



POLICY  
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# **The promotion of spin-off activities through VTT Ltd and VTT Ventures Ltd, Finland**

Case study contribution to the OECD TIP Knowledge Transfer and Policies project

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## **The promotion of spin-off activities through VTT Ltd and VTT Ventures Ltd, Finland: Case study contribution to the OECD TIP Knowledge Transfer and Policies project**

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## Executive summary

VTT Technical Research Centre of Finland (VTT) has gathered valuable experience on how to develop and foster tech-based spin-off activities. As from 2010 a dedicated sister company - VTT Ventures Ltd - was set up as to guarantee a dedicated team of investment professionals and large enough seed rounds for the deep tech ventures that were being developed. VTT Ventures has invested in 22 new spin-off companies that have raised in total 82 million Euro capital out of which almost 80% came from external investors. Many of the start-up ambitions have evolved around the open piloting infrastructure of VTT that offers a unique opportunity for the creation of new applications and business.

Key insights from VTT's venture team are threefold. Firstly, creating and developing spin-offs requires the best talent from a research and technology organisation and this loss in talent often reduces a research's unit capacity to attract new contract research. Secondly, the valuation of technology should not be too high as to give a flying start to the spin-off team. Thirdly, finding the right business and entrepreneurial people that can complement the VTT technology experts in the spin-off team is challenging, time-consuming but crucial for success. However, successes are possible and great stories are for example being written by the spin-offs Focalspec, Minima Processor, Paptic, Spectral Engines Spinnova and Tactotek.

The national innovation policy context of VTT's operations has increasingly focused on start-ups and scale-ups but until recently, no special attention has been paid to foster research and tech-based spin-offs. However, in 2017 VTT became the first Finnish RTO that had spin-off activities as a key performance indicator set by its parent Ministry of Employment and the Economy while for other Finnish RTO's spin-offs are still not considered to be a target. The understanding grows that for the renewal of the Finnish and European Economy deep tech start-ups will be crucial and should become an explicit target.

## Introduction

Established in 1942, VTT Technical Research Centre of Finland (VTT) is an impartial non-profit Research and Technology Organisation (RTO) with the national mandate to carry out research to create knowledge and know-how to support innovation, economic competitiveness and societal development. To facilitate global agility the organisation changed its legal status from public research institute to state owned company<sup>1</sup> in 2015. The governance of VTT happens through VTT management and the VTT board of directors with representatives from industry and universities and is guided by the Finnish Ministry of Employment and the Economy (hereunder MEE).

VTT's key expertise is organised around three main pillars: (1) knowledge intensive products and services, (2) smart industry and energy systems, and (3) solutions for natural resources and environment. However, VTT applies holistic, trans-disciplinary and cross-sectoral approaches to create business opportunities and value added for its partners. In 2017, VTT's turnover was 235 million € including 73 million € of government grant (31%). Direct government support allows VTT to carry out high-risk strategic research and to invest in research and technology infrastructures, which both are key for fulfilling VTT's public mandate. In 2017, the average number of personnel was 2109, of which 70% are scientists and 30% focus instead on research support, business support and management. In terms of diversity, 38% of the personnel were women and 6,2% foreigners. In addition to the parent company VTT, the VTT Group owns three subsidiaries that are in charge of delivering manufacturing services for micro and nano-electronic devices (VTT Memsfab Ltd), the internationalisation of its activities (VTT International Ltd) and the creation and development of spin-offs (VTT Ventures Ltd).

As an innovation house, VTT's close collaboration with industry is part of its DNA. In 2017, VTT's client portfolio consisted of 915 domestic and 390 foreign companies. The cooperation with customers essentially takes place in two major types of projects, namely (1) commercial projects and (2) jointly funded-projects. However, collaboration with industry often happens through long-term partnerships with multiple players organised around VTT's piloting infrastructure and competences. For effectively targeting innovations, an ecosystem approach with common goal setting has swiftly become the new standard. For example, to contribute to EU goals for H2020 and beyond VTT works in synergy with MEE, with regional innovation networks throughout Finland and with numerous European platforms and partnerships. As of October 2018, VTT is involved in 446 EU-funded research projects (236 within H2020)<sup>2</sup>. VTT has won EUR 123 million in research funding from the H2020 programme, representing around 17% of all EU Horizon funding brought into Finland.

VTT aims at impact through innovation and excellence and therefore explicitly targets spin-off activity.

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<sup>1</sup> Act on the Limited Liability Company Called VTT Technical Research Centre of Finland Ltd (8761/2014) lays down provisions on the operations and status of VTT. This Act entered into force 1st of January 2015 and supersedes the Act on the Technical Research Centre of Finland 953/2010 and all amendments subsequently made to it.

