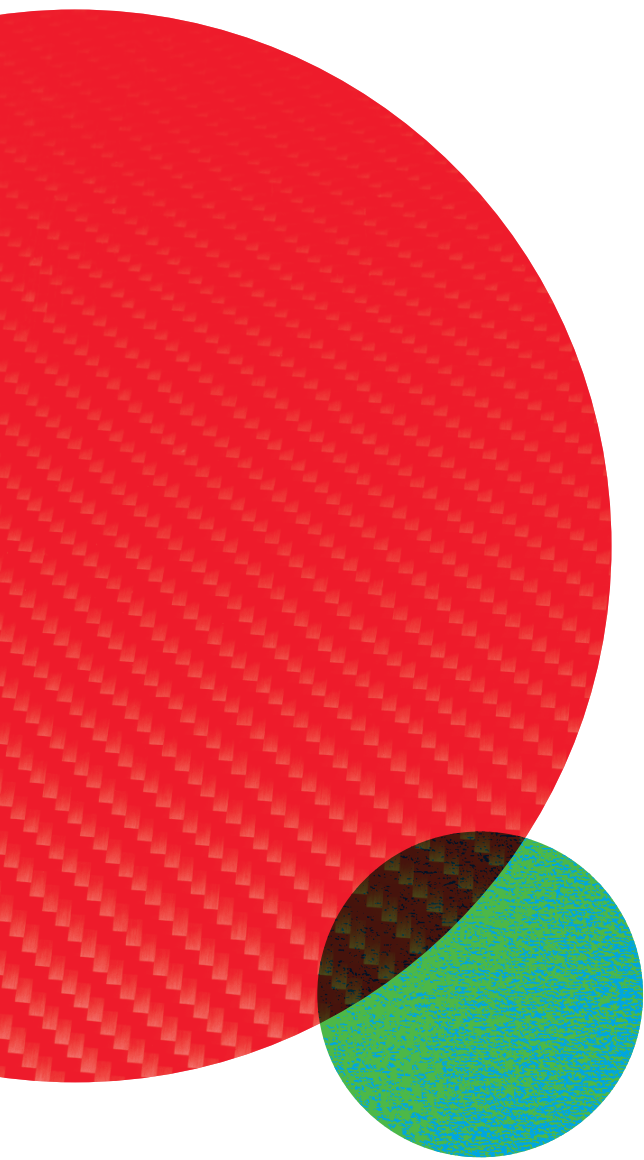
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1. SUMMARY

The purpose of this document is to describe the Transnational Living Lab Concept developed during 30 months within the project Product Validation in Health. During the project, dissemination of best practises was presented at six different workshops with all participating partners with topics relevant for management of Living Labs. It also served to give the participants tools and inspirations for continuous development of Living Lab practices and services. The six thematic areas, including Services, Business model, Value proposition, and Results assessment, and other, gave all participants a basic knowledge that now acts as tools for moving forward, both as individual Living Labs, but also to continue building the Transnational Living Lab structure.

The Transnational Living Lab collaboration model, which guides Living Labs in their approach on how to build lasting setups, and more specifically the steps on the way of building a Living Lab collaboration, is based on a four-level, six-factor maturity collaboration model describing the necessary steps and components together with identified drivers and obstacles. Business models for Transnational Living Labs are a combination of both individual and Transnational models. The transnational value proposition for SMEs are better product market fit in a wider context together with easy access to Baltic Sea Region markets. Identified and developed transnational services packages includes, harmonized services - such as workshops and usability testing, country specific services - such as country whitepapers of health structures and system, and unique services, that can being leveraged over the whole Baltic Sea Region. Improved marketing for individual Living Labs as well as for the transnational collaboration is achieved through larger reach and combined resources according to maturity levels. Transnational collaboration with access to knowledge sharing and learnings improves management and organizational skills. Continuous improvements through evolving self-assessment and SME involvement. Living Labs should be closely aligned with their ecosystems for maximum impact, and needs to demonstrate its unique place within the innovation system. The policy recommendations clearly showed Living Labs and Transnational Living Labs rarely achieve self-sustainability, thereby they need policy and financial support from all governmental levels.

2. BACKGROUND

2.1 Product Validation in Health (ProVaHealth)

2.1.1 PROJECT AIMS

From October 2017 to March 2020 ProVaHealth, project within the EU Interreg Baltic Sea Region programme 2014-2020 under policy area Innovation, was run and the overall strategic aim is the “Baltic Sea Region as one test site for development of healthcare products and services”. The main challenges to overcome was a slow market uptake of innovations as well as Living Lab infrastructures serving only locally or regionally. 17 partners (14 Living Labs) was involved in creation of collaboration between the health Living Lab's in the BSR region and ensure smoother access for SMEs to their services and thereby enabling better market uptake of their new products and services. The total budget was 2.73 MEUR and ProVaHealth was led by Tallinn Science Park Tehnopol. The project shares best practices to improve business models of the labs and helps open access to the services for small and medium sized enterprises (SMEs) from the entire Baltic Sea region to ensure health innovation and growth of health SMEs with global potential. This way it leads to enforcing BSR health innovation, creation of new health enterprises and growth of health SMEs with global potential as well as improving people's health, well-being and quality of life.

2.1.2 PARTICIPANTS

Participating Living Labs comes from the countries within the Baltic sea region and includes four from Finland, one from Estonia, one from Latvia, one from Lithuania, one from Germany, two from Poland, one from Sweden and three from Denmark.

Partner name	Short
Tallinn Science Park Tehnopol	Tehnopol
Haapsalu Neurological Rehabilitation Centre	Haapsalu
Tallinn University	Tallin U.
The North Denmark Region - Aalborg University Hospital	Idéklinikken
Health Innovation Zealand	Zeeland
Syddansk sundhedsinnovation-CoLab Denmark, Region of Southern Denmark	CoLab
South-Eastern Finland University of Applied Sciences	XAMK
Oulu University of Applied Sciences	Oulu
Seinäjäki University of Applied Sciences	SeAMK
Laurea University of Applied Sciences	Laurea
Latvian Health Tourism Cluster	LHTC
Vilnius University	Vilnius U.
The Municipality of Lublin City	Lublin
Upper Silesian Agency for Entrepreneurship and Development Ltd.	GAPR
Innovation Skåne AB	ISAB
ScanBalt® fmba	Scanbalt
Scanbalt NGO	
WITENO	WITENO

2.1.3 OUTCOME OF PROJECT

ProVaHealth will introduce and finalize a Self-Evaluation Toolbox for Living Lab's, tested within the 14 partner Living Lab's. Evaluate the 14-pilot cross-border collaborations executed within the project. Each individual Living Lab will be supported, by collecting best practices and experience of the involved partner Living Lab's, to further develop management structures and services offered. All 14 Living Lab's will by the end of the project have their long-term business plans ready and together developed a Transnational Living Lab Concept, including a business service model, based on the needs of health SMEs from all Baltic Sea Region countries.

2.2 Living Labs

Living Labs function in a multi-helix partnership, a public-private-people ecosystem integrating research and innovation processes centred around users and open innovation. Living Lab's support companies commercialize and scale their services and products to global markets.

Living Lab's operates in real-life or close-to-real-life environment, trying to mimic a real-life environment.

Living Lab activities engage various stakeholder groups to the different innovation process phases to co-create solutions, which are meeting the end-users need. Living Lab's co-creation is typically associated with collaboration between various multi-helix partners (public organisations, companies, researchers and end-users) with the most important actors being the end-users. To execute Living Lab-driven research, development and innovation process a set of procedures and processes (instruments, methodologies, approaches, tools etc) are required.

2.2.1 KEY PRINCIPLES OF LIVING LAB

In the Methodology handbook of Living Labs, Ståhlbröst & Holst (2012) describe five key principles for Living Lab's, and the value they provide as foundation for design of Living Lab operations.

By providing a realistic real-life setting in the Living Lab it enables people to better understand how the solution/product influences and fits into the different settings. The innovation process within the Living Lab is open and invites several stakeholders, who are considered active partners. Their involvement is important as they are domain experts and as potential users, providing insights to needs and demands. The open process is vital to a better market fit, new ideas and exploiting of new markets. Sustainable development meets the need of the present without jeopardizing next generations ability to meet their needs. A combination of user value (for customers) and business value (SMEs) is the dual value creation in the Living Lab innovation process.

OPENNESS **INFLUENCE**
VALUE **REALISM**
SUSTAINABILITY

2.3 Development of Transnational Living Lab concept

This activity is concentrating on delivering six high quality and practical workshops that support the continuous development of partner Living Labs and absorbs the experiences of all partner Living Labs. 18 best practices are selected from partner Living Labs on the following topics: services, clients, test users and stakeholders, finances, activities, impact.

Based on the data and analysis from the Living Lab Analysis (includes Policy recommendations, Self-assessment toolbox and Living Lab business model) the plan for Transnational Living Lab actions and possibilities will be written in tight cooperation with all partner Living Labs and involved SMEs from all partner countries throughout the project and by the end of the project. The Business Model Canvas will be used as a tool because it includes both providers' viewpoints as value capturing and customers' viewpoints as well as value creation. The Transnational Living Lab concept will be formed through six project workshops and be finalized by the end of the project.

Transnational Living Lab concept contains in-depth description of transnational aspect of Living Labs: value proposition to SMEs from other countries, service transnational specifics, business model, marketing, organisational and management transnational specifics. The concept will be based on gathered data and actions during the project through action research and iterative process in generating a concept for real life use. The concept will be based on European/global know-how, know-how of ENoLL, joint development work through the six ProVaHealth workshops and validation with 14 SMEs from all BSR countries (SME interviews and Transnational testing pilots). Transnational Living Lab concept described for the health domain will be well usable for most other sectors.

3. METHODOLOGY

The aim of the work was focused towards the sharing of best practices for continuous improvement of Living Labs, and developing a Transnational Living Lab Concept based on all the results from the ProVaHealth-project. The concept was to contain an in-depth description of transnational aspect of Living Labs: value proposition to SMEs from other countries, service transnational specifics, business model, marketing, organisational and management transnational specifics. The concept was to be based on gathered data and actions during the project and through an iterative process generating a concept for real life use. The concept would be based on European/global know-how, know-how of ENoLL, joint development work through the six ProVaHealth workshops and validation with 14 SMEs from all BSR countries (SME interviews and Transnational testing pilots). The aim was that the developed Transnational Living Lab concept described for the health domain would also be usable for most other sectors.

