



# **Case Study on the policy mix for science-industry knowledge transfer in Finland**

POLICY  
CASE  
STUDY

Contribution to the OECD TIP Knowledge Transfer  
and Policies project

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**Case study on the policy mix for science-industry  
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OECD TIP Knowledge Transfer and Policies project**

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## Executive Summary

This study concerns the evolution and implications of Finnish knowledge transfer policy mix. There is a long and intense tradition of collaboration between science, applied research and industry. In the last 10 years, several reforms have affected knowledge transfer in Finland. Following is a short list of the main reforms of the structure and R&I policy tools:

### Research Policy

- The University Inventions Act that came into effect in January 2007 affected the context of knowledge transfer in Finland. The new legislation provided universities with the rights to the inventions produced using externally funded research, whereas previously rights to all inventions belonged to the inventors.
- A comprehensive reform of state research institutes and research funding occurred in 2014–2017. The reform has changed the structure of state research institutes, many of which have been consolidated into larger units. This helps them to make clearer focus choices and build larger co-operation models with the companies.
- The Reform on basic funding for the universities in 2017 strengthens the government's ability to coordinate research policy. To speed up the pace of change, the role of competitive funding has been strengthened over the past decade, and thus, funding has been reallocated from universities to the Academy of Finland. The new university funding model emphasizes scientific quality, but incentives to focus on cooperation and societal and economic impacts still remain weak.
- A total of 14 universities operate in Finland. In general, technical universities has had a focal role in collaboration with the industry and so-called academic universities has less important role even in knowledge transfer.
- Technology transfer companies (TTOs) play a significant role in the commercialization of results as well as research and knowledge transfer. Most of commercialization activities have been funded by TUTL program carried out by Business Finland.
- The Academy of Finland is the key agency for funding research and promoting high-quality research and science policy in Finland. Most of the Academy of Finland funding tools improve scientific capabilities and a role of science-industry collaboration is less important.
- The Research and Innovation Council's (RIC) has been founded in 1987 and it has been traditionally in major role to coordinate the Finnish research and innovation policy. The vision and roadmap define a common directions for Finnish research, development and innovation policies for the coming years in Finland; including the goal of improving development of knowledge platforms and growth ecosystems. A 2014 evaluation of the RIC stated that its influence had declined since 2005. The new RIC has been slow to start, and its role in the near future cannot be predicted.

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## Innovation policy

- In recent years, a clear shift has been found from research-driven and big company-focused policy towards more innovation-driven, startup-focused policy. The policy framework also emphasizes growth ecosystems as a tool in the new industrial and innovation policy, as the understanding of the role of partnerships and networks in the global economy has evolved.
- Tekes (the Finnish funding agency for innovation) was the most important public funding organization for research, development and innovation in Finland, and it has the central role in applied research collaboration with the industry. Tekes and Finpro has been merged as Business Finland, and its role has been broadened to export and invest-in activities.
- In Business Finland, main applied research-industry tool remain the same as it was in Tekes: cooperative programme funding is still the most effective in transferring knowledge. Moreover, new tools for knowledge transfer are Growth Engines, which strengthen ecosystem policy and funding concepts aimed at research organizations: 1) Co-Creation, 2) Co-Innovation and 3) New Businesses from Research Ideas (TUTL) funding.
- In 2015, the government imposed severe cuts on the Tekes budget, and two large-scale programmes, SHOKs and INKA, were terminated. After these cuts, the discussion surrounding Finnish RDI policy has to a large extent focused on the role of ecosystems and platforms at the national, regional and city level as well as on policies to support these actions.
- There is a strong tradition of PPP collaboration extending from the early Tekes technology development programmes, which mandated a consortium of (public) research and private enterprise, all the way to the SHOK programme. In retrospect, the SHOKs can be seen as an early, yet extensive, effort to build ecosystems. The programme started in 2006-2007 as five vertical clusters with incumbents and their immediate partners, but over the course of the programme's existence, cross-industry collaboration increased, and close to termination the programmes had become more cross-disciplinary.
- At the regional level, the Finnish government seeks to provide financial support to regional and industry-specific centres of excellence. Major investments by cities and municipalities will be used as a testing ground for innovations in the future. The goal is to use innovative procurement to promote model projects and exports. Another goal called Smart Specialisation has been applied in Finland both at the national and regional levels with a focus on the knowledge base, lead markets initiatives and ecosystems development.
- Finland has also sought to increase the performance of public R&D&I policies and internationalization through joint activities and strategic programmes. In this regard, Tekes has played important role, as have the Academy of Finland's Strategic Research Council and the government working group for the coordination of research, foresight and assessment activities (TEA Working Group).

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## Implications

- Overall, the Finnish knowledge transfer policy mix seems relatively balanced and comprehensive. There is a long and intense tradition of collaboration between universities and industry, particularly within the technical sciences.
- The reform of the public research system was necessary in order to promote public-private partnerships and to enhance the entrepreneurial orientation of university research. The important objective for the revision has been to increase collaboration and knowledge transfer between universities and enterprises, by for example involving business leaders in university boards.
- Activities which concern commercialization of research results should be broader. The commercialization tool (TUTL) mostly cover most of activities in this field. In the future, the university researchers need also career paths inside the universities that support co-operation with the industry.
- Ecosystem policy is important tool for the small open economy as Finland. Ecosystems are more open models for co-operation between science, applied research and industry when compared to SHOK:s of which large companies were in main responsibility for coordinating research and innovation plans.
- Ecosystem as a tool raise the question how effectively the ministries can utilize the current policy mix and recommendations of RIC that more efficient knowledge transfer models can be put into practice especially in science-industry collaboration.

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## Introduction

A goal of this study is to describe the policy mix that is helping Finnish scientists, innovators and industrialists to build working methods to improve their knowledge transfer. The main focus is on the actions of two ministries, namely, the Ministry of Education and Culture (MEC) (higher education and science policy) and the Ministry of Economic Affairs and Employment (MEAE) (economic, employment and innovation policy). There are many institutions working under these two ministries carrying out policy actions. A policy mix is therefore devised to shape educational and research aspects as well as economic and innovation aspects, and a goal is to create circumstances wherein companies and research and innovation institutions can build the most competitive platforms and ecosystems in Finland.

On the political level, innovation and research policy is increasingly connected to societal issues that pose a challenge to growth and well-being (for example, globalisation, ageing, environment and public health). This policy framework also aims to support collaboration and engagement between the public and private sectors on these issues.

The structure of this case study is as follows. Section A broadly describes the history, evolution and recent reforms that have led to the present policy mix. Section B explains the governance structure of the main institutions acting under the two ministries mentioned above. In section C, current trends are explained, considering in particular economic and societal renewal, quality of research, collaboration and ecosystem policy. Section D describes the impact, synergies and trade-offs of the current policy mix, and Section E presents main implications.

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## 1. Development of the policy mix

### 1.1. Economic and knowledge policies in Finland

#### *History and evolution*

Since the 1990s, Finland has turned from an industrial investment-driven towards an innovation-driven economy. The economy was opened up in an effort to reposition Finland in the world market, and more emphasis was placed on **microeconomic policies** in order to enhance competitiveness. Adoption of a **cluster policy** emphasised reliable knowledge as a base for the economy. The concept of innovation system was implemented in Finland in the early 1990s as well. The Science and Technology Policy Council (later the Research and Innovation Council) set an agenda for economic growth led by ICT and for creation of a “national innovation system”. As a consequence, more funding was made available for research and development (R&D) and higher education institutions. Prior to the economic recession of the early 1990s, Finnish R&D policy focused mainly on individual enterprises rather their contexts<sup>1</sup>.

Collaboration and engagement are an important recommendation provided by the European Commission to boost knowledge transfer, and they have been implemented to a high degree in Finland. Researcher mobility into the business sector has traditionally been high, and a range of programmes support public-private collaboration. Moreover, the government has incentivised universities to seek external and private sector funding more actively. The latter has been carried out by incentivising universities to add competitive funding to their funding model and by multiplying private sector donations to universities.

At the policy level, demand and user-driven innovation are identified as central topics in the current Finnish innovation policy. The majority of instruments, however, are still on the supply side. The emphasis in Finland has typically been on programme-related funding rather than on tax incentives.

When considering the governance of the policy mix, at least four important aspects have affected knowledge production and knowledge sharing over the past two decades:

First, there has traditionally been a broad consensus surrounding the principles of knowledge production and sharing. The basic approach towards policy regarding the knowledge economy remained relatively stable until 2015, when the new government imposed severe budget cuts and made new strategic decisions that also affected the policy mix related to knowledge sharing.

Second, the Finnish approach has been especially strong in using foresight to support the setting of both the national agenda and individual policies executed by the sectoral ministries and agencies.

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<sup>1</sup> Halme, Lindy, Piirainen, Salminen & White, eds. (2014): Finland as a Knowledge Economy 2.0: Lessons on Policies and Governance. World Bank, available at <http://documents.worldbank.org/curated/en/418511468029361131/Finland-as-a-knowledge-economy-2-0-lessons-on-policies-and-governance> ; Sotarauta, M. 2012: Policy learning and the ‘cluster-flavoured innovation policy’ in Finland, *Environment and planning C: Government and policy*, vol 30, number 5, available at [tampub.uta.fi/bitstream/handle/10024/68192/policy\\_learning\\_2012.pdf?sequence=1&isAllowed=y](http://tampub.uta.fi/bitstream/handle/10024/68192/policy_learning_2012.pdf?sequence=1&isAllowed=y)



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Third, there has traditionally been strong coordination of education, research, and innovation activities at the national level. The role of the Science and Technology Policy Council (Research and Innovation Council since 2008) has been pivotal in terms of crafting and coordinating the strategy.

