

Path to creating business from research

Evaluation of TULI Programmes

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Tekes



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Evaluation Report

The logo for Teke, consisting of the word "Teke" in a bold, blue, sans-serif font.

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Tekes – the Finnish Funding Agency for Technology and Innovation

Tekes is the main public funding organisation for research, development and innovation in Finland. Tekes funds wide-ranging innovation activities in research communities, industry and service sectors and especially promotes cooperative and risk-intensive projects. Tekes' current strategy puts strong emphasis on growth seeking SMEs.

Tekes programmes – Tekes' choices for the greatest impact of R&D funding

Tekes uses programmes to allocate its financing, networking and expert services to areas that are important for business and society. Tekes programmes have been contributing to changes in the Finnish innovation environment over twenty years.

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Foreword

The long lasting programme Creating Business from Research (TULI) has come to an end, and it is important to review the effectiveness of activities in commercialization of research results.

In addition to the traditional tasks of universities – basic research and higher education, a third, societal mission has been appointed to them. This includes the commercialization of public research results to benefit the society and the economy. In concrete terms, this can be seen e.g. as patents applied or research based spin-off companies born.

The evaluations of Finnish innovation system indicate that Finland performs well in research but not so well in the commercialization and exploitation of research results in general. Several studies show that entrepreneurial thinking has not been widespread among researchers. However, now there are some positive signs of cultural change, like the increasing willingness of students to start their own companies.

Tekes' key tool has been TULI programme, which means all activation and financial activities that concern the business ideas or commercialization of innovation platforms based on the results of public research. TULI activity has been carried out since 1993, but the first nine years of implementation took place in the form of local projects without the programmatic structure. The first Tekes TULI programme (2002–2006) combined the previous separate TULI projects. The programme purchased services from eight technology centers and had a strong regional perspective. The second TULI program was launched in 2008 to support the development of commercialization skills in universities. The programme introduced a new proof-of-concept approach, to test the feasibility of the concept at an early stage.

The evaluation was carried out by inno AG and Spinverse Oy. The evaluation analysed the changes in the operating environment of universities and the outcomes and impacts of TULI programmes in relation to their targets. Tekes wishes to thank the evaluators for their thorough and systematic approach. Tekes expresses its gratitude to steering group, those interviewed, workshop participants and all others that have contributed to the evaluation.

The evaluation contains a number of recommendations for all stakeholders. Just to pick one: the universities could consider the merit of commercial expertise and excellence when evaluating candidates for academic tenure. This might currently be one missing piece in the puzzle in fostering research-based innovation and creating economic growth and jobs. At Tekes, TULI has been replaced by a new generation instrument, called TUTLI (New knowledge and business from research ideas). The evaluation findings are very important in developing it to better serve the important but difficult task of commercialization.

April 2013

Tekes

Contents

Foreword	5
Summary of the TULI programme	7
Overview	7
TULI 2002–2006.....	7
TULI 2008–2012.....	9
Overview of output numbers.....	11
TULI-ohjelmien arviointi – Yhteenveto arvioinnista ja suosituksista	15
Arvioinnin yhteenveto.....	15
Yhteenveto ohjelman tavoitteiden saavuttamisesta.....	17
Suositukset.....	19
1 Overview to the evaluation methodology	22
2 The Finnish and international context of research commercialisation	25
2.1 The Finnish innovation landscape.....	25
2.2 International trends and benchmarks	27
3 Assessment of fulfilment of programme objectives	33
3.1 Objective 1: Development of a professional commercialisation system.....	33
3.2 Objective 2: Make commercialisation a strategic topic for HEI/RTO management.....	38
3.3 Objective 3: Create dynamic cooperation between the actors.....	43
3.4 Objective 4: Challenges in integrating commercialisation into the academic world	45
3.5 Objective 5: Licensing is not a straight-forward deal	49
3.6 Objective 6: Foundations were laid for start-up ecosystems.....	53
4 Recommendations	60
4.1 Target groups for the recommendations.....	60
4.2 Three main recommendations.....	61
4.3 For policy makers	62
4.4 For Tekes	64
4.5 For universities, vocational universities and research organisations.....	66
4.6 For motivating the researchers and innovators.....	68
4.7 Summary of recommendations.....	69
Appendices	
1 List of persons interviewed.....	70
2 Participants at TULI evaluation workshop 15.1.2013.....	71
Tekes Programme Reports	72

Summary of the TULI programme

Overview

TULI (Tutkimuksesta liiketoimintaa, Creating Business from Research) was Tekes' targeted long-term effort aimed at creating business from public research. Tekes had individual TULI-measures to encourage commercialisation of public research since 1993, but for the first nine years they were implemented as local projects without joint programme-like structure. Technology transfer companies were conducting projects in which they searched for TULI ideas from local universities for evaluation and further development.

In 2002, TULI activities were arranged under a programme and local technology and knowledge centres gained a larger role as providers of TULI services and conductors of different activities. TULI programme also became centrally coordinated. Between 2002 and 2006 TULI activities were based on buying services from technology centres and commercialisation consultants while the role of universities was mainly focused on handling invention disclosures and offering services.

After renewing the programme in 2007, the funding was appointed straight to universities and research institutes with the aim to induce development of competences and structures within the organisations. In this model, the research and innovation services of universities and research institutes were responsible for implementing the TULI programme. Vocational universities / universities of applied sciences were also granted access to the programme at this stage.

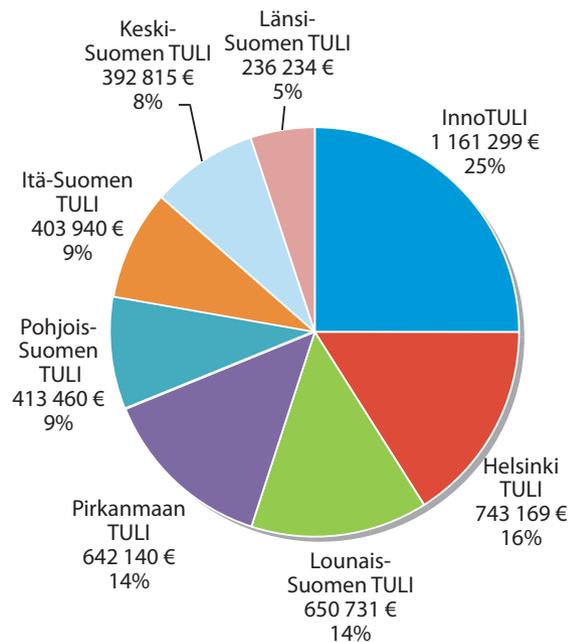
TULI 2002–2006

The operational model of the TULI programme was based on localized implementation, formed from eight regional TULI centres. Local project managers searched for and identified ideas and inventions, organised the evaluation of their commercial potential and arranged consulting services to advance commercialisation for those which were approved as projects. The role of the national coordination was to organise the activities of the network and produce useful tools for the project managers.

TULI activities were divided into two packages, 40% of the funding was reserved for the first one and 60% for the second. First package consisted of activation work on campuses and research groups to get ideas and screening, mapping and evaluation of research based business ideas. Second package was for developing potential ideas by using up to 10 k€ per project for using external expert services. The funding could not be used for project's expenses except for necessary travel costs. The total volume of the programme was about 2.5 M€ per year¹. InnoTuli and HelsinkiTuli were the two largest by volume accounting for over 40% of the overall funding.

¹ Tutkimuksesta liiketoimintaa TULI 2002–2005 -ohjelman loppuarviointi, Tekes (2006)

Figure 1. The cumulative volume of TULI programme since 2002 by region. Situation on 19.10.2005.²

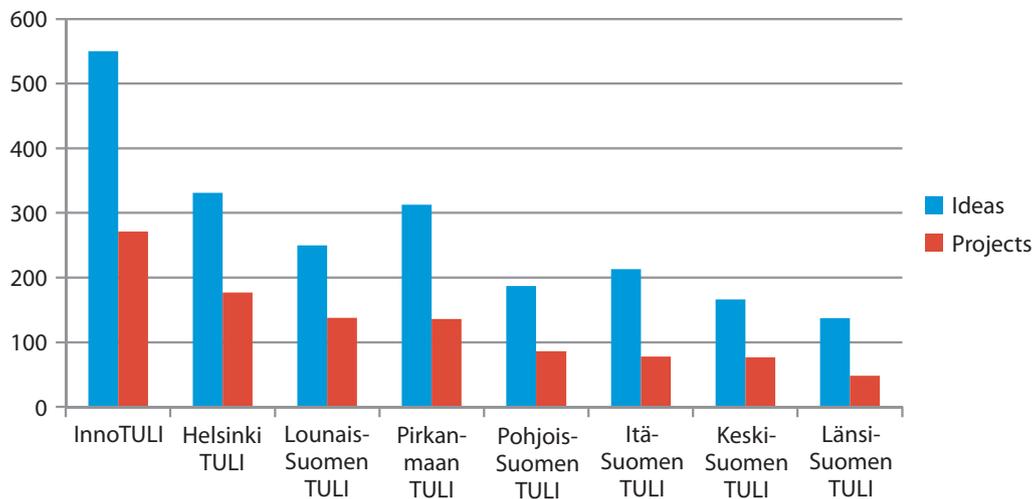


Projects

The programme evaluated about 600 ideas a year and over 200 projects were funded every year. InnoTuli and HelsinkiTuli were the two largest by volume accounting for over 40% of the overall ideas and funded projects.

A record was also kept for ended projects and resulting output (licensing cases or new companies). Notable is that from InnoTULI's ended projects, over 60% resulted in either licensing cases or new companies while in other regions the rate was between 30% and 10%.

Figure 2. The cumulative amount of TULI ideas and projects since 2002 by region. Situation on 19.10.2005³. Note that there were differences in idea recording practices between regions.

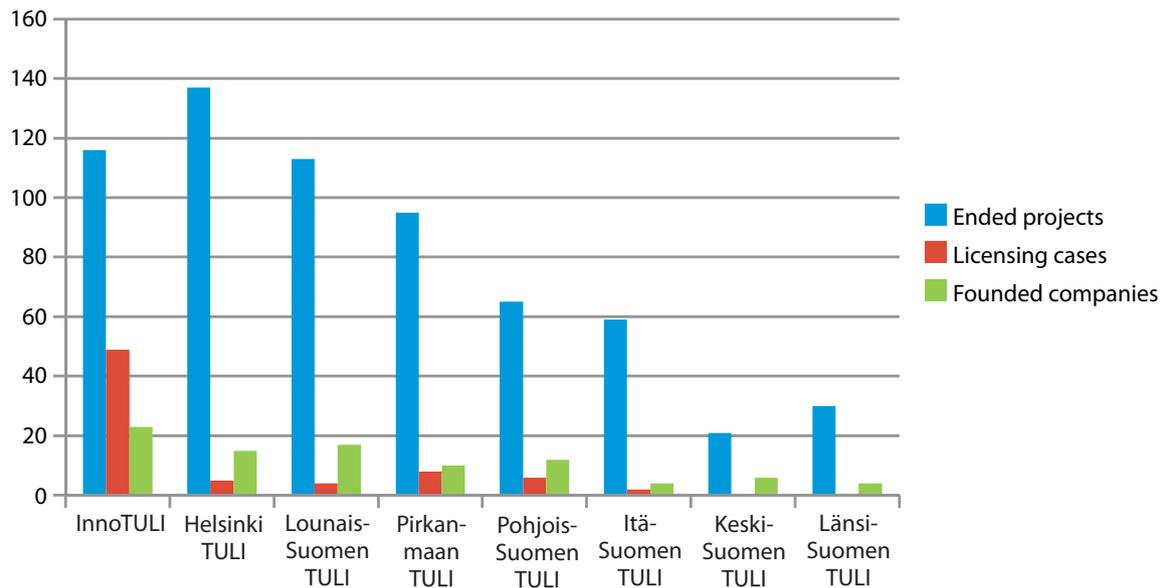


² TekelNyt-database (19.10.2005) via Tutkimuksesta liiketoimintaa TULI 2002–2005 -ohjelman loppuarviointi, Tekes (2006)

³ TekelNyt-database (19.10.2005) via Tutkimuksesta liiketoimintaa TULI 2002–2005 -ohjelman loppuarviointi, Tekes (2006)

⁴ TekelNyt-database (19.10.2005) via Tutkimuksesta liiketoimintaa TULI 2002–2005 -ohjelman loppuarviointi, Tekes (2006)

Figure 3. The cumulative amount of ended TULI projects, licencing cases and founded companies since 2002 by region. Situation on 19.10.2005⁴.



Companies

Over 90 companies were founded during the first part of TULI programme (2002–2006), but only 38 of them could be identified for this evaluation due to missing data⁵. 25 of the identified companies have been able to post revenues and 13 had their numbers for 2011 available. Total revenue of these 13 companies was 14.3 million € and median revenue was 513,000 €. These 13 companies were employing a total of 144 people in 2011, rising 40% from 2010. 6 of the 13 companies were posting losses and seven profits in 2011, with the sum of losses and profits being -3.8 million €.⁶

TULI 2008–2012

In the last stage of TULI programme (2008–2012), the research and innovation services, innovation manager or TULI contact person at the university, research institute or AMK functioned as gateway to TULI services. All participating organisations also took part in consortiums which were formed based on geography and organization type. There were four university consortiums, one RTO consortium and four AMK consortiums. Every consortium had an operational level project group, which was responsible for granting funding for evaluation and refinement projects (see TULI process). These project teams consisted of representatives of participating organizations and industry, commercialisation experts and investors. The coordinator of TULI programme offered for example training, communications and marketing services to support the programme.

⁴ TekelNyt-database (19.10.2005) via Tutkimuksesta liiketoimintaa TULI 2002–2005 -ohjelman loppuarviointi, Tekes (2006)

⁵ Data was obtained through Tekes from Tekel database, but the follow-up records did not include company names or registration numbers in most cases.

⁶ Source: Tekes, Talouselämä

Process

The total amount of TULI funding could be up to 55,000 euro per one research-originated invention or business idea. Funding could be given to an idea or invention that was born as part of research conducted in a university, research institute or university of applied science, for example from theses and dissertations, and if a company had not yet been founded to utilize it. It was also possible to use TULI funding for the personnel costs of universities and research institutes, which enabled inventors, innovators and the commercialisation services in universities to do more concrete things for their projects. The funding had been divided into three phases: initial evaluation of the project, evaluation and improvement. The three phases have been summarised in the table below (Table 1).

Initial evaluation

In the initial evaluation phase, different kinds of expert services could be obtained fast and flexibly to assess the preliminary commercial potential of the idea. For example, the possible markets, competitors and cooperation partners of a product idea could be examined, or patentability and IPR landscape could be mapped in the investigations. These investigations lay the foundation for assessing the preliminary commercial potential of the idea and possible further investigations. Funding for the initial evaluation phase was up to 5,000 € and it could be granted by a TULI contact person.

Evaluation

In the evaluation phase, the idea was assessed in more detail from the commercialization point of view. The goal was to formulate and develop the commercialization path of the project and open new outlooks for commercialising a successful idea. In the evaluation phase, services and partnerships that enhance the growth of commercial potential and remove obstacles of success could be acquired for the project. These kinds of actions could include for example mapping different cooperation partners, more extensive market analysis, business and funding plans and analysis of technology level and competitive advantages. Funding for the evaluation phase was up to 20,000 € and the funding was decided and granted by a TULI project group.

Refinement

In the refinement phase, challenges and bottlenecks of commercialization concerning product development or testing could be solved. The goal of the phase was to provide the project with means to fly on its own on the way to success. Actions in the improvement phase could include for example developing a prototype, proving technical operability and profitability analyses. With these actions, the commercial potential of the project could be confirmed and next steps for utilizing the potential could be defined as concrete actions. Funding for the evaluation phase was up to 30,000 € and it was decided and granted by a TULI project group.

