Multi-Stakeholder Service Model Creation to Improve the Efficiency of Research and Innovation Infrastructures

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Abstract

Requirement to increase the effectiveness and wider impact of research dominates the discussion when considering sustainable, resilient and inclusive world of the future. Part of attention has focused on making better use of existing and new research and innovation infrastructures (RIIs), which often require extensive and long-term investments in both new technologies and high levels of expertise.

The need to develop customer-centred service models for RIIs has been identified in many EU, national and regional contexts. Design of service models should build on close collaboration with all triple helix stakeholders. The co-created service models embed the required agility for wider utilisation of RIIs as well as intense and continuous capacity building of talents.

The aims of service model creation for RIIs are, firstly, to increase industry competitiveness by opening university-based infrastructures for wider use. Secondly, the objective is to agree on jointly agreed service model creation process and its deployment. Finally, the model strengthens development, upscaling and updating of competences and skills of future professionals and life-long learners.

As a result, key elements of RII service model creation process were adapted, shared and evaluated together with a stakeholder group consisting of local triple helix representatives of the manufacturing industry in Tampere Region. Feedback from the RII service model creation process and pilot results highlight the importance of open and visible research and innovation environments for the competitiveness of the manufacturing industry. Specific features of the RII service model arising from the triple helix stakeholder needs include transparency, ensuring long-term capabilities, dynamics and funding, ecosystem creation and risk sharing, among others.

The successful RII service model creation process, pilot results and received feedback imply that bridging the gap between research and innovation and university-industry collaboration can be achieved. Research and innovation infrastructures must become self-sustained and recognised value providers in the region's innovation ecosystem. This can only be achieved by continuous development of their business and service models. In the future, industry should be encouraged more to exploit regional RII resources and services. In addition, more ambitious level of joint use of expertise and equipment must be extended to cover all RII providers in the region, country and even abroad.

Keywords

Service model, research and innovation, infrastructure, multi-stakeholder, triple helix

1 Introduction

1.1 Main problem addressed in the paper

Expectations and requirements to increase the effectiveness and wider impact of research dominates the discussion when considering sustainable, resilient and inclusive world of the future. The forms and practical outcomes of research impacts can be manifold, depending on the discipline, external operational environment, timeframe (short and long-term impacts), and type of measurements and assessment tools (qualitative and/or quantitative). However, a commonly agreed principle is that the desired effects and impacts should be agreed and targeted from a multi-stakeholder perspective, maximising the added and sustainable value for societies, businesses, environment, and individuals.

One dimension in increasing the research impact focuses on making better use of existing and new research and innovation infrastructures (RIIs), which often require extensive and long-term investments in both new technologies and high levels of expertise. The need to develop customer-centred service models for RIIs has been identified in many EU, national and regional contexts. Design of service models should build on close collaboration with all triple helix stakeholders, i.e., universities, industry and regional authorities responsible for Smart Specialisation Strategies. The co-created service models embed the required agility for wider utilisation of RIIs as well as intense and continuous capacity building of talents.

1.2 Main goal of the paper

As a response to these challenges, Tampere University of Applied Sciences (TAMK) has designed a multi-stakeholder service model creation to improve the efficiency of research and innovation infrastructures. This model builds on close collaboration with industrial partners and embeds the needed agility for the skill and competence update as well as facilitating university-industry collaboration.

The objectives of service model creation for RIIs are:

(1) To increase industry competitiveness by opening university-based research and innovation infrastructures for wider use

(2) To agree on jointly agreed service model creation process and its deployment

(3) To strengthen development, upscaling and updating of competences and skills of future professionals and life-long learners

In this practitioner paper we introduce the co-creative service model process engaging the regional innovation ecosystem in Tampere Region, also to be extended to international contexts.