Finally, education policy has been central and well-integrated into the national knowledge strategy. Education has for a long time been a high priority in Finland, where policy has strived to reach both a high level of education among the population and provide high-quality and universal basic education. Finnish public policy can therefore be recognised as having played a key role in turning Finland into a knowledge economy<sup>2</sup>.

### ***Recent Reforms***

In the last 10 years, several reforms have affected knowledge transfer in Finland. Following is a short list of the main reforms:

- **The University Inventions Act** that came into effect in January 2007 affected the context of knowledge transfer in Finland. The new legislation provided universities with the rights to the inventions produced using externally funded research, whereas previously rights to all inventions belonged to the inventors. The reform increased universities' incentives with regard to the commercialisation of research. The largest set of revisions to the current Finnish R&I system, however, started with **the University Reform** (2010), followed by the **Polytechnic Reform** (2011) and **the Reform of Research Institutions and Research Funding** (2012) as well as the new **University Funding Model** (2013, refined in 2017). A cross-cutting theme in the legislative reforms has been the aspiration to stimulate science-industry knowledge transfer and support actors in cooperating more actively.

- The IPR legislation changes (2007) along with the introduction of the **new University law** (2010) marked a fundamental change with regard to the organisation of knowledge transfer in Finnish universities. The new law gave universities a mandate and responsibility to organise the knowledge transfer and academia-business collaboration.

These developments have led to the decreasing role of technology parks and other knowledge transfer intermediaries.

- A **comprehensive reform of state research institutes and research funding** occurred in 2014–2017. The reform has changed the structure of state research institutes, many of which have been consolidated into larger units. Another key element of the reform has been the reorganisation of research funding. The aim of the reorganisation has been to connect funding more closely to societal issues and government priority areas. Budget cuts have also been made to state research institutes' yearly budgets, and these funds have been reallocated into 2 new instruments: the Academy of Finland's *Strategic Research Council* (SRC) and *government analysis, assessment and research activities*. (Budgetary reallocations are introduced in more detail below.)

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<sup>2</sup> Halme, Lindy, Piirainen, Salminen & White, eds. (2014): Finland as a Knowledge Economy 2.0: Lessons on Policies and Governance. World Bank, available at <http://documents.worldbank.org/curated/en/418511468029361131/Finland-as-a-knowledge-economy-2-0-lessons-on-policies-and-governance>

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- **The Reform on basic funding for the universities** in 2017 strengthens the government's ability to coordinate research policy. To speed up the pace of change, the role of competitive funding has been strengthened over the past decade, and thus, funding has been reallocated from universities to the Academy of Finland. The revised funding model emphasises strategic choices, specialisation, and societal impact with regard to the teaching and research carried out in universities for basic funding as well. Basic funding is divided into 3 pillars, where education accounts for 39% of total funding, research 33% and other factors related to education and research policy goals 28%. The last pillar – education and research policy – incorporates criteria for strategic funding that amounts to 12% of total university funding. The total amount of yearly funding is around €1.6 billion<sup>3</sup>. The new university funding model<sup>4</sup> emphasises scientific quality, but incentives to focus on cooperation and societal and economic impacts still remain weak.

## 1.2. Current focus of policies for knowledge transfer

The government is currently seeking to develop competences and incentives for demand and/or user-driven R&D&I activity, promote cooperation between public and private actors (PPP partnerships), increase citizens' participation opportunities and develop cooperating models and platforms<sup>5</sup>.

In recent years, a clear shift can be found from research-driven and big company-focused policy towards more **innovation-driven, startup-focused policy**. The policy framework also emphasises **growth ecosystems** as a tool in the new industrial and innovation policy, as the understanding of the role of partnerships and networks in the global economy has evolved. This realigned policy is based on the assumption that investments in cooperative research and the ideas of small companies will gradually generate competitiveness. Moreover, one policy tool involves promoting and identifying the most promising ecosystems, which are assumed to enable growth. This policy is being implemented through the government's key projects involving ecosystems, and several new policy measures focusing on networks are pending<sup>6</sup>.

Finland has also sought to increase the performance of **public R&D&I policies and internationalisation** through joint activities and strategic programmes. In this regard, Tekes (the Finnish funding agency for innovation) has played important role, as have the Academy of Finland's Strategic Research Council and the government working group for the coordination of research, foresight and assessment activities (TEA Working Group). Based on the government's 2011 programme, the Team Finland network was established

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<sup>3</sup> MEC 2016 [http://minedu.fi/artikkeli/-/asset\\_publisher/yliopistojen-rahoitusmalli-uudistuu](http://minedu.fi/artikkeli/-/asset_publisher/yliopistojen-rahoitusmalli-uudistuu) (accessed March 20, 2018)

<sup>4</sup> MEC 2017 Universities' Funding Model [minedu.fi/documents/1410845/4392480/Universities\\_funding\\_2017.pdf/abc0974d-b8d5-4486-a12a-aa141d54b66f](http://minedu.fi/documents/1410845/4392480/Universities_funding_2017.pdf/abc0974d-b8d5-4486-a12a-aa141d54b66f) (accessed March 20, 2018)

<sup>5</sup> Ministry of Employment and Economy demand-driven innovations -group (2010): Demand and User-driven innovation policy – Framework (Part I) and Action Plan (Part II). Publications of Ministry of Employment and Economy, Innovation 48/2010, Available at <https://www.slideshare.net/erikboralv/demand-and-userdriven-innovation-policy> .

<sup>6</sup> MEAE 2016 <https://tem.fi/en/ecosystems> (accessed March 20, 2018)

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to bring together the public actors that are providing internationalisation services and R&D&I funding. A goal is to provide a more efficient service path for businesses that are seeking to internationalise.

Modification of the structure and organisation of the leading actors is still partly ongoing. Coordination of the Team Finland network was transferred from the Prime Minister's Office to the Ministry of Economic Affairs and Employment in 2017, and then to Business Finland in 2018. To enhance the activities of the international network and the accessibility to services for Finnish businesses operating abroad, Tekes and the internationalisation advisory service provider Finpro were merged into one organisation called Business Finland at the beginning of 2018. The aim of the collaboration is to provide a uniform service pathway from support provided to research and development activities and product and services innovations to entry into international markets.

**The comprehensive reform of state research institutes and research funding** carried out in 2014–2017 has changed the structure of state research institutes as many of them have been consolidated into larger units. Budget cuts have also been made to state research institutes' annual budgets, and these funds have been reallocated to 2 new instruments: the Academy of Finland's *Strategic Research Council (SRC)* and *government analysis, assessment and research activities*.

In 2015, the government also imposed severe cuts on the Tekes (the Finnish funding agency for Innovation) budget, and two large-scale programmes, SHOKs and INKA, were terminated (see Box 1 below for descriptions of SHOKs and INKA). In total, the government cut 130 million EUR of Tekes' annual funding and increased temporary funding for 2016–2018 by a total of 59 million EUR (combined). However, additional investments in knowledge, growth and employment were channelled into new directions. These include the capitalisation of vocational knowledge centres (80 million EUR), flagship institutes (60 million EUR) and Tekes (60 million EUR); the Academy of Finland's budget mandate for the years 2018–2019 was also increased by 50 million EUR and that of Tekes by 70 million EUR<sup>7</sup>.

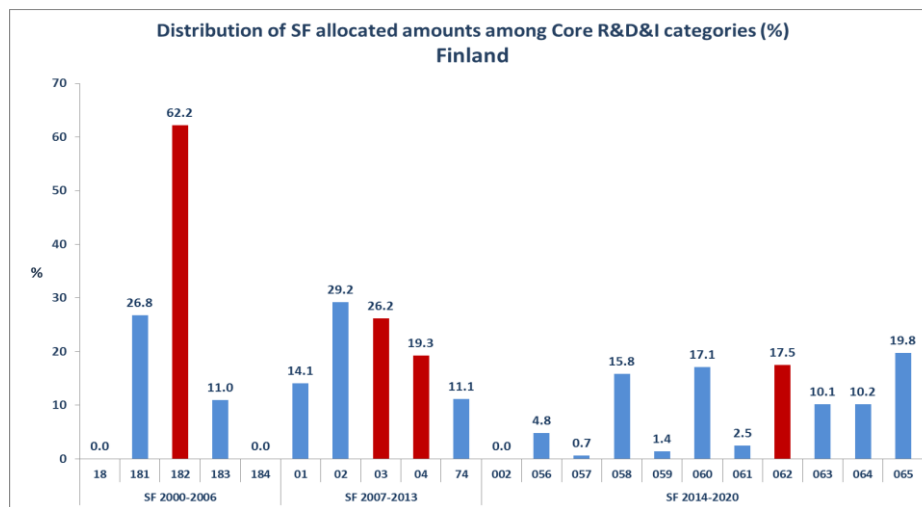
For the years 2014–2020, 17.5% of Finland's structural funds are allocated to the core R&D&I activities of technology transfer and university-business cooperation, which primarily benefit SMEs. Finland's contribution is higher than the EU average of 15.7% but much lower than in previous programmes<sup>8</sup>.