Table 1. The three phases of TULI funding.⁷

	Initial evaluation phase	Evaluation phase	Refinement phase
Funding per idea	Up to 5,000 €	Up to 20,000 €	Up to 30,000 €
Decision maker	TULI contact person	Project group	
Response time to the customer	Immediately	Less than a month	
Duration of the phase	Some weeks	1–3 months	1–6 months

⁷ Source: Tekes

Overview of output numbers

General

In 2009–2011 it was required for all participating organisations to provide information describing the results of the activities in a systematic way every half year. In 2008 the reporting was made in various different forms and in 2012 the results were not reported in a systematic way (to ending of programme coordination and several changes in TULI funding). The reported information is not fully comprehensive, as there were gaps in information (and interpretations of what should be reported) concerning e.g. filed patents or founded companies and some individual organisations were missing from the 2011 reporting.⁸

Funding

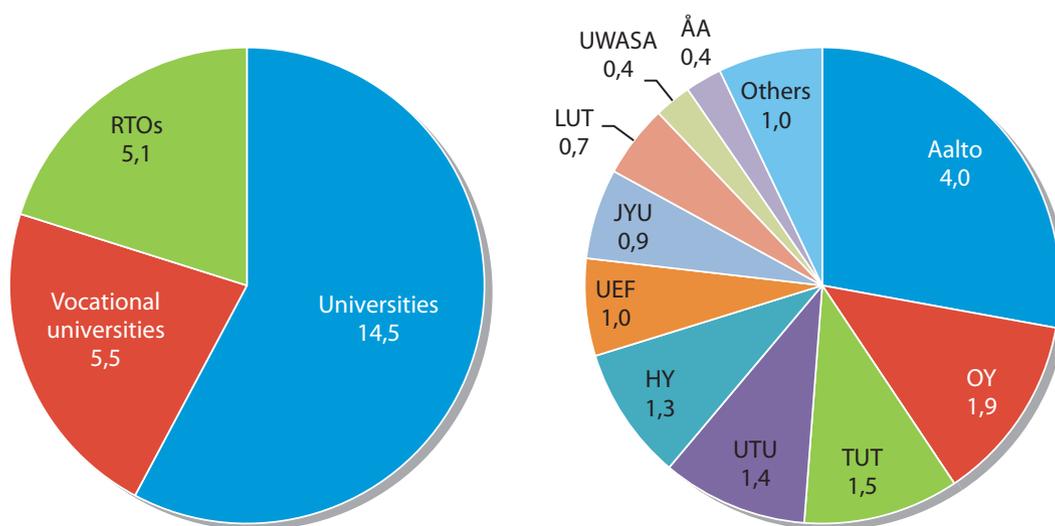
Between 2007 and 2011 a total of 25 million € of TULI funding was granted to the participating organisations, 14.5 million €

to universities, 5.5 million € to vocational universities and 5.1 million € to RTOs. Largest receivers of funding were VTT with 4.3 million € and Aalto University (and its predecessors) with 4 million €. Also over 70% of the funding granted to universities went to five universities that were most active in the program.⁹

Projects

Between 2008 and 2011 over 2,600 TULI projects were funded from more than five thousand assessed ideas. 45% of the projects originated from universities, 32% from vocational university and the rest from RTOs. When dividing the projects based on the funded amount, smallest projects (less than 5 k€) follow the same distribution as the overall projects. With the next size class (5 k€ to 20 k€) universities account for 46% from vocational universities 36% and RTOs 18%. The largest projects (more than 20 k€) are originating mainly from universities and RTOs with 48% and 31% shares respectively. Vocational universities only account for 21% of the largest projects.¹⁰

Figure 4. Distribution of TULI funding between different types of organisations and distribution of the share of universities between different universities (M€)



⁸ Tuli-ohjelman loppuraportti 2008–2012, Tekes (2012)

⁹ Source: Questionnaire to organizations made by programme coordinator, Tekes; *Tuli-ohjelman loppuraportti 2008–2012*, Tekes (2012)

¹⁰ Source: Questionnaire to organizations made by programme coordinator, Tekes; *Tuli-ohjelman loppuraportti 2008–2012*, Tekes (2012)

Figure 5. Amounts of different sized TULI projects in universities between 2008 and 2011.¹¹

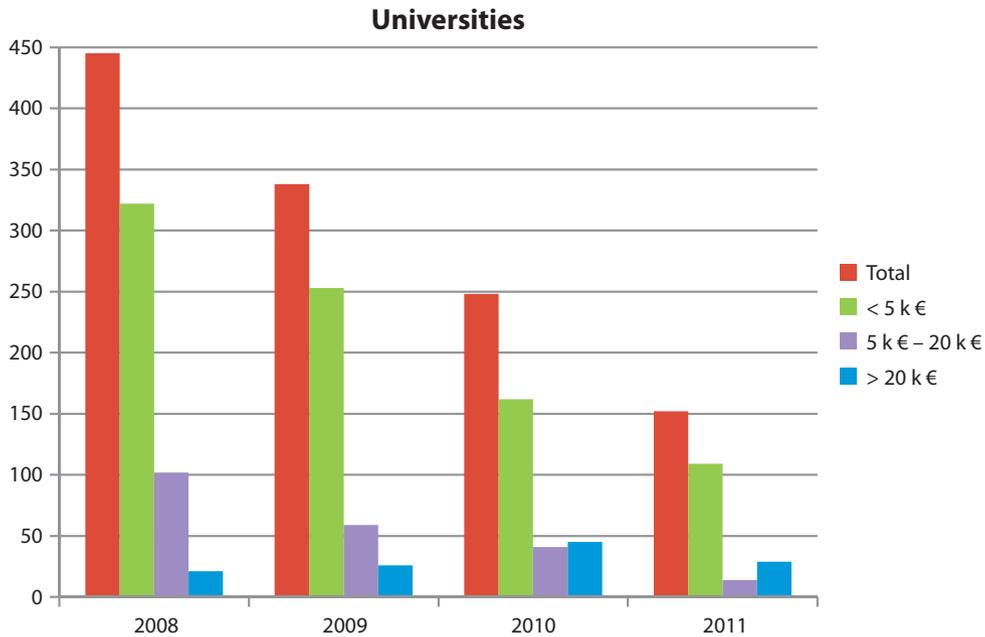
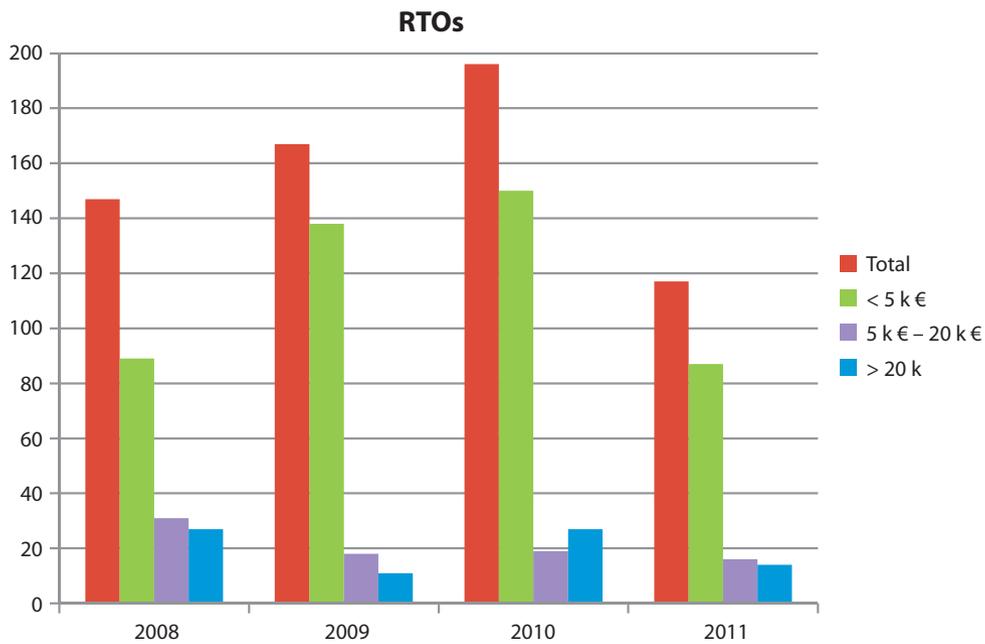


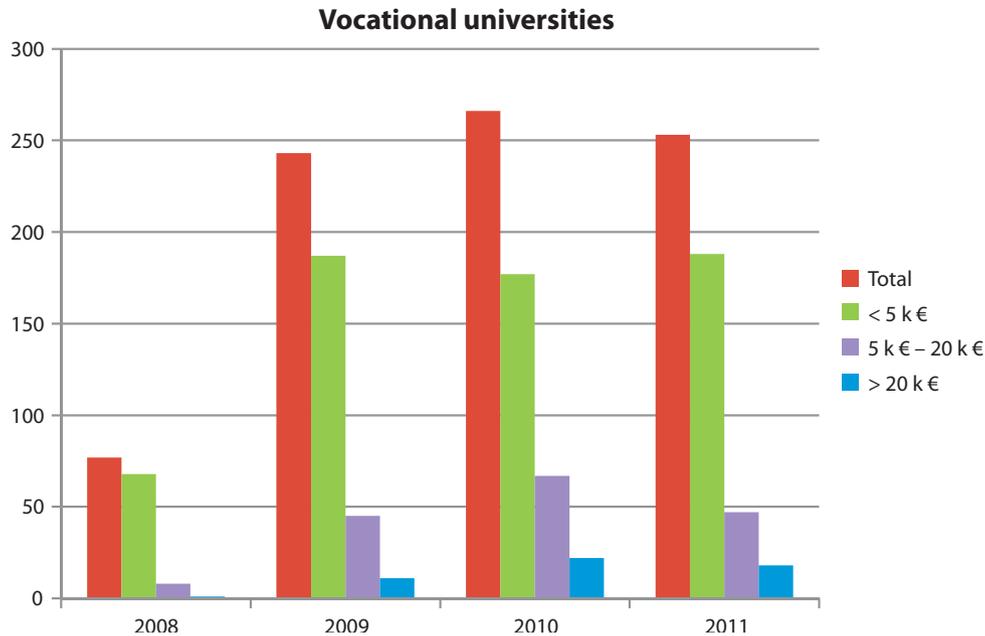
Figure 6. Amounts of different sized TULI projects in RTOs between 2008 and 2011.¹²



¹¹ Source: Questionnaire to organizations made by programme coordinator, Tekes

¹² Source: Questionnaire to organizations made by programme coordinator, Tekes

Figure 7. Amounts of different sized TULI projects in vocational universities between 2008 and 2011.¹³



Companies

A total of 164 companies founded between 2008 and 2011 related to TULI projects¹⁴ and 76 of the companies have been able to show revenue. Total revenue of 8.8 million €¹⁵ was generated by those 76 companies in 2011, median revenue was 25,000 € and annual median growth rate for companies that are able to post revenue is 60%. 5% of the companies are generating 75% of the revenue. Companies established by help of Aalto University, University of Jyväskylä and University of Eastern Finland count 75% of total revenue generated and 90% of total revenue is coming from firms that originate from universities. According to a rough estimate, at least 150 new jobs have been created. Only few of the companies post profit at this stage and six out of the 164 companies do not exist anymore.

Patent applications and licensing

512 patent applications were filed between 2008 and 2011 relating to TULI projects and VTT accounted for the majority of those. The amount of patent applications by different types of organisations can be seen in the figure below.¹⁶

TULI related projects produced almost 5.4 million € in licencing income between 2008 and 2011, over 80% of this income came from VTT originated projects and almost all the rest from universities and other RTOs. Vocational universities accounted only for 1% of the licencing income related to TULI projects.¹⁷

¹³ Source: Questionnaire to organizations made by programme coordinator, Tekes

¹⁴ Source: Tekes, data collected by programme coordinator by end of 2011. The TULI final report includes a slightly higher number of companies, explained by the fact that this report was written at the end of 2012.

¹⁵ Source: Taloussanommat yritystietopalvelu, Fonecta ProFinder

¹⁶ Source: Questionnaire to organizations made by programme coordinator, Tekes; *Tuli-ohjelman loppuraportti 2008–2012*, Tekes (2012)

¹⁷ Questionnaire to organizations made by programme coordinator, Tekes; *Tuli-ohjelman loppuraportti 2008–2012*, Tekes (2012)

Figure 8. Number of patent applications (in total and TULI project related) in different organisations in 2008–2011. VTT's low number in TULI related applications in 2008 is due to misunderstanding of reporting instructions¹⁸.

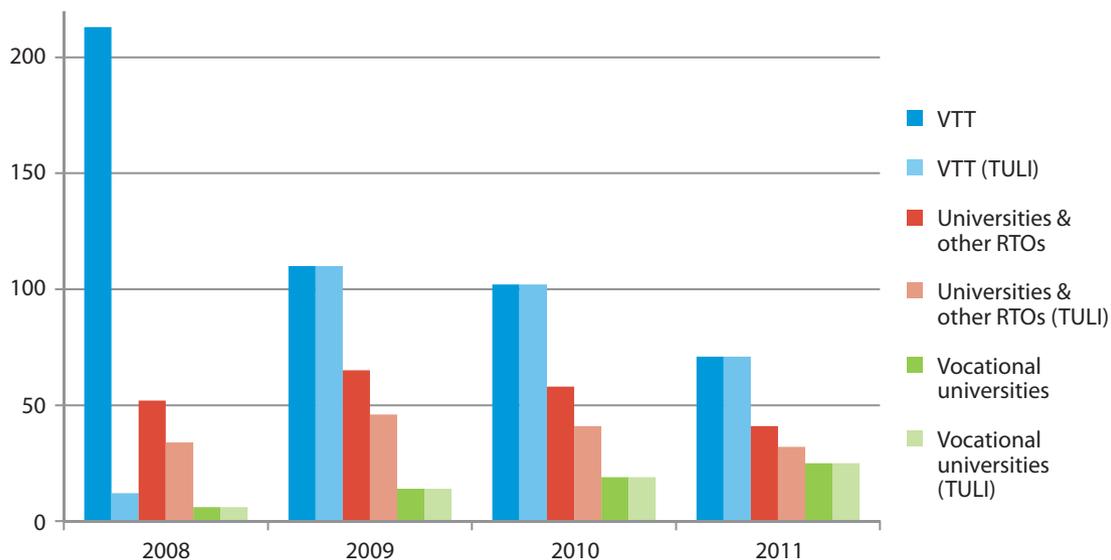
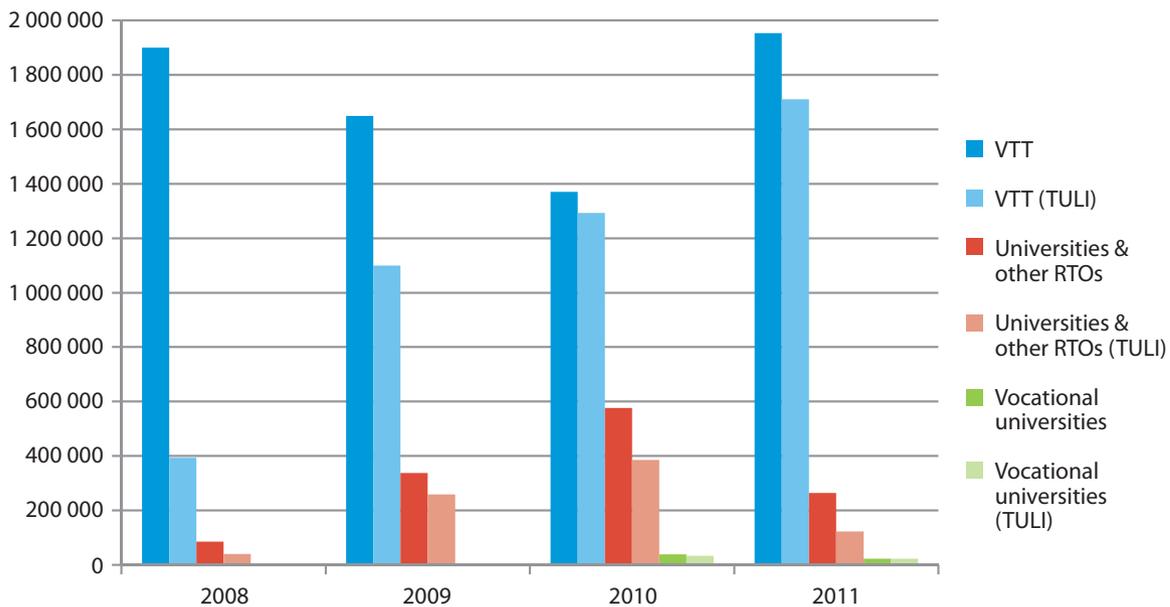


Figure 9. Licensing income in €, overall and TULI project related, by different types of participating organisations.