In this respect we planned the work to include overhearing between the work packages in the project, but also to include final thoughts from respective areas in the Transnational Living Lab Concept presented in this report.

As stated, the work included overhearing between the activities during the entirety of the project with the final concept version including the conclusions from the supporting activities. In this process we specifically focused on information from activities related to: Policy recommendations, Long-term Business Plan for Living Labs, and Test Pilots, to create the final Transnational Living Lab Concept.

As previously described there were three focus areas: 1) Training program for Living Lab management skills, that were based on performing six best practise workshops, 2) Drivers and Obstacles, that looked into what components are acting as Drivers and Obstacles for Transnational Living Lab setup, and 3) Transnational Living Lab Collaboration Maturity Model, that developed a maturity model which can guide the development of future Transnational Living Labs. The methods for these three are described in more detail onwards.

3.1 Training programme for Living Lab management skills

3.1.1 BEST PRACTISE WORKSHOPS

As part of the Training programme in the ProVaHealth project, several knowledge transfers between partners were organized and performed throughout the project. These knowledge transfers were arranged as best practice seminars presented in project meetings, and focused on a variety of aspects covering Living Labs performance and practices. 2-3 partners were selected to present their own experience within each topic, which were arranged as follows:

WS	Topic	Location	Date	Presenting org
1	Services. Technology testing services, real life testing services with real users.	Gliwice	180207-08	SEAMK
				CoLab
2	Involving real users and stakeholders	Vilnius	180618-19	Vilnius U.
				Innovation Skåne
				Oulu
3	Financial: Business model and sustainability	Odense	181008-09	WITENO
				IdéKlinikken
				Laurea
4	Clients & SME 's. Value proposition, attracting, process, pricing	Greifswald	190123-24	Innovation Skåne
				Lublin
				SeAMK
5	Activities. Activity lines in the centre to keep it constantly active, staffing and everyday maintenance of the centre	Lublin	190522-23	IdéKlinikken
				Lublin
				Laurea
6	Impact and results assessment, benefit realization	Oulu	191016-17	RISE*
				XAMK

(*) RISE – Research Institute of Sweden, external partner to Innovation Skåne.

As stipulated in the project description these best practices presentations were to be gathered and disseminated via the project communications platform.

Furthermore, to condense all presented material into an easily accessible presentation, all teams were tasked with developing a single presentation for each topic, in collaboration. Partners involved in the previously presented topic participated in this exercise, resulting in all topics being presented to project partners at the project meeting in Lund (200121-22). These presentations were documented, filmed and published on social media channels related to the project.

3.1.2 DRIVERS AND OBSTACLES

A workshop was held in Greifswald in order to find commonalities and areas centred around the identified four questions:

1. What are the most important parts of a transnational cooperation?
2. What added-value do you see for your own Living Lab?
3. What obstacles do you see in transnational cooperation? e.g. resources, money ...]
4. What added-value do you see for the transnational cooperation?

The transnational dimension was discussed from the perspectives of the participating Living Labs. These questions were used for gathering the first round of the participating Living Lab's view on Transnational Living Lab drivers and obstacles. This work was followed up by each individual Living Lab identifying and collecting drivers and obstacles for transnational collaboration, in their own words. These were then analyzed for similarities and differences and harmonized into identified general drivers and obstacles (components). In a group setting all Living Labs participated in together ranking these identified components from most important to least important. Based upon the outputs from the workshop drivers and obstacles for a transnational Living Lab concept there was a mapping between all answers to gather a shortlist of statements for the four questions and a questionnaire was sent out to participating Living Lab for prioritizing of the shortlist of statements where they were asked to rank the answers by importance from their perspective, using the rank points 0, 1, 3, 9. This gave us which components ranked the highest across all participants.





3.1.3 TRANSNATIONAL LIVING LAB COLLABORATION MATURITY MODEL

In our ambition to develop the Living Lab Concept we adopted De Bruin et al (2005) six step model (i.e. scope-design-populate-test-deploy-maintain) for developing maturity models while utilizing the mixed methods research approach (Johnson et al. 2007). Furthermore, we used Mattessich and Monsey (1992) to understand and use the six categories (Environment, Membership, Process/Structure, Communications, Purpose, Resources) that influence the success of a collaborations formed by human service, government, and other non-profit agencies. The six-step model were performed according to the below description:

Scope phase

The sample group participating in research activities consisted of 14 health and wellbeing Living Lab's from seven Baltic Sea Region countries taking part in the Interreg funded ProVa-Health-project. The project would here comprise the description of the Transnational Living Lab collaboration aiming to open up access to the transnational Living Lab services for small and medium sized enterprises (SMEs) operating in the health and wellbeing industry for increased growth opportunities.

Design phase

To layout a solid theoretical foundation, a systematic literature review was conducted covering both transnational and cross-border Living Lab themes as well as generic networking, coordination, cooperation and collaboration studies focusing on inter-organizational collaboration. The work focused on identifying, and describing the internal and external target audiences, application methods and drivers, respondents and applications.

In principle, the suggested Transnational Living Lab model is targeted for a group of Living Lab actors to perform a self-assessment in a co-creative manner when developing a shared vision for establishing transnational collaboration. The model can be used as a co-creation tool when multiple Living Labs from multiple regions are seeking to collaborate.

Populate and Test phases

During the populate and test phases it was defined what is included and measured in the model and how. Since LL as a research stream is immature, the domain specific literature review is providing only a faint starting point. Therefore, an iterative process consisting of literature review from other domains (i.e. research on networks and interorganizational collaboration), interviews and co-creation workshops was applied. To further design and populate the model, additional inputs for the model were collected from participating LLs via iterative processes in six thematically distinct workshops during a 2-year period. The findings from workshops were analysed, summarized, iterated several times and used as input to create survey questionnaires for empirically verifying how the diverse group of LLs understand and relate to the concept of a transnational LL.

During this process, the work towards finding the Drivers and Obstacles (See chapter 4.2) for transnational collaboration were performed and used as input for a LL workshop centred around a maturity model and integration level, where the results were combined and used to identify the factors, subfactors, and the corresponding maturity level descriptions in the proposed transnational LL multi-factor maturity model. The workshop focused on services and collaboration maturity model. According to Mattessich and Monsey (1992) there are six (6) factors influencing the success of collaboration applicable to human services, government and community organizations. Those factors were discussed in round table setup. The factors were divided into a four-stage model for what each factor means in different stages (Networking, Coordinated network, Cooperation and Collaboration (Camarinha-Matos et al 2009) Network - based on communication and information exchange in a somewhat ad hoc and “loose” informal network, Coordinated network - where activities and processes are somewhat aligned for achieving mutual benefits and goals but not always respected, understood, or effective. Weak central organization, Cooperation - coordination of well characterized and understood processes, information and activities to achieve compatible goals, and Collaboration - Co-production, joint activities, strategy, goals, identity, resources and knowledge.

The outcome from the workshop were validated with participating LLs.

Deploy phase

The combination of maturity factors from theory, drivers and obstacles (a.k.a. components) for Living Lab were harmonized and generalized into a transnational maturity model. Future work relating to the deployment and limitations to ensure the sustainability and maintenance of the model over time, are planned in a follow up project called - Transnational Living Lab Valley.

3.2 Input from other activities within ProVaHealth

3.2.1 POLICY RECOMMENDATIONS

The policy recommendations includes a review of support that Living Labs mostly need, phases when the support is most critical, and how to combine support strategies to achieve the continuous and resilient development of Living Labs. The activities are of particular transnational relevance as the results from partner Living Labs' mapping and progress assessment was used as input to make policy recommendations, including but not limited to: (a) what kind of support Living Labs mostly need, (b) in which phase the support is most critical, (c) how to combine different support strategies to achieve the continuous and resilient development of Living Labs.

3.2.2 DEVELOPMENT OF TOOLBOX FOR SELF-ASSESSMENT

Based on the results of mapping and studying good practices of Living Labs in the BSR and other parts of the EU and the world, and the monitoring of the progress of partner Living Labs a toolbox was developed which can also be used by different kinds of Living Labs (in other sectors) to self-assess their progress and development.

3.2.3 INTERVIEWS WITH SMES

80 SMEs (10 per country) was interviewed (semi-structured) to understand their needs for products testing and validation. Special barriers which are encountered within the product testing process and the advantages of Living Lab services (especially when offered internationally) was analysed.

3.2.4 TRANSNATIONAL TESTING PILOTS

Development, testing, and monitoring of a transnational service process for innovative health products and services for SMEs. Ensuring that the Living Labs in the BSR are capable of serving SMEs from other countries. One SME's from each partner Living Lab with potential for commercialization was selected for the pilot testing.

3.2.5 LONG-TERM BUSINESS PLAN AND SERVICES FOR LIVING LABS

Management and implementation of continuous improvement process of ProVaHealth 14 Living Labs throughout the project lifetime. It was based on the resulting know-how from the Self-assessment toolbox and practical validation with SMEs in Testing Transnational Pilots.