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<sup>7</sup> Sipilä J (2017): *Ratkaisujen Suomi, Suomen kuntoon laittaminen jatkuu* (Finnish Government Mid-term Review) April 2017 presentation by Prime Minister Sipilä, available at <http://valtioneuvosto.fi/hallituksen-puolivalirihi-2017> (visited March 27, 2018)

<sup>8</sup> JRC IPTS RIO elaboration on Scopus data collected by Sciencematrix in a study for the European Commission DG RTD (Campbell, 2013).

**Figure 1 Structural funds devoted to knowledge transfer**



### Box 1. SHOKS and INKA

The **Strategic Centres for Science, Technology and Innovation** (SHOKs), introduced in 2008, were an important instrument supporting R&D collaboration between universities, applied sciences, research institutions and businesses. The SHOKs were privately-owned companies, and they strove to renew industry clusters and to create new innovations in key Finnish business sectors, namely the environment and energy, the metals industry, health and wellbeing, ICT and the digital services sector, the built environment and the bioeconomy sector. The six SHOKs companies had collectively formulated a research strategy with their shareholders (companies, universities and research institutes) that implemented long-term research programmes (5–10-year time span).

The SHOKs' financing model was based on Tekes funding, which covered on average 60% of the budget, while the companies involved funded the remaining 40%. The SHOKs' funding was one of the more generous funding concepts for industry-academia knowledge transfer, amounting to EUR 88 million in 2014. In addition, the Academy of Finland funded basic research within SHOKs.

Due to economic pressures, PM Sipilä's Strategic Government Programme introduced significant budget cuts to public expenditure from 2016 onwards. This included the termination of the SHOKs' funding by the end of 2015, upon which the SHOKs programme was closed. Despite the terminated funding, two of the six SHOKs continue to work as open innovation clusters with businesses, universities and research institutions as shareholders.

The **INKA Programme** was implemented during 2014–2017 in Finland's largest city regions. The aim of the programme was to turn the cities into attractive and international hubs supported by the national networks and able to create new, competence-based business activities.

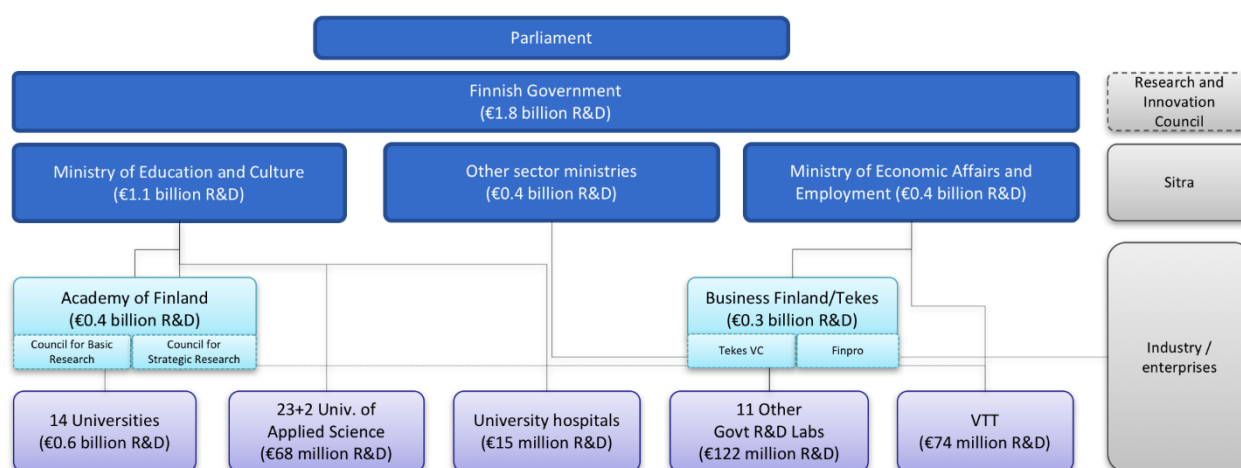
The development schemes were in line with the European Structural Funds Programme: smart city and renewal of industries (responsible city Tampere), sustainable energy solutions (responsible city Vaasa in the Ostrobothnia region; Pori in the Satakunta region included as a partner), cybersafety (responsible city Jyväskylä in Central Finland), future health (Tampere as a partner) and bioeconomy (Jyväskylä in Central Finland and Seinäjoki in Southern Ostrobothnia as partners).

The work of the INKA Programme has been further taken up through the Six City Strategy (6AIKA Programme) (see Box 4.)

## 2. Governance of the policy mix: main actors and governance structure

Figure 2 below presents the overall governance structure of the key knowledge organisations (education, research, innovation). Dark blue represents the political / policy level, light blue represents public funding agencies, and purple represents knowledge (education, research and innovation) production, application and implementation.

**Figure 2 Governance structure for key knowledge organisations in Finland. Figures in brackets represent allocation of public R&D expenditure in 2017**



Source: Statistics Finland

The R&I system in Finland is divided into four strategic and operational levels. Innovation policies and strategies are steered by the **Finnish government**, which sets national development goals and general guidelines. **The Research and Innovation Council (RIC)** has had a central role in coordinating the R&I system, but it has recently been reorganised. **Funding agencies, universities and research institutes** have substantial freedom to create and implement their strategies.

National funds are mainly allocated through the **Ministry of Education and Culture (MEC, 60%)** and the **Ministry of Economic Affairs and Employment (MEAE, 27%)**, and their agencies, the Academy of Finland and Business Finland<sup>9</sup>. These two ministries also have a central and direct role in R&D&I and knowledge transfer activation.

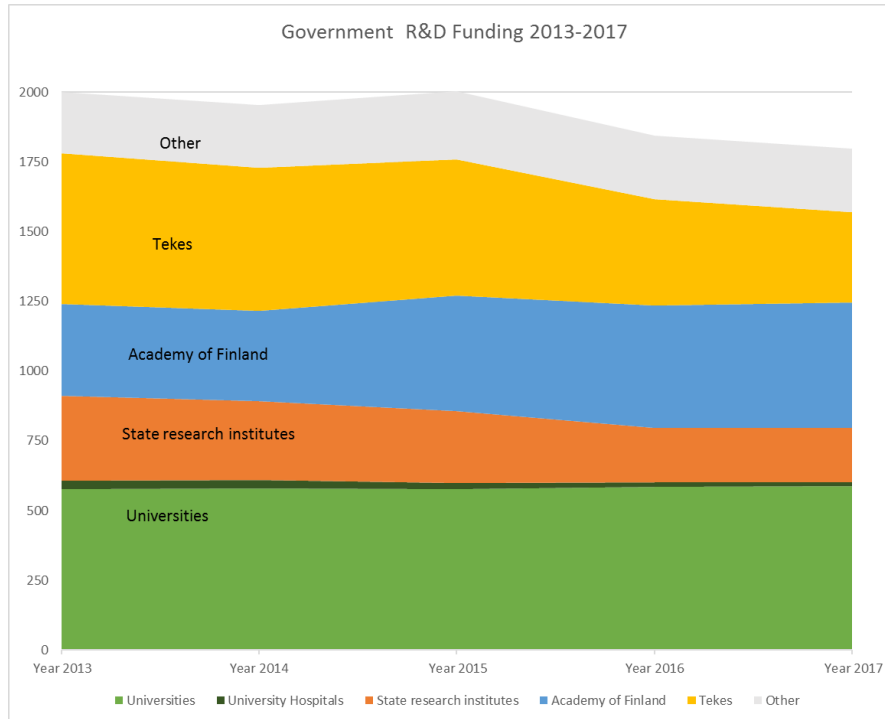
Although Finland's R&D&I governance system is centralised in terms of national guidelines, a mix of national and local administration gives regions a relatively high degree of autonomy in the design and implementation of regional policies. With the ongoing **county-level administrative reform**, regional autonomy will be further strengthened.

When considering social policy objectives, the majority of government R&D funding is allocated to the general advancement of knowledge as university research funding and to the general advancement of science (Figure 3). In 2016, HEIs performed approximately

<sup>9</sup> Statistics Finland 2017 [http://tilastokeskus.fi/til/tkker/2017/tkker\\_2017\\_2017-02-23\\_tie\\_001\\_en.html](http://tilastokeskus.fi/til/tkker/2017/tkker_2017_2017-02-23_tie_001_en.html) (accessed March 20, 2018)

25% of all R&D activities. Universities' share of HEI R&D expenditure was 86%, universities of applied sciences' share was 9.6%, and university hospitals' share was 4.5%. GERD as a percentage of GDP produced by HEIs was 0.69% in 2016<sup>10</sup> (EU28 average of 0.47% in 2015).

**Figure 3 Government R&D Funding 2013-2017**



## 2.1. Field of the Ministry of Education and Culture (MEC)

The **Ministry of Education and Culture (MEC)** is responsible for planning and implementing higher education and science policy, preparing statutes and setting forth national budget proposals. MEC's funding of R&D amounts to EUR 1.1 billion or approximately 60% of total government R&D funding (see Figure 4) and is mainly allocated through budget funding to **higher education institutions (HEIs)** and the **Academy of Finland**.

### *Higher Education Institutions*

A total of **14 universities** operate within MEC's administrative branch. Two of these are foundations pursuant to the Foundations Act and the others are corporations under public law. Higher education degrees in the military sector are completed at the Finnish National Defence University, which operates under the defence administration. Only some of these universities have strong role in science-industry knowledge transfer. In general, technical universities has had a focal role in collaboration with the industry and so-called academic universities has less important role even in knowledge transfer.