¹⁸ Source: Mika Naumanen, VTT

TULI-ohjelmien arviointi – Yhteenvedo arvioinnista ja suosituksista

Arvioinnin yhteenvedo

Arvioinnin tausta

Viimeksi kuluneen kymmenen vuoden aikana on julkisen tutkimuksen kaupallistamisen kentässä eletty muutoksen aikaa. Muutoksen taustalla ovat mm. uusittu yliopistolaki ja korkeakoulukeksintölaki, joiden toimeenpano on edellyttänyt rakenteellisia ja operatiivisia muutoksia niin yliopistojen ja korkeakoulujen sisällä kuin myös koko innovaatiojärjestelmässä. Yksi keskeisimmistä instrumenteista tutkimuslähtöisten innovaatioiden kartoittamiseen, arviointiin ja kehittämiseen on ollut Tekesin Tutkimuksesta liiketoimintaan (TULI) -rahoitus. Toiminta käynnistyi itsenäisinä paikallisina projekteina jo vuonna 1993 ja vuoden 2001 TULI-arvioinnin suositusten mukaisesti se organisoitiin ohjelmaperusteiseksi vuonna 2002.

Tekes on jo aikaisemmin teettänyt toiminnasta ulkoisia arviointeja, kuten esimerkiksi ensimmäisen varsinaisen TULI-ohjelman loppuarvioinnin, joka toteutettiin syksyn 2005 aikana. Samaan aikaan toteutettiin myös muita aiheita sivuavia selvityksiä, kuten ”Julkisten tutkimustulosten kaupallinen hyödyntäminen” -raportti (2006). Sen jälkeen sekä TULI-toiminnan toteutustapa että volyyymi muuttui viimeisimmän TULI-ohjelman (2008–2012) myötä. TULI-toiminnan päättyessä oli tärkeää luoda katsaus viimeisimmän ohjelman tulosten lisäksi myös toiminnan kokonaisvaltaiseen vaikuttavuuteen Suomen tutkimustulosten kaupallistamisen kentällä.

TULI-ohjelmien kuvaus

Tekesille keskeinen väline julkisen tutkimuksen hyödyntämisen tehostamisessa ovat olleet TULI-ohjelmat, joilla tarkoitetaan kaikkia niitä aktivointi- ja rahoitustoimia, jotka kohdistuvat julkisen tutkimuksen tuloksiin pohjautuvien liikeideoiden tai innovaatioaihioiden kaupallistamiseen. TULI-ohjelmien kaltaista toimintaa on toteutettu jo vuodesta 1993 lähtien, mutta ensimmäiset yhdeksän vuotta toteutus tapahtui paikallisten projektien muodossa ilman ohjelmallista yhteisrakennetta.

Ensimmäinen Tekesin TULI-ohjelma (2002–2006) yhdisti aikaisemmat erilliset TULI-projektit ja toi toimintaan tehokkuutta ja määrämuotoisuutta. Toimintamalli perustui palveluiden ostoon teknologiakeskuksilta ja konsulteilta, ja siinä oli vahva alueellinen näkökulma. Vuosina 2002–2005 Tuli-ohjelmassa arvioitiin yli 1000 tutkimuslähtöistä keksintöä tai liikeideaa. 74 hanketta eteni lisensointisopimukseen ja 91 uuden yrityksen perustamiseen perustamiseen (ohjelman loppuarvioinnin mukaan, Valovirta et al. 2006). Tämän arvioinnin aikana tunnistettiin lisäksi n. 10 yritystä, jotka oli perustettu vuonna 2006. Yhteensä yrityksiä pystyttiin tunnistamaan nimeltä vain 33 kpl puutteellisten tietojen vuoksi. TULI-ohjelman rahoitusvolyyymi oli vuosina 2002–2006 noin 2,5 miljoonaa euroa vuodessa.

Vuonna 2008 käynnistyneen TULI-ohjelman tavoitteena oli tukea kaupallistamisosaamisen kehittämistä vahvalle kansainväliselle tasolle. Uudistetussa ohjelmassa Tekesin rahoitus myönnettiin suoraan yliopistoille, korkeakouluille ja tutkimuslaitoksille. TULI-rahoitusta käytettiin kaupallistamishankkeita tukevien asiantuntijapalvelujen ostoon, minkä lisäksi rahoitus mahdollisti myös oman organisaation kaupallistamistoiminnan kehittämisen ja konkreettisen työn hankkeiden hyväksi. Ohjelmassa pyrittiin edistämään niin yliopistojen, korkeakoulujen, ammattikorkeakoulujen ja tutkimuslaitosten keskinäistä yhteistyötä kuin tutkimusorganisaatioiden yhteistyötä yritysten kanssa. Myös kansainvälisen verkottumisen tukeminen oli tärkeä elementti. Lisäksi tavoitteena oli muuttaa julkisen tutkimuksen kaupallistamisen rakenteita ja laajentaa kaupallistamisen rahoituspohjaa. Ohjelmaan tuotiin uutena ns. proof of concept -toimintatapa varhaisessa vaiheessa olevan tuote-, palvelu- tai liiketoimintakonseptin toimivuuden testaamiseen.

Myöhemmän TULI-ohjelman kokonaisvolyyymi oli noin 50 miljoonaa euroa, josta Tekesin osuus oli 40 miljoonaa euroa. Sen aikana rahoitettiin noin 3000 hanketta. Ohjelmassa oli aluksi mukana 18 yliopistoa, 5 tutkimuslaitosta ja 23 ammat-

tikorkeakoulua. Ohjelman aikana osa organisaatioista jäi pois omaan päätöksensä perustuen, joitakin yliopistoja yhdistyi ja lisäksi jaksorahoituspäätöksiä tehtiin valikoidusti ohjelman aikaisiin tuloksiin perustuen. Viimeisessä vaiheessa mukana oli 10 yliopistoa, 13 ammattikorkeakoulua ja kaksi tutkimuslaitosta. Vuosina 2008–2012 perustettiin yliopistoista ja tutkimuslaitoksista yhteensä 135 yritystä ja ammattikorkeakouluista 52 yritystä (ohjelman loppuraportin mukaan, Tekes 2012). Tässä

arvioinnissa on näistä yrityksistä oli mukana seurannassa 164 (välillä 2008 – lokakuu 2011 ohjelman koordinaatiolle raportoidut yritykset).

Yliopistojen ja tutkimuslaitosten osalta TULLI-ohjelma päättyi kesäkuussa 2012. TULLI:n tapainen toiminta toteutetaan Tekesissä jatkossa uudentyypisellä julkisen tutkimuksen rahoituksella (Tutkimuksesta uutta tietoa ja liiketoimintaa -instrumentti) ja muulla aktivointitoiminnalla.

Taulukko 1. Arvioinnin tehtävät ja kysymykset

Tehtävä	Arviointikysymys
I. Toimintaympäristön muutos ja kehitys	<ol style="list-style-type: none"> Mitä merkittäviä muutoksia on tapahtunut tutkimustulosten kaupallistamisen toimintaympäristössä 2000-luvulla? Kuinka tutkimustulosten kaupallistamistoimintaa on edistetty ja siinä onnistuttu eri maissa? Suppea kansainvälinen vertailu 3 - 5 maan käytännöistä. TULLI osana koko tutkimustulosten hyödyntämisen kenttää. Mikä on ollut TULLI:n rooli?
II. TULLI-ohjelmien tulokset ja vaikutukset suhteessa tavoitteisiin	<ol style="list-style-type: none"> Miten ohjelmille asetetut tavoitteet ovat toteutuneet? Mitä tärkeimpiä tuloksia on saatu? Mitkä tulokset olisivat jääneet toteutumatta ilman ohjelmia? Miten relevantteina ja haasteellisina ohjelmien tavoitteita voi pitää? Kuinka hyvin ohjelmissa tavoitettiin tärkeimmät asiakasryhmät – esimerkiksi korkeakoulu, tutkijat, opiskelijat? Kuinka hyvin ohjelmat, sen palvelut ja hallinnointi vastasivat osallistujien tarpeita? Mitä kokemuksia on kansainvälistymispalveluista? Kuinka paljon uusia yrityksiä on syntynyt TULLI -ohjelmien avulla? Mikä on ollut yritysten elinkaari suhteessa muihin aloittaviin yrityksiin? Kuinka yritykset ovat kasvaneet ja kansainvälistyneet? Kuinka vaikuttavuusmallin päämääräkohtaiset vaikutukset ovat toteutuneet ohjelmien aikana? Miten pysyvinä, laajoina ja merkittävänä vaikutuksia voi pitää? Missä määrin ja millä tavoin ohjelmat ovat vaikuttaneet <ol style="list-style-type: none"> Osaamisen ja innovaatiotoiminnan kyvykkyyksien kehittymiseen? Mikä on ollut ohjelman vaikutus yrittäjyysosaamiseen ja –ilmapiiriin yliopistoissa ja korkeakouluissa? Kotimaisten ja kv. verkostojen muodostumiseen; erityisesti elinkeinoelämän ja tutkimusmaailman verkottuminen ja osaamisen-/teknologiansiirto? Merkittäviin innovaatioihin ja liiketoimintamahdollisuuksiin? Tuottavuuteen ja alueelliseen kilpailukykyyn? Uusien yritysten syntymiseen ja elinkeinoelämän uudistumiseen? Laajemmin elinkeinoelämään ja yhteiskuntaan? Miten edellä mainitut kohteet (i-vi) ovat kehittyneet case-esimerkeillä kuvattuna tai indikaattoreilla mitattuna?
III. Johtopäätökset ja suositukset	<ol style="list-style-type: none"> Innovaatiopolitiikalle: Millä innovaatiopolitiikan keinoilla julkisen tutkimuksen kaupallistamisen tehostamista pitäisi jatkossa tukea? Tekesille: Mitä konkreettisia ja toimivia hyviä käytäntöjä on tunnistettavissa Tekesin uudelle Tutkimuksesta uutta tietoa ja liiketoimintaa –instrumentille sekä muuhun toimintaan kuten julkisen tutkimuksen asiakkaiden hoitoon? Yliopistojen, ammattikorkeakoulujen ja tutkimuslaitosten kaupallistamistoiminnalle: Miten toimintaa voisi tehostaa ja kehittää jatkossa? Millä uusilla rahoituksellisilla tai palvelullisilla keinoilla tutkimustulosten hyödyntämistä ja osaamisen siirtoa voisi edelleen tehostaa? Mikä on alueellisen erikoistumisen merkitys tulevaisuudessa? Yksittäisille tutkijoille ja innovaattoreille: Millä tavoin yksittäisten tutkijoiden, tutkimusryhmien ja innovaattoreiden resurssija ja osaamista voisi paremmin tukea jatkossa?

Arvioinnin tavoitteet

Arvioinnin kohteena oli kaksi Tekesin Tutkimuksesta liiketoimintaa eli TULLI-ohjelmaa:

- TULLI 2002–2006 jälkiarviointi
- TULLI 2008–2012 loppuarviointi.

Lisäksi arvioitiin myös Tekesin pitkäaikaisen TULLI-toiminnan vaikuttavuutta. Ohjelmien osalta arvioinnin kohteena oli sekä TULLI:n ohjelmamainen toiminta että valitut case-esimerkit. Arvioinnin kokonaistavoitteena oli kartoittaa TULLI-toiminnan onnistumista julkisen tutkimuksen kaupallistamisen edistäjänä vuodesta 1993 alkaen. Lisäksi tavoitteena oli tuottaa suosituksia tutkimusvetoisen yrittäjyyden tukemisen ja rahoituksen kehittämiseen, sekä innovaatiopolitiikan, Tekesin ohjelmajärjestelmän ja alan tutkimus-, kehitys- ja innovaatiotyön strategiseen suuntaamiseen.

Arvioinnissa tarkastellut tehtävät ja kysymykset on esitetty taulukossa 1.

Arviointimetodologia

Arvioinnin toteutuksen pohjana sovellettiin Tekesin vaikuttavuusmallia, jossa vaikuttavuutta arvioidaan neljällä tasolla: yhteiskunnalliset vaikutukset, tuotokset, toiminta sekä panokset. Lisäksi Tekesin vaikuttavuudelle on asetettu neljä yhteiskunnan vaikuttavuustavoitetta, jotka ovat talous ja uudistuminen, ympäristö, hyvinvointi sekä kyvykkyydet.

Arviointi jakautui seuraavaan neljään vaiheeseen:

1. Määrittelyvaihe:

- a. Toimintaympäristön tarkastelu
- b. Taustamateriaalin ja yhteystietojen kokoaminen
- c. Arviointikriteereiden ja indikaattoreiden määrittely

2. Arviointi

- a. Kyselytutkimukset, joiden kohderyhmänä oli erityisesti TULLI-rahoitusta vuosina 2008–2012 saaneet toimijat
- b. Syvähaastattelut. Haastateltavia ryhmiä olivat i) yliopistojen, ammattikorkeakoulujen ja tutkimuslaitosten innovaatioasiamiehet tai TULLI-yhteyshenkilöt, ii) ulkopuoliset konsultit, iii) yliopistojen, ammattikorkeakoulujen ja tutkimuslaitosten johto, iv) TULLI-ohjelman koordinaattorit sekä johtoryhmä, v) Tekes ja vi) ministeriöt
- c. Case-esimerkkien tarkastelut

3. Analysointi:

- a. Tulosten tilastollinen ja laadullinen analyysi
- b. Kansainvälinen vertailututkimus (benchmarking)

4. Pohdinta:

- a. Työpaja
- b. Johtopäätökset
- c. Suositukset

Yhteenveto ohjelman tavoitteiden saavuttamisesta

TULLI 2008–2012 -ohjelman tavoitteet

TULLI 2008–2012 -ohjelmalle oli asetettu seuraavat tavoitteet:

1. Julkisen tutkimuksen kaupallistamisvalmiuksien, -prosessien, -rakenteiden ja osaamisen pitkäjänteinen kehittäminen, tehostaminen ja nostaminen kansainväliselle tasolle.
2. Saada yliopistot ja korkeakoulut asemoimaan ja resursoimaan tutkimustulosten kaupallistamisen strategisesti tärkeäksi osaksi toimintaansa.
3. Saattaa yliopistot, korkeakoulut ja ammattikorkeakoulut tiiviiseen yhteistyöhön ja yhteisiin toiminnallisiin konsortioihin kaupallistamiseen tähtäävässä toiminnassa.
4. Saada huipputason tutkijat ja liiketoiminnan kehittämisen ammattilaiset yhteistyöhön sekä luoda tehokkaasti toimivia teknologiansiirtoverkostoja tutkimusorganisaatioiden ja yksityisten palvelutarjoajien välille potentiaalisten aihoiden kaupallistamisessa.
5. Saattaa julkisen tutkimuksen tulosten lisensointi ja teknologian myynti kansainväliselle tasolle.
6. Vahvistaa edellytyksiä sille, että julkisen tutkimuksen tuloksista, osaamisesta ja osaajista tulee merkittävä uuden liiketoiminnan ja kasvuyritysten lähde.