4. RESULTS

4.1 Best practise workshop learnings

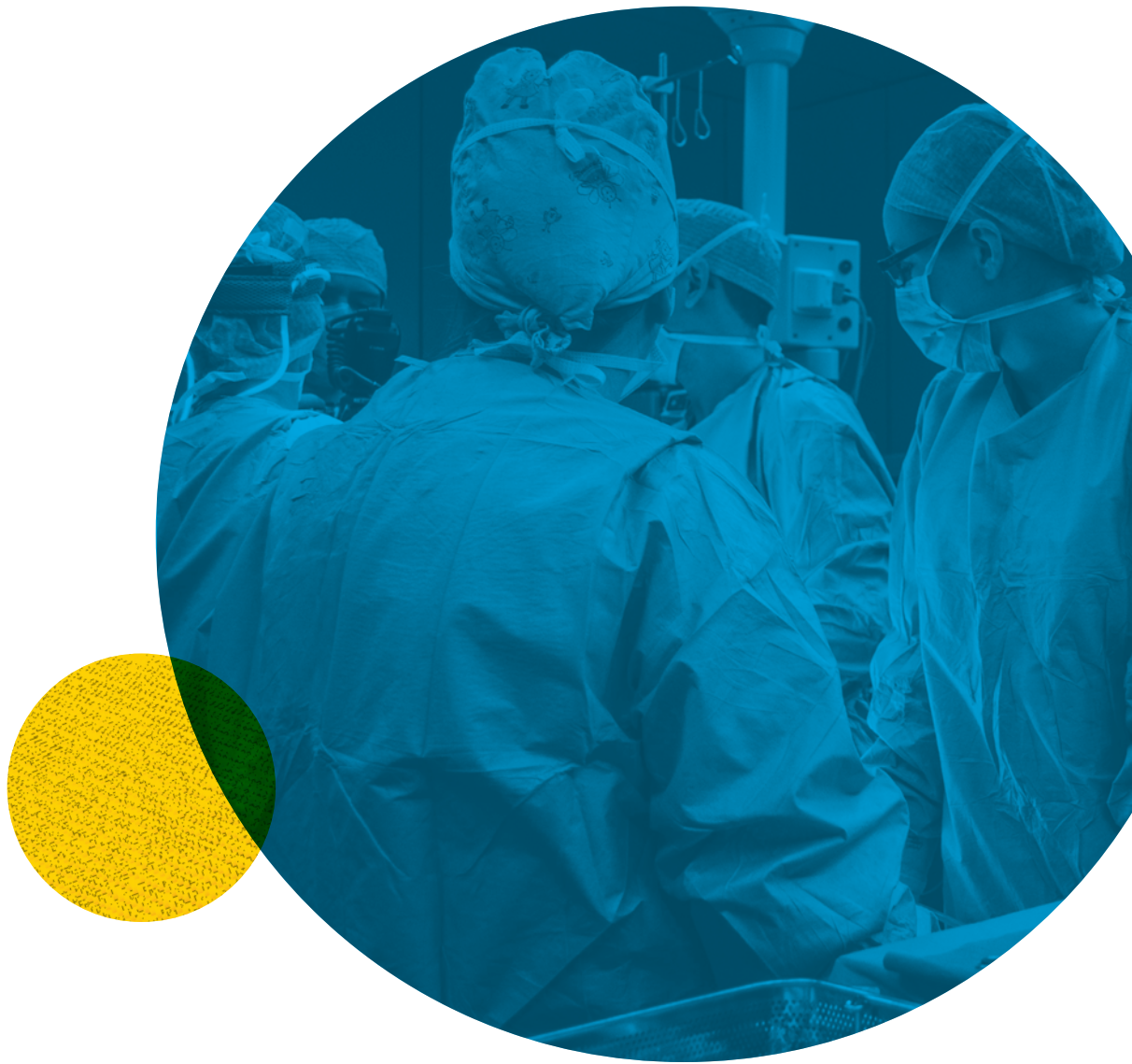
In general, all partners presenting their experiences and best practices gathered in a range of topics for the Best Practices workshops focused on two aspects in their respective presentations. Describing their organisation, operations, and often surrounding environment, and from there building on that description to describe their Best Practices within the specific topic. Additionally, external experts were also invited for adding valuable input to several of the selected topics. The best practise workshops clearly showed the large variance between the participating Living Labs, both in set-up, focus areas, areas of development phases and user focus. Each workshop area is described below, with examples of selected best practices mentioned, under each topic.



WS	Topic	Presenting Org.	Best Practice
1	Services. Technology testing services, real life testing services with real users.	CoLab	Presented their setup with the “plug-and-play” platform developed by them, used for accommodating companies with a suitable service along their range of offered services.
2	Involving real users and stakeholders	Oulu	Presented their OAMK Simlab (INNOCENTER), a simulation centre for engaging end users and stakeholders in collaboration with companies.
3	Financial: Business model and sustainability	IdéKlinikken	Presented their funding model and how strategic funding often most come from a combination of funding sources, as well as presented actual practices on how to work strategically to secure political public funding.
4	Clients & SME 's. Value proposition, attracting, process, pricing	Lublin	Presented the crucial aspect of finding a value proposition in the LL 's unique position and role in their respective ecosystem, and how to use that position for achieving mandate as the single point of contact for LL services.
5	Activities. Activity lines in the centre to keep it constantly active, staffing and everyday maintenance of the centre	IdéKlinikken	Similarities of examples of successfully implemented best practices were challenging to find among participating LL 's. What was described is often recruitment strategy as the most crucial part of sustaining the innovative environment of the LL.
6	Impact and results assessment, benefit realization	RISE	Presented output measurements from an academic viewpoint and described methodologies on how to assess benefit realisation by using theoretically validated methods in a practical setting.
7	All topics were presented in groups by 3 (partners)	Haapsalu IdéKlinikken Zeeland CoLab XAMK Oulu SeAMK Laurea Lublin GAPR ISAB	As a concluding exercise the workshop in Lund (200122-200123) was used for, for each topic, combining the presentations from that topic into a summarized one. These presentations were then documented and published on the projects social media channels.

SME's get access to real users and stakeholders through direct or networked contact, with support in coordination and handling. This general concept of a LL, being able to offer a pathway, or Arena, for solution owners to meet end-users was described in a range of aspects and variations by each LL during the Best Practices workshops. CoLab presented in 2018 their at the time conceptualized Plug & Play-platform managing the process of offering standardized, quality-driven services to SME 's.





CASE COLAB DENMARK (2018)

Real life testing in local CoLabs

Health and assisted living technologies are being developed and implemented in real life

Coordinates to ensure no wrong doors

Ensures coordination of enquiries and professional match making

Creates local ownership

Five local CoLabs co-run the operational test and development processes

Ensures standardized processes

Tools and methods to ensure measurement and documentation of effects

Builds strong partnerships

Collaboration between regional, national and international public and private partners.

Solution owners are in need of end-user support and understanding by varying degree and in varying ways depending on where in the product development process they are currently situated. LL's are expected to provide active support throughout most development stages (regularly excepting the final, implementation stage), which was described and discussed by Innovation Skåne (2019) using a generalized understanding developed in the NOTEB ('NOrdic TEstBeds') project.



In general, a product development process can be described as going through stages of 'Product idea' – 'Conceptualization' – 'Proof Of Concept' – 'Validation', and ending in 'Implementation'. Although access to end-users in hospitals, primary care, etc. is crucial in all stages for continuous client feedback the type of feedback most beneficial for the solution owner, at any given time, is depending on the development stage they are currently in. This is also true for the actual input value from LLs at each stage, as feedback in early stages can potentially have substantial impact on the final solution purpose and design, while feedback in latter stages of the process, while certainly being of importance, has somewhat less impact on major adjustments of the finalised solution or concept.

The early stages can be described as being dialogue-driven, with activities such as workshops, interviews, etc., in order to gain a more robust understanding of the actual (healthcare) need, latter stages are more tech-focused focusing on validation and tests. Although this process involves many different (types of) end-users, working in varying levels of operations and in different professions, it is beneficial for the Living Lab to, throughout the process, internalize the gained knowledge, not only towards the participating company, but also adding to internal knowledge management to be able to gain a better understanding of product development processes as well as the specific end-user/healthcare system where the solution might be applied. An inherent problem with the co-creation process, in relation to the knowledge management aspects, are that IP-rights often come into play. The Living Lab must have a clear, transparent, and communicated IPR-strategy in place to be able to provide as good support as possible to companies. Examples of such strategies are licensing solutions, as public entities most Living Labs have very little interest in owning and maintaining an IPR portfolio of their own. It is mostly through these experiences that Living Labs can improve offered services, improve the collaborative support given to companies, and thereby increasing their chances for faster and more successful product implementation with a better understanding of the end-user and the actual healthcare need.



CASE OAMK SIMLAB INNOCENTER (2019)

Expertize in:

Nursing
Public Health Nursing
Emergency Nursing
Midwifery
Physiotherapy
Occupational Therapy
Bioanalytics
Radio- and Sonography
Dental Hygieny
Optometry
Social Service

Innovative co-creation:

Interprofessional Research, Development and Innovation center for future health & social services and education

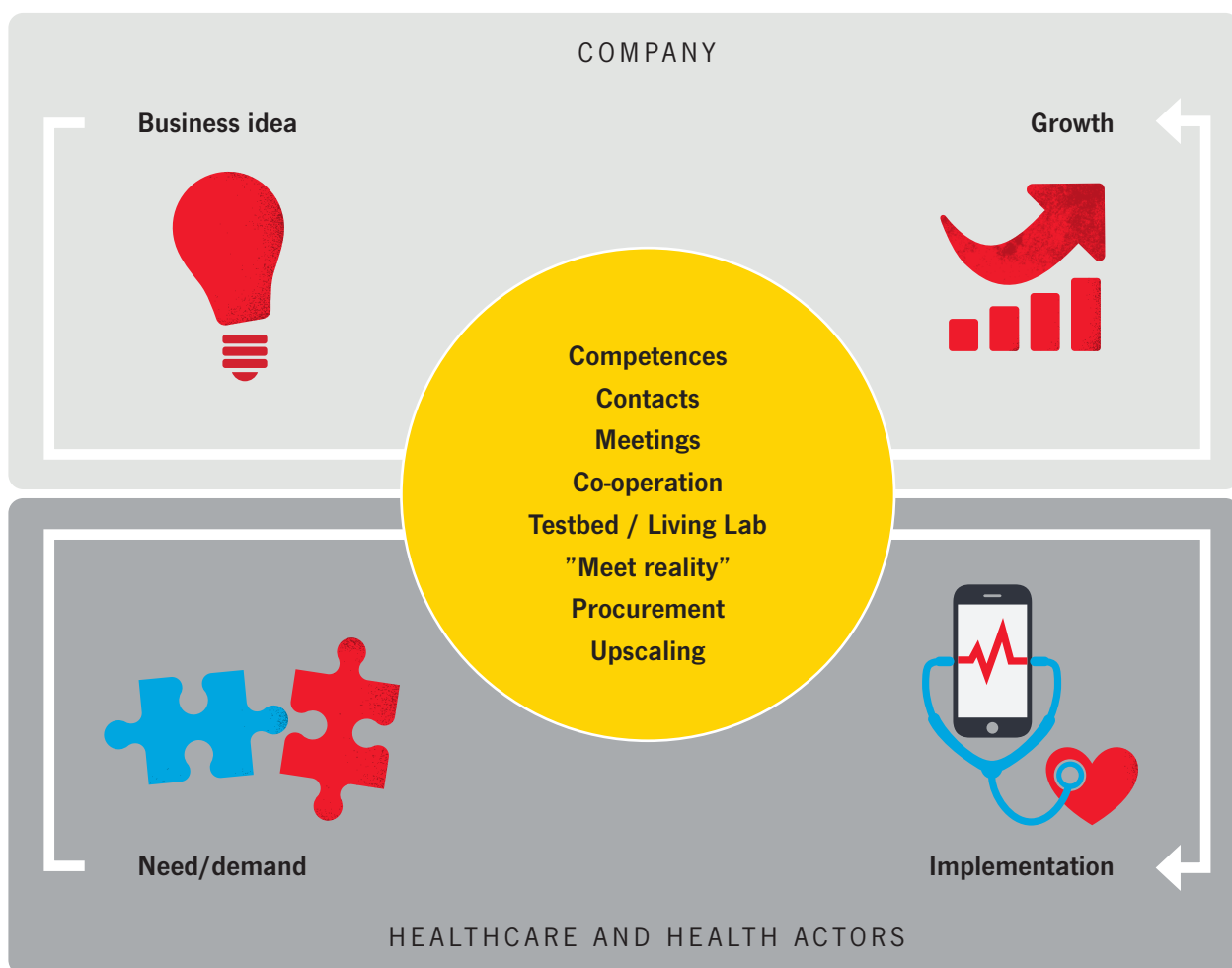
Co-creation forum for students, educators, professionals, companies and stakeholders