<sup>10</sup> Statistics Finland 2017 [http://tilastokeskus.fi/til/tkke/2016/tkke\\_2016\\_2017-10-26\\_kat\\_001\\_en.html](http://tilastokeskus.fi/til/tkke/2016/tkke_2016_2017-10-26_kat_001_en.html) (accessed March 22, 2018)

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A total of **23 universities of applied sciences** operate as public limited companies in the Ministry of Education and Culture's administrative branch. In addition, there are two other universities of applied sciences in Finland; Högskolan på Åland (Åland University of Applied Sciences) and the Police University College, which operates under the mandate of the Ministry of the Interior. Main idea of the autonomy of the universities of applied sciences is that they should be more involved in practical co-operation with the companies.

Both universities and universities of applied sciences are independent legal entities that have the right to make independent decisions on matters related to their internal administration. Government budget funding to universities is 0.6 billion euros annually, and competitive funding from the Academy of Finland is available to universities.

### *TTOs*

Technology transfer companies (TTOs) play a significant role in the commercialisation of results from research and knowledge transfer. There are several university and research institute-based TTOs in Finland. These companies include Aboatech Oy, HU, Licensing Oy, Finntech Oy, Oulutech Oy, Tuotekehitys Oy and Tamlink.

The aim of TTOs is to facilitate the diffusion of technology generated by their owner organisations (e.g., universities, VTT) for industrial or societal use through licensing. As TTOs are private companies, they are also able to make commercial research, development and exploitation agreements that their owners are not willing to make because of the liabilities or risks involved.

The MEAE, the University of Helsinki and the University of Tampere launched a development programme called **SPARK Finland** in 2017. The programme aims, first, to enhance the commercialisation abilities of researchers and research-based companies in the health sector, second, to strengthen the cooperation between industry and academia, and third, to commercialise research results as well as to build and grow internationally competitive businesses in Finland. After the two-year pilot stage in Helsinki and Tampere, the programme is planned to be extended to other university regions. There is also a European SPARK programme operating in Berlin<sup>11</sup>.

### *University Hospitals*

Finland has 5 university hospitals located in Helsinki, Turku, Tampere, Kuopio and Oulu. They are responsible for the R&D activities in their region and are an elemental part of the research infrastructure of medical research. University hospitals work in close cooperation with universities and universities of applied sciences and therefore they have strong science-industry link in those projects where pharmaceutical companies are involved. Total funding of R&D activities in university hospitals amounts to approximately 15 million euros per year.

### *Academy of Finland*

The Academy of Finland is the key agency for funding research and promoting high-quality research and science policy in Finland. The Academy of Finland provides approximately 0.4 billion euros in yearly funding for R&D. There are **four research councils** (for

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<sup>11</sup> MEAE 2017 [http://tem.fi/artikkeli/-/asset\\_publisher/yliopistot-yhteistyohon-vauhtidittaa-terveysalan-tutkimuslahtoisten-yrittysten-kasvuuna?\\_101\\_INSTANCE\\_KbgSvtizPgsM\\_languageId=en\\_US](http://tem.fi/artikkeli/-/asset_publisher/yliopistot-yhteistyohon-vauhtidittaa-terveysalan-tutkimuslahtoisten-yrittysten-kasvuuna?_101_INSTANCE_KbgSvtizPgsM_languageId=en_US) (accessed March 22, 2018)

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Bioscience and Environment, Culture and Society, Natural Sciences and Engineering, and a Research Council for Health) at the Academy of Finland, which each carry out the Academy's tasks within their respective fields.

Most of the Academy of Finland funding tools improve scientific capabilities and a role of science-industry collaboration is less important. The key activities of the Academy of Finland are the following:

- The Academy runs its own **research programmes**, which are science-driven, thematic and target-oriented body of research projects that are aimed at supporting scientific regeneration and increasing scientific and societal impact.
- The **Centre of Excellence programme** funds research and training networks that are at the very cutting edge of science in their fields. Funding is provided for an eight-year term, and CoEs are jointly funded by the Academy of Finland, universities, research institutes, the private business sector and many other sources.
- The **flagship programme** aims to pool together expertise from different fields in Finland to form high-level research and impact clusters that will further contribute to increasing the quality and impact of Finnish research work. The funding earmarked for the flagship programme is 25 million euros in 2018 and 25 million euros in 2019.
- The Academy of Finland provides funding for the acquisition, establishment or strengthening of nationally significant **research infrastructure** that promotes scientific research<sup>12</sup>.

Two special funding streams related to science-industry knowledge transfer are of relevance:

- The 2010 university reform gave universities the opportunity to develop and actively implement their own strategies. The expectation was that universities would select their own key areas of focus and actively promote those areas and differentiate from each other. A strategy-based funding element was incorporated to be part of the system of core university funding. However, progress towards differentiation and stronger university profiles has been slow. The research and innovation policy action programme drafted by the MEC and MEAE in 2012 proposed targeted **profiling funding to universities**, which is now implemented. The Finnish government's public finances plan for 2015–2018 included the gradual transfer over 2015–2019 of 50 million euros of central government finances earmarked for universities for allocation through the Academy of Finland. These funds will be used to strengthen the research profiles of universities<sup>13</sup>.
- The Academy of Finland's new **Strategic Research Council (SRC)** was established in 2014 as a part of the comprehensive reform of state research institutes and funding. One of the key targets of the reform was to promote research that is closely connected to societal issues and government priority areas. The SRC seeks to fund "high-quality research that has great societal impact" through

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<sup>12</sup> Academy of Finland 2018 <http://www.aka.fi/en/about-us/> (accessed March 22, 2018)

<sup>13</sup> Academy of Finland 2015 <http://aka.fi/en/research-and-science-policy/university-profiling/> (accessed March 23, 2018)



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multidisciplinary approaches that produce concrete solutions to great challenges. The instrument emphasises collaboration between those who produce research and those who use the new knowledge. Research themes and priorities are formulated annually by the SRC and approved by the government. The SRC's annual funding budget is ca. 55 million euros, and SRC programmes run for 3–6 years<sup>14</sup>.

### ***Research and Innovation Council (RIC)***

The Research and Innovation Council (RIC)<sup>15</sup> played a central role in coordinating the R&I system in the past. It has recently been reorganised on the basis of a 2014 evaluation of the RIC that stated that the Council's influence had declined since 2005.

The RIC acts as an advisory body and is chaired by the Prime Minister. Since its revision in 2016, the RIC has started preparing a roadmap and launched its vision based on the government programme including key projects and the National Reform Programme, presented in more detail in chapter C1.

## **2.2. Field of the Ministry of Economic Affairs and Employment (MEAE)**

The main actors under the mandate of the MEAE are Business Finland (formerly Tekes and Finpro) and VTT. Annual funding of R&D&I activities is approximately 0.4 billion euros (22% of the total government allocation). Business Finland and VTT are responsible for business R&D, development, marketing and internationalisation and applied research with a business or societal interest, whereas the MEC is responsible for basic research and partly for applied research.

### ***Business Finland***

**Tekes** (the Finnish funding agency for Innovation) and **Finpro** (a non-profit state-owned company responsible for internationalisation and investment operations) were merged at the beginning of 2018 and started operations as a new entity called **Business Finland**<sup>16</sup>.

Tekes was the most important public funding organisation for research, development and innovation in Finland, and it has the central role in applied research collaboration with the industry. Tekes provided funding for companies, research organisations, and public sector service providers. Funding of research organisations and the public sector was not considered state aid as it was directed to non-economic activities of these organisations.

Almost half of Tekes funding was granted through Tekes programmes and other proactive initiatives. Tekes programmes and initiatives were targeted at addressing specific industrial or public sector challenges or opportunities related to specific global trends or new technologies. The remainder of Tekes funding for companies was reactive, i.e., allocated to companies' R&D and innovation projects based on a continuously open call. Programme funding was provided through different Tekes aid schemes.

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<sup>14</sup> Academy of Finland 2017 <http://www.aka.fi/en/about-us/SRC/> (accessed March 23, 2018)

<sup>15</sup> Finnish Government 2018 <http://valtioneuvosto.fi/en/research-and-innovation-council> (accessed March 22, 2018)

<sup>16</sup> Business Finland 2018 <https://www.businessfinland.fi/en/for-finnish-customers/home/> (accessed March 22, 2018)

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Tekes cooperative programme funding was traditionally the most effective in transferring knowledge. It mostly targeted large companies, with a requirement that the companies buy research services from HEIs or PROs or SMEs. HEIs, PROs and SMEs, therefore, received a major part of the funding through large companies. The government made the decision to cut most of these incentives in 2015.

## **Box 2. Examples of Tekes programmes**

### **5thGear 2014–2019**

The programme aims to solve challenges related to next generation wireless data communications, the creation of new businesses, and boosting Finland as a leading target for international investments.

### **Arctic Seas 2014–2017**

The aim of the programme was to turn Finland into an internationally attractive concentration of Arctic know-how.

### **BEAM – Business with impact 2015–2019**

A joint programme of Tekes and the Ministry for Foreign Affairs of Finland. Its aim is sustainable growth for Finland and the developing world.

### **Bits of Health 2014–2018**

The programme is mainly intended for companies that utilise digitalisation and strive for international growth and that develop products and services promoting health, the early diagnosis of illnesses, health monitoring and personalized treatment.