Arvioinnin löydökset on kiteytetty seuraavassa luvussa vastaten kuhunkin kuuteen tavoitteeseen.

Arvio ohjelman tavoitteiden saavuttamisesta

Tavoite 1: Ensimmäinen askel kohti ammattimaista kaupallistamisjärjestelmää

TULI-ohjelmilla todettiin olleen tärkeä rooli ammattimaisen kaupallistamisjärjestelmän pohjustamisessa. Sen suurimpana vaikutuksena oli kaupallistamisprosessia koskevan kiinnostuksen, tietoisuuden ja ymmärryksen lisääntyminen. TULI lisäsi tietoisuutta sekä tutkijoiden, opiskelijoiden, innovaatioasiamiesten että organisaatioiden johdon keskuudessa. TULI-ohjelmilla oli myös perustavaa laatua oleva rooli kaupallistamisen prosessien ja rakenteiden luomisessa ja kehittämisessä tutkimusorganisaatioissa. Eri organisaatiot kuitenkin hyödynsivät TULI-instrumenttia eri tavoilla, riippuen organisaation ja sen henkilöstön valmiuksista ja ajattelutavoista. TULI myös mahdollisti tällaisen joustavan lähestymistavan. Yhteenvetona todettiin, että TULI oli kehitystä katalysoiva ja täydentävä instrumentti – kehitykseen ovat vaikuttaneet myös muut tekijät, mutta esimerkiksi useiden yliopistojen ja ammattikorkeakoulujen kohdalla TULI-ohjelmien todettiin vaikuttaneen merkittävästi kaupallistamiskäytäntöjen kehittämiseen ja tuoneen lisäarvoa.

Tavoite 2: Kaupallistaminen ei vielä sisälly tutkimusorganisaatioiden johdon keskeisiin strategisiin tavoitteisiin

Yksi TULI-ohjelman tavoitteista oli tutkimusorganisaatioiden ylimmän johdon sitouttaminen organisaatioidensa kaupallistamisprosessien kehittämiseen. Arvioinnissa todettiin, että TULI ei ole vielä täysin läpäissyt johdon ajattelutapaa, mutta siitä on kuitenkin tullut yksi osa strategista agendaa. Johto noudattaa ulkopuolelta annettuja ohjeita ja toimintatapoja, mutta ei vielä toistaiseksi ole kovin sitoutunut toimintaan. Tutkimusorganisaatioiden johtajat pitivät tärkeimpänä tavoitteena organisaationsa menestymistä ja arvostusta perinteisillä ansioilla mitattuna. Riskinä nähtiin, että kaupallistamista tuetaan vain paperilla, jolloin todelliset panostukset jäävät pieniksi. Riski ei koske ainoastaan Suomea, vaan se on euroopanlaajuinen haaste, sillä kaupallistamista pidetään edelleen vähäpätöisempänä tehtävänä kuin tutkimuslaitosten alkuperäisiä missioita. Kaupallistamisen läpäisevyyden todettiin vahvasti riippuvan siitä ajavista yksilöistä ja ryhmistä, ja kulttuurivastarintaa esiintyy edelleen. TULI on kuitenkin mahdollistanut virallisten kaupallistamistoimintojen muodostamisen ja tarjonnut johdolle työkalun, jolla aktivoida tutkijoita kaupallistamiseen. Organisaatioiden aiempi kokemus, organisaatiokulttuuri ja sisäinen strategia vaikuttivat merkittävästi ohjelman tuloksiin eri organisaatioissa.

Tutkimusorganisaatioiden johdolle TULI on ollut tervetullut instrumentti, jolla on voitu tarjota innovaatio- ja kaupallistamispalveluita, joita tuskin olisi kehitetty omaaloitteisesti organisaatioiden sisäisellä rahoituksella ilman yhteiskunnan tukea ja vaatimuksia. Ohjelma ei kuitenkaan ole luonut tutkimusorganisaatioiden johdolle riittäviä edellytyksiä ja kannustimia panostaa kaupallistamiseen tiettyä vähimmäismäärää enempää. Lisäksi ensimmäistä TULI-ohjelmaa (2002–2006) ei myöskään kohdistettu tutkimusorganisaatioiden johdolle. Johdon houkuttelemiseksi instrumentteihin ja toimintatapoihin tulisi liittää entistä tehokkaampia mittareita ja kannustimia.

Tavoite 3: Yhteistyö eri toimijoiden välillä ei ole dynaamista

TULI-ohjelmassa tutkimusorganisaatioilta edellytettiin konsortioiden muodostamista yksittäisten projektien rahoituksesta päättämiseksi ja kokemusten vaihtamiseksi. Tästä huolimatta todellinen yhteistyö jäi vähäiseksi, sillä ohjelman rakenteet yhteistyön tukemiseksi esimerkiksi mittareiden ja kannustimien avulla olivat puutteelliset. Vaikka yhteistyötä ja ajatusten vaihtoa kyllä esiintyi ja siihen oli halukkuutta, erityisesti ammattikorkeakouluissa, se jäi tavallisten kontaktien tasolle eikä nousut tärkeäksi prioriteetiksi. Lisäksi ohjelmassa muodostettujen arviointikonsortioiden rooli jäi monille innovaatiojohtajille epäselväksi, joten niitä hyödynnettiin vain vähän. Yhteenvetona todettiin, että TULI-ohjelmien rakenne ei kannustanut riittävästi yhteistyöhön, joten tavoitetta tiiviin yhteistyön luomisesta ei saavutettu. Organisaatioiden motivoimiseksi yhteistyöhön olisi tarvittu selkeitä indikaattoreita, rahoitusmekanismeja tai muita kannustimia.

Tavoite 4: Kaupallistamisen integroinnissa akateemiseen maailmaan on haasteita

TULI todettiin käteväksi välineeksi, jolla ulkopuolisia asiantuntijoita voitiin hyödyntää alkuvaiheen kaupallisen potentiaalin tarkastelussa. Tutkijoiden tietoisuus kaupallistamisesta kasvoi, mutta vuorovaikutus tutkijoiden ja ulkopuolisten palveluntarjoajien välillä jäi kuitenkin rajatuksi. Verkostoja syntyi etupäässä tutkimusorganisaatioiden innovaatioasiamiesten henkilökohtaisten kontaktien kautta ja kokemusten määrä lisääntyi, mutta TULI ei kuitenkaan saanut aikaan systeemistä muutosta teknologiansiirto- ja innovaatioverkostojen luomisessa.

Akateemisen kulttuurin muuttamiseksi täytyy ymmärtää tutkijoiden motiiveja kaupallistamiseen: tärkeimmät tekijät eivät arvioinnin mukaan ole taloudellisia, vaan yhteiskunnal-

linen vaikuttaminen ja itsensä toteuttaminen sekä keksintöjen hyötykäyttö todettiin tärkeimmiksi motivaation lähteiksi. Myös tutkimusorganisaatioiden innovaatiopalveluiden rooli on oleellinen, ja Tekes on vahvistanut niiden uskottavuutta tutkijoiden silmissä, joskin palveluiden näkyvyydessä ja kommunikaatiossa tutkijoiden kanssa on vielä parannettavaa. Tämä puolestaan vaatii organisaatioiden johdon sitoutumista kaupallistamiseen, minkä lisääntymisestä havaittiin jo merkkejä. Suurimmat tarpeet nähtiin kaupallistamistoiminnan ammatimaistumisessa sekä osaamisen ja oikean elämän liiketoiminnan tietotaidon liittämässä kaupallistamisjärjestelmiin. TULLI-ohjelma tarjosi työkalun yhteistyön rakentamiseksi tutkijoiden ja liiketoiminnan kehittämisen ammattilaisten välille, mutta kaupallistamista tukevien rakenteiden kehittymättömyys rajoitti tehtävän onnistumista.

Tavoite 5: *Lisensointi ei ole suoraviivaista toimintaa*

Jälkimmäisen TULLI-ohjelman aikana toimintaympäristössä tapahtui muutoksia: yliopistoissa tehtyjen keksintöjen omistajuussäädökset muuttuivat ja kansallinen innovaatiopolitiikka yhdessä yliopistojen strategian kanssa siirtyivät suosimaan start-up-yritysten perustamista lisensoinnin sijaan. Osa toimijoista kyseenalaisti koko lisensointitavoitteen järjestyksen.

Lisensointi ja teknologian myynti eivät ole lisääntyneet viime vuosina, ja VTT on ainoa organisaatio, joka saa lisensoinnista jatkuvasti tuloja. Suomen kotimarkkinat lisensoinnille ja immateriaalioikeuksien myynnille ovat pienet. Myöskään myynti ulkomaille ei ole ongelmatonta ja monet yliopistojen toimijat näkivät siinä ristiriidan kansallisten yhteiskunnallisten tavoitteiden kanssa. Lisäksi immateriaalioikeuksien myynti ja niiden käytön vaikutusten ennakointi vaativat teollisuuden ja markkinatilanteen syvällistä ymmärtämistä sekä monilta yliopistojen työnteekijöiltä puuttuvia kontakteja teollisuuteen. Erityisen kriittinen kysymys on, miten suomalaisten yritysten tarpeet sekä johtavat ja eniten uusia ideoita tuottavat tutkimusalat kohtaavat? Lisensoinnin määrän kasvattamiseksi tarvittaisiin tutkimuksen ja teollisuuden välisiä strategisia kumppanuuksia, joihin TULLI-ohjelma ei varsinaisesti vaikuttanut. Ne organisaatiot, jotka olivat ennenkin toimineet yhteistyössä teollisuuden kanssa, olisivat todennäköisesti jatkaneet yhteistyötä ilman TULLI-ohjelmiakin. Toisaalta lisensointi kuitenkin vaatii periaatteessa vain vakaan IPR:n, markkinanäkemyksiä, hyvän lisensointistrategian sekä konseptin toimivuuden testauksen, jotka kaikki olivat saavutettavissa TULLI-rahoituksella. TULLI ei siis ollut lisensoinnin kehityksen rajoite, vaan yleinen kehitys painotti muita kaupallistamisreittejä.

Tavoite 6: *Start-up-yritysten ekosysteemeille luotiin perusteet*

Uusien start-up-yritysten määrä kasvoi merkittävästi viimeisten muutaman vuoden aikana (2009–2012). Tarkasteltaessa TULLI-ohjelmien pohjalta perustettuja yrityksiä pidemmällä aikavälillä huomataan, että osa yrityksistä on pystynyt kasvamaan, mutta vasta toimittuaan useita vuosia. Eri tutkimusorganisaatioiden välillä havaittiin suuria eroja uusien yritysten perustamisessa. Suurimmat kehitystarpeet nähtiin hanke/ideavirran kasvattamisessa, kaupallistamispalveluiden tehokkuuden parantamisessa, kaupallistamisen integroimisessa tutkimukseen sekä keskittymisessä perustettujen yritysten laatuun ja kilpailukykyyn. Start-up-yritysten perustamisen ei pitäisi itsessään olla tavoite, vaan yritysten tulisi kyetä kasvamaan ja menestymään. TULLI-ohjelman luoma ammattimainen viitekehys auttoi rakentamaan ympäristöä, joka tukee uusien yritysten perustamista. Ohjelman suoraa osallisuutta uusiin yrityksiin on vaikea arvioida, koska TULLI instrumenttina keskittyi ensisijassa innovaatioprosessin varhaisempiin vaiheisiin, kehittyen kattamaan väliä alkuvaiheen rahoituksesta yrityksen perustamiseen asti.

Suosituks

Suosituksen kohderyhmät

Arvioinnin pohjalta laaditut suositukset on jaettu neljälle kohderyhmälle, jotka edustavat innovaatio- ja kaupallistamisprosessien eri kerroksia. Nämä kohderyhmät sekä niiden tarkastelunäkökulmat ovat:

1. Innovaatiopolitiikan päättäjät

- a. Kuinka päättäjät voivat jatkaa entistä tehokkaampien kaupallistamisjärjestelmien tukemista julkisissa organisaatioissa?

2. Tekes

- a. Mitä konkreettisia ja todistettuja parhaita käytäntöjä on voitu tunnistaa hyödynnettäväksi Tekesin uudessa "Tutkimuksesta uutta tietoa ja liiketoimintaa"-rahoitusinstrumentissa sekä muissa kaupallistamistoimissa?

3. Yliopistojen, ammattikorkeakoulujen ja tutkimuslaitosten innovaatiojärjestelmät

- a. Miten olemassa olevia rakenteita, prosesseja ja toimia voidaan tehostaa ja parantaa?
- b. Miten kaupallisen arvon tunnistaminen ja tuottaminen voidaan kytkeä organisaation perinteiseen päämäärään?
- c. Mikä on erikoistumisen (esimerkiksi alueellisen erikoistumisen) merkitys?

4. Yksittäiset tutkijat ja innovaattorit. Kohderyhmää tarkasteltiin innovaatiojärjestelmän vastuullisen johtajan näkökulmasta ja keskityttiin keinoihin, joilla yksittäisiä henkilöitä voidaan houkutelua ja motivoida osallistumaan kaupallistamisprosessiin.

- a. Mitä kannustimia on olemassa yksittäisten henkilöiden motivoimiseksi? Kuinka heitä voidaan parhaiten tukea?

Kolme läpileikkaavaa suositusta

Arvioinnin tuloksena tunnistettiin kolme läpileikkaavaa suositusta, jotka on seuraavassa taulukossa eritelty yksityiskohdaisemmiksi suosituksiksi neljälle eri kohderyhmälle. Nämä suositukset ovat:

1. Siirtyminen seuraavaan vaiheeseen – osaamisen rakentamisesta kaupallisiin tuloksiin
2. Synergioiden hyödyntäminen – kansainvälinen ulottuvuus
3. Pitkän aikavälin sitoutuminen – yksityisen sektorin osallistaminen

Suositukset eri toimijoille

Suositukset eri toimijoille on esitetty taulukossa 2.

Päätäjille

Jotta siirtyminen osaamisen rakentamisesta kaupallisten tulojen kasvattamiseen on mahdollista, päättäjien tulisi tehdä innovaatioista ja kaupallistamisesta kansallinen päämäärä, jonka toteuttamiseen ja ohjaamiseen tulee panostaa useilla eri tavoilla: i) Asettamalla kaupallistamiselle strategisia tavoitteita, joiden toteutumista mitataan taloudellisin mittarein, ii) tarkastelemalla toteutettuja toimia vaikuttavuusarvioinneilla, ja iii) varmistamalla kaupallistamiselle riittävä tuki integroimalla sen rahoitus kansalliseen tutkimusrahoitukseen. Koska innovaatiot ja kaupallistaminen saavat jatkossa entistä enemmän painotusta eurooppalaisissa (tutkimus)ohjelmissa, täytyy Suomen varmistaa riittävät resurssit ja osaaminen rahoituksesta kilpailumiseksi. Päätäjillä on tärkeä rooli ohjelmien suunnitteluun vaikuttamisessa, Suomen innovaatiojärjestelmän tukemisessa

Taulukko 2. Suositusten neljälle eri toimijaryhmälle.