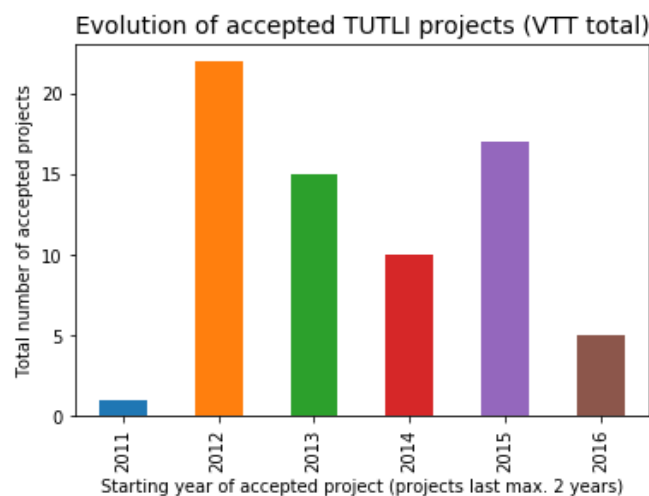
<sup>2</sup> [https://ec.europa.eu/research/participants/portal/desktop/en/organisations/partner\\_search.html](https://ec.europa.eu/research/participants/portal/desktop/en/organisations/partner_search.html)

While VTT's technology has been used in spin-offs since its early days, only in 2006 a VTT Ventures department was set up within VTT as to concentrate the support to all spin-off activities throughout the institute. However, during 2006-2009 the investments were very small (less than 0.1 M€) and the investment results were poor. Key lessons learned at that time were that good investments needed a dedicated team of investment professionals and large enough seed rounds for hardware type deep tech ventures. Subsequently in 2010, the VTT Ventures department became a separate dedicated company called VTT Ventures Ltd. Since its start VTT Ventures Ltd. has invested in 22 new spin-offs and typical seed rounds have recently been over 1M€.

## 1. Strategy to support spin-offs

As a project based organization, VTT generates ideas, knowledge, technologies and networks during research projects. As VTT IPR support is key to the commercialisation process, VTT's IPR team has been crucial in monitoring all invention disclosures and in supporting all commercialisation processes. VTT business support aims to form more and better IPR. In addition, some specific internal and external instruments exist that aim to support and speed up the innovation process. After the foundation of VTT Ventures Ltd in 2010, the pipeline for potential investment projects was strengthened in 2012 by the TUTLI programme of Business Finland and by the launch of the internal BizFund instrument that has been important for the preparation of TUTLI applications and pitches. These instruments that support business development aim to improve the commercial capabilities of the researchers. The ultimate goal however is to create more jobs and growth through the commercialisation of research. In 2017, the VTT internal iBEX instrument was launched to identify future grand challenges and exponential problems. The attention of the instrument lies on teams seeing and solving valuable problems and on external exposure from the ideation stage onwards. The focus in the research spin-off support instruments has been gradually shifting from tech push to demand pull.

**Figure 1 Evolution of VTT's projects in the Business Finland TUTLI commercialisation programme**



The first and most important financing source for business development support is competitive funding from Business Finland parked within a programme called ‘*new business from research ideas programme*’ (in short the TUTLI programme)<sup>3</sup>. The programme targets researchers and research teams aiming at the commercial exploitation of the research results. The aim of the projects eligible for the TUTLI programme is to assess both business potential paying attention to possible commercialisation channels. At the start of the project, it is required that sufficient rights on the research results can be handed over to the party of commercialisation after the project has ended. Importantly, the support instrument requires a high level of ambition and scope for the envisioned business activity. The average TUTLI project size is approximately 400-500t€ in total funding, from which 70% comes from Business Finland and 30% comes from the research organization (VTT or university). A typical duration of the TUTLI project is 18 months. The TUTLI programme has been the main source of the VTT Ventures deal flow and has allowed the initiatives to get closer to the first products and services. It has also allowed VTT Ventures to have a long dialogue with the potential founder team and steer them into the right direction. The TUTLI instrument has been very helpful in creating new spin-offs from VTT as the core team collaboration and technology readiness level has increased during TUTLI-projects. Since the start of the program VTT has been running 70 TUTLI projects worth 20.6 M€. Figure 1 shows the evolution over time of TUTLI projects ran by VTT for the period 2011 to 2016. The figure mirrors a VTT shift to use the TUTLI instrument exclusively for commercialisation via spin-offs. Average project size of these commercialisation projects was slightly below 300.000 EURO. The VTT number (amount) represents 19.6% (17.7%) of the entire Finnish TUTLI program<sup>4</sup>.