Development of Living Lab activities in simulation environment:

- Testing service protocols and products
- Training the trainers
- Integrating students to testing activities
- Strengthening international relationships

A Living Lab providing such a range of different types of support, similar to the ones described above is Oamk Simlab (Oulu) 'INNOCENTER'. With ties to academia and centred on a healthcare-focused simulation centre, a number of services for companies as well as training with healthcare professionals and students can be provided through this platform. The centre is a successful example of how a well-positioned Living Lab (within the local and regional ecosystem) can attract a large range of healthcare professionals and stakeholders, thereby being able to offer better services to companies.

Positioning within the local ecosystem is key for the individual Living Lab to be able to achieve sustainable operations. This not only directly drives access to stakeholders and end-users but also formulates the value proposition to companies, and thus access to financial resources for maintaining Living Labs operations.



Most Living Labs describe a situation where financial resources are relied upon from a combination of sources. As SME's often navigate on a strict budget, providing services to them expecting full reimbursement for activities and involvement of healthcare professionals is of limited potential. Nor can Living Labs only focus on providing support to larger companies, who are able to pay for robust services. This results in a situation where Living Labs often are active in working with, and applying for, project grants, as well as working strategically to enable permanent grants from across the political, public spectrum.

4.2 Drivers and obstacles

In Greiswald four questions were identified and used:

- Question 1. What are the most important parts of a transnational cooperation?
- Question 2. What added-value do you see for your own Living Lab?
- Question 3. What obstacles do you see in transnational cooperation? e.g. resources, money ...
- Question 4. What added-value do you see for the transnational cooperation?

The participating LLs answered these questions individually with a range of answers, these were then harmonized into 6-7 categorized answers (components) per Question area, see table below.

Question	Number of Answers	Harmonized answers
1	43	6
2	36	6
3	38	7
4	34	7

The questions, examples of answers, and the categorized answers (components) are:

1. What are the most important parts of a transnational cooperation?

- Improvement and sharing of different services of the Living Labs
- Better understanding of different market information
- Learning and benchmarking each other to improve the own Living Lab
- Building up a reliable partner network (trust building, clear rules)
- Expanding the network
- Communication (internal/external, marketing, promoting)

"Shared virtual and onsite showrooms where applications, devices and gadgets are shown and presented as well as tested by the end-users from different countries."

Living Lab

This question focus on what parts of a Transnational Living Lab collaboration is the most important.

The highest three components for Question 1 are here seen according to scale:

Improvement and sharing of different services of the Living Labs

Building up a reliable partner network

Communication (internal/external, marketing, promoting)

2. What added-value do you see for your own Living Lab?

- Further development of own services and access to services of partner LL
- Access to knowledge and technologies
- Learning from other LL
- Build up and expand the own network to cooperate easily
- Using the cooperation to increase the own visibility and improve the marketing
- To be partner in a transnational LL network/consortium could increase international fundings

"Know how skills and methodologies for similar product development in future."

Living Lab

This question focus what added value a Transnational Living Lab collaboration would bring. The highest three components for Question 2 are here seen according to scale.

Using the cooperation to increase the own visibility and improve the marketing

Further development of own services and access to services of partner LL

Access to knowledge and technologies

3. What obstacles do you see in transnational cooperation? e.g. resources, money...

- Different regulations in the countries and a different business culture
- The interest of the involved SME's can be different and also the fear of competition can occur
- The international cooperation will cost more resources (time, money) and is actually not covered in the most cases
- The interests of the LL can be different depending on its orientation and development phase
- Lack of "Fast track market adaptation" services
- Language difficulties
- Lack of information about the competences of Living lab & potential partners

"Significant differences between countries in regard of policies, health care system, IT-structure etc."

Living Lab

This question focus on what obstacles there are against a successful transnational Living Lab collaboration. The highest three components for Question 3 are here seen according to scale.

Different regulations in the countries and a different business culture

The interests of the LL can be different depending on its orientation and development phase

Lack of information about the competences of Living Lab & potential partners

4. What added-value do you see for the transnational cooperation?

- Access to other services to offer
- Access to more and other user and expand the own network
- Better access to knowledge
- Access to foreign market especially for the SME's
- Growth of LL
- Future (project) cooperation
- Possibility for SMEs to scale and grow

"Ability to offer services beyond the range of our own country."

Living Lab

This question focus on what added value a successful Transnational Living Lab collaboration would have on the whole LL-SME collaboration. The highest three components for Question 4 are here seen according to scale.

Access to foreign market especially for the SME's

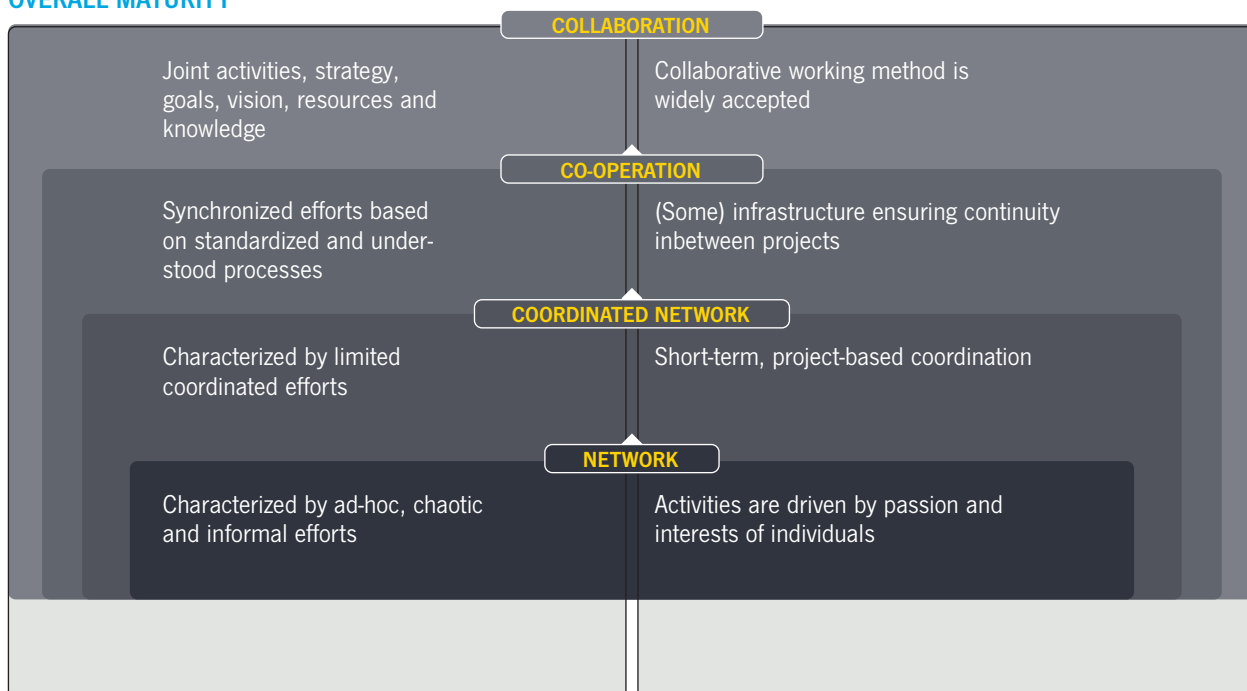
Future (project) cooperation

Better access to knowledge

4.3 Transnational Living Lab Collaboration Maturity Model

The suggested Transnational Living Lab collaboration maturity model is a four-stage-model with the stages; Network, Coordinated network, Co-operation, and Collaboration. This is combined using a multi-factor model, based on the six factors; 1) Environment, 2) Membership, 3) Process/Structure, 4) Communications, 5) Purpose - goal and vision, and 6) Resources, with their respective subfactors. A collaboration and its maturity goes through these stages gradually, in an evolutionary way, but it is important to note that a collaboration “inherits” all the subfactor capabilities from the lower levels also, but can combine several of the subfactor features into the whole. This can be seen in below Figure where the first box is the “Network”, and those features are inherited into the next box “Coordinated network”, etc.

OVERALL MATURITY



Each factor with its subfactors are shown in Figures 1–6, describing each subfactor level and the gradual evolution from ‘Network’ to ‘Collaboration’.