Päätäjille	Tekesille	Yliopistoille ja tutkimuslaitoksille	Tutkijoiden ja keksijöiden motivoimiseksi
1. Siirtyminen seuraavaan vaiheeseen – osaamisen rakentamisesta kaupallisiin tuloksiin			
Tukekaa aktiivisesti tutkimuksen kaupallistamisen kasvattamista asettamalla se kansalliseksi tavoitteeksi ja luomalla kaupallistamiselle taloudellisia ja kansainvälisiä mittareita.	Integroikaa kaupallistaminen rahoitusohjelmiin.	Luokaa organisaatiolenne kaupallistamisstrategia ja varmistakaa resurssit sen käytäntöön viemiseksi.	Motivoikaa tutkijoita voimakkaalla ja vaikuttavalla tuella - kaupalliset kyvyt ja ymmärrys lisäävät rahoitusmahdollisuuksia.
2. Synergioiden hyödyntäminen – kansainvälinen ulottuvuus			
Parantakaa Suomen valmiuksia ja kykyä kilpailla uusista eurooppalaisista ohjelmista.	Vahvistakaa ja keskittäkää kaupallistamisen tuen resursseja.	Varmistakaa pääsy käytettävissä oleviin resursseihin kilpailukyvyyn kasvattamiseksi tulevissa rahoitusohjelmissa.	Keskittäkää resurssit potentiaalisimpiin projekteihin sekä halukkaisiin ja osaaviin toimijoihin.
3. Pitkän aikavälin sitoutuminen – yksityisen sektorin osallistaminen			
Sitoutukaa pitkällä aikavälillä ja varmistakaa, että kansallinen tutkimusbudjetti sisältää kaupallistamista tukevaa ja aktivoivaa rahoitusta.	Varmistakaa soveltuva ja joustava rahoitus, jolla voidaan taata ammattimaiset kaupallistamispalvelut ja kehittää julkis-yksityisiä yhteistyökumppanuuksia.	Kehittäkää yksityisen sektorin kanssa strategisia kumppanuuksia, jotka takaavat riittävät resurssit ja kaupallistamisprosessin fasilitoinnin.	Auttakaa rakentamaan pitkäaikaisia kumppanuuksia teollisuuden ja tutkimusryhmien välille. Kaupallistaminen ei ole vain kertatarjous.

sekä tietoisuuden ja läpinäkyvän kommunikaation lisäämisessä. Rahoitus täytyy varmistaa pitkällä aikavälillä ja keskittyä toimijoihin, jotka ovat sitoutuneita ja saavat aikaan tuloksia. Taloudellisilla ja muilla kannustimilla kannattaa palkita niitä toimijoita, jotka kehittävät kaupallistamisen ammattimaisia rakenteita.

Tekesille

Tekesin aloite kehittää entistä taloudellisesti kykenevämpiä ja keskittyneempiä kaupallistamisen rahoitusinstrumentteja, kuten TUTLI, on tervetullut lisä Tekesin innovaatorahoitukseen. Uusien instrumenttien lisäksi tärkeä tekijä on siirtyminen teknologiavetoisuudesta markkinalähtöisyyteen (technology push -> market pull). Tämän saavuttamiseksi Tekesin tulisi parantaa kaupallistamisen integroimista julkisen tutkimuksen rahoitukseen kautta linjan ja sallia entistä joustavampi eri rahoitustyyppien välinen vuorovaikutus, jotta lupaaville aihioille voidaan tarjota kehityspolkuja. Synergioiden hyödyntämiseksi Tekesin tulisi kohdentaa rahoitus tuloksia tuottaville toimijoille ja tukea sellaisia rakenteita, joilla a) luodaan toiminnallista yhteistyötä ja b) keskitytään tiettyyn, vahvaan ja kaupallisesti merkittävään tutkimusalueeseen. Pitkän aikavälin tulosten varmistamiseksi ammattimaisten kaupallistamispalveluiden osaamisen sekä julkis-yksityisten kumppanuuksien muodostamisen tukeminen ovat Tekesin tärkeimpiä tehtäviä.

Yliopistoille, ammattikorkeakouluille ja tutkimuslaitoksille

Kaupallistamiseen sitoutumiseksi tutkimusorganisaatioiden tulisi luoda sisäinen strategia, jolla kaupallistamisesta tehdään prioriteetti, huolehditaan riittävästä resurssista sekä kehitetään ja käytetään tavoitteita ja mittareita sen toteutumisen seuraamiseksi. Kaupallisesta menestyksestä tulisi myös tehdä yksi akateemisten virkojen arvioinnin mittari. Organisaatioille täytyy taata riittävät resurssit, ja niiden käyttö tulee kohdentaa kiinnostuneisiin ja kyvykkäisiin toimijoihin. Kaupallistamisen ja rahoituksesta kilpailemisen tukemiseksi tulisi arvioida mahdollisuudet sisällyttää kaupallistamispalveluiden rahoitus tiettyjen tutkimuskeskusten budjetteihin, aloittaa kaupallistamistoimet nykyistä aikaisemmassa vaiheessa sekä tehdä proaktiivista yhteistyötä sekä teollisuuden että muiden tutkimusorganisaatioiden kanssa. Strategisilla kumppanuuksilla voidaan tukea kaupallistamistoimia pitkällä aikavälillä. Kumppanuudet ulkopuolisten asiantuntijoiden kanssa voisivat tarjota kestäviä kaupallistamispalveluita.

Kumppanuudet teollisuuden kanssa voisivat puolestaan fasilitoida kaupallistamisprosessia jo riittävän aikaisessa vaiheessa, jolloin se saadaan paremmin kytkettyä loppukäyttäjän tarpeisiin.

Tutkijoiden ja keksijöiden motivoimiseksi

Kaupallistamista ei kannata pakottaa kaikkien tehtäväksi, vaan potentiaalisten kaupallistajien motivoimiseksi on useita vaihtoehtoja: i) innovaatiojohtajat voivat painottaa kaupallistamisen mukanaan tuomaa uutta rahoitusta esimerkiksi eurooppalaisista ohjelmista, ii) toisaalta voidaan myös näyttää, että kaupallistaminen voi rikastaa tutkimuksen sisältöä ja iii) muiden tutkijoiden positiivisia kaupallistamiskokemuksia voidaan käyttää kannustavana esimerkkinä. Vaikka organisaatiokulttuurin kehittäminen kaupallistamismyönteiseen suuntaan onkin tärkeää, innovaatiojohtajien tulisi kuitenkin voida keskittää voimavaransa kaupallisesti potentiaalisimpiin tapauksiin. Päätösprosessin tulee kuitenkin olla läpinäkyvä. Pitkän aikavälin kehityksen varmistamiseksi innovaatiojohtajat voivat myös fasilitoida kaupallistamisprosessia tukemalla pitkien kumppanuuksien syntyä teollisuuden ja tiettyjen tutkimusryhmien välille.

Suosittelujen yhteenveto

Yhteenvetona toteamme, että TULI oli pohjimmiltaan osaamisen rakentamiseen keskittynyt ohjelma ja oppimisprosessi. Osa organisaatioista on edistynyt hyvin ja jopa saavuttanut johtavan aseman Euroopassa, mutta samalla täytyy muistaa, että kilpailu on globaalia. Suomen tulisi nyt siirtyä seuraavaan vaiheeseen, jonka tavoitteena on tuottaa vakaita kaupallisia tuotoksia sekä keskittyä niihin toimijoihin, jotka ovat sitoutuneita, edistyskellisiä ja pystyvät esittämään tuloksia. Tähän tavoitteeseen pääsemiseksi päättäjien sekä yksittäisten organisaatioiden on oleellista kehittää kaupallistamisen strategisia tavoitteita sekä suoritustavoitteita, joilla tarkastellaan suoriutumista taloudellisten tuotosten näkökulmasta.

Taloudellisesti kilpailukykyisten ja hyödyllisten tulosten tuottaminen vaatii myös perustavaa laatua olevan ongelman ratkaisemista: miten siirtyä tutkimuslähtöisten ideoiden työntämisestä markkinoille kehittyneempään järjestelmään, jossa kaupallistaminen on integroitu tutkimukseen ja sitä ohjaavat teollisuuden sekä loppukäyttäjien tarpeet. Tämän saavuttamiseksi suomalaisen kaupallistamisjärjestelmän ja sen toimijoiden täytyy sitoutua pitkällä aikavälillä ja syventää yhteistyötä yksityisen sektorin kanssa strategisten kumppanuuksien kautta.

1

Overview to the evaluation methodology

The objective of the assignment was to perform an impact evaluation of two Tekes' programmes:

- TULI 2002–2006 ex-post evaluation
- TULI 2008–2012 final evaluation

Also evaluating the long-term impact of Tekes' TULI activities. The overall goal was to evaluate how well TULI activities have succeeded in advancing the commercialisation of research since 1993.

The aim of the evaluation was to provide recommendations for supporting research-based entrepreneurship, developing funding instruments and strategically steering innovation policy, Tekes programmes and research, development and innovation activities in this field.

Table 2 shows the evaluation questions that were included in the original ToR by Tekes.

The implementation of the evaluation was based on Tekes' impact model, in which impact is evaluated on four levels: impacts, outputs, activities and inputs. The evaluation was divided into four phases: definition, assessment, analysis and discussion. The defining phase included a study of the operating environment, collecting background material and relevant contact details, and finalising the evaluation criteria and indicators with Tekes' steering group. The assessment phase consisted of a web survey, in-depth interviews and study of case examples. The analysis phase included statistical and qualitative analyses and an international comparison study. In the discussion phase, a workshop was held, conclusions were drawn and recommendations were formed. The phases of the evaluation are visualised in figure 10 below.

Figure 10. Phases of the evaluation.

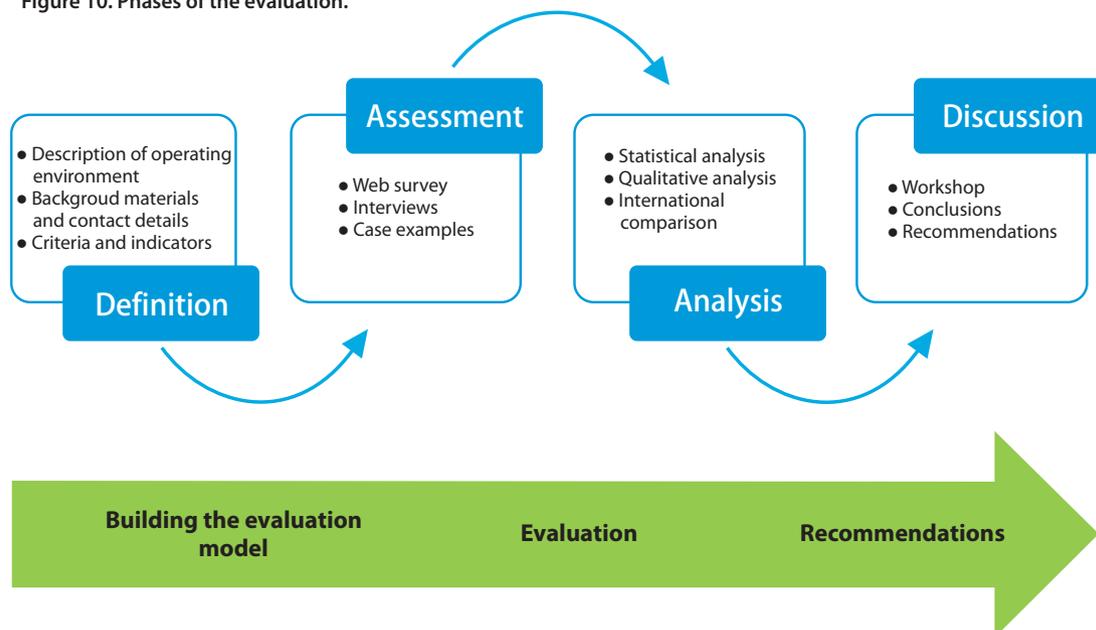


Table 2. The evaluation questions included in the original ToR by Tekes.

Task	Evaluation questions
I. Change and development of the operating environment	<ol style="list-style-type: none"> 1. What significant changes have taken place in the environment of research commercialisation in the 2000s? 2. How have research commercialisation activities been promoted and how has that succeeded in different countries? Reduced international comparison of practices in 3 to 5 countries. 3. TULL as part of the whole field of research utilisation. What has been TULL's role?
II. The outcomes and impacts of TULL programmes in relation to their targets	<ol style="list-style-type: none"> 4. How have the objectives of the programmes been achieved? What are the most important results obtained? Which results wouldn't have been realised without the programmes? How relevant and challenging can the objectives of the programmes be considered? 5. How well did the programmes reach their most important customer groups - for example, universities, researchers, students? How well did the programmes, their services and management respond to the needs of participants? What kind of experiences are there from internationalisation services? 6. How many new companies have been found with the help of TULL programmes? What has been the life cycle of the companies in comparison to other start-ups? How have the companies grown and internationalised? 7. How have the objective-specific effects of the impact model been realised during the programmes? How permanent, extensive and significant can the effects be considered? To what extent and how have the programmes affected: <ol style="list-style-type: none"> i. The development of know-how and capabilities in innovation activities. What has been the programme's impact on entrepreneurship knowledge and climate in universities? ii. The formation of domestic and International networks; especially the networking and knowledge / technology transfer between businesses and research. iii. Major innovations and business opportunities iv. Productivity and regional competitiveness v. The creation of new companies and renewal of businesses and industries. vi. The industries and the society in a wider perspective? 8. How have the above-mentioned items (i-vi) developed? Illustrated as case examples or measured with indicators.
III. Conclusions and recommendations	<ol style="list-style-type: none"> A. For innovation policy: By which means of innovation policy should the strengthening of commercialisation of public research be supported in the future. B. For Tekes: What concrete and proven best practices can be identified to be used in Tekes' new instrument "New knowledge and businesses from research", as well as in other activities such as public research customer relationship management? C. For the commercialisation activities of universities, polytechnics and research institutes: How could activities be enhanced and developed in the future? By what kind of new financial means or services could the utilisation of research results and knowledge transfer be further improved? What is the significance of regional specialisation in the future? D. For individual researchers and innovators: In which ways could the resources and skills of individual researchers, teams and innovators be better supported in the future?

The web survey was directed at the “original idea owners”, i.e. researchers, staff members and students, who had received funding from the TULI programme during 2008–2012. Contact details were obtained from TULI contact persons at organisations that had participated in the TULI programme: universities, vocational universities and research institutes. Contact details were requested from altogether 38 organisations and 25 of these chose to participate in the survey (this includes VTT, all universities except the University of Helsinki and part of the vocational universities, METLA and MTT). The survey was sent to 1,039 persons and it yielded 234 answers giving a 22.5% response rate. The survey was conducted during October 2012 – January 2013.

Data for quantitative analysis was obtained from Tekes: programme documentation, data collected by the programme coordinator during TULI 2008–2011, data collected

by the programme manager of TULI 2002–2006, Tekes’ funding data and information about companies that had been founded based on TULI funding. Regarding the companies, a follow-up study was conducted using data obtained from Taloussanommat yritystietopalvelu and Fonecta ProFinder (e.g. company revenues).

Interviews were carried out with representatives of different TULI interest groups: (i) innovation managers / TULI contact points at universities, vocational universities and research organisations, (ii) external consultants, (iii) HEI/RTO management, (iv) TULI coordination and steering group, (v) Tekes, and (vi) Ministries. A list of the persons interviewed is provided as an attachment to this report. In the final phase of the evaluation, a workshop was organised to reflect the obtained findings and to get input from the actors to formulate the recommendations.