The second instrument for smaller commercialisation projects is the BizFund. This internal BizFund proof-of-concept instrument can be used for market studies, for business concept formation, for IPR studies, for assessing technological or commercial feasibility by Proof-of-concept (POC) –studies, for demonstrating the technology and application for potential customer segments and for the development of service and technology offering based on promising technologies or competencies.

The third instrument is the VTT own internal iBEX fund that aims to solve exponential problems. iBEX was recently launched in 2017 and aims to tackle grand challenges and create visionary leaps forward. While the instrument does not directly target commercialisation and spin-off activities its visionary approach and high ambitions can expect to be highly relevant for future activities. In addition to the above financial support instruments, additional soft instruments have been common practice at VTT, such as: pitching training; entrepreneur-in-residence programs; set-up of talent pools for strengthening founding teams; venture capital industry model training; standard shareholder agreement terms and incentives training; fundraising advice and support; networks; founder equity split model and cap table planning tool training; technology

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<sup>3</sup> For the TUTLI programme details and conditions see the Business Finland webpages: <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/research-organizations/New-business-from-research-ideas/>. Business Finland is an organisation that originated from the merger between TEKES and FINPRO. Before that merger, a similar TUTLI programme was available at TEKES. For the recent evaluation of the TUTLI programme see: [https://www.businessfinland.fi/globalassets/julkaisut/evaluation\\_of\\_precommercialisation\\_activities\\_of\\_tekes\\_tutli\\_and\\_innovation\\_scout.pdf](https://www.businessfinland.fi/globalassets/julkaisut/evaluation_of_precommercialisation_activities_of_tekes_tutli_and_innovation_scout.pdf)

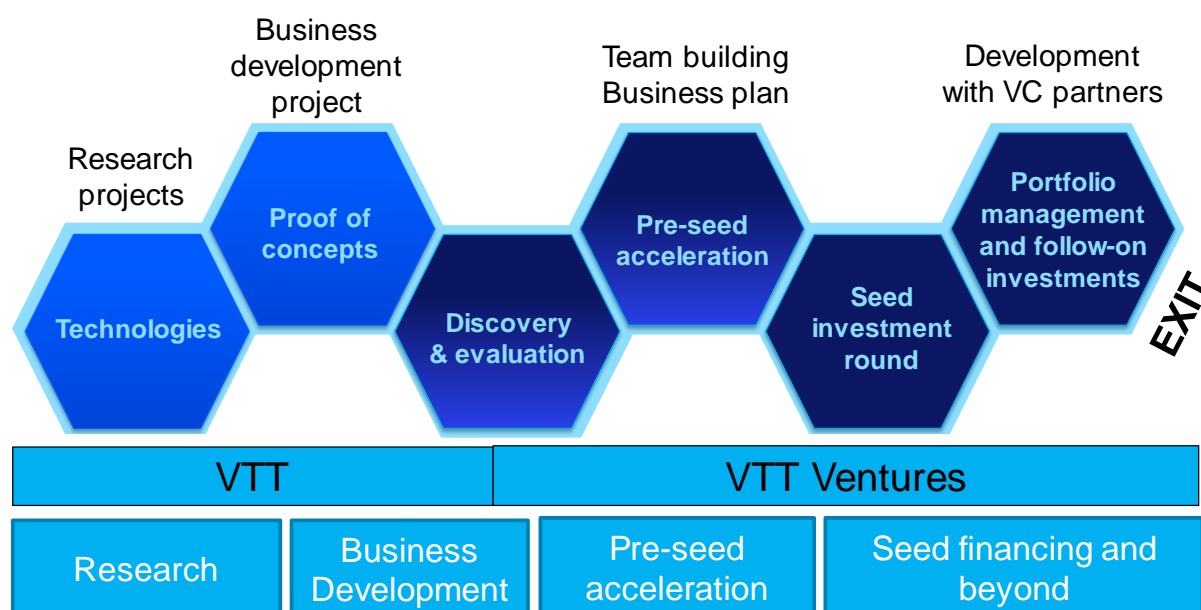
<sup>4</sup> Shares calculated based on the totals available on October 15<sup>th</sup> 2018.



transfer model with contract framework training and independent third party valuation of IPRs.

Many commercialisation projects and start-up ambitions evolve around the piloting infrastructure of VTT. An example of research infrastructure that has been crucial for start-up generation and development is Printocent that has been focusing on printed electronics research and applications<sup>5</sup>. In the majority of cases, young and small firms have no access to capital to invest in piloting plants and therefore the open access infrastructure of RTO's offers a unique opportunity for the creation of new applications and business.