FACTOR 1: ENVIRONMENT

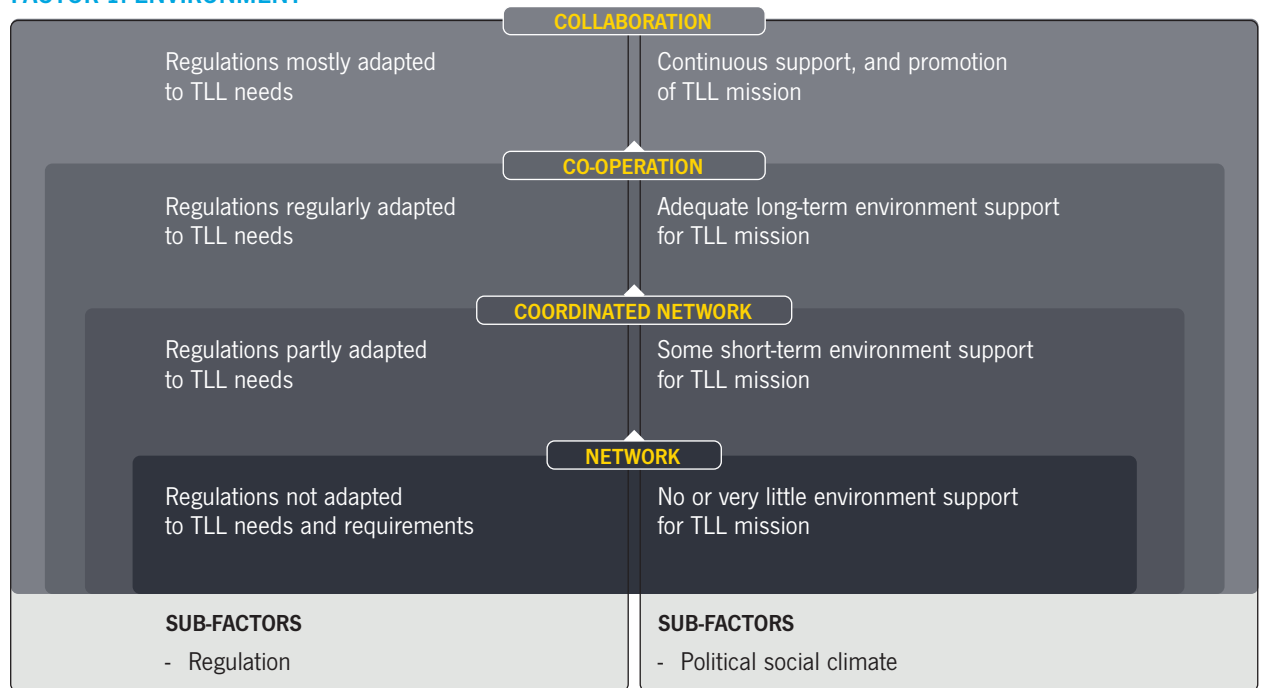


Figure 1

FACTOR 2: MEMBERSHIP

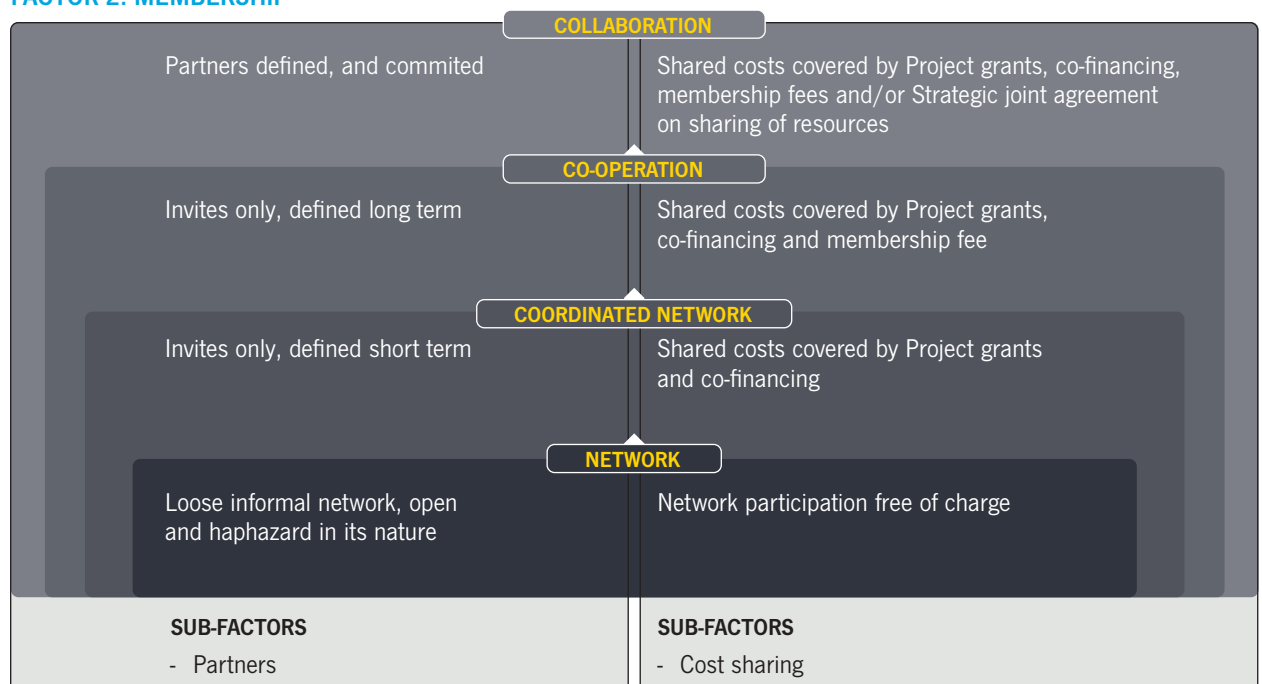


Figure 2

FACTOR 3: STRUCTURE-PROCESS

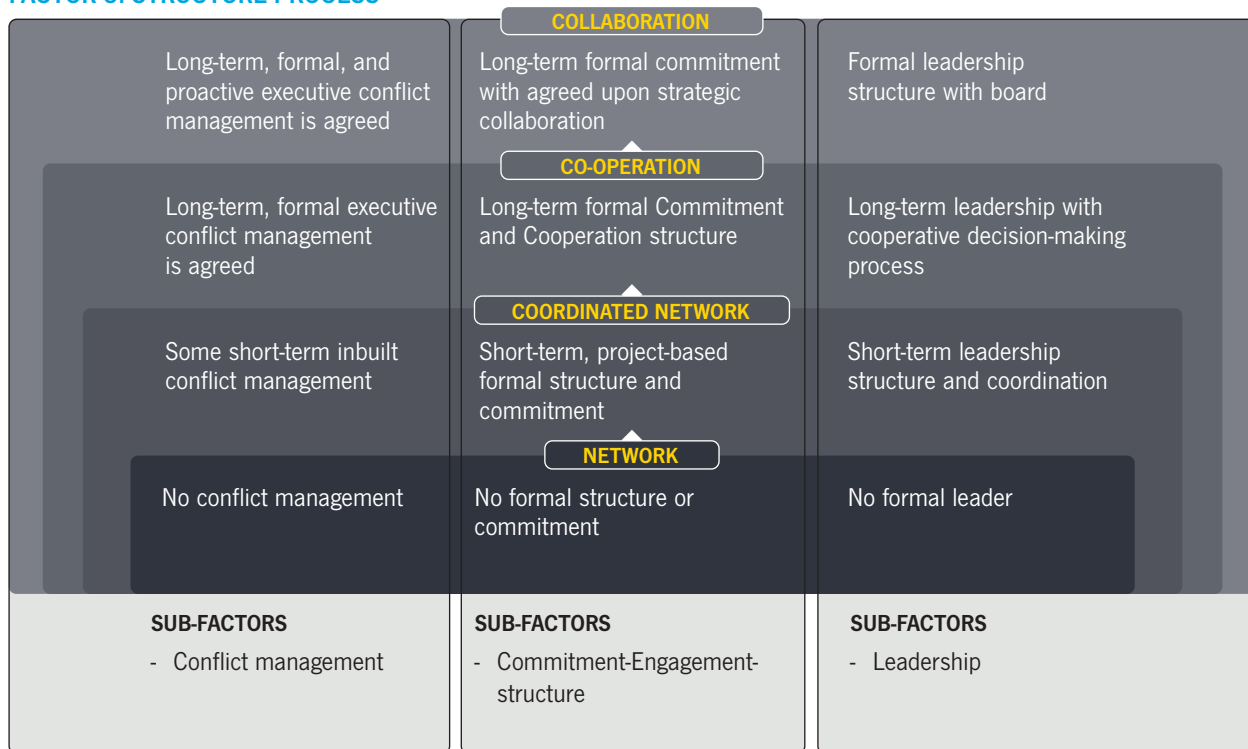


Figure 3

FACTOR 4: COMMUNICATION

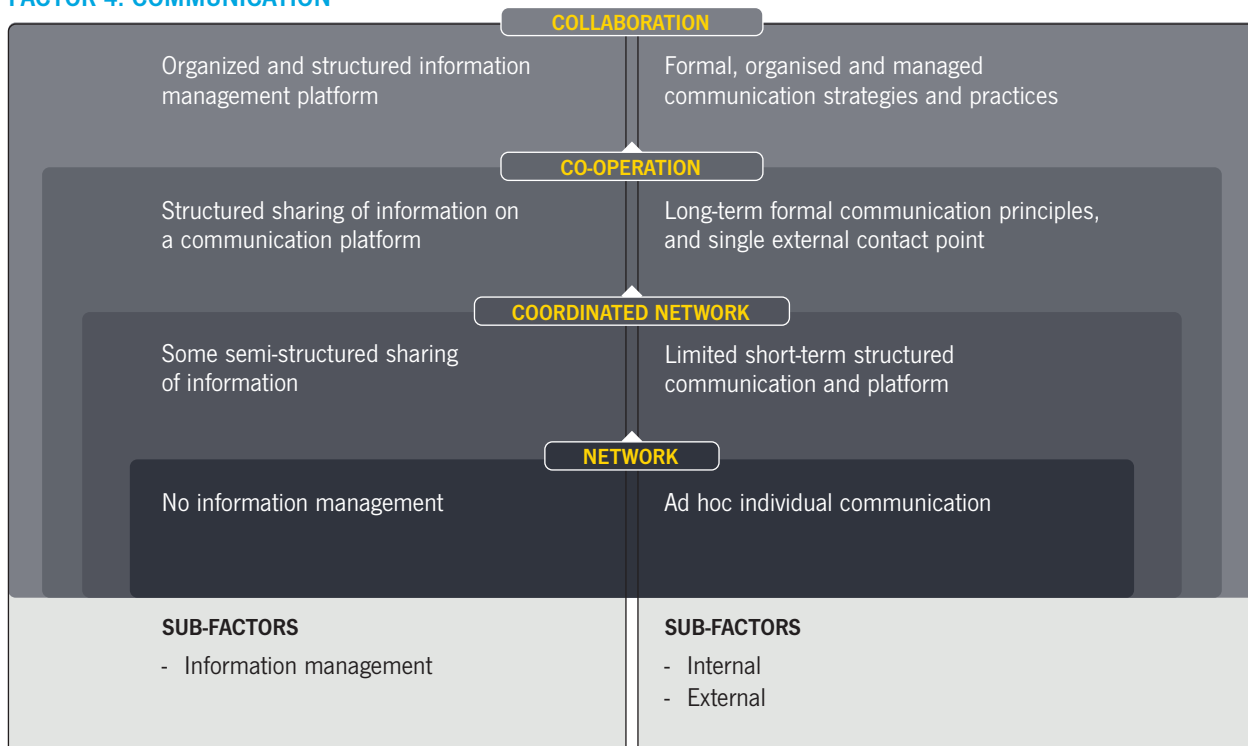


Figure 4

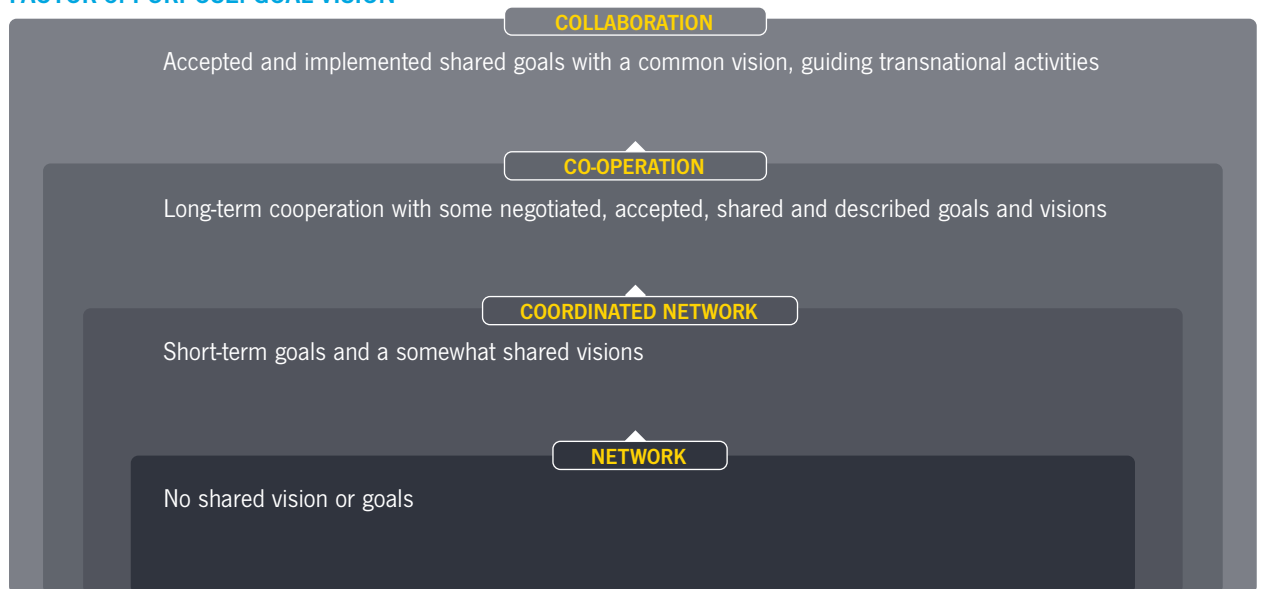
FACTOR 5: PURPOSE: GOAL-VISION

Figure 5

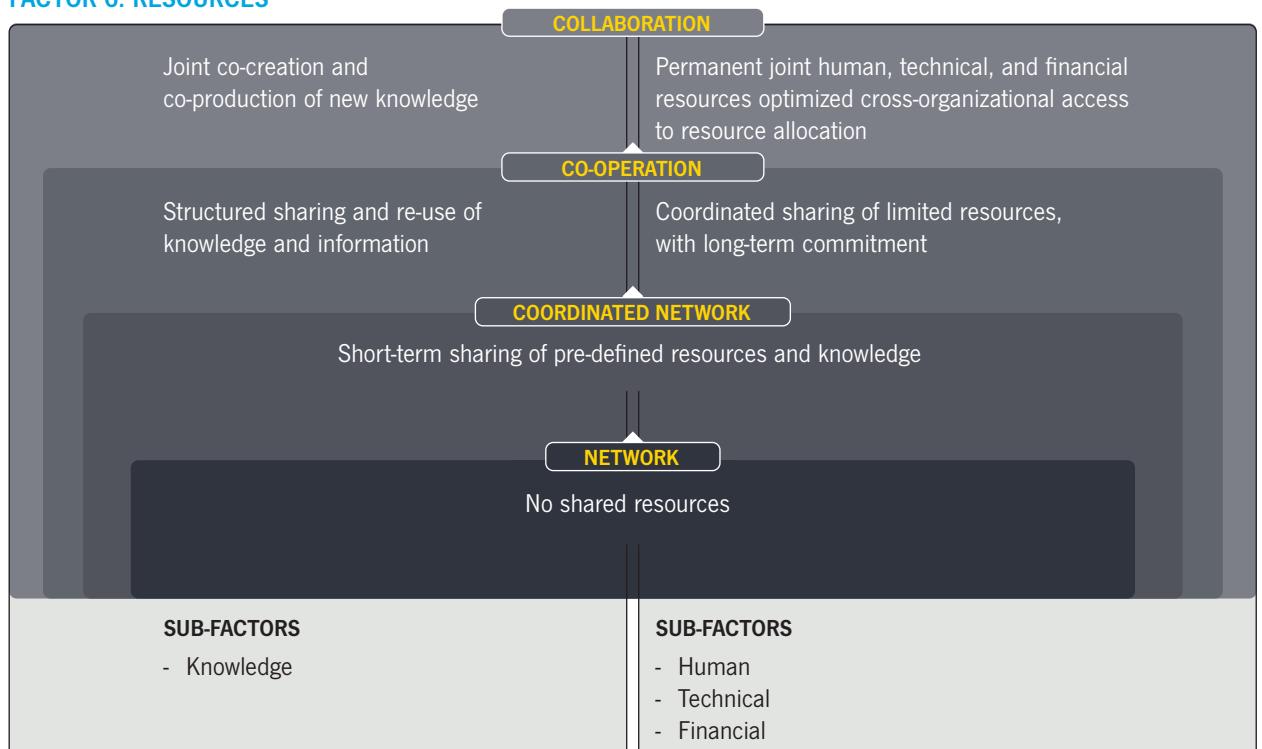
FACTOR 6: RESOURCES

Figure 6

5. DISCUSSION

First we want to highlight the results, conclusions and comments that were brought up in the activities and tasks within the ProVaHealth project. As the Transnational Living Lab Concept is to be a synthesis of all work done in the project it is important to find commonalities and parts to include in the model, so that the model stands on firm ground and are well built. Each area is presented separately, with the main findings, and then combined with the work presented here, to form the total model for Transnational Living Lab Concept.

5.1 Highlights from policy recommendations

The ProVaHealth work with Transnational Living Lab policy resulted in several conclusions, some are lifted here:

- 1. There is a strong, long term policy support needed at all levels of government**

Long-term policy support is needed from all levels of government; EU, national, regional and local, for the growth and development of Living Labs and quattro helix approach.

- 2. Create an atmosphere of dialogue and cross sector collaboration within quattro helix**

An increased focus on dialogue and cross sector collaboration is needed within the quattro helix ecosystem. Public sector/health organisations, nurse/doctor need access to end-users and increased quality. Public sector/care organisation need to look for existing solutions before embarking on innovations. Public sector/politician need to have access to success stories through ensured procurement of innovation. The SME/company needs good overview of clinical needs, existing solutions, to demonstrate their own, develop with end-users, know the healthcare market, and grow internationally. End-users need access to the best possible devices. Academia/researcher need a networking platform between science and business.

- 3. Policy design must involve all quattro helix users**

The policy design and strategies should foster innovation. To achieve this, the following elements must be included in the policies: set up of end-user forums / platforms for involvement, systematic collection of healthcare ideas, organized meeting platforms for industry/healthcare ideas testing, and opportunities for open dialogue and communication across silos and world-views.

4. The Living Labs must be very professionally driven