2

The Finnish and international context of research commercialisation

In this chapter we will give an overview of important milestones relating to the Finnish development of a framework supporting research commercialisation. In addition to this we will provide an overview of important and interesting international trends to support Finnish findings and serve as a general inspiration for the further strengthening of the Finnish context.

2.1 The Finnish innovation landscape

Innovation has been a prominent topic in European research policy discussions that draw the strategies for developing global competitive advantages, growth and employment in the future. Innovation is also at the heart of EU's growth strategy for the coming decade (Europe 2020¹⁹). In this landscape, universities are considered to be a key source of new knowledge leading to radical innovations and major jumps in development.

The Finnish innovation system has received praise and international attention over the years. For example, in EU's annual research and innovation scoreboard ²⁰ Finland is ranked among four "innovation leaders" in Europe. Under global challenges, Finland has realised the need to continuously develop the innovation system on a national basis²¹. A systematic reform began in 2008, leading to a broadening of the innovation policy base by seeking economic growth and wellbeing through various types of non-technological know-how. Key choices made under the innovation strategy include investments in compe-

tence and its utilisation, growth entrepreneurship, linkage to the global operating environment, a systemic set of practices and demand and user-oriented innovation activity.

Tekes plays a key role in the practical implementation of innovation funding. Tekes' strategy has followed the guidelines set by the national strategy. In 2002, emphasis was still strongly on technology development. Since then non-technical contents and services have gained ground alongside a strengthened global perspective. The most recent strategy of 2011 "Growth and wellbeing from renewal" emphasises that success and continuous renewal of the industries are a precondition for sustainable growth and the wellbeing of people and the environment. The main target group of Tekes has been decided to be forerunners aiming for significant renewal and priority is given to growth seeking, innovative SMEs.

Legislative changes and university reform

The past decade has been a time of major changes in the Finnish innovation landscape regarding especially higher education institutions (HEI) and commercialisation of research. In addition to the main tasks of research and education, a so-called "third or societal mission" was appointed to universities. This includes commercial utilisation of public research results for the benefit of industries and society at large.

The most notable drivers influencing commercialisation of research in Finland have been the Act on the right in inventions made at Finnish higher education institutions (HEI) and the Finnish university reform.

¹⁹ http://ec.europa.eu/europe2020/index_en.htm

²⁰ http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf

²¹ Innovation Policy, Ministry of Employment and the Economy, <http://www.tem.fi/index.phtml?l=en&s=4600>

The ownership of inventions made in HEIs was re-defined by legislation entering into force in Finland on 1 January 2007: Act on the Right in Inventions made at Higher Education Institutions (369/2006). This Act sets basis for HEIs' regulations regarding exploitation of inventions made by university employees, processing of invention disclosure notifications and policies on rewarding inventors. The Act covers employees at both universities and vocational universities.

Today all universities and many vocational universities have designated innovation services (at least a single innovation liaison officer or a research officer). Their key task is to provide researchers the necessary commercialisation support services and processes for practical matters, like IPR agreements and invention disclosure notifications.

The Finnish university reform is part of European higher education reform ("Delivering on the Modernisation Agenda for Universities: Education, Research, Innovation", Communication of the European Commission, 2006). The key development targets are internationalisation, clearer institutional missions and positions, and diversification of the funding structure. The main objectives of structural development of HEIs emphasise ensuring quality and effectiveness, as well as strengthening the role of HEIs within the innovation system.

The legal status of Finnish universities changed in the beginning of 2010. The universities are now legal persons separate from the State, either as corporations under public law or foundations under the Foundations Act. The aim is to improve the universities' capabilities to operate within the surrounding society and in an international environment.

According to an impact evaluation conducted in 2012, the greatest effects of the reform are at this initial stage observed in strategic management²². The reform has strengthened universities' strategic steering and management, financial management, stakeholder cooperation and development of internal organisations. The top management has played a pivotal role in these changes, while the role of other university personnel has been rather thin so far.

Encouraging the universities to develop their profiles and select their strategic priority areas was one of the key aims

of the university reform. According to the impact evaluation, several universities have already made some strategic choices in their resource allocations due to the legislative change. The upcoming financing model reform also aims at developing a better, more efficient international university system with stronger impact and a better defined profile²³.

On the whole, it still remains too early to say how substantial strategic choices the universities will make in the coming years.

National policy regarding commercialisation of research

Commercialisation of research – turning public investments into competitive products and services – has not been a real forte of Finland. When comparing the level and quality of Finnish research to economic activity springing from this research, experts have pointed out a discrepancy between the high R&D input and relatively low innovation output, named as the "commercialization paradox"²⁴.

This is a recognised European-wide problem. EU countries have not been able to close the so-called innovation gap like international leaders USA, Japan and South Korea, and emerging economies such as China, Brazil, and India have been catching up over the past five years.²⁵ Flagship initiative of the Europe 2020 strategy, called the Innovation Union, aims at removing obstacles to innovation – like expensive patenting, market fragmentation, slow standard-setting and skills shortages – which currently prevent ideas getting quickly to market. Member States are invited to carry out self-assessments and identify key challenges and critical reforms as part of their National Reform Programmes.

In Finland, national policy has been developed over the last ten years to address the commercialisation challenge with the aim of improving universities' capabilities of transforming leading research into commercially applicable innovations and removing bottlenecks that prevent good ideas from reaching the markets. At the same time, the Finnish innovation policy has developed from a technology-driven approach to a broader base. In commercialisation, emphasis has notably shifted to

²² "Yliopistolakiuudistuksen vaikutusten arviointi", Opetus- ja kulttuuriministeriön julkaisu 2012:21

²³ Laadukas, kansainvälinen, profiloitunut ja vaikuttava yliopisto – ehdotus yliopistojen rahoitusmalliksi vuodesta 2013 alkaen, Opetus- ja kulttuuriministeriö, 2011

²⁴ "Commercialization at Finnish universities", Tahvanainen, Nikulainen, ETLA Discussion paper, 2011 and references therein.

²⁵ http://ec.europa.eu/news/science/120208_en.htm

favour the entrepreneurship and start-up route over licensing and transfer to existing companies. This is clearly visible and outspoken in universities' strategies: they aim at spinning off companies and thus providing their societal impact through the expertise and jobs created by these companies.

In addition to legislative changes, Finnish innovation policy tools have included new services to support commercialisation and reforms of public funding instruments. Public programmes, most notably the Tekes TULI programmes, have been established to develop commercialisation capabilities and structures. A plethora of intermediate organisations have taken part in the commercialisation process, including science parks, regional development companies, incubators and service providers.

Several studies have pointed out factors that currently seem to pose obstacles to successful commercialisation. These include the academic culture and researchers' motivation to partake in commercialisation²⁶, professionalism and effectiveness of intermediate actors in the commercialization process²⁷, availability of proper services or resources (linked to the previous points), and innovative companies' access to finance²⁸.

Role of TULI programme in the Finnish context

TULI programme has been the central instrument of Tekes to improve the effectiveness of research commercialisation. This includes funding and other activation and support measures targeted at commercialisation of results or ideas originating from public research. The focus of TULI activities has been the early stages of the commercialisation process: activating the flow of potential ideas, supporting the development of commercialisation capabilities and structures, and extending the funding base (e.g. from initial investigations to proof of concept).

In addition to TULI, other funding has been available, especially for the phase after a start-up has been established. Tekes has always offered R&D funding for companies, and targeted Young Innovative Enterprise (NIY) funding became available 2008. Funding has also been available through ELY-centres (Centres for Economic Development, Transport and the Environment) and Finnvera.

On the side, the Foundation for Finnish Inventions has offered support for screening and evaluating inventions and

business ideas made by private persons. The Foundation has also played a major role in developing the commercialization capabilities across Finland, e.g. through a network of technology transfer officers (some of the officers later employed by universities were initially employed by the Foundation).

Overall, TULI accounted for a large part of the activities carried out in the early commercialization stages that include idea generation, first evaluations of commercial potential and mapping the possible commercialisation routes. Further financial support for these stages from the research institute (except for VTT), university or polytechnic was typically very limited or completely absent.

The coverage of TULI funding increased through the years. In the first programme 2002–2006, only initial stage idea evaluations could be funded, while during the latter part 2008–2012 three funding phases were possible within TULI, followed by a possibility to apply for further proof-of-concept funding from Tekes.

2.2 International trends and benchmarks

This section presents and exemplifies three different trends in various ways linked to commercialisation, involving actors on different levels. The trends highlighted concern 1) the integration of references to commercialisation in research funding, 2) how commercialisation structures can be consolidated in different ways, and 3) policy makers' understanding of the need for long-term commitment to commercialisation support structures.

Commercialisation as an integrated part of the mainstream research funding

For certain individuals within academia driven by curiosity, that find reward in accumulation of new knowledge, research just for the sake of research may sometimes be incentive and satisfaction enough. However, from a larger point of view, taking societal needs into consideration and weighing in the need to strive for economic growth, job creation and rising affluence; it is equally important what happens once the research part is done. Turning research findings into tangible products or usable services, either through creation of new

²⁶ Commercialization at Finnish Universities, Tahvanainen, Nikulainen, ETLA Discussion Papers, 2011

²⁷ Välttämättömät tutkimuslähtöisen yritystoiminnan edistäjänä, Jari Konttinen, Nina Suvinen ja Mika Nieminen

²⁸ See, e.g. http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=action-points

companies or licensing of IP, contributes to those other goals that transcend the mere scientific value of research. This trend reflects a more conscious inclusion of commercialisation-related efforts in funding of research to take the knowledge “out of the labs”. It does not necessarily mean that the end-goal must be commercialisation, but it is a reminder of that important piece of the puzzle.

To a certain extent, we see this as a growing trend both on a European level as well as in the national research programmes. To illustrate this, we have chosen two examples:

- Integration into Horizon 2020
- The Dutch NanoNed programme

Horizon 2020^{29 30}

The aim of Horizon 2020 is to secure Europe’s global competitiveness through research and innovation. The programme, similar to previous programmes, will aim to support top-level research in Europe and promote industrial leadership, and as such the programme will be one of the most important funding vehicles for the European research community.

Compared to its predecessors, Horizon 2020 will take a stronger focus on the importance of research and innovation, as well as the utilisation of that research to overcome the challenges in the future. In this sense, Horizon is expected to put an even stronger emphasis on how the projects will commercialise/utilise the results. As highlighted by the programme, it will be even more important to show that there is a commercial need for the end product of the research project.

Nanotechnology in the Netherlands-NanoNed^{31 32}

An example of the importance of keeping commercialisation in mind during research is the nanotechnology industry. The NanoNed project is a joint project between eight centres of excellence and Philips and has established a valorisation platform that can help with the commercialisation process. The aim of the project is to improve the knowledge infrastructure in the Netherlands. The approach to reach this objective is a strong system for knowledge transfer that can lead to new industrial nanotechnology applications. A fundamental part

of the NanoNed project is to start and support new business activities.

The nanotechnology industry is special, for instance there is no typical existing market for the products that are developed. According to the NanoNed project, the markets are created when nanotechnology research generates possibilities for creating better and cheaper products. More ideas for new and diverse industries are generated in this kind of technology. The small start-up companies are important in the development of the whole nanotechnology industry, and new and diverse industries are generated constantly.

Lianne Doeswijk, advisor at Agentschap NL, was interviewed regarding how companies and the Dutch government are cooperating to develop nano and micro technology. She concludes that an overview perspective that organisations, such as NanoNed can provide, can help scientist in the development phase of a project. When distributing the financing of research funds, these kinds of interventions seem to increase the return of investment. It represents a more efficient way of structuring funds and provides a better utilisation of knowledge. Projects like the NanoNed can help by providing networks and address questions that evaluators tend to ask. There is an advantage to know what and how investors and others in the industry are thinking, as there is otherwise a risk that the researchers are not utilising the research funds in the development phase in an optimal manner. And so, the researcher might spend funds on tests that are not necessary or underestimate the importance of other tests that potential investor believes is important.

Consolidation of commercialisation structures

A trend of consolidation can be witnessed on different levels and with different meaning attached to the term “consolidation”. For instance, as can be seen from the German example, consolidation was – and has continuously been – orchestrated on a national level, concentrating and strengthening the commercialisation structures of the universities through regional technology transfer offices with the expertise to serve a multiple number of surrounding universities, and also research institutes. We also witness this model as one success factor

²⁹ http://ec.europa.eu/research/horizon2020/index_en.cfm?lg=en&pg=faq&sub=results&printfaqs=yes

³⁰ European commission “Impact assessment” (2011) http://ec.europa.eu/research/horizon2020/pdf/proposals/horizon_2020_impact_assessment_report.pdf

³¹ “Nanotechnology in the Netherlands-valorisation” <http://www.nanoned.nl/valorisation/about.html>

³² “NanoNed – Annual report” (2009). <http://www.nanoned.nl/downloads.html>

in cases where this trend of one TTO serving several research organisations has been launched not based on a requirement by a funding agency/policy maker, but on individual initiative. This is for instance visible in cases from Switzerland, Australia and Norway as the examples below will show.

Creation of a regional system of technology transfer structures in Germany^{33 34 35}

Several national reforms in the early 2000s had a significant impact on how technology transfer at publicly funded research organisations in Germany was to be conducted. Following, or perhaps playing a key role in initiating, the European trend of enabling Higher Education Institutes (HEI; universities, universities of applied sciences and colleges in particular) to take an active role in the commercial valorisation of the research results/inventions that were developed by their staff, the German policy makers moved to remove the so-called “professor’s privilege”³⁶; an amendment of the law governing the employer-employee relationship, which took effect in early 2002.

Through a national initiative termed the “*Verwertungsoffensive*” (Valorisation campaign), the Federal Ministry of Education and Research (BMBF) wanted to develop and professionalise the infrastructure for a more efficient commercial utilisation of research results; the overall goal being to create a more dynamic regional and national economy.

As part of this initiative, a transformation of the existing technology transfer offices was undertaken, which resulted in a network of publicly funded PVAs (*Patentverwertungsagenturen*³⁷) that were regional, and which should preferably serve several universities and/or research institutes. The German government’s initial goal was for the establishment of one PVA in each of the 16 states, which in the end became 21 institutions performing commercialisation services on behalf of close to 240 different universities and research institutes. The important point being raised here is that it was not foreseen

to be an efficient use of resources to allow each and every university or research institute to develop these structures on their own; at least in this initial phase. The requirement was instead that universities join forces for this mission and form commercialisation structures in cooperation with other regional research actors.

The PVAs have since then constantly been evaluated and followed-up. As a result, the number of PVAs has declined as some models have proven not to be effective/produced the results expected. As some organisations have ceased their activities, regional governments and universities have instead started to investigate even further consolidation of structures to also allow transregional partnerships, e.g. Brandenburg-Berlin or Schleswig-Holstein-Hamburg.

Similar to this trend, the BMBF has initiated a more recent initiative, which takes a thematic (not geographical) approach to commercialisation. For example in the programme “*Sektorale Verwertung*”, service providers have been procured to provide thematically oriented commercialisation support to research institutes (and to a certain extent also towards universities). The rationale being that a successful commercialisation approach requires in depth industrial insight and networks. Consequently a small number of public and private actors have been awarded this task, e.g. the public organisation Ascension handles a substantial share the commercialisation activities in the field of Life Science.

University of Queensland – UniQuest^{38 39}, Australia

Modelled after similar university technology transfer experiments in Silicon Valley and Cambridge, England, the company UniQuest was established in 1983 as the responsible commercialisation unit of the University of Queensland (UQ). UniQuest, which is a wholly-owned subsidiary of UQ, identifies, packages and commercialises university technology, expertise and facilities, operating through four separate divisions.