**Figure 2 Overview of VTT's spin-off process**



### 1.1. Phases in the VTT'S spin-off process of creation

One of the key innovation diffusion channels used by the VTT Technical Research Centre of Finland (VTT) runs via the creation of new ventures. As the share of R&D done in Finland by established industry players has been falling for over a decade now one can expect the innovation activities of spin-offs to become more important. The focus in the case description below is on the operations and the support of the firm VTT Ventures Ltd and on the lessons learned during the last 8 years.

VTT Ventures acts as an in-house accelerator. VTT Ventures' mission is to develop commercialisation ready prototypes from the most promising technologies. The extraction of value from VTT technology aims at the development of early stage technology-intensive spin-off companies that are growth oriented and given the relatively small Finnish open economy, all have international ambitions. Figure 2 depicts the process of venture

<sup>5</sup> For more information on the printocent innovation and business ecosystem see: <https://www.printocent.net/>.



creation<sup>6</sup>. Its activities are one of the keys to creating a flow of projects with investment potential.

VTT Ventures selects target companies based on three key criteria: (1) Technological and commercial innovation, (2) team competencies and (3) international potential. It is unusual that the spin-off team members would retain their jobs (even part time) at VTT but instead start working full time with the spin-off company. VTT's internal policy allows the researcher to take a one-year leave of absence so as a back-up plan they can return to VTT from the spin-off within that 12-month period. VTT Ventures co-invests in its spin-offs with private investors. Its investments in portfolio companies are market-based and follow the same principles as venture capital investors. VTT Ventures invest in the spin-offs both money and technology (in-kind investments) and hold a minority ownership in the portfolio companies. Typically, VTT Ventures ownership is between 10-25%. VTT Ventures are active owners and participate in the companies through board membership.

## 1.2. Additional support

In addition to monetary support, VTT Ventures strengthens the new ventures in four ways:

1. by maturing the idea and technology together with the researchers using its own industry networks;
2. by coaching the research team with the business planning, financial numbers, legal documentation (through legal advisory), investor pitch and presentation materials;
3. by introducing the team and open doors for them to meet other potential investors (venture capital firms, corporates, business angels); and
4. by scouting for additional professionals to join the project e.g. even hired head-hunters to find external founder team members to join the founding team (typically CEO or sales roles).

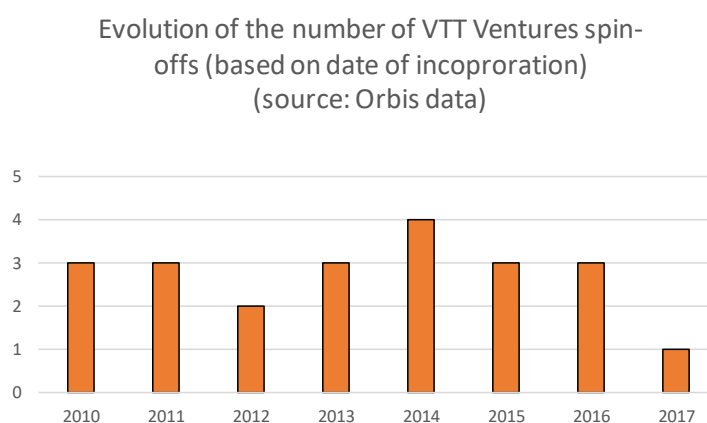
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<sup>6</sup> For a 2013 description of the spin-off process see Loikkanen et al. (2013). Roles, effectiveness, and impact of VTT. Towards broad-based impact monitoring of a research and technology organisation. <https://www.vtt.fi/inf/pdf/technology/2013/T113.pdf> p. 49.

### 3. Results achieved so far

How the success of a tech-based spin-off should be measured depends the focus and timeline. As VTT Ventures is focused on innovation the fact that a spin-off is being born that is or will commercialise a product and or service can already be seen as a concrete success. Impact of the spin-off activities is measured through (1) the total capital raised, (2) the total number of employees and (3) the net sales of the companies. Impact of VTT Ventures includes the above three measures for the entire portfolio. In addition to stimulating innovation, VTT Ventures has the operational goal of making a healthy return on its early stage capital investments. Therefore, also the spin-off exits have to be monitored.

**Figure 3 The spin-off pipeline of VTT Ventures Ltd**



On average, VTT Ventures Ltd has invested in approximately 2.75 new spin-offs per year. More specifically by September 2018 VTT Ventures Ltd has made 22 investments since its start in 2010. The below Figure 3 shows the evolution of the number of VTT spin-offs by year of incorporation. While the number of spin-offs is certainly not the best measure for impact they give an initial idea on how many ambitious start-up teams have been built around VTT's technologies. Having a closer look at the entire portfolio of 22 firms shows that 19 have survived and three have gone bankrupt (Hookie Technologies, Iscent, Posterfy). From the companies that survived two were fully acquired and one was only partially sold (Spinnova)<sup>7</sup>. Currently VTT ventures Ltd still has 17 companies in portfolio.