1.3 Structure of the paper

The structure of this paper is following. In Section 1 Introduction, we present the main features of the problem addressed as well as the main goals and objectives of the present paper. Section 2 Setting the Scene provides the reader with a wider framework to be investigated in this context, presenting the challenges and opportunities offered by the rapid global and regional change of the operational environment. In Section 3, we explain the main features of the novel multi-stakeholder service model creation co-designed and implemented between Tampere University of Applied Sciences and its public and private sector partners. Section 4 Results and Implications presents a short overview of findings illustrating the main benefits and lessons learnt of the model creation from the point of view of different stakeholders. Finally, in Section 5 Conclusions and Recommendations, assessment of the model creation process so far is concluded. In addition, we point out some risks concerning the approach as well as bring forward a few aspects to be further investigated and evaluated.

2 Setting the scene

One of the main policy documents setting the framework for research and innovation in Europe is the European Research Area (ERA). Its ambition, similar to that of the European Single Digital Market, is to create a borderless, joint environment for research, innovation and technology across the EU. Launched already in 2000, it aims to facilitate and increase the efficacy of research and innovation collaboration between EU countries by aligning their research policies and programmes. In 2020, The Directorate-General for Research and Innovation of the European Commission (2020) has begun a process to revitalise the ERA with four strategic objectives:

(1) Prioritise investments and reforms in research and innovation, to support the digital and green transition and Europe's recovery.
(2) Improve access to excellent research and innovation for researchers across the EU.
(3) Translate results into the economy to ensure market uptake of research output and Europe's competitive leadership in technology.
(4) Make progress on the free circulation of knowledge, researchers and technology through stronger cooperation with EU countries.

Following the COVID-19 pandemic, the ERAvsCorona Action Plan was added to the framework in order to address the new challenges (European Commission, 2020). In addition to alignment and renewal by time and change, the ERA is also accompanied with Knowledge Exchange Platform (KEP), originally launched by the European Commission in 2015 and revised as KEP 2.0 in 2020, especially offering further support for regions and cities in their local endeavors to promote research and innovation (European Committee of Regions at al., 2020). Being accompanied by regional Smart Specialisation Strategies (S3) and Regional Strategies for Research and Innovation (RIS3), these policy

guidelines and support mechanisms aim to facilitate the research and innovation collaboration not only at regional levels but also transnationally and transregionally

Research and innovation infrastructures play a crucial role in the success and advancement of the priorities set by the policy framework described above. At European level, a few initiatives such as European Research Infrastructure Consortium (ERIC) and the European Strategy Forum on Research Infrastructures (ESFRI) participate in setting the roadmaps for joint actions around RIIs but also facilitate the establishment of new RIIs and their mutual co-operation in Europe. (European Research Infrastructure Consortium (ERIC) (2020); European Strategy Forum for Research Infrastructure (ESFRI) (2020))

Research and innovation infrastructures have often traditionally been closed environments with solely serving the purposes of fundamental research inside universities and higher education institutions. Recently, however, their value as a part of the value chain between research and innovation has been acknowledged, both as demonstration and experimentation platforms as well as co-creative spaces. They can facilitate to fasten the time-to-market of new innovations and inventions, to bridge the knowledge gap between contemporary and new emerging technologies and service models. Furthermore, research and innovation infrastructures can support knowledge transfer and contribute to updating and upgrading of skills and competences for both degree students and life-long learners from companies and working life, same time supporting development of soft skills. (Puurtinen & Pohjola 2019; Puurtinen et al. 2020; Siivonen et al. 2021)

3 Multi-stakeholder service model creation for research and innovation infrastructures

3.1 The framework of the approach

Tampere University of Applied Sciences (TAMK) has adapted and piloted a concept for research and innovation infrastructure service model creation. This service model creation path describes a way for engaging triple helix stakeholders in the field of research and innovation towards joint usage of open access infrastructures provided by universities and companies. The applied path includes the following steps:

(1) Mapping of regional research and innovation infrastructures; documenting their services and capabilities as they are offered or available for external usage.
(2) Visualisation of RII offering; services and capabilities showing infrastructures and their networks, how are they spread according to their users and what service and resources they provide.
(3) Embedding needs of companies in RII services; service models and their expected benefits in solving industry's problems, targeting improved customer satisfaction and growth of collaboration.