Living Labs needs to have a strong internal organization and structure in order to be successful, with professional staff with a wide set of skills and competences, and be able to access clinics and end-users for development and knowledge about needs in the public sector, and also have a high level of knowledge of markets and structures.

5. Strong communication needed - simple messages

The Living Labs must focus on communication with potential clients and end-users, and with all levels of government in order to ensure continued support, inflow of clients and smooth collaboration with the health systems. Systematic and continued marketing should highlight precise goals through communication about objectives, activities and concrete results.

6. Transnational Living Lab collaboration with existing networks and organizations

A future Transnational Living Lab structure should be built in collaboration with existing national and international health innovation networks and Living Labs structures. Such network would have more impact on the policy formulation at EU level, as well as on national, regional and local policy levels.

7. All levels of government must support Living Labs financially

All levels of government: local, regional, national, and the EU must provide financial resources and support for the set up and running of the living lab structures for them to succeed. The value of a cross sectoral, needs- and dialogue- based collaboration in quattro helix ecosystems and Living Labs must be enshrined in policy and strategies at all four levels of government:

- LOCAL LEVEL – define concept – ensure promotion, set up strong institutional framework, provide access to end-users
- REGIONAL LEVEL – define Living Labs concept, support quattro helix ecosystem
- NATIONAL LEVEL – prioritize quattro helix and Living Labs concept in growth and development policies and overarching strategies
- EU LEVEL – prioritize quattro helix and Living Lab development in EU policies and frameworks

5.2 Highlights from Self-Assessment Toolbox

The Self-assessment toolbox developed in the project and used for self-assessing each individual participating ProVaHealth Living Lab showed that over the project period the Living Labs learned from best practices workshops and gained knowledge in several fields, such as cooperation between sectors, stakeholder involvement, more systematic LL service process and business planning. There are now international contacts, a developed network and methods, as well as tools for international collaboration between LLs, and SMEs. Plans are made to build a platform for sharing needs from municipalities, hospitals, clinics and healthcare staff that can be submitted for LL analysis and preparation.