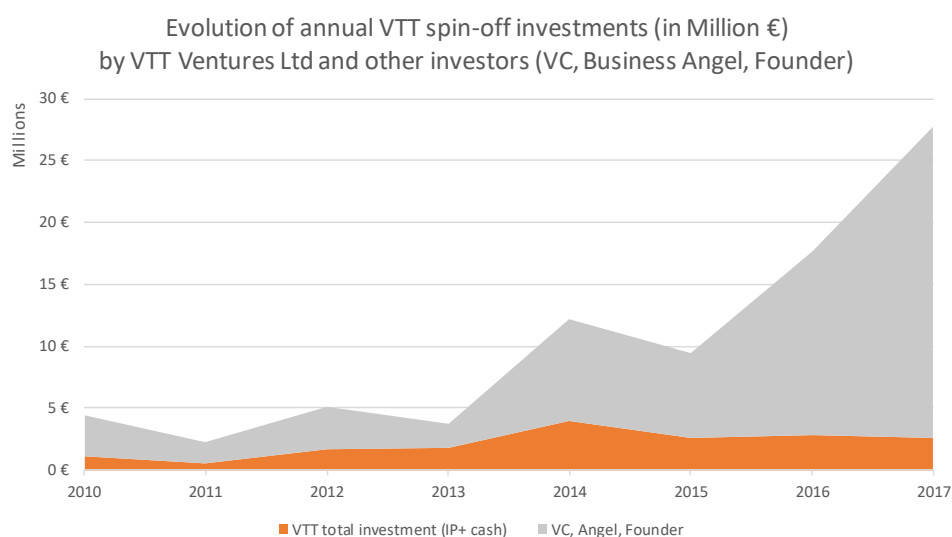
At the end of 2017, all companies launched since the start of VTT Ventures Ltd in 2010 had an aggregated employment of 275. The total employment growth during the same year 2017 (2016) was 26% (111%). In terms of aggregated turnover the companies reached 5.4M€ in 2017. The turnover stayed stable during 2017 but did grow with 79% during 2016. In sum, the average turnover per employee or simple labour productivity generated in these high tech start-ups is 20 000€ per employee. When zooming in on the 2017 firm employment size distribution of the portfolio 47% are micro firms (employment < 10), 47%

<sup>7</sup> For more information on VTT Ventures portfolio companies and selected success stories see <http://www.vttventures.fi/our-portfolio/>.

are small firms (employment 10 to 50) and 6% are medium sized firms (employment >50). In terms of turnover, all early stage tech-based firms are still micro-firms with 16% of the firms having already a turnover above 0.5 M€<sup>8</sup>.

In the 2010-2017 period, VTT spin-offs raised a total of 82 million Euro capital out of which 65 million or 79.3 % came from external investors and 17 million or 20.7% came from VTT's Ventures either through in kind investment (4.7%) or through cash investment (15.9%). In addition to the equity raised the spin off companies obtained soft loans - such as R&D loans from Business Finland - and grants. Figure 4 shows the evolution of equity raised and highlights two recent developments: (1) the investment scale and volumes are clearly getting bigger and (2) the share of VTT Ventures capital is diminishing. Overall, access to external capital is improving and frees up VTT Ventures LTD funds for developing new activities.

**Figure 4 Evolution of annual capital raised for VTT spin-offs (orange: internal capital, grey: external capital)**



When running the process to create and develop spin-offs the VTT Ventures team has run into three key challenges. (1) Setting-up spin-offs requires the best talent from the RTO and this loss in talent often reduces a research's unit capacity to attract new contract research. (2) To give the spin-off and its team a flying start, the valuation of technology should not be too high. (3) A third challenge relates to finding the right business and entrepreneurial people (often the CEO and CFO) that can complement the VTT technology experts in the spin-off team. It is increasingly difficult to get access to the best talent and external networking of team members is often crucial for the success of the spin-offs. VTT Ventures has a good network of national and international VC's and has access to a pool of serial entrepreneurs. In some cases VTT Ventures has used headhunter offices.

<sup>8</sup> For firms size definitions used by the European Commission see [http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition\\_en](http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en).

### 3.1. Examples of VTT ventures spin-off cases

Below follows a short description of some VTT ventures spin-off cases illustrating the diversity and quality of the firms in portfolio. They underline the role of piloting activities and investments, the need for public grants and loans from national and European key players such as the European Investment Bank and the truly global character of both the firm activities and the ownership.