### **Feelings – Intangible value creation and experienced value 2012–2018**

The programme aims to make customer experience, emotions and meanings key business drivers alongside technology and expertise. In addition to emotions and customer experience, the programme encourages companies to better exploit all of their intangible assets, including brands, reputation and knowledge capital.

### **Innovative Cities 2014–2017**

The aim of the programme was to create internationally attractive innovation clusters in Finland based on top-notch talent. Innovation clusters included companies aiming for growth and capable of creating brand-new products and services for the international market.

### **Liideri – Business, Productivity and Joy at Work 2012–2018**

The vision of the programme is that in 2020 Finland will have Europe's most competitive workplaces. Making this vision a reality requires radical changes to management methods and new forms of work organization and working.

### **Smart & Green Growth – clean transition to the bioeconomy**

The vision of the Smart and Green Growth programme is to create internationally attractive R&D environments and business ecosystems in the Finnish bioeconomy and clean solution sectors.

### **Smart Energy**

Smart Energy is a national Team Finland programme managed by Tekes and Finpro. It supports the role of Finland as forerunner and test bed of smart energy solutions.

### **Team Finland Industrial Internet Programme 2014–2019**

The programme aims to renew the business operations of companies through the Industrial Internet and encourage companies from different fields to engage in new kinds of cooperation.

### **Witty City 2013–2017**

The aim of the Smart City programme is to provide people with better living and working environments and companies with opportunities to bring new products and services to the market.

After the merger, Business Finland has become the main agency providing funding and support on a national scale to knowledge transfer. It has a number of instruments to support collaboration, internationalisation and startup and spin-off activities and can provide support to companies entering international markets. Its main activities in the field of knowledge transfer include:

- **Growth Engines**, which is a new public private partnership model to activate research-industry knowledge transfer. Business Finland has a budget of €60 m for 2018 to start the Growth Engine model, which aims to build platforms for partnerships and cooperation among businesses, research and the public sector.
- New instruments: **Challenge Finland**, **Innovation Scout** and **Research Benefit**. Tekes has carried out Innovation Scout since 2015 with the aim of promoting research organisations' competencies in the commercialisation of research. Innovation Scout is going to be incorporated into an Innovation Bank, a digital service for SMEs and HEIs to make better use of IP, patents and research results.
- Three funding concepts aimed at research organisations are: 1) **Co-Creation**, 2) **Co-Innovation** and 3) **New Businesses from Research Ideas (TUTL) funding**. The aim of Co-Creation funding is to generate new cooperation whose goal is for research organisations and companies to develop radical innovations together. In Co-Innovation funding, the starting point is business needs for which research organisations and companies seek solutions together. **TUTL** is targeted at research projects, where the project group prepares the commercialisation of a research idea.

### ***VTT Technical Research Centre of Finland***

VTT is a state-owned and controlled non-profit limited liability company under the mandate of the MEAE. VTT has specific Innovation and Spearhead programmes through which it implements its strategy and seeks to tackle future challenges. VTT is the main actor in Finland for example in EU FP-programmes and therefore pivotal in linking Finnish research and businesses to international research and knowledge networks.

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## 2.3. Other actors and measures

### *Public Research Institutions (PRIs)*

A total of 12 public research institutes operate under the auspices of the relevant sector ministries. The Technical Research Centre of Finland (VTT) is the largest, accounting for around half of the research personnel and over half of the budget of all PRIs. Government spending on PRIs was 427 million euros in 2015, and PRIs employed over 3,000 fulltime researchers. Between 2011-2015 budgetary funding for PRIs and the number of fulltime researchers both decreased by approximately 24%. In the case of VTT public funding is ca. 30% of total turnover, while for other PRIs it varies between 50-85%<sup>17</sup>. The PRIs in Finland include the following:

- Finnish Institute of International Affairs, UPI (Parliament of Finland)
- Government Institute for Economic Research, VATT (Ministry of Finance)
- Natural Resources Institute Finland LUKE (Ministry of Agriculture and Forestry)
- Finnish Food Safety Authority, EVIRA (Ministry of Agriculture and Forestry)
- National Land Survey of Finland, NLS (Ministry of Agriculture and Forestry)
- Finnish Meteorological Institute (Ministry of Transport and Communications)
- Geological Survey of Finland, GTK (Ministry of Employment and the Economy)
- VTT Technical Research Centre of Finland Ltd. (Ministry of Employment and the Economy)
- Radiation and Nuclear Safety Authority, STUK (Ministry of Social Affairs and Health)
- National Institute for Health and Welfare, THL (Ministry of Social Affairs and Health)
- Finnish Institute of Occupational Health, TTL (Ministry of Social Affairs and Health) Finnish Environment Institute, SYKE (Ministry of the Environment)

### *SHOKs - DIMECC and CLIC*

Two Strategic Centers for Science, Technology and Innovation (SHOKs) have continued to operate after the government cut earmarked funding from Tekes in the context of austerity measure in the 2015 strategic programme<sup>18</sup>.

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<sup>17</sup> OECD (2017): OECD Reviews of Innovation Policy: Finland 2017. In series: OECD Reviews of Innovation Policy. <http://www.oecd.org/finland/oecd-reviews-of-innovation-policy-finland-2017-9789264276369-en.htm>

<sup>18</sup> Prime Minister's Office (2015): Finland, Land of Solutions, Programme of Prime Minister Sipilä's Government. Government Publications 12/2015, available at [http://valtioneuvosto.fi/sipilan-hallitus/hallitusohjelma?p\\_p\\_id=56\\_INSTANCE\\_SSKDNE5ODInk&p\\_p\\_lifecycle=0&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-2&p\\_p\\_col\\_count=1&56\\_INSTANCE\\_SSKDNE5ODInk\\_languageId=en\\_US](http://valtioneuvosto.fi/sipilan-hallitus/hallitusohjelma?p_p_id=56_INSTANCE_SSKDNE5ODInk&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_count=1&56_INSTANCE_SSKDNE5ODInk_languageId=en_US)

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DIMECC Oy (from Digital, Internet, Materials & Engineering Co-Creation) and CLIC Innovation LTD have their roots in the Strategic Centres of Excellence (SHOK) programme launched in 2006-2007 to create platforms for industrial renewal. The SHOK programme started with the general objective of bridging the gap between (basic) research and innovation to support growth and renewal in key areas of industry<sup>19</sup>.

CLIC Innovation stems from the merger of Finnish Bioeconomy Cluster FIBIC Ltd., originally Forestcluster Ltd., and CLEEN. Originally, Forestcluster was organised around the forest conglomerates with the objective to improve and optimise existing products such as pulp and paper and explore new products such as biofuels and other chemicals. CLEEN in turn was a clean tech cluster focused on energy and environmental technologies and developing new clean energy, waste management and other technologies. FIBIC and CLEEN merged to form CLIC Innovation in September 2015. As of 2018, the shareholders of CLIC Innovation Ltd. include 30 companies and 17 universities and research institutions<sup>20</sup>.

The future of the organisations is uncertain. The last Tekes-funded SHOK projects will end in 2018, and both DIMECC and CLIC are searching for new funding streams.

## 2.4. Regional actors

The Finnish government seeks to provide financial support to regional and industry-specific centres of excellence. Major investments by cities and municipalities will be used as a testing ground for innovations in the future. The goal is to use innovative procurement to promote model projects and exports.

Special growth agreements have been signed between the government and cities. A total of nine agreements have been signed as of December 2017, and cities' commitment to innovative procurement is a part of the agreements. The MEAE is responsible for the preparation of the agreements for the government, which plans on establishing a centre of excellence during the spring 2018 to enhance innovative procurement by municipalities especially. In the vision for 2025, regions need to create growth based on high-quality competences, sustainable development and smart specialisation. The vision is based on regional strengths, active renewal of business structures, and a workable basis for entrepreneurship and business operations to create economic prosperity.

**Smart Specialisation** approach has been applied in Finland both at the national and regional levels with a focus on the knowledge base, lead markets initiatives and ecosystems development. A broader goal is to increase the specialisation of universities and PROs by increasingly strategic R&I choices. All regions in Finland have to formulate a Research and Innovation Strategy for Smart Specialisation (RIS3), which is set by the Regional Councils. In addition to smart regions, Finland's national smart specialisation strategy focuses on developing smart cities. Nationally, Finland's Smart specialisation priority areas are: 1) manufacturing and industry, 2) key enabling technologies, 3) sustainable innovation,

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<sup>19</sup> Lähteenmäki-Smith et al. (2013): "Lisence to SHOK?" External evaluation of the strategic centres for science, technology and innovation. Publications of the Ministry of Employment and the Economy<sup>[SEP]</sup>/Innovation 1/2013.

<sup>20</sup> <https://clicinnovation.fi/clic-innovation/> (accessed Feb 14, 2018)

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4) human health & social work activities, and 5) information & communication technologies<sup>21</sup>.

### Box 3. Regional policy instruments

The Six City Strategy (6Aika) is implemented in and with the cooperation of Finland's largest city-regions, i.e. Helsinki, Espoo, Tampere, Vantaa, Oulu and Turku. Approximately 30% of Finland's population lives in these cities. The programme is carried out as part of Finland's structural fund programme for sustainable growth and jobs (2014–2020). Three areas of focus are open innovation platforms, open data and interfaces, and open participation and customership. The strategy also supports sustainable urban development including robotisation, artificial intelligence and digital platforms. The six cities work together in an open operating model based on the creation and testing of innovations while also increasing productivity.