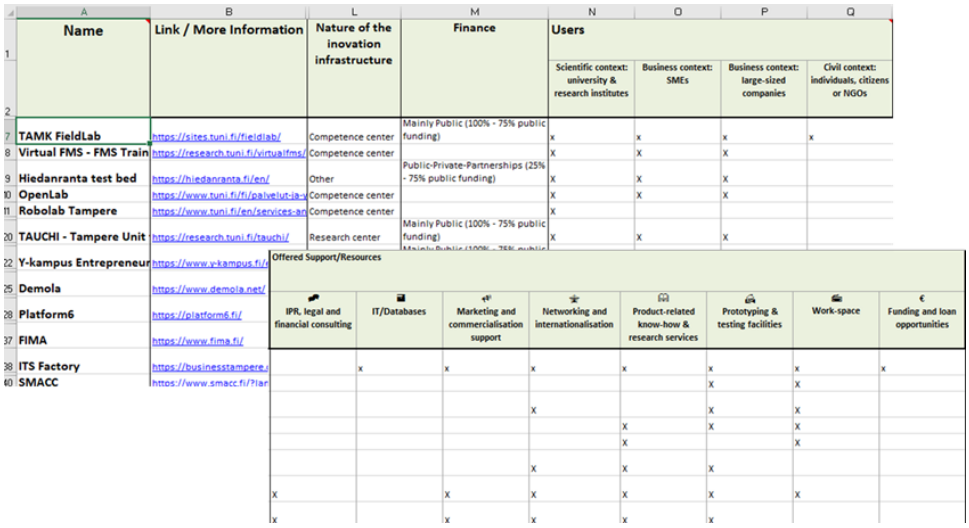
(4) Collaborative engagement of regional stakeholders in the finalisation of visualised RII network, continuous design of service models.

Regional triple helix stakeholders as core partners in the innovation ecosystem should be actively engaged in the capitalisation of research and innovation infrastructures. As a response to this challenge, offering a trustful and open platform for a continuous dialogue is essential. The described RII service model creation process offers a piloted path to create an integrated service model for manufacturing industry in Tampere Region.

The framework for the model creation described for this practitioner paper is the InnoHEIs project (2019-2023) funded by the Interreg Europe Programme (InnoHEIs (2021). In the project, a set of key players in regional innovation ecosystems in selected European countries investigate, assess and peer review their RIIs. The process is implemented in triple helix context, where all stakeholders are actively engaged. As the toolbox for the process is jointly agreed and utilised, the results of individual regions can be compared, and the conclusions and recommendations scaled up to European level. The partners are also committed to share their best practices in developing and supporting regional innovation ecosystems by a more effective utilisation of universities' research and innovation infrastructure on an open Policy Learning Platform sustained by Interreg Europe Programme (2021).

3.2 Mapping of regional research and innovation infrastructures

The first step in the service model creation path is to create a map where each RII is documented with different characteristics and data related to infrastructures type, use and services offered. Mapping starts with identification of which user group is mainly addressed by the studied research and innovation infrastructure, e.g., whether the RII is in the first place utilised within a basic scientific community serving users from universities and research institutes, or whether it is deeply directed towards business contexts relevant for companies. Furthermore, the RII can also be designed towards civil society and public context focusing on individuals, citizens and NGOs.