#### 3.1.1. *TactoTek<sup>9</sup> – IOT & electronics*

TactoTek is the world leader in injection molded structural electronics (IMSE). According to IDTechExStructural electronics is one of the most important technological developments of this century: it allows electronic functions to be integrated directly inside of injection-molded plastic to create ‘smart molded structures.’ This enables a dramatic transformation in electronics design as lightweight, shaped, rugged, structural electronics replace the 100-year-old components-in-a-box approach. Encapsulation of electronics and circuitry in injection-molded plastics makes products inherently durable and protected from the environment. TactoTek’s expected addressable market in Automotive Interior Market alone is 5B EUR. Automotive Interior Market will drive TactoTek to over 200M EUR in 2020. Frost&Sullivan Global Technological Innovation Award winner in 2017. VTT and TactoTek also won the 2018 EARTO - European Association of Research and Technology Organisations Innovation Award in the category Impact Delivered. Practically all automotive OEMs and 1<sup>st</sup> tier suppliers engaged with TT. Co-investors: Conor Venture Partners, Leaguer VC, Faurecia Ventures, private angels, Business Finland (TEKES before 2018), and European Union’s Horizon 2020 Research and Innovation Programme<sup>10</sup>.

#### 3.1.2. *Paptic<sup>11</sup> – new materials and advanced manufacturing*

Paptic’s technology enables the manufacturing of a revolutionary new fiber product with plastic-like properties. Main driver for Paptic is the bad image of plastics, emphasized by EU packaging waste directive to be enforced in 2017. PAPTIC® material has a multitude of applications, such as carrier bags, flexible packaging, and logistics. The annual European plastic bag market alone is 100 billion bags, valued at over £3bn. We estimate that regulation and sustainability driven brand owners will drive Paptic’s revenue to 200M EUR in 2020. Tuomas Mustonen, Paptic CEO says, “When we sensed that the market was ready for our biodegradable bags, we had two options: either to found a start-up or offer the concept to a bigger, more established company. We chose the first option, in order to bring our product to the market quicker, and I couldn’t be happier with our choice. VTT Ventures has helped us tremendously after taking this step, from getting us through the first investment rounds to providing practical information on governance and legal matters.

<sup>9</sup> <https://tactotek.com/>

<sup>10</sup> <https://www.idtechex.com/research/articles/injection-molded-structural-electronics-tactotek-secures-23-million-00013752.asp>

<https://www.tactotek.com/press-release-frost-sullivan-names-tactotek-winner-2017-global-technology-innovation-award/>

<sup>11</sup> <https://paptic.com/>

VTT Ventures' credibility and experience has opened many doors. Most importantly, their way of working is a win-win: they always keep in mind what is best for the founders."

### ***3.1.3. FocalSpec<sup>12</sup> – imaging and optics***

Automated industry requires automatic measuring and quality control: FocalSpec's unique Line Confocal Imaging (LCI) technology provides the solution. Delivering extremely accurate data and high-resolution 3D imaging of metal, glass, paper and plastic surfaces, no other technology can measure challenging surfaces and shapes with the equivalent combination of speed and accuracy. FocalSpec is growing at a fast pace due to its immense expertise in 3D imaging, instrument and software design. Today, FocalSpec operates globally through their subsidiaries in Atlanta, USA, and Ratingen, Germany, as well as through a skilled network of system integrators and distribution partners. In 2018, FocalSpec is responding to the continuous growth in demand in Asia by establishing a subsidiary in China. FocalSpec's new CEO Harri Leinonen says the company has ambitious growth targets: "After many years of hard work, we have reached a point where we have several industry-scale projects, which will make it possible to multiply our sales over the next few years. FocalSpec's LCI technology is also being used in other industries, but over the next few years, the biggest growth is likely to be generated in the electronics industry."

### ***3.1.4. MinimaProcessor<sup>13</sup> – IOT & electronics***

MinimaProcessor's ultra-low power energy saving technology is the world record holder in energy efficient chips and has saving potential up to 20x comparing to current state of art IOT processors. The Internet of Things (IoT) is the next growth engine for the semiconductor Industry. Number of IOT device is expected to be 4 times as high as the global population and 5 times more than smartphones in 2020. Minima's total available market in power energy optimization is estimated at 191 billion (IDC industry forecast 2020). The ultra-wide scalability from smallest IoT nodes to supercomputers will drive the revenues of Minima Processor beyond €100M in 2020. Co-investors: Lifeline Ventures, CFT Nordic Capital, group of angel investors, European Union's Horizon 2020 Research and Innovation Programme.