Building solid local ecosystems connected internationally through Transnational Living Labs would assist local SMEs to grow internationally. The Transnational Living Lab business model would need to be arranged supporting this growth, which calls for some harmonizing of the services offered. A transnational market service with the ability to provide basic health care system and structures overview have a high potential to increase this international growth.

5.3 Highlights from SME Interviews

The interviews showed that many SMEs were not aware of what a Living Lab is and its capabilities and competences, and instead often indicated states, regions or health actors as preferred for testing and validation purposes. SMEs also indicated preference of performing tests and

validation activities in their vicinity or home country, possibly due

to complicated logistics, additional costs of products delivery & employees relocation. Living Labs there-

fore needs to focus on communicating what

Living Labs are, and what strengths and capabilities it has as well as focusing

on the individual needs of the SMEs.

They also should assist the health institutions in formulating and

communicating the precise

needs to the SMEs for them to solve.



In general, Living Labs core mission in regard to SMEs is to support companies to organize and structure collaboration with the public sector, bridging the gap. Living Labs should also build more specific profiles. Specialized products insights, with deep technical or systemic knowledge with necessary scientific background and market knowledge, and with the capacity to provide high-quality services and dedicated support would benefit the individual SME greatly. In the transnational domain the Living Lab should act as local and regional markets experts. Therefore, Living Labs must understand the systemic context and structure in which they operate, in order to be able to guide the SME both domestic and foreign. Another finding from the analysis were that successful collaboration between SME and Living Lab means that both parties were heavily involved in identifying end-user needs, requirements and capabilities, thereby forming an improved, joint understanding of the best possible solution that satisfies both parties expectations and bring most added value in the product development process.

5.4 Highlights from Transnational pilot testing

Generally, the findings from the LL-SME pilots were that 86% of the SMEs were positive to repeat the process which is a clear indication of a positive experience throughout the pilot process, even though a transnational collaboration regarding co-creation and development is a complex process with many associated risks. An SME described the experience as “I think the ProVaHealth project makes a lot of sense. Indeed, it would be much harder for us to arrange user testing in other countries. During the preparations, we learned a lot about our product and what needs to be done in the future.”. SMEs were also likely to seek out other countries in a Transnational Living Lab network, one SME described it as “We would be looking more into German, UK, or Russian users next time”. The overall impressions are that the high degree of SMEs that would be willing to contract the same Living Lab to repeat the process for similar services provides optimism for Living Labs and the developments of frameworks for future services and open innovation.

5.5 Highlights from Transnational Living Lab Business model and services

In summary, the findings from the work was that Living Labs, Living Lab processes and **services** need common descriptions in order to ease promotion to customers and stakeholders, and to promote and facilitate Transnational Living Lab collaboration. Living Labs and their approaches and **business models** are different, with different parent (hosting) organizations, which demonstrate a need for common understanding and affects the Living Labs possibilities to operate together. This suggests a need for transnational funding

opportunities in the system since project grants are still needed due to SMEs continued shortage of money. We have the basic terminology in order to build an effective transnational cooperation, but some details are still fuzzy. Living Labs should **orchestrate ecosystems where networks and clusters** would play a large role going forward as key partners in transnationally connected ecosystem setups. Living Labs continue to work on their offerings with evolving services, while also building the transnational component. **Long-term relationship** is key to achieve a successful Transnational Living Lab structure, where the network would benefit from improved **marketing**. Building a solid Transnational Living Lab collaborative partnership would improve the possibilities for international growth of SMEs, especially looking at the eHealth SMEs which often are easier to scale globally, thus needing more transnational testing possibilities. Collaboration across nations and/or organizations often come with cultural dimensions with differences in language and preferences etc – these are important to recognise. This is one of the reasons **project grants** are necessary for funding of Transnational Living Lab collaboration.

Services in a Transnational Living Lab setup can be many, but generally there are more local services, such as network coordination and stakeholder mapping in the local area, as well as competitor and market analysis. These areas point towards a need to develop basic country guides including healthcare structure and reimbursement systems, and financial information of each country or region. This needs to be complemented with individual services focused towards laws and regulations, which most often have a national angle. Transnational services could be co-creation, usability workshops or expert opinions/ interviews, which are all somewhat easy to standardize. **Unique** testing infrastructure is a **key resource** for value proposition on a transnational level. Some services are highlighted below:



5.6 Transnational Living Lab Concept

5.6.1 BEST PRACTISE WORKSHOPS

The best practice workshops were used to spread experiences and best practices between the participating Living Labs. It also served to give the participants tools and inspirations for continuous development of Living Lab practices and services. The six thematic areas, including Services, Business model, Value proposition, and Results assessment, gave all participants a basic knowledge that now acts as tools for moving forward, both as individual Living Labs and to continue building the Transnational Living Lab structure. It would be very difficult to improve without such inputs as analysing each Living Lab's Business model and looking at what is the value proposition for better understanding main focus and setup of the Living Lab. Similarly, the Best practise workshops acted as informal inputs into all the project tasks and reports.

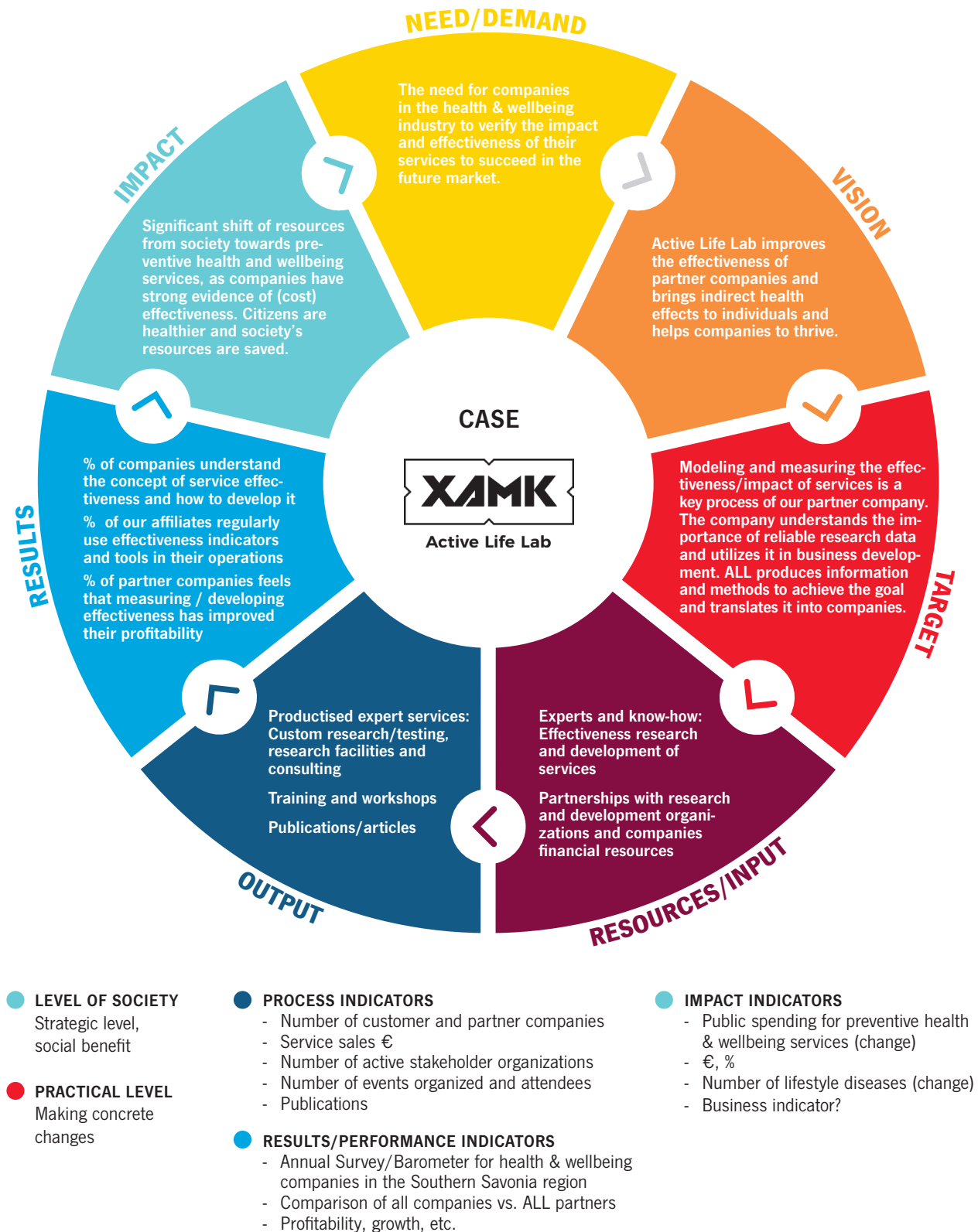
By finding similarities between several participating Living Labs operations and setups, generally applicable conclusions could be reached in several of the topics presented and discussed during the Best Practices workshops. In terms of Services many Living Labs describe a situation where a range of services is offered to companies. As a company and their solution evolves different types of Services come into significance along the product development process, as well as along the company maturity process.

Discussions related to the topic of Involving end-users and stakeholders, as well as Client & SME's, the LL's attraction and value proposition, often reached similar conclusions and experiences of best practices among participating Living Labs. In general, it is crucial to position the Living Lab as the most suitable innovation agent in their respective ecosystem to be able to attract end-user involvement as well as clients and SME's. Positioning the Living Lab as the ideal partner, and single-point of entry for offering Living Lab services in the local/regional ecosystem is one of the single most important aspects of driving successful Living Lab activities.

In terms of financing the Living Lab, and developing a suitable business model, participants found common ground in the description that long-term financing is often reached by strategically working with a combination of funding sources. These can be permanent funding from politically driven innovation strategies, licensing models from co-creation activities (and even the results thereof), project grants, etc. Conclusions from the topic of Activities, and how to sustain activity, staffing and everyday management of the LL were few and difficult to find as strategically implemented. Presenting Living Labs put an emphasis on the crucial role of active recruitment to find the ideal combination of competences required to continuously advance Living Lab operations.

Similarly, participants found few commonalities when presenting and discussing the topic of benefit realisation and processes for validating actual impact reached in concluded activities or projects.