³³ Sidonia von Ledebur (2008) – “Technology transfer offices and university patenting: a review”, Jena Economic Research Paper, <https://www.econstor.eu/dspace/bitstream/10419/25717/1/570983843.PDF>

³⁴ “PVA MV Report on the abolition of the German professors privilege” (2003) http://www.vinnova.se/upload/dokument/Om_VINNOVA/Regeringsuppdrag/Vinnforsk/Vinnforsk_8_tyskland.pdf

³⁵ “Offentligt stöd till universitetens samverkansuppdrag” Vinnova analys VA 2006:05 <http://www.vinnova.se/upload/epistorepdf/va-06-05.pdf>

³⁶ Professor’s privilege: The right of a university staff member to privately dispose of the results of his/her research activities.

³⁷ Patent and commercialisation agencies

³⁸ <http://uniquest.com.au>

³⁹ Australian Centre for Innovation – Best Practice Processes for University Research Commercialisation <http://www.howardpartners.com.au/publications/best-practice-processes.pdf>

Techcom, the technology commercialisation branch, works with a decentralised “Hub and Spoke” model whereby so-called Managers of Innovation and Commercial Development (MICD) are embedded in faculties and institutes within UQ and other partner research institutions (e.g. University of Wollongong, University of Technology of Sydney, James Cook University). The collaboration with universities, centres of excellence and research institutes allows UniQuest to package projects with content from multiple sources, building on the individual, but complementary research strengths of each partner.

This has proven a very successful approach, which has had many positive spin-off effects on how technology transfer can be handled effectively and efficiently within a framework that includes several research organisations, but builds on the synergetic utilisation of the already available experience, expertise and resources of one strong and competent actor whereas at the same time providing an additional funding stream for the UQ to support and further strengthen its in-house commercialisation unit. Fundamental to UniQuest’s success, which today e.g. can boast both about playing a key role in the development of several globally recognised products and showing substantial annual revenues (in excess of 250 million Euro for the last five years), has been its continuous development of strategic commercialisation partnerships with leading Australian universities and research institutes.

UniTectra⁴⁰ – Universities of Bern, Zürich and Basel, Switzerland

UniTectra, formed in 1999, is the joint tech transfer structure of the Swiss universities Bern and Zürich, and more recently also Basel. The company, a wholly-owned subsidiary of the universities, is different in the way it was established. Instead of springing from a national or regional initiative, UniTectra was created by a demand for stronger interaction with universities by industry, and was consequently also founded by people with an industry background.

Despite of being an external unit and having a multi-actor approach, UniTectra has made a lot of effort to establish close relationships with the researchers of the universities, and to be perceived as an in-house resource at one of the universities. University researchers contact UniTectra exactly the

same way they would call any internal unit at the university; this in order to create and build trustful relationships with the research staff.

UniTectra provides a strong resource for the universities when engaging in commercialisation activities, providing competent staff and proven methodologies for supporting commercialisation activities, which provides the universities with a framework to draw support from. At the same time, the model is flexible and adapts itself to the universities own sets of rules concerning the vision for commercialisation, objectives for technology transfer, distribution of income, etc. These rules and guidelines are respected by UniTectra and they handle technology transfer within the boundaries set separately by each university.

The university shareholders of UniTectra however agree that the model has provided them with a platform that works and pays off, particularly due to following success factors:

- Critical mass of research results for commercialisation
- Synergies on all levels, from financing to IP portfolio
- Negotiating power, e.g. both in individual agreements, but also in creating more long-term industrial collaboration platforms, that otherwise would not have been possible

The last factor recently played an important role, when the three universities formed a long-term collaboration with pharma giant Roche in 2012 to foster and support joint R&D and knowledge transfer between the partners. The management of the collaboration programme will be led by UniTectra.

Bergen Teknologioverføring⁴¹, Norway

Bergen Teknologioverføring (BTO) is a technology transfer office founded in 2004 by the University of Bergen, Haukeland University Hospital and the Institute of Marine Research, following the removal of the professor’s privilege in Norway in 2003. Today, BTO supports eight research institutions in the Bergen area with commercialisation of research results and handling of intellectual property aspects.

In addition to technology transfer services, BTO also functions as the local commercialisation actor of the innovation promotion programme FORNY, run by the Research Council of Norway and Innovation Norway. Through its Consulting branch, BTO provides entrepreneurs and others outside of

⁴⁰ <http://www.unitectra.ch>

⁴¹ <http://bergento.no>

academia with relevant services, competence and networks linked to the innovation process.

According to Mr Anders Haugland, managing director at BTO, the technology transfer office provides an infrastructure that the participating institutions would not be able to maintain single-handedly due to the cost. The critical competence is gathered in one place instead of being duplicated at each institution and is specialised towards life science – a common research area among the partners. Furthermore, gathering all the technology transfer efforts under the BTO brand provides visibility in the innovation system; BTO is a clearly defined actor, not only towards local entrepreneurs, but also towards regional decision makers responsible for distribution of project funding.

Mr Haugland acknowledges that BTO is well on its way to reach the targets set for year 2020 by FORNY⁴², so far there have been 31 spin-offs and 60 cases of technology licensing. However, he also stresses the importance of anchoring a project like BTO thoroughly with the participating institutions, so that the terms of cost and benefits to the individual partners is understood and agreed upon from the beginning.

Innovationskontoret Fyrklövern^{43 44}, Sweden

Innovationskontoret Fyrklövern is an innovation office serving Örebro University, Mid Sweden University, Karlstad University and Linnaeus University. The four universities are regarded as equal partners and nodes, united by their similar geographic and regional conditions as well as being comparatively young among Swedish universities. Fyrklövern is one of the current eight university innovation offices established through a Government decision in 2009 as a measure to initiate, stimulate and support the utilisation of research from Swedish academic institutions.

Operations within Fyrklövern are network-based and the innovation support services are jointly developed by the participating universities. Benefitted by co-operation with other relevant actors of the regional innovation system, the office provides researchers with support starting in the research phase through all stages until the final creation of a business.

Mr Håkan Spjuth, Manager Grants and Innovation Office at Karlstad University, see many benefits with the Fyrklövern model, perhaps the most important having to do with resources. The smaller size of the universities results in limited funds, so being a part of Fyrklövern brings both a depth and width of competence that would not have been possible to achieve for a university acting independently. The fact that the universities can “borrow” expertise from each other gives a higher level of service and professionalism towards the researchers seeking advice; Fyrklövern can offer experience within every topic.

The innovation office has also accelerated the cooperation between the universities, according to Mr Spjuth. Researchers previously unknown to each other have been brought together through Fyrklövern, leading to joint applications for project funding. Another goal and ambition for the innovation office has been to bring added value to the region of each university; a closer cooperation between e.g. the County Administrative Boards is an outcome of Fyrklövern.

National programmes with long-term commitment

The development of a self-sustainable commercialisation structure with sufficient financing and able to handle the task it was designed for, takes time. The trend of long-term commitment in support of e.g. technology transfer offices presented here reflects an increasing understanding of this among policy makers.

French National Research Agency: SATT⁴⁵

The SATT, Sociétés d’Accélération de Transfert de Technologies (“Technology transfer accelerating companies”), is run by the French National Research Agency within the Investment for the Future Programme launched in 2010, with a budget of approximately 1 billion Euro during a ten-year period. The intention is to create a “big size” technology transfer structure with a critical mass of technology transfer professionals and sufficient financial resources.

⁴² The FORNY programme (“Forskning basert Nyskapning”) by the Research Council of Norway

⁴³ <http://www.kau.se/forskning/grants-and-innovation-office/innovationskontor>

⁴⁴ Telephone interview, Mr Håkan Spjuth, Manager Grants and Innovation Office at Karlstad University, 2013-02-28

⁴⁵ “Tech transfer current reforms in France: SATT – tech transfer accelerating companies” <http://www.slideshare.net/met3project/tech-transfer-current-reforms-in-france-satt-tech-transfer-accelerating-companies>

There are nine SATTs, with two additional under way (2012), made up by a mix of universities and research organisations, given the task to act as an interface between research and industry. Their overall aim is to increase the efficiency of value creation from French research by accelerating the transfer to and application by industry; accelerating technology transfer to companies in order to strengthen the innovation potential as well as the competitiveness of French industry.

In practice this is done by the SATTs through provision of a wide range of technology transfer and commercialisation services, as well as organising vertical integration of technology transfer activities. Thus, SATTs are involved in e.g. innovation culture promotion, IP portfolio management, support of collaborative research, project engineering from early stage technology to commercialisation and transfer, defining IP and technology transfer strategies, and more.

The Research Council of Norway's FORNY2020 Programme⁴⁶

The FORNY2020 Programme ("Forskingsbasert Nyskaping") runs between 2011–2020 with a total budget of approximately 675 million Euro, with the overarching goal of facilitating innovation commercialisation of R&D results generated by publicly-funded research institutes.

This is captured in the Programme's primary objective as stated in the work programme: to "increase value creation by ensuring that R&D results from publicly-funded research institutions are brought to the market." The programme has a broad coverage, supporting commercialisation within all disciplines and business areas where concepts and R&D results come from research institutions backed by public funding; including those instances where collaborative projects involve actors from trade and industry as well. FORNY2020 provides competition-based proof-of-concept funding intended for verification of R&D results with the aim of facilitating the commercial application of these results.

The notion is that projects in an early stage of development, where potential utility and profitability is uncertain, and risks may appear too high for both private and public actors to get involved, suffer from low demand that needs to be com-

pensated through some measure. In this case, FORNY2020 acts as that mitigating measure. Furthermore, the intention is to create growth in new or existing companies through funding of projects expected to generate either substantial commercial returns or major societal benefits.

In addition to the pure commercialisation support measures, the FORNY2020 Programme supports the establishment of technology transfer offices connected to the publicly-funded research institutions. The basic funding for these TTOs is awarded on a multi-year basis and may cover up to 50 per cent of the operating costs of the TTO. The Programme also allocates funds for promoting network-building and competence building at TTOs, improving their integration and collaboration with actors from trade, industry, research.

Swedish Governmental support for Innovation offices⁴⁷

The most recent version of the Swedish government's "Bill on research and innovation" (published in October 2012), describing the Government's intentions for the period 2013–2016, specifically highlights the role of the current eight innovation offices present at Swedish universities. Along with the holding companies also connected to universities and colleges, the offices are credited as important tools in increasing cooperation as well as utilization of research-based knowledge. The current innovation offices were created through funds allocated specifically for this purpose in the previous Bill, published in 2008.

Based on the good results and the vital role in strengthening the academic institutions' ability to act, the Government intends to increase the funding over coming four years with the explicit intention of establishing innovation offices at four Swedish universities where there currently are none. "All universities should be given the same opportunities to support innovation through an innovation office, and therefore should be given the funds for such offices", as it is rationalized in the Bill. The funds are supposed to be used for building basic competence in e.g. business development and IPR, but also for assisting individual students and researchers in utilizing research-based knowledge.

⁴⁶ "Work programme for the FORNY2020 programme (2011-2020)" http://www.forskningsradet.no/prognett-FORNY2020/Home_page/1253963921779

⁴⁷ "Forskning och innovation, Prop. 2012/13:30" <http://www.regeringen.se/sb/d/15650/a/201368>

3

Assessment of fulfilment of programme objectives

In this chapter we will assess the programmes fulfilment of its objectives, as well as pay special attention to programme additionality and adequacy in this regard.

3.1 Objective 1: Development of a professional commercialisation system

Objective 1: Develop and strengthen research commercialisation readiness, processes, structures and know-how to bring them on par with international standards.

One of the main objectives of the TULI programme was to enable the development of fundamental capacities and structures within the universities and research institutes to provide professional commercialisation services for the research community. From the perspective of the evaluation and when putting the results and effects of the Finnish system into an international context, it is of course necessary to at the same time consider the effects of parallel initiatives and programmes when discussing the actual effects and contribution of the programme. Chapter 2 already discusses such important effects on a systemic level, which are important to consider when analysing the programme's contribution to reaching the pre-set objectives. These effects will also be discussed in this chapter to support the discussion of the results and effects, as well as programme additionality.

Our conclusion

We conclude that TULI is one of several important measures to impact the level of commercialisation readiness and professionalism in terms of structures, competencies and processes at Finnish universities and research institutes⁴⁸. As a funding

instrument, the programme is unique in the Finnish context as it provided research organisations access to funding to put policies and reforms into practice, which we believe would otherwise have not been made available on a holistic scale.

TULI played an important role towards a professionalised commercialisation system

Coupled with measures such as legislative reform (e.g. the Act on the Right on Inventions) and policy reform (e.g. University reform), TULI provided an important piece of the puzzle in regards to enabling universities and research institutes in creating such a system. It is evident from studies of other countries that have gone through similar change, that legislative and policy reform combined with a flexible funding instrument has provided key incentives to enable the envisioned system reform. It is therefore not possible to say that one reform was more important than the other; instead all these activities were warranted and should be viewed as a whole. We thereby conclude that the base line funding instrument as provided by TULI was absolutely necessary to allow for the systemic improvements on a national level we now witness. We furthermore conclude that TULI has provided both the incentive and the financial means to catalyse the development of commercialisation services at a national level, which we do not foresee to have happened on a similar comprehensive level.

Increasing the level of interest and awareness of commercialisation were the largest effects

To reiterate, the programme's objective was to develop and strengthen commercialisation readiness, processes, structures and know-how, and to bring these on par with international

⁴⁸ Other measures in this regard have already been presented and discussed in chapter 2.

standards. Based on the actual effects that we have seen within the research organisations, we can conclude that the largest impact can be seen in the early phases of the commercialisation process, namely concerning increased interest, awareness and understanding of the commercialisation process. This concerns not only researchers, but also innovation managers as well as upper management. This is evident from the interviews, as seen by the following selected quotes:

- **Creating direction:** *"TULI created an agenda for change – a sense of urgency and need for action, which could not be disregarded."* – Innovation manager at a university.
- **Increasing awareness:** *"Awareness among researchers has greatly improved. It's now at 80%, where it used to be 20% based on our own surveys."* – Innovation manager at a university.
- **Changing researcher mind-sets:** *"TULI helped researchers see that entrepreneurship could be a career path" and "Using words like 'commercialisation' and 'product' is no longer considered as swearing in church."* – University vice-rector and innovation manager.

That the programme clearly served the purpose of activating the research community to take part in the process, is also evident from the increasing flow of idea-phase proposals that were identified by and presented to the innovation managers. While the first programme period (2002–2006) account for approximately 1,000 invention disclosures, the latter programme period (2007–2011) can account for more than twice that size, namely over 2,500 disclosures. Such numbers should of course be analysed with caution, but one apparent conclusion that can be drawn from this is that the researcher mind-set and the university/research institute surroundings has improved in the sense that the awareness and level of interest had substantially increased over the years.

This conclusion is further supported by the fact that statistical evidence further shows that researchers were becoming more engaged in the commercialisation activities. Here the number of idea-phase project proposals increased from below 500 in 2008 to approximately three times that size in 2011.

TULI played a fundamental role in establishing processes and structures

The other aim of the first programme objective was to support the creation of professional support structures and processes for handling and steering the flow of innovations as well as

allowing for their professional commercial development towards the market. The efficient screening of invention disclosures/research projects in regards to commercial potential, and the active support and leadership needed in regards to achieving that potential should be considered an absolutely critical function in the chain of commercialisation activities. As such this service both requires very experienced and competent commercialisation experts that can overview the situation and provide as well as assign key services that actually bring the invention forward. It is not to be expected that the driving force in this regard can be the researcher, but instead the innovation manager (and/or an external consultant).