### ***3.1.5. Spectral Engines<sup>14</sup> (exited) - Sensing and diagnostic***

Spectral Engines is meeting a clear need for new, innovative sensors which are small, robust, inexpensive and intelligent to bring measurements from laboratories to field use. Spectral Engines' NIRONE™ Sensor enables size and cost reductions in the next generation of high-performance spectral measurement instrumentation. It is the world's first truly miniaturized and robust near infrared MEMS spectral sensor. Co-Investors: Inventure, Finnvera, group of angel investors, European Union's Horizon 2020 Research and Innovation Programme. Spectral Engines is meeting a clear need for new, innovative sensors which are small, robust, inexpensive and intelligent to bring measurements from laboratories to field use. Spectral Engines' NIRONE™ Sensor enables size and cost reductions in the next generation of high-performance spectral measurement

<sup>12</sup> <https://www.focalspec.com/>

<sup>13</sup> <https://minimaprocessor.com>

<sup>14</sup> <https://www.spectralengines.com/>

instrumentation. It is the world's first truly miniaturized and robust near infrared MEMS spectral sensor. Co-Investors: Inventure, Finnvera, group of angel investors, European Union's Horizon 2020 Research and Innovation Programme.

Additionally, Spectral Engines received 2.4M€ EU grant (H2020 SME instrument) for developing a revolutionary portable drug screening device. In 2016 it won the Horizon Prize (0.8M€) for the best mobile solution that analyses precisely, quickly and efficiently food composition, nutrition facts and potentially harmful ingredients such as allergens.

### **3.1.6. Spinnova<sup>15</sup> (exited) – new materials and advanced manufacturing**

Spinnova produces yarns and filaments made directly from wood fibres – no harmful chemicals are used in the production. Spinnova offers a sustainable alternative to cotton and oil based yarns, with its cost-structure, recyclability, and environmental aspects. The company is currently in the industrialisation phase. Post-A valuation at 28M€ in 2017.

In 2015, Spinnova won an international biorefinery competition. In 2016, Spinnova was selected among eight best Cleantech companies in Europe. The same year it rolled out the first demo product made with Melli EcoDesign, which was a t-shirt for babies.

First potential customers among the top global companies in fashion and packaging industry. Co-investors: Fibria S.p.A., Besodos Investors Oy, Lenzing AG, group of angel investors.

## **4. Interactions with broader national context**

To enable the renewal of Finnish industry, start-ups can play a crucial role. For over a decade now, Finnish public innovation support players have increasingly paid attention to start-ups and bottom-up activities have generated fascinating entrepreneurial and networking activities (e.g. Slush<sup>16</sup>). However, a specific Finland wide strategy to foster research and tech-based spin-offs has not been in place, as appears from the vision and road map of the renewed Research and Innovation Council Finland<sup>17</sup>. Currently, spin-off activities in RTOs are supported by four national financing instruments (1) Business Finland TUTLI funding, (2) Business Finland VC funding (support for establishing new VC funds), (3) Business Finland R&D grants and (4) Business Finland R&D (soft) loans. The pre-commercialisation activities of TEKES (integrated in Business Finland as from 2018) have recently been evaluated and the recommendations for RTO's were that more attention should be paid to: tracking the commercialisation targets, specific differences in

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<sup>15</sup> <https://spinnova.fi/>

<sup>16</sup> Slush the world's leading start-up event: <https://www.slush.org/>

<sup>17</sup> Vision and road map of the Research and Innovation Council Finland (2017): [https://valtioneuvosto.fi/en/artikkeli/-/asset\\_publisher/10616/suomesta-vetovoimaisin-ja-osaavin-kokeilu-ja-innovaatioymparisto-tutkimus-ja-innovaationeuvosto-paatti-visiosta-ja-tiekartasta](https://valtioneuvosto.fi/en/artikkeli/-/asset_publisher/10616/suomesta-vetovoimaisin-ja-osaavin-kokeilu-ja-innovaatioymparisto-tutkimus-ja-innovaationeuvosto-paatti-visiosta-ja-tiekartasta)

research fields, intensified collaboration and knowledge sharing between RTO's and developing a more ambitious commercialisation mentality<sup>18</sup>.

Finland has produced several important research and tech-based spin-offs. In this process, VTT has contributed well and learned a lot during that creative process. A dedicated decade of focused experience with spin-off creation lifts VTT as a good benchmark for universities and other research organisations in the country. While industry has always been an important partner for the commercialisation of research at VTT, spin-off creation may well be the only way to commercialise radical innovations. MEE encourages VTT to promote spin-off creation as much as possible. This focus is part of VTT's societal role to promote the reform of the Finnish economy. VTT targets related to the commercialisation of research have been set in the VTT-law. The increased specific attention to spin-offs, driven both by industry and policy, has shown up in the latest performance agreement with MEE in the form of concrete spin-off targets (impact indicators)<sup>19</sup> while for other Finnish RTO's spin-offs are not considered to be an explicit target yet<sup>20</sup>.