Name	Link / More Information	Nature of the inovation infrastructure	Finance	Users			
				Scientific context: university & research institutes	Business context: SMEs	Business context: large-sized companies	Civil context: individuals, citizens or NGOs
TAMK FieldLab	https://sites.tuni.fi/fieldlab/	Competence center	Mainly Public (100% - 75% public funding)	x	x	x	x
Virtual FMS - FMS Train	https://research.tuni.fi/virtualfms/	Competence center		x	x	x	
Hiedanranta test bed	https://hiedanranta.fi/en/	Other	Public-Private-Partnerships (25% - 75% public funding)	x	x	x	
OpenLab	https://www.tuni.fi/fi/palvelut-ja-v	Competence center		x	x	x	
Robolab Tampere	https://www.tuni.fi/en/services-an	Competence center		x			
TAUCHI - Tampere Unit	https://research.tuni.fi/tauchi/	Research center	Mainly Public (100% - 75% public funding)	x	x	x	

Name	Offered Support/Resources							
	IPR, legal and financial consulting	IT/Databases	Marketing and commercialisation support	Networking and internationalisation	Product-related know-how & research services	Prototyping & testing facilities	Work-space	Funding and loan opportunities
Y-kampus Entrepreneur	https://www.y-kampus.fi/							
Demola	https://www.demola.net/							
Platform6	https://platform6.fi/							
FIMA	https://www.fima.fi/							
ITS Factory	https://businesstampere.c	x	x	x	x	x	x	x
SMACC	https://www.smacc.fi/?lar					x	x	
				x		x	x	
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	x		x	x	x	x		

Fig. 1: Mapping tool for research and innovation infrastructures

The map also documents the nature of the research and innovation infrastructure, e.g., whether the infrastructure focuses on incubator-type actions or whether it emphasises the engagement of users and individuals in the spirit of Living Lab methodologies. Other forms of categorisation include, among others, competence centers, research centers or technology transfer centers. Additionally, each RII offers certain types of resources and services to its users. Used RII mapping template has eight preselected, different categories of resources such as equipment, prototyping and testing facilities, and work-space services. The mapped non-tangible services consist of dimensions such as innovation competences and expertise, funding and loan opportunities, IPR, legal and financial consulting, IT and databases, marketing and commercialisation support, networking and internationalisation, product-related know-how, and research services. The availability of these elements is identified and documented during the mapping process and presented in the outcome. In addition, RII's financial funding model is also depicted in the axis of public-private-partnerships.

3.3 Visualisation of research and innovation infrastructure ecosystem

The second step of the service model creation path visualises the regional research and innovation infrastructure ecosystem formed by the studied and mapped RIIs. In this particular InnoHEIs project context, the goal of visualisation of RII ecosystem of the manufacturing industry in Tampere Region is to be able to more clearly examine the versatile and multi-actor RI infrastructure provision of the region, and to detect its priorities and shortcomings. The visualisation of data will help in regional development work, communications and dialogue of interests between various stakeholder groups. The added value of the visualization process is to illustrate the whole RII landscape of the region, to stimulate discussion of the challenges and opportunities, and to draw conclusions from the situation.

Data regarding the RII infrastructure ecosystem of manufacturing industry in Tampere Region has been collected in the framework of the InnoHEIs project which aims at developing and improving the research, development and innovation policies of partner regions involved. In Tampere Region, Tampere University of Applied Sciences and the Council of Tampere Region have participated in the implementation work, along with a large number of the regional development actors and stakeholders.