Regional innovations and experimentations (AIKO) is a regional development measure led by the MEAE. It includes three tools to ensure competitiveness and to promote growth and smart specialisation in different parts of the country. The tools are: 1) measures for anticipated structural change (ERM), 2) growth agreements between the state and selected cities, and 3) establishing nationally important growth zones. AIKO is coordinated with the ending INKA Innovative Cities Programme that was executed in 12 urban regions.

## 3. Current trends

### 3.1. Harnessing knowledge and competence for economic and societal renewal

As part of the current government's key projects, investments in new **growth sectors** are now planned. The key projects are: the bio-economy, clean and green technologies and healthcare as well as digitalization, which is a cross-cutting theme in all sectors. Measures to boost experimentation, ecosystem development and deregulation are to be introduced to further digitalize public services. A national **Reboot Finland strategy** has also been launched by the Ministry of Economic Affairs and Employment, Tekes and Finpro (now Business Finland), with the Federation of Finnish Enterprises and Confederation of Finnish

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<sup>21</sup> e.g. European Commission (2017): Smart Specialisation – Strengthening Innovation in Finland. Regional Policy, InfoReg, available at [http://ec.europa.eu/regional\\_policy/en/information/publications/factsheets/2017/smart-specialisation-strengthening-innovation-in-finland](http://ec.europa.eu/regional_policy/en/information/publications/factsheets/2017/smart-specialisation-strengthening-innovation-in-finland) ; Prime Minister's Office (2017): Finland, a land of solutions. Mid-term review of Government Action Plan 2017–2019. Government Publications 7/2017. Available at [https://www.google.fi/search?q=Finland%2C+a+land+of+solutions.+Mid-term+review+of+Government+Action+Plan+2017%E2%80%932019.+Government+Publications+7%2F2017.+&ie=utf-8&oe=utf-8&client=firefox-b&gfe\\_rd=cr&dcr=0&ei=QOu5WqD\\_LsmwX-HqtfAL](https://www.google.fi/search?q=Finland%2C+a+land+of+solutions.+Mid-term+review+of+Government+Action+Plan+2017%E2%80%932019.+Government+Publications+7%2F2017.+&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&dcr=0&ei=QOu5WqD_LsmwX-HqtfAL) .

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Industries among others as partners<sup>22</sup>. Digitalization was central to many previous Tekes programmes as well, including 5G, IoT and Smart City.

The Research and Innovation Council's (RIC) vision and roadmap define a common direction for Finnish research, development and innovation policies for the coming years in Finland. The foremost aim of the RIC's vision work is "*Knowledge based growth, wellbeing and employment*", and it has four themes, namely; 1) strengthening the knowledge base, 2) strategic choices boosting renewal, 3) development of knowledge platforms and growth ecosystems, and 4) internationalisation as a prerequisite for quality and impact. In practice, the work is divided into activities for which responsibility is divided among ministries and agencies of the government. A number of activities are already ongoing or have already been scheduled to be implemented by different ministries. For example, among the government's key projects and reforms, the renewal of vocational education, commercialisation of innovations and new openings in the government's mid-term review have already been implemented, and are already in force (starting January 1, 2018)<sup>23</sup>. The following activities are in the implementation or planning phase<sup>24</sup>: 1) Vision for higher education and research in Finland 2030; 2) Internationalisation plan; 3) Structural reforms of the R&D&I system; 4) Renewal of the government's analysis, assessment and research activities; 5) Development of the cooperation process between HEIs and PROs; 6) Selection of the government's priority areas (BCDH); 7) Preparation of the new PPP models; 8) Strengthening of growth ecosystems; 9) Innovative public procurement; 10) Innovation-friendly regulation.

### 3.2. Quality of higher education, science and research

Resulting from the negotiations covering the period 2017–2020 between the Ministry of Education and Culture and universities, university-specific measures were outlined, and funding models for universities UAS were renewed with the objective of enhancing the quality, effectiveness and productivity of their activities<sup>25</sup>.

The vision work for higher education and research 2030 was launched by the MEC in February 2017. The idea for the vision was to define targets for higher education and research through 2030<sup>26</sup>. In its action plan for the years 2017–2019, the government directed the vision work to focus on the comprehensive needs of the research and innovation system<sup>27</sup>. As a result of the vision process a joint understanding of future goals

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<sup>22</sup> Reboot Finland <http://www.rebootfinland.fi/en/> (accessed March 27, 2018)

<sup>23</sup> MEC [http://minedu.fi/en/article/-/asset\\_publisher/ammattillinen-koulutus-uidistuu](http://minedu.fi/en/article/-/asset_publisher/ammattillinen-koulutus-uidistuu) (accessed March 27, 2018)

<sup>24</sup> Vision and road map of the Research and Innovation Council Finland [http://valtioneuvosto.fi/en/artikkeli/-/asset\\_publisher/10616/suomesta-vetovoimaisin-ja-osaavin-kokeilu-ja-innovaatioymparisto-tutkimus-ja-innovaationeuvosto-paatti-visiosta-ja-tiekartasta](http://valtioneuvosto.fi/en/artikkeli/-/asset_publisher/10616/suomesta-vetovoimaisin-ja-osaavin-kokeilu-ja-innovaatioymparisto-tutkimus-ja-innovaationeuvosto-paatti-visiosta-ja-tiekartasta) (accessed March 27, 2018).

<sup>25</sup> Europe 2020 Strategy: Finland's National Reform Programme, Spring 2017. Ministry of Finance publications 18c/2017.

<sup>26</sup> MEC <http://minedu.fi/en/vision-for-higher-education-and-research-in-2030> (accessed March 27, 2018)

<sup>27</sup> Finland, a land of solutions. Mid-term review of Government Action Plan 2017–2019. Government Publications 7/2017. Available at <https://www.google.fi/search?q=Finland%2C+a+land+of+solutions.+Mid->

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for higher quality and more impactful and international Finnish higher education and research by the year 2030 was created and published in October 2017 as a “Proposal for Finland 100+”. The implementation of the vision will be planned together with HEIs and stakeholders<sup>28</sup>.

There is a need to consolidate a fragmented university network, the government has put forward a bill to merge three HEIs in 2019, including two universities (University of Tampere and Tampere University of Technology) and a university of applied sciences (Tampere University of Applied Sciences). The merger has been planned in cooperation with the HEIs, the region’s business sector and the providers of public services. The objective of the merger is to generate stronger cooperation and increase effectiveness and efficiency. The government has also put forward a proposal to promote cooperation between universities and UAS with the aim of increasing the quality of teaching and to create internationally attractive knowledge centres.

The proposal would enable a better division of labour among HEIs and a higher quality of education. Similar cooperation and division have already been implemented in the teaching of foreign languages since August 2016<sup>29</sup>.

The government has also allocated resources to a new Finnish university network, FITech (Finnish Institute of Technology), which is under reorganisation in Turku. The network is coordinated by Aalto University and includes 6 other universities, Technology Industries of Finland as well as the association of Academic Engineers and Architects of Finland (TEK). The purpose of the network is to attract experts with an engineering degree in particular to serve the shipbuilding and automotive industries, to organise continuing education and to provide doctoral students with opportunities to conduct research on topics related to business growth in the Turku region and South-Western Finland<sup>30</sup>.

### 3.3. Intensified focus on collaboration

In addition to recently introduced reforms in education and STI and changes in funding models, the aim to increase cooperation and collaboration among different education, research and innovation focused actors has become a central topic. This cooperative development of the Finnish research and innovation system was also recommended by the OECD review of Finland’s research and innovation policy. According to the review, attention should be paid to reinforcing the overall governance of the system and enhancing interaction between the research and business community<sup>31</sup>.

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[term+review+of+Government+Action+Plan+2017%E2%80%932019.+Government+Publications+7%2F2017.&ie=utf-8&oe=utf-8&client=firefox-b&gfe\\_rd=cr&dcr=0&ei=QOu5WqD\\_LsmwX-HqtfAL](#) .

28 MEC <http://minedu.fi/en/vision-for-higher-education-and-research-in-2030> (accessed March 27, 2018)

<sup>29</sup> Prime Minister’s Office [http://valtioneuvosto.fi/artikkeli/-/asset\\_publisher/1410845/tampereen-uusi-yliopisto-aloittaa-2019-korkeakoulujen-opetusyhteistyö-laaajenee](http://valtioneuvosto.fi/artikkeli/-/asset_publisher/1410845/tampereen-uusi-yliopisto-aloittaa-2019-korkeakoulujen-opetusyhteistyö-laaajenee) (accessed march 28, 2017)

<sup>30</sup> MEC [http://minedu.fi/artikkeli/-/asset\\_publisher/suomeen-uusi-teknikan-yhteistyoyliopisto-lounais-suomeen-osaajia-heti-syksylla](http://minedu.fi/artikkeli/-/asset_publisher/suomeen-uusi-teknikan-yhteistyoyliopisto-lounais-suomeen-osaajia-heti-syksylla) ; Aalto University <http://www.aalto.fi/en/current/news/2017-10-05/> (both accessed March 27, 2018)

<sup>31</sup> OECD Reviews of Innovation Policy: Finland 2017, available at <http://dx.doi.org/10.1787/9789264276369-en>



Enhancing collaboration and utilisation of research is being carried out through the vision and roadmap of the RIC and the creation of Business Finland. At the same time, research funding will also be modernised to improve the utilisation of research in companies and the co-creation of innovations. The funding aims to create value for companies and researchers as well as for society as a whole. As the government bill on Business Finland states, the aim of the merger is to clarify and simplify the public services provided to companies, internationalise the Finnish innovation system, increase SMEs' exports, support regional growth services, and create preconditions for a more dynamic allocation of human resources for customer interface and activities abroad<sup>32</sup>.