Finnish challenges are that SME participation in R&D has been relatively low. SMEs account for less than a quarter of BERD (21.8% in 2013, far below the OECD average of 35%)<sup>21</sup>. Fuelling research and tech-based spin-off creation in all RTO's can offer a valuable answer to this challenge. It is difficult to convert "hard" scientific knowledge into marketable KETs-based<sup>22</sup> products and services and "deep-tech" companies. To do better Finland will need new incubation models and services to mentor researchers to be engaged in spin-offs and business creation. Moreover, the university invention act may benefit from simplification. A new act on university inventions has already been proposed possibly entering into force on January 1<sup>st</sup> 2019.<sup>23</sup> Next to enhancing the supply of new viable projects, attention should be paid to the access to financing sources for these projects. VCs have largely left the KET space, leaving a huge funding gap between university research and traditional venture funding. Most VCs have been focusing on social media and internet companies, which often require less cash and shorter time to market than KET based business cases. In 2014, Euro-zone venture funding was €4.7 billion, of which investments

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<sup>18</sup> Business Finland (2018). Evaluation of pre-commercialisation activities of Tekes - TUTL and innovation scout. Business Finland Report 2/2018: [https://www.businessfinland.fi/globalassets/julkaisut/evaluation\\_of\\_precommercialisation\\_activities\\_of\\_tekes\\_tutl\\_and\\_innovation\\_scout.pdf](https://www.businessfinland.fi/globalassets/julkaisut/evaluation_of_precommercialisation_activities_of_tekes_tutl_and_innovation_scout.pdf)

<sup>19</sup> Based on the latest performance agreement with TEM VTT's spin-off activities have been evaluated tracking the total annual spin-off capital raised.

<sup>20</sup> OECD Reviews of Innovation Policy: Finland 2017: <http://www.oecd.org/finland/oecd-reviews-of-innovation-policy-finland-2017-9789264276369-en.htm>

<sup>21</sup> OECD Reviews of Innovation Policy: Finland 2017: <http://www.oecd.org/finland/oecd-reviews-of-innovation-policy-finland-2017-9789264276369-en.htm>

<sup>22</sup> European Commission has defined six Key Enabling Technologies (KETs), which will provide the basis for innovation in a range of products across all industrial sectors. They are instrumental in modernizing Europe's industrial base, and drive the development of entirely new industries.

<sup>23</sup> In Finland the university invention ownership system is hybrid with university ownership and researcher ownership. While VTT follows the more straightforward employee inventions act (VTT owns the IPR and fairly compensates the employee) the universities are also subject to the university inventions act.



in KET-type companies was only just above €0.1 billion (~2% of total VC funding). Thus, VCs are often unable and unwilling to fund these KETs start-up to commercial success.

The lack of startup and series A funding for academia and RTO based high technology deal flow creates an early stage capital gap. The mere small size of the Finnish early stage venture capital market, the complexity of KET technologies and their longer time-to-market limit the participation of early stage institutional investors and so-called VIGO funds (micro funds >20 M€) in the early stage.

VTT Venture has therefore taken the role of supporting the seed phase of spin-offs generated from VTT technology. VTT has been using own funding as well as European, regional and national innovation public funding instruments to obtain initial proof-of-concepts and mature ideas for commercialisation, although the situation has been destabilised by the deep funding cuts initiated in 2015 to both VTT and Tekes (former Finnish Funding Agency for Technology and Innovation now integrated in BusinessFinland)<sup>24</sup>.

However, the main challenge and handicap in Finland has been the inability to turn significant R&D efforts into scaling businesses. In other words very few of the R&D driven SMEs have been able to enter the ‘league’ of big companies. Despite the significant investments in R&D, the list of biggest Finnish companies remains unchanged compared to the 1990s. Number of new entries into the Nasdaq First North, has been few far between, particularly in the case of high-technology based companies.

We would like to conclude by restating constructively that in Finland the key targets for developing knowledge transfer at RTO’s are the development of capabilities, the incentives, the metrics and transparent reporting.<sup>25</sup>

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<sup>24</sup> see OECD reviews of innovation policy: Finland 2017, e.g. pp. 114-116, <http://dx.doi.org/10.1787/9789264276369-7-en>

<sup>25</sup> See Kai Husso (2016). University-industry interaction and exploitation of new knowledge created by public R&D organisations: Finnish experience. OECD Workshop on “Assessing the Impacts of Public Research Systems” 2-3 May 2016, OECD. <https://www.innovationpolicyplatform.org/system/files/15.%20Kai%20Husso%20-%20Finland.pdf>