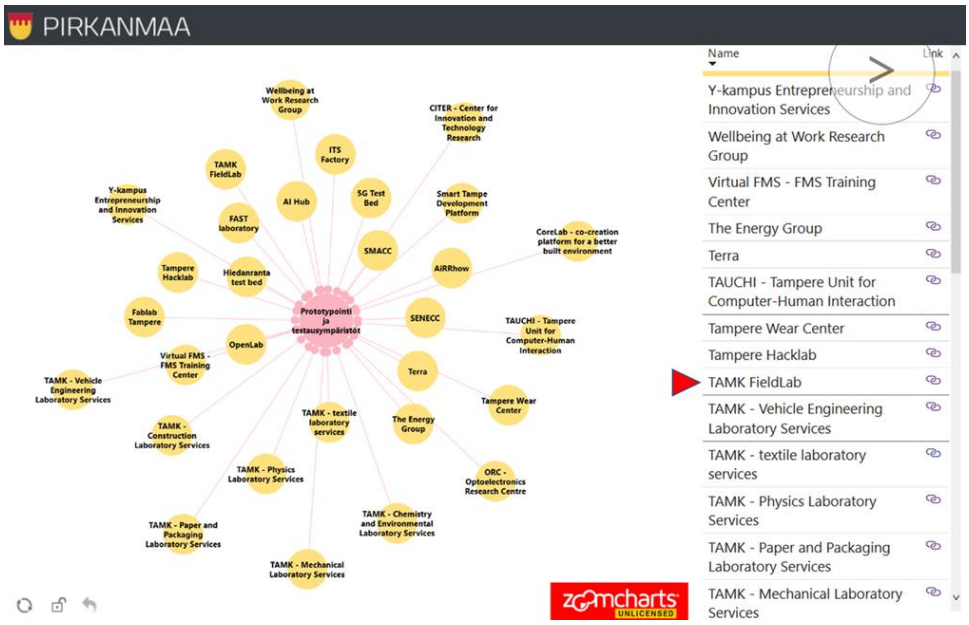

Fig. 2: Visualisation of RII ecosystem available at: https://tieto.pirkanmaa.fi/inno/pages/syventymat/pirkanmaan_ekosysteemi_visualisointi.html

The visualisation of the features, characteristics and interdependencies provides tools for universities, companies and regional actors to gain better understanding of regional RII infrastructure ecosystem. The visualisation also stimulates discussions about the good practices, operating models and service offering of the various RI infrastructures. Furthermore, considerations on the improvement of the RII accessibility, performance and joint service models for all stakeholders are nourished. In the future, detailed information will be collected and added to the visualisations concerning for example RI infrastructures' capabilities, equipment and service models.

3.4 Embedding multi-stakeholder needs into RI infrastructure service models

The third step of service model creation path is to embed the needs of ecosystem stakeholders into the operational modes of universities' RI infrastructures. This endeavor is implemented in co-creation and dialogue with the relevant regional stakeholders from business and industry, regional authority representatives and RII owners and providers. The outcomes of the mapping describe features of some of the expected benefits in

solving industry's problems, targeting improved customer satisfaction and growth of collaboration. Tool used for this mapping and co-creation purpose was Value Proposition Canvas by Strategyser.com (2021).

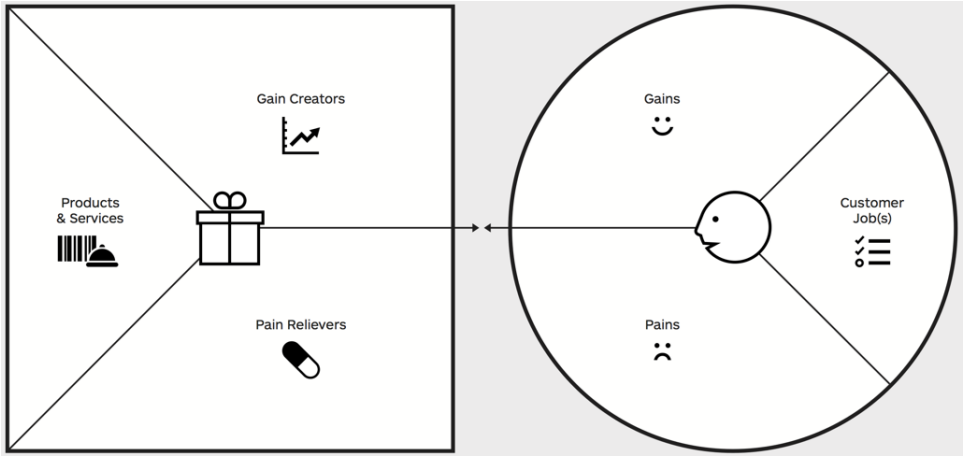

Fig. 3: Value Proposition Canvas (Strategyzer, 2021)