Improving collaboration is highlighted in the government's action plan for 2017–2019 as well. It defines the vision work for HEIs as one of the priorities to maximise the use of scientific and research resources. Moreover, the aim is to boost Finnish education exports and cooperation among HEIs, research institutes and business. Achievements are to be evaluated at the end of 2018<sup>33</sup>.

Over the past decades the reforms have changed the funding and structure of public research institutes as well. After several mergers their number declined from 19 in 2009 to 12 in 2016. Further mergers are under way under the guidance of the Ministry of Agriculture and Forestry, as the Finnish Food Safety Authority (Evira), the Agency for Rural Affairs (Mavi) and some of the ICT services of the National Land Survey of Finland (NLS) will be merged into one agency in 2019<sup>34</sup>.

### 3.4. Emergence of ecosystem policies

The discussion surrounding Finnish RDI policy has to a large extent focused on the role of ecosystems and platforms as well as on policies to support these. The stance of the MEAE towards ecosystems is exemplified in a seminar report from 2017 that discusses ecosystems and their implications for policy<sup>35</sup>.

The principles currently translate to increased focus on existing networks of actors, facilitating their activities while allowing some self-guidance. There is also more interest in indirect instruments, e.g., innovative public procurement and platform creation.

Business Finland, has funded smaller scale ecosystems through various instruments. One example is Finland's 100<sup>th</sup> jubilee Reboot Finland programme run jointly by the MEAE

<sup>32</sup> MEAE [http://tem.fi/en/article/-/asset\\_publisher/business-finland-aloittaa-toimintansa-1-tammikuuta-2018](http://tem.fi/en/article/-/asset_publisher/business-finland-aloittaa-toimintansa-1-tammikuuta-2018) (accessed March 23, 2018)

<sup>33</sup> Finland, a land of solutions. Mid-term review of Government Action Plan 2017–2019. Government Publications 7/2017. Available at [https://www.google.fi/search?q=Finland%2C+a+land+of+solutions.+Mid-term+review+of+Government+Action+Plan+2017%E2%80%932019.+Government+Publications+7%2F2017.+&ie=utf-8&oe=utf-8&client=firefox-b&gfe\\_rd=cr&dcr=0&ei=QOu5WqD\\_LsmwX-HqtfAL](https://www.google.fi/search?q=Finland%2C+a+land+of+solutions.+Mid-term+review+of+Government+Action+Plan+2017%E2%80%932019.+Government+Publications+7%2F2017.+&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&dcr=0&ei=QOu5WqD_LsmwX-HqtfAL).

<sup>34</sup> MAF 2017 <http://mmm.fi/hanke2? tunnus=MMM012:00/2017> (accessed March 27, 2018).

<sup>35</sup> Salminen, V. and Halme, K. (2017) Ekosysteemit uuden elinkeino- ja innovaatiopolitiikan kohteena. Helsinki, FI. Available at: <https://tem.fi/documents/1410877/4429776/Ekosysteemit+uuden+elinkeino-+ja+innovaatiopolitiikan+kohteena/f46d3709-fdcf-4a73-83df-e84ae24b4196>.

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and Business Finland, which aims to renew Finnish industry and society through digitalization partly through funding platforms and ecosystems<sup>36</sup>.

Furthermore, Business Finland has offered ecosystem grants for ‘spearheading business areas with significant international market potential and demand’<sup>37</sup>. Ecosystems have also been supported within existing Tekes/Business Finland programmes, such as the BioNets Programme, in which five ecosystems in the bio- and circular economy area were supported<sup>38</sup>. Other examples include the support of individual ecosystems, such as the CleverHealth Network, in which a major hospital district and 13 leading medical devices and IT service providers are engaging in collaborative research and development around a common pool of clinical data<sup>39</sup>, as well as the One Sea Ecosystem, which brings together leading maritime and offshore suppliers and software companies around a programme to develop autonomous vessels.

In 2017, the Finnish government allocated an additional budget appropriation specifically to ‘Growth Engines’, which are large scale PPPs expected to grow into ecosystems. Accordingly, Business Finland is now running a Growth Engine instrument of equity loans to consolidate the ecosystem funding<sup>40</sup>.

#### **Box 4. Background for ecosystems policies - lessons from SHOKs**

There is a strong tradition of PPP collaboration extending from the early Tekes technology development programmes, which mandated a consortium of (public) research and private enterprise, all the way to the SHOK programme. In retrospect, the SHOKs can be seen as an early, yet extensive, effort to build ecosystems. The programme started in 2006-2007 as five ‘vertical’ clusters with incumbents and their immediate partners, but over the course of the programme’s existence, cross-industry collaboration increased, and close to termination the programmes had become more cross-disciplinary. The earmarked SHOK funding fell prey to the 2015 austerity package with a major portion of the RDI’s applied budget and was wound down between 2016 and 2018. It is not only the SHOKs that are at a crossroads; a host of changes are being effected in the RDI system, including to the budget ad organizations, described elsewhere in the document.

An evaluation of the SHOK programme or instrument was conducted in 2012 and published in early 2013, when the SHOKs had operated for approximately 5 years. The

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<sup>36</sup> MEAE 2017 <http://tem.fi/reboot-finland> (Accessed Feb 14<sup>th</sup> 2018)

<sup>37</sup> Business Finland 2018 <https://www.investinfinland.fi/-/finland-launches-cleverhealth-network-for-digital-health-innovations>; Helsinki-Uusimaa Hospital District 017 [https://www.spinverse.com/wp-content/uploads/2017/09/Press\\_release\\_CleverHealth-Network\\_Finnish.pdf](https://www.spinverse.com/wp-content/uploads/2017/09/Press_release_CleverHealth-Network_Finnish.pdf) (Accessed Feb 14<sup>th</sup> 2018)

<sup>38</sup> Business Finland 2018 <https://www.businessfinland.fi/suomalaisille-asiakkaille/palvelut/verkostot/biotalous-ja-cleantech/bionets/> (Accessed Feb 14<sup>th</sup> 2018)

<sup>39</sup> Business Finland 2018 <https://www.investinfinland.fi/-/finland-launches-cleverhealth-network-for-digital-health-innovations>; Helsinki-Uusimaa Hospital District 017 [https://www.spinverse.com/wp-content/uploads/2017/09/Press\\_release\\_CleverHealth-Network\\_Finnish.pdf](https://www.spinverse.com/wp-content/uploads/2017/09/Press_release_CleverHealth-Network_Finnish.pdf) (Accessed Feb 14<sup>th</sup> 2018)

<sup>40</sup> Tekes 2017 [https://tapahtumat.tekes.fi/tapahtuma/kasvumoottorit\\_tiedotustilaisuus](https://tapahtumat.tekes.fi/tapahtuma/kasvumoottorit_tiedotustilaisuus) & [http://team.finland.fi/artikkeli/-/asset\\_publisher/kasvumoottorit-vauhdittavat-tulevaisuuden-kasvualoja](http://team.finland.fi/artikkeli/-/asset_publisher/kasvumoottorit-vauhdittavat-tulevaisuuden-kasvualoja) (Accessed Feb 14<sup>th</sup> 2018)

evaluation was openly critical and presented findings similar to the earlier review by industry stakeholders regarding the SHOKs' focus on existing industry boundaries and the strong position of incumbents. The evaluation underlined the lack of commercial and scientific impact in particular as well as some key challenges with regard to collaboration and stakeholder incentives. Many of these stemmed from very broad and somewhat conflicting goals and expectations, as the programme was conceived to produce world-class research and develop and commercialize radical new innovations that would renew Finnish industry at the same time. On the governance side the position of the SHOKs between research and innovation and different instruments was not clear. In addition, the instrument and whole programme had weak ownership and unclear responsibilities combined with distant oversight; moreover, the monitoring system consisting of a total of 30 different key performance indicators failed to steer and incentivize the participants. In fact the main lessons from the SHOKs' interim evaluation came back to basic programming, setting consistent goals and a coherent monitoring system, clear responsibilities and oversight and ensuring mutual interest.

The evaluation found that the first years were used to learn collaboration, build trust, and hone the operating models. In the beginning, the enterprise partners were uncertain as to how to start with the operation model, and there were challenges related to IPR and particularly to commercialization. Towards the end of the programme, particularly in 2015 when the funding was reshaped, the SHOKs had already developed into a much more radical cross-industry direction. In its final determinations, the SHOK Steering Group confirmed that the rationale and need for SHOK-type activities still exists and outlined some of the same points as the previous evaluation in proposing that the strategy could be sharpened, international collaboration and commercialization should be strengthened and the constituents' strategic commitment to the SHOK should be ensured.

The recent discussion on ecosystems as a target for innovation and industrial policy partly highlights the same challenges faced by the SHOKs. Determining how to organize and fund ecosystems is challenging and must be planned efficiently. In the SHOKs, it took ten years and approximately half a billion euros to initiate new ecosystems. This experience could serve as a yardstick for setting expectations for ecosystems policy.