Participants from XAMK presented their work on the topic in a well-developed illustration describing the relations between Need – Vision – Input – Output – Results – Impact, what type of observations can be done in the different stages and what type of understanding can be gained, from each step.



5.6.2 DRIVERS AND OBSTACLES

The identified Drivers and Obstacles also showed a surprising coherence across the topics in terms of value for Living Lab and SME. Some areas that were ranked high over many topics can be described as: knowledge and improvement of ones own Living Lab, boosting the visibility through strong communication, access to partners for increased service access, and improved funding chances. Obstacles also showed similarities, with differences in regulation and culture, unknown interests and competences, all pointing towards Trust as the main component. Here it can be argued that the added values over time would overcome the possible trust issues, but in short-term collaborations these obstacles need to be taken into account.

5.6.3 TRANSNATIONAL LIVING LAB MATURITY MODEL

The developed maturity model with its clear stepwise approach can guide the emergence of transnational collaborations. It is; however, a model based on the practice of Living Labs and their specific requirements and is therefore suited for that area in particular. When looking at the model and the levels used therein, there are different ways of assessing the levels, but throughout this work we have assumed: Level 1 Network – describing an informal network, and Level 2 Coordinated network – describing a common project partnership, and Level 3 Co-operation – describing a partnership where the partners have collaborated for some time in various projects and have built long-term trust which have reached a certain maturity, and Level 4 Collaboration – describing a very mature collaboration, often with a formed joint venture or similar.

It should be noted that moving from one level to the next would most likely cost time, resources and energy to succeed. Therefore, this transformation is more dependent on external circumstances than everyday operations, needing more specific financial and policy support from all levels of government.

Likewise, it is equally possible to be at an “in-between” level, where some features from the next maturity level is in place but other are not, either by design, or by chance. This could be because of slow maturation of the partnership, unguided development, or being in domains with very specific constraints.

5.6.4 TRANSNATIONAL LIVING LAB CONCEPT - SUMMARY

There are clear overlaps between the various results, which can act as building blocks or foundation to the Transnational Living Lab Concept, some of these are SME Interviews, Pilots, Self-assessment toolbox, Business Model, Services and Drivers and Obstacles.

There is a strong **need for Transnational Living Lab services and structures**. SME growth is closely related to internationalization and they need easy access to transnational markets for product development and testing, as well as easy access for understanding the market and structure of the other country's health system. In this a Transnational Living Lab structure would help boost the SME growth. SMEs have also responded positively both in interviews and after testing to the possibility of easy testing in other countries.

In several aspects similar responses have emerged regarding transnational services, both in terms of uniqueness and on similarities. It would be possible to **harmonize** several **base services** across participating Transnational Living Labs, such as, Workshops, Usability, Interviews and Expert evaluations. Another service that could be developed and that would be both unique and harmonized is the creation of **Country specific guides** of the health system, structure and reimbursement system, acting as a first step "easy to access" overview into other countries. Additionally, it is also recognized that Living Labs with specific, unique testing capabilities add importance to the transnational Living Lab structure.

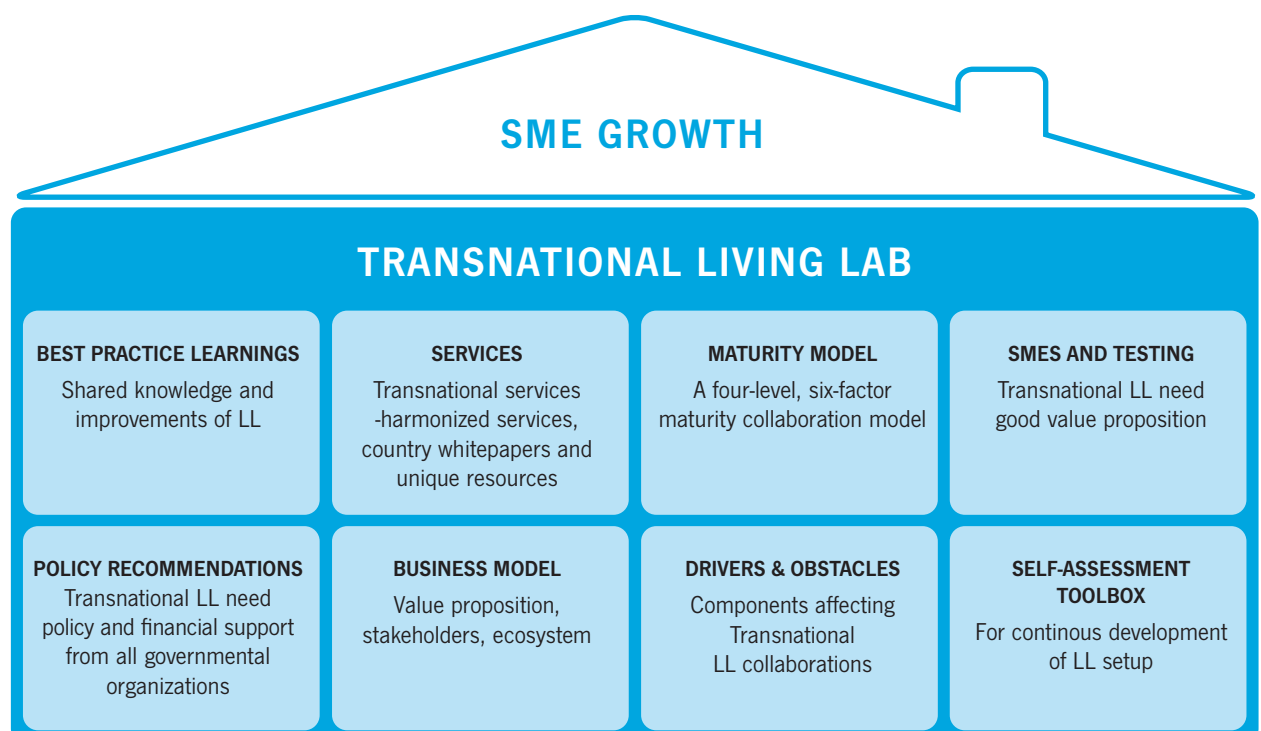
While the need for Transnational Living Lab services are clear, this is not the case for what a Living Lab is and nor its capabilities or functions. This is also the case between Living Labs, where **understanding and trust** between each partner in the transnational Living Lab collaboration is vital. Most Living Labs have **different setups, roles and parent organizations for solving their mission**, which also add to the difficulties in understanding one another. In order to handle this, a **common terminology** on how to describe each Living Lab was developed in the ProVaHealth-project. As trust and understanding is not easily built, a **long-term** component must be added in, with long-term relationship built according to the maturity model practices.

Communication is a vital part of a successful Transnational Living Lab collaboration. As described the knowledge about Living Labs are lacking in the SME community and surrounding ecosystems. Focus should therefore be on what Living Labs are and how they can assist SMEs in their growth, through **strong, simple and straightforward messaging**. Living Labs should aim to orchestrate building local multi-helix **ecosystems** and connect those through the transnational Living Lab ecosystem into a larger whole, if possible, building on existing networks such as EnoLL. Within each ecosystem the Living Lab should be closely integrated into the parent organizations structures thereby knowing health needs and **acting as a bridge between SME and health organization** for product development and testing. Living labs must focus on building a **culture of dialogue** between SME, Living Lab and health organization for creating possibilities for trust and knowledge to be shared across all stakeholders in the ecosystem. Living Labs needs to **invest time** for achieving understanding between SME and Living Lab, as capabilities and functions needs to be understood.

As the maturity of all of this takes time, energy and resources, Transnational Living Labs **need strong and long-term support from all levels of government** (EU, national, regional and local). If possible, this could be as through both direct support to Transnational Living Labs, and indirect support where SMEs would receive vouchers or similar to be used for Living Lab services. There also have to be support on the policy level surrounding funding rules or schemes, which today can limit funding for transnational collaborations between SME and testing Living Lab's.

Supporting all this is the Transnational Living Lab concept, which guides Living Labs in their approach on how to build sustainable setups, and more specifically the steps on the way to build Living Lab collaboration in their region, both in their country and transnationally.

A real-life example is Nordic Proof, that started as a three-year Nordic Innovation project between Nordic health institutions, with the goal to harmonize testing for medical devices and to create a simplified way into the testing track. After the project, the partners decided to continue working together, but under a new common name – Nordic Proof. Nordic Proof is a network of partners from renowned health institutions and testing hubs in healthcare in the Nordic countries. The network went from being a coordinated network, in our proposed model to in many cases fulfilling the criteria of a Co-operation. This was because of the trust built between the partners during the project phase. Even though the partners don't necessarily have the same business model today or provide the same services, they act under the same umbrella – and share experiences and knowledge between each other.





6. CONCLUSIONS

The Transnational Living Lab concept is based on a four-level, six-factor maturity collaboration model describing the necessary steps and components together with identified drivers and obstacles. Business models for Transnational Living Labs are a combination of both individual and transnational models. The transnational value proposition for SMEs described here is better product market fit in a wider context together with easy access to Baltic Sea Region markets, but the concept can easily be scaled outside this geographical region. Identified and developed transnational service packages include harmonized services - such as workshops and Usability testing, country specific services - such as country whitepapers over health structures and system, and unique services that can be leveraged over the entire Baltic Sea Region. Improved marketing for individual Living Labs as well as for the transnational collaboration can be achieved through larger reach and combined resources as seen in the maturity level descriptions.

Transnational collaboration with access to knowledge sharing and learnings improves management and organizational skills. Continuous improvements are enabled through evolving self-assessment and SME involvement. Living Labs should be closely aligned with their ecosystem for maximum impact, and needs to demonstrate its unique value within the innovation system, since as the policy recommendations clearly showed, Living Labs and Transnational Living labs rarely achieve self-sustainability, therefore needing Policy and financial support from all governmental levels.

The project Product Validation in Health is a demonstration of a Coordinated network according to the maturity collaboration model. In the beginning only a few of the partners were in a network setting (according to the maturity level) with lack of trust and knowledge about the partnership. Over project activities and time, trust and understanding grew together with knowledge about SMEs needs and demands, plus best practice sharing, while also building sustainable business models. Transnational Living Lab practices were evaluated, and continuous improvement were monitored by the development of a Self-Assessment toolbox. All this was done while receiving financial policy support from the EU Interreg Baltic Sea region, which showed the importance of the Environment factor in the maturity model.

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