The Value Proposition Canvas is divided in two areas. The details of the left half of the canvas depict features related to the company's, in this case the RII provider's, value proposition representing RII's offering such as products and services including the features and support they provide. Further included are impressions and evidence of customer problems the RII is addressing, and which pains the customer needs to mitigate with the RII offering. These pain relievers provided by the RII collaboration are shown in their own sector. 'Gain creators' sector is used to describe how the RII offering benefits customers. (Strategyzer, 2021)

The right side of the canvas is about the customer profile with three sectors. 'Customer Job(s)' sector describes important issues and needs that customers want to solve and fulfil. 'Pains' sector describes barriers and difficulties customers are having while trying to get a job done. The positive outcomes or benefits the individual customer desires are recorded to sector 'Gains'. (Strategyzer, 2021)

3.5 Collaborative engagement of regional stakeholders

Fourth and final step of the service model creation path is the most vital in order to create the wider, sustainable and long-term impact which the multi-stakeholder service model creation is aiming at, i.e., to improve the efficiency and performance of research and innovation infrastructures. This model builds on close co-creation and dialogue with industrial and public sector partners and embeds the needed agility for the skill and competence update and upgrade while strongly facilitating university-industry collaboration.

Continuous discussion, mapping of current and future needs as well as open feedback collection are time-consuming and require a lot of effort. Identifying and creating discussion forums engaging selected members representing the potential industrial customers, private and public infrastructure users and RII owners and providers helps the service model creation to rapidly response to needs of various users and customers. In addition, this helps to create the desired impact with effective communication channels and methods, such as regional and international engagement events and open dissemination workshops.

4 Results and implications

As a result, the following elements of research and innovation infrastructure service model creation process were adapted, shared and evaluated together with a stakeholder group consisting of local triple helix representatives of the manufacturing industry in Tampere Region:

(1) RII map with services and capabilities documented as they are offered or available for external usage
(2) Dynamic visualisation chart of the RII network describing the dependencies between users, services and resources
(3) Analysis documenting the needs and benefits of companies towards an effective and customer-based RII service model
(4) Action plan for the future based on collaborative feedback

Feedback from the RII service model creation process and pilot results highlight the importance of open and visible research and innovation environments for the competitiveness of the manufacturing industry. Specific features of the RII service model arising from the triple helix stakeholder needs include transparency, ensuring long-term capabilities, dynamics and funding, ecosystem creation and risk sharing, among others.

The successful RII service model creation process, pilot results and received feedback imply that bridging the gap between research and innovation and university-industry collaboration can be achieved. This required an open-minded, collaborative experimentation and testing of the pilot process. Feedback also shows that during the pilot process, transfer of know-how of RII services availability among participated companies and regional stakeholders improved tremendously.

5 Conclusions

In the global transformation of industrial value networks, it is important to quickly make research and innovation outcomes and expertise available to industry. Updating and upscaling of competences and skills are essential factors in increasing not only the

competitiveness of companies but also to prospering societies. In addition, offering agile and adequate service models of the research and innovation infrastructures assists all stakeholders of regional ecosystems to keep up with the accelerating cycles of global transformation and transition.

Research and innovation infrastructures must become self-sustained and recognised value providers in the region's innovation ecosystem. This can only be achieved by continuous development of their business and service models. Only RIIs which foster features such as industry-driven, customer-focused orientation and proper user segmentation will flourish thanks to their wider business models in the long-term. Continuous collaboration with different industrial partners and gaining better understanding of their requirements and needs play a critical role in this endeavor.

In the future, industry should be encouraged more to exploit regional RII resources and services. In addition, more ambitious level of joint use of expertise and equipment must be extended to cover all RII providers in the region, country and even abroad.

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