Sources: Annala, K. and Ylä-Jääski, J. (2011) Strategisen huippuosaamisen keskittymät CLEEN, FIMECC, Metsäklusteri ja TIVIT yritysnaökulmasta. Helsinki, FI: The Federation of Finnish Technology Industries. Available at:

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Lähteenmäki-Smith, K. et al. (2013) "Licence to SHOK?" - External Evaluation of the Strategic Centres for Science, Technology and Innovation, MEE Publications. 1/2013. Helsinki, FI: Ministry of Employment and the Economy. Available at:

<http://www.tem.fi/julkaisut?C=98033&xmid=4981>.; Piirainen, K. A. et al. (2017) 'The reverse tragedy of the commons: an exploratory account of incentives for under-exploitation in an open innovation environment', *Technology Analysis & Strategic Management*, 7325(April), pp. 1–14. doi: 10.1080/09537325.2017.1308479.;

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## 4. Impacts, synergies and trade-offs

OECD country review of Finland's innovation policy was published in 2017. The review recognises Finland's success in economic and social development and with its transition from a resource-based to a leading knowledge-based economy – largely due to continued investments in education, research and innovation. According to the review, attention should be paid to reinforcing the overall governance of the system and enhancing interaction among researchers and businesses and entrepreneurs. A stronger vision for Finnish research and innovation policy should be created and the internationalisation of business and research improved<sup>41</sup>.

An impact evaluation of the reform of the Universities Act was completed in two phases in 2015 and 2016. The aim of the reform was to detach universities from the state organisation and allow them to become independent legal persons under public law or alternatively under the Foundations Act. According to the evaluation the reform has generated significant structural and cultural change in the way universities are led and increased universities' autonomy and preconditions for profiling<sup>42</sup>.

Several favourable impacts can be found when considering the Finnish policy mix. For example, engagement between Finnish universities and the business sector is considered to be well-developed, although the economic crisis is still affecting the R&I landscape and activities and many of the former key companies and industries have taken a less active stand in collaboration activities, which has had an effect on the activities that support knowledge transfer as well.

The share of innovative companies in Finland cooperating with academia was 36.1% in 2012. This is well above the EU-28 average of 31.3%. Of the innovative Finnish companies, 26% worked with higher education institutions and 23% with government or public or private research institutes. These figures are the highest among the EU-28.

Finland performs well, for example, in terms of co-publications, the share of enterprises working with academia, number of startups as well as research agreements between universities and businesses. According to the Scival platform and Scopus data from 2015, Finland had 155 public-private co-publications per million of population (EU-28 average was 29, Denmark had 182 and Sweden had 113). Joint university-business publications accounted for 5.1% of publications in 2013. This level has remained fairly stable over the last decade and is well above the EU-28 average. Energy, engineering, materials science and computer sciences are the areas with the highest percentage of public-private co-publications.

Furthermore, according to the Knowledge Transfer Study, Finland performs among the top two for number of research agreements (231.3/1,000 research staff), but Finland's performance is still below the EU average with regard to patents granted (1.3/1,000 research staff), license agreements (4.1/1,000 research staff) and license income (22,000 Euro/1,000 research staff). Finland ranks below the EU-28 with regard to percentage of GERD as well, although it is above with regard to percentage of GDP. Regardless, public-

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<sup>41</sup> OECD Reviews of Innovation Policy: Finland 2017, available at <http://dx.doi.org/10.1787/9789264276369-en>

<sup>42</sup> Owl Group (2016): Impact evaluation of the Universities Act reform, Publications of the Ministry of Education and Culture, Finland 2016:30.

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private cooperation in Finland is fairly strong, and public-private cooperation methods have developed. Enterprises and research organisations plan and execute cooperative projects with common goals and shared disciplines. Resource allocations are made on both sides, and knowledge sharing occurs between and among organisations, which is typically invisible in the statistics. Programmes and funding to support this type of cooperation and knowledge transfer were mainly carried out by the innovation funding agency Tekes, now Business Finland. In terms of the intensity and frequency of business-academia cooperation, Finland typically ranks high. The volume of Business Enterprise Sector (BES)-funded research performed by HEIs and PROs is low, and most of the BES' R&D investments are focused on improvement of existing products and services<sup>43</sup>.

In other international rankings, the Finnish framework conditions for business research and innovation are systematically ranked high. In the WEF Global Competitiveness Index 2016–2017<sup>44</sup>, Finland is among the top 5 performers in terms of institutions and health and primary education (1st), higher education and training (2nd), and innovation (3<sup>rd</sup>) and is placed 10<sup>th</sup> overall in 2016. The Global Innovation Index GII<sup>45</sup> currently ranks Finland 8<sup>th</sup>, which is 3 rankings lower than in 2015. Finland ranks highly in Human capital and research (1<sup>st</sup>), Institutions (4<sup>th</sup>) and Business sophistication (6<sup>th</sup>) but not as well in outputs: Knowledge & technology outputs (10<sup>th</sup>) and Creative outputs (18<sup>th</sup>). According to the European Innovation Scoreboard 2017, Finland is among the Innovation Leaders, but its performance has declined by 5.1% relative to that of the EU in 2010<sup>46</sup>.

A recent study on the added value of the framework programmes for Finnish innovation found that Finnish actors are active in terms of applying, but the acceptance rate of applications is relatively low compared to the reference group.

Over the last decade, the Finnish economy has been undergoing major structural reforms, and traditionally strong export sectors (e.g., forestry and paper, metal industry, ICT) have declined. In response, economic and innovation policy has increasingly focused on implementing industrial reforms and has started to support startups and high growth SMEs. However, the current policy approach includes demand-side measures (such as public procurement for innovation), while the majority are still supply-side instruments. Much emphasis has been placed on improving the performance of public policies for R&I and internationalisation through joint activities and strategic programmes.

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<sup>43</sup> Statistics Finland [http://pxnet2.stat.fi/PXWeb/pxweb/fi/StatFin/StatFin\\_ttt\\_tkke/](http://pxnet2.stat.fi/PXWeb/pxweb/fi/StatFin/StatFin_ttt_tkke/) (Accessed March 23, 2018)

<sup>44</sup> Klaus Schwab (eds.) Global Competitiveness Report 2016-2017, World Economic Forum, available at <http://reports.weforum.org/global-competitiveness-index-2017-2018/>

<sup>45</sup> Cornell University, INSEAD, and WIPO (2017): The Global Innovation Index 2017: Innovation Feeding the World, Ithaca, Fontainebleau, and Geneva.

<sup>46</sup> European Innovation Scoreboard [http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards\\_en](http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en) (accessed March 22, 2018)

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## 4.1. Balance of the policy mix

Overall, the Finnish knowledge transfer policy mix seems relatively balanced and comprehensive.

There is a long and intense tradition of collaboration between universities and industry, particularly within the technical sciences. Public-private partnership has been an integral element of R&D&I funding since the early 1980s.

At the same time, the Finnish research and innovation system has undergone significant reforms and changes during the last decade or two. The institutional set-up of universities has changed completely with the introduction of the new university law (2010), followed by a number of other smaller revisions in university management structures, IPR and funding. One important objective for the revision has been to increase collaboration and knowledge transfer between universities and enterprises, by for example involving business leaders in university boards. The profound change has taken several years to complete, and its effectiveness is still being assessed. In parallel, public research institutions have undergone reforms, with the aim of streamlining numerous institutions. By far the largest and most versatile research centre, VTT, has been transformed to act as a private company.

In parallel to these institutional and governance reforms, and largely due to the economic downturn of the ICT industry, both private and public funding for RDI have fallen in Finland since the mid-2000s. This has put increasing pressure on (mainly publicly funded) universities and research institutions to more actively seek private sector and international collaboration as a source of funding. Ever since the financial crisis in the mid-1990s, Finnish R&D&I policies have emphasised competition (competitive funding) and collaboration (PPP). Much of the practical implementation responsibility has been delegated to two agencies: the Academy of Finland and Business Finland.

Finland was one of the first OECD countries to adopt systemic innovation policies since the early 1990s and has since then actively planned and considered R&D&I policies from the systems perspective. There is also a very active evaluation culture in Finland, promoting multiple methodological approaches and systemic evaluations.

At the same time, a clear shift in R&D&I policy can be found towards promoting more startups, fast growth SMEs and ecosystems. New instruments and ecosystem initiatives have been launched. These approaches are still relatively new, and their broader implications remain to be determined in the near future.

## 4.2. Interactions of policy instruments

The major reforms of both the university sector and the public research institutions were considered timely and necessary, and at their part they aim to promote public-private collaboration. After the reform, universities are less dependent on the ministry coordination and they have more freedom to improve their science-industry relationships. Research institutions should also be more viable and competitive. Effects of the structural reforms in the public research are not yet fully visible, but as these have coincided with funding cuts to innovation agencies and research institutions and the drop in industry R&D investments, practical/project level collaboration with companies and research actors has weakened. However, since 2017, the Finnish economy has shown signs of rapid recovery, which is likely to lead to a positive trend in research-industry collaborations.

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Ecosystems are important tools for the small open economy as Finland. Ecosystems are more open models for science-applied research-industry co-operation when compared to SHOK of which large companies were in main responsibility for coordinating research and innovation plans. However, ecosystem as a tool raise the question how effectively the ecosystem actors as well as ministries can utilise the current policy tools and recommendations of RIC that more efficient knowledge transfer models can be put into practise especially in science-industry collaboration.

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