The process however needs to be clear and transparent in order to care for the efficient handling of inventions, to allow for clear decision points and decision making, as well as a transparent dialogue with the researcher. In regards to the Finnish system, we conclude that there are clear signs of the development of such structures and processes at most participating research organisations.

We furthermore conclude that TULI has played a fundamental role in allowing for the creation of such structures and processes. Before the initiation of the programme, it was clear that very little (if anything) existed in terms of internal support structures/measures for commercialisation services. Instead this task was mainly left to the researcher, with the university being uncommitted as evident from the following quotes:

- **Need for structures:** *"Before TULI we had no processes, no structures. It was just a 'random walk', where we happily left the researcher alone to do everything. If we as the employer do not believe in this, support this, why should the researcher? Or put in other words, I would have been very surprised if they had."* – University vice-rector.
- **Creating structures and processes:** *"TULI allowed us to develop instruments, which we would not have been able to develop on our own. We can support individual innovations, but our budgets would not have allowed for the development of structures."* – University vice-rector.

More importantly, in addition to seeing structures and processes being developed (this has been happening over a somewhat longer period of time), we more recently see signs of maturing structures and processes through a number of indicators. For instance, we witness a decreasing trend of both invention disclosures as well as patent filings at both universities and research institutes between 2008 and 2011, with invention disclosure

being down to 52% in 2011 (compared to 2008) and patent filings being down by 58% in the same period. In the interviews the actors have indicated that this is due to focusing on the best cases, which could be interpreted as more professionalism in analysing applications/increased awareness that commercial value is created through business development services. This is also evident from an international benchmark, where the initial phases often saw an increased focus on awareness raising and early phase commercialisation services. Based on this you often tend to see a strong increase of invention disclosures and patent filings during the first 2-3 years. Subsequently, as the organisation matures, you tend to see these numbers drop in favour of more business development related services. The following quote illustrates this conclusion:

- **Developing competencies, increasing professionalism:**
“During the first TULI programme, we spent most of our time on invention disclosures and patents. Today it’s 50% and the other 50% is spent on business development.” – Innovation manager at a university

We would regard this statement as a positive sign and a clear indication of maturing organisations. This means that the pipeline of new inventions disclosures has stabilised and that researchers have reached a level of awareness both in terms of opportunity, but also importance, that their research could possibly have a commercial value. This would then allow the innovations managers, to apply a stronger screening filter in regards to the in-flow of invention disclosures, and focus more on the actually providing commercial services/business development support (which in itself is much more time consuming and is where the commercial value is starting to be developed).

Since such services do require a lot of time per case, this could be an explanation for a reduced inflow/pipeline. Another possible explanation, which cannot be disregarded, is that the decreasing trend is a result of winding down of activities due to the uncertainty of future TULI/internal funding.

The challenge is now to continue to allow these services to be developed and mature, e.g. through the provision of incentives and other supporting measures, in order to reach sustainability while at the same time caring for value generation and efficiency in operations. From a European perspective, we conclude that Finland can indeed show internationally leading individual structures for commercialisation (Aalto University and VTT), followed by a breadth of organisations with varying degree of readiness and capabilities to provide

commercialisation services. As such we regard the system as a whole is on par with European peers (e.g. Sweden, Denmark and Germany). Whereas it would be unfair to attribute the success of Aalto and VTT solely to the TULI programme, it is evident that TULI has played a part. On other hand, the implication of TULI in the other participating organisations is evidently higher, and this is also where the comparison to European peers should be made.

Large perceived differences and effects between the target groups

The aforementioned discussion also leads us to the point of how TULI has been perceived and what effect the programme has had within the different research organisations (universities, research institutes and vocational universities). Even though TULI from a programme perspective did not discern between these research organisations, or between different organisations within one group, it is evident that the programme has impacted each organisation differently.

We can therefore conclude that there has not been “one TULI programme” for all actors, instead the programme has allowed for enough flexibility to allow for differences/similarities in approach and methodology, but also – of course – in between different actors within one segment (perhaps most evident in regards to the universities). Furthermore, the different internal cultures and prerequisites have therefore allowed for the development of different approaches and results. It is from our survey and prior understanding of the Finnish system evident that different organisations were differently prepared to engage in the TULI programme.

Whereas research institutes in general – and in the Finnish setting VTT in particular – had a long tradition of collaborating hand-in-hand with the industry, conducting research on much more application oriented solutions, the universities had a much different tradition. It is consequently evident that the research institutes based on this, were better prepared (e.g. in regards to mind-sets, research projects, networks and industrial networks and understanding) to embrace this change. At the same time the universities, with the exception of technical universities, did not enjoy the same level of tradition and understanding, and consequently motivation, of conducting application oriented research with the focus on providing results for the industry. Whereas many of the vocational universities who had been working with industry had most of their experience in practical-level implementation projects, and lesser so in R&D-based cooperation.

In turn, this automatically influenced the internal agenda for implementing the programme, e.g. taking into account the level of understanding and interest of the average researcher, the familiarity and sense of importance of the function in the eyes of upper management, the commercial relevance of and industrial involvement in the results, pre-existing structures and process, and of course the breadth of the existing industrial network. As a consequence, the mind-sets posed an immediate challenge for the establishment of the structures and therefore also governed the initial phases of the establishment of the structures and processes. It was evident that organisations had to adapt their offer towards the inventors who were most likely to participate in the process. This meant lead to the following rough characterisation of target groups for the different organisations:

- Research institutes: Researchers
- Universities: Researchers, but to a certain degree also students
- Vocational universities: Students

The effect of how the different organisation types chose to implement the programme also lead to different impacts in regards to the TULLI intentions and objectives (which is not necessarily the same as providing value in individual organisations or in their individual settings):

- **Highest impact/lowest value:** Vocational universities – No prior experience. TULLI enacted the commercialisation system. Predominant strategy: entrepreneurship/start-ups. Students leaving the university after completing their studies. Limited possibility for the universities to follow-up and impact results after the students have finished their studies. As such, it is possible that these activities for most will remain as an internal entrepreneurship programme for students. Low propensity to finance operations.
- **Medium impact/highest value:** Universities and research institutes except for VTT – Limited prior experience. TULLI provided an instrument to create structures and processes, where such were necessary/required. Thereby helping

CASE STUDY: University of Jyväskylä

“During the past 5–6 years, the biggest change has been an increase in knowledge and knowhow. Also change in awareness and attitude is clear among research staff”, describes Riikka Reitzer, Innovation Manager at the University of Jyväskylä regarding the most significant results of TULLI programme from her point of view.

TULLI programme has also played a role in developing the internal commercialisation structures. The University of Jyväskylä was the first in Finland to move innovation managers into their own budget funding. Before that all Finnish innovation managers were employed by the Finnish Foundation for Inventions, although many of them worked at the university campuses.

According to the University’s internal surveys awareness of innovation services has increased substantially among the research staff over the TULLI period, from around 20% to around 80% now. The amount of ideas has increased three fold, from below 50 to current 150 annually. Quality of the original idea proposals perhaps hasn’t changed, but the innovation services see that they are now much better equipped and capable to select the most promising cases,

also knowing how to work on those. They have learned that the researcher’s commitment plays a central role in the commercialisation process. The innovation services now steer the researchers to process their ideas further using e.g. NABC-analysis⁴⁹ – which also tests the commitment of the researcher in the very beginning.

Regarding the future, Jyväskylä will be emphasizing entrepreneurship in their strategy. They are joining forces and sharing resources locally through a joint pilot with the JAMK University of Applied Sciences under the entrepreneurship theme and establishing cooperation with Protomo which offers product prototyping along with support and business sparring. Together with JAMK they have an on-going project KOHINA that aims at building a joint innovation and entrepreneurship culture in the organisations. This includes an activity named “Ideasta ilmiöksi” (“from an idea to a phenomenon”) that aims at clarifying the commercialisation process and includes activation measures, workshops and awards. The University has also launched a service called “commercialisation clinic”⁵⁰ to partly replace work previously done in the TULLI programme.

⁴⁹ “Need, Approach, Benefits, Competition” is the Stanford Research Institute’s (SRI) method, often used for early stage invention assessment.

⁵⁰ Kaupallistamiskliniikka

the universities to comply to their societal mission (e.g. “the third task”, “innovation union”, etc.) and greatly speed up the development process. Predominant strategy: entrepreneurship/start-ups. Capable of providing clear value and medium to high propensity for the university to finance operations.

- **Low to medium impact/medium value:** VTT – Considerable prior experience (comparatively). TULI provided additional means to support the development that was already happening, possibly speeding up the process. Predominant strategy: licensing. In line with internal strategies/mission, provides clear value and a high propensity to continue financing operations.

We acknowledge that there are exceptions to the categories.

Programme additionality

TULI provided an instrument that complemented and catalysed the development

Evaluation methodology states that counterfactual analysis is preferred when analysing the additionality of a programme intervention. In reality this is seldom possible, as it is not possible to isolate the effects and impact of a programme to an uninfluenced environment. In consequence, additionality should be considered carefully and always clearly indicate other identified influencing factors. We have taken additional care to assure this, as can be seen from the prior discussion of TULI and parallel measures enacted during the programme life time.

A European comparison shows that the programme’s objectives, such as Objective 1, have in the absolute majority of cases in other countries been developed through similar programmes such as TULI (albeit with slightly different programme functionality and logic). This realisation in combination with the input from the interviews, particularly with upper management, we conclude that it is highly doubtful that such a comprehensive change in particular in regards to awareness and structures would have been possible in the absence of TULI, or a similar funding instrument. The parallel measures that accompanied TULI affected other fundamental aspects of the process, but a funding vehicle was absolutely necessary to enable the development of operations at universities and research institutes.

At the same time, it can certainly be argued that structures and processes might have been developed based on in-

dividual initiatives, such as at the major universities (e.g. Aalto) or research institutes (e.g. VTT), as a result of these actors are more closely following the international trend and are more inclined to invest resources to stay on par with their immediate peers. The interviews with innovation managers and upper management, have however not clearly indicated that this would have been a parallel reality. On a holistic level however, we conclude that TULI in many cases has been instrumental in orchestrating a similar comprehensive system, which is now visible (in terms of competencies of staff, visible structures and documented processes).

More to the point, we also conclude that the level of additionality has of course been of varying degree between the three research organisations (universities, research institutes and vocational universities – albeit with individual exceptions):

- **Universities:** In the absence of Aalto, we regard that TULI has been critical for most universities to reach the programme’s objectives.
- **Research institutes:** We conclude that the additionality of TULI in this setting is lower. On the one hand we a committed and highly experienced RTO in VTT, whereas on the other hand the other RTOs did not have such a strong prior experience. We believe that the level of awareness, competence and professionalism to a high degree already existed at VTT based on its closeness to and relationship with the Finnish industry. As such, it is likely that the structures and processes we today witness would have been developed anyway. In VTT’s absence, we witness both commitment and development at MTT, which we attribute highly to the programme. The same cannot be said for the remaining institutes, where we have seen very little sustainable development.
- **Vocational universities:** Very high degree of additionality. Based on the interviews, it is evident that prior to TULI nothing in terms structures and processes existed. This has been established with TULI funding. Since the vocational universities have chosen to focus on students, it is also evident that awareness among researchers has remained low, so also the commitment of management.

The perceived and desired effects among the three types of research organisations should in hindsight be discussed with Tekes in order to understand possible internal priorities that should be used when finalising the analysis of these results.

Programme adequacy

TULI provided an easy-to-use and well-structured instrument to catalyse development

Our interpretation of the programme logic is that one of the fundamental objectives of the programme was to allow a large number of researchers to come into contact with the programme (with commercialisation) in order to affect mind-sets of a large number of researchers, provoke upper management and provide an easy-to-use vehicle for initiating the process. In this regard the programme's approach (small amounts favouring many projects, low-bureaucracy, short decision making process, etc.) served this purpose well.

We furthermore conclude that the individual amounts distributed, were adequate to take the first critical steps towards understanding and developing the commercial potential (i.e. adequate to analyse, understand and to a certain degree develop the commercial potential of the invention) to make it presentable to a licensee/buyer/partner for collaboration. The scale and scope of the programme, in regards to the funding distributed, was similar to what can be seen from other national programmes (e.g. VINNOVA's "Verifiering för Tillväxt" and the budgets distributed to the German PVA's⁵¹ for individual cases).

To this end, we conclude that the programme was aptly suited to allow for the foreseen results.

3.2 Objective 2: Make commercialisation a strategic topic for HEI/RTO management

Objective 2: Encourage HEI/RTOs to position research commercialisation as a strategically important part of their activities, including adequate resourcing

Another fundamental objective of the TULI programme was to engage upper management of the research organisations in the creation and development of the internal commercialisation process; both through the active support of the mission as such, but also by actively ensuring that fundamental aspects of commercialisation are included in the internal policies and strategic guidelines of the organisation. This in turn was in order to allow both awareness and processes to thoroughly permeate the research organisations with the outspoken, active support and commitment by management to facilitate this cultural shift

among the research staff. The longer-term objective being that the research organisations themselves would be willing and able to assign internal budgets towards this purpose during, and even more importantly after, the programme has ended.

Our conclusion

TULI has not yet permeated the mind-set of management; however is part of an agenda which cannot be disregarded

Taking into account the long history and internal culture of particularly the universities, it should be emphasised that the additional mission of innovation and value creation has happened over a rather short period of time. From previously being activities outside of the curricula that received little to no structured attention on a systemic level, to becoming part of the daily vocabulary of both management and research staff. Here TULI has certainly played a part.

- **Creating a new language:** *"TULI created a national platform and a common language that supported change."* – Innovation manager at a university

It is of course not possible to isolate this trend to a particular policy reform or funding programme. Instead there are many factors that have played a part, from industrial development to enabling funding programmes to support this change.

A few factors that we view as critical in this regard:

- **Industrial shift** towards a knowledge-driven economy
- Economic challenges and financial crises
- **Policy shifts** driven by the European Union, national funding agencies and ministries
- **Global trends and success stories**, using American (and European) universities/research organisations as role models and good practice
- Research funding becoming more interlinked with innovation and societal impact
- **Legislative** and other **reforms** (e.g. Law for inventions, University reform, ...)
- **Increased awareness** and insight in how universities/research organisations actually can contribute
- **Catalysing funding programmes** supporting the development and implementation of commercialisation activities

⁵¹ PVA: Patent- und Verwertungsagenturen; Patent and commercialisation agencies

In this vast and complex chain of cause and effect, we see that management has consequently been influenced and participated in many layers of this process over the course of many years, and that the various aspects have impacted management to different degree. To this end, we conclude that management will first and foremost see to it that the organisation as such is ranked high based on its traditional merits (e.g., and somewhat simplified, academic merits for universities and the degree of industrial funding for research institutes), as this is generally conceived bottom-line for how the organisation remains competitive and successful. Consequently we regard that measures closer to the traditional mission of the organisation, such as a policy/legislative reform and the design of funding programmes for research, has had the highest impact in lifting commercialisation as a strategically important topic.

This said, we can summarise that on the whole the aforementioned measures on a collective level have impacted the organisations to a degree that commercialisation today is certainly part of the strategic agenda, and also visible in the internal policies. They are however, still of lesser rank and importance in comparison with the main mission, which at the same time is understandable. What is more disturbing is that we witness very little in terms of substance, e.g. discussion and support of internal funding or measurable KPIs, to accompany and support these policies. Until more commitment is provided, we cannot regard the programme objective as achieved.

Management is acting according to guidelines and policies, yet with little commitment

There is also the inherent risk that commercialisation and the activities that support it, despite being supported both in writing (in internal strategies and policies) as well as in the message of management, are not actually understood by management. In this case, what we are witnessing is opportunistic, “forced-upon” adaptation to a changing policy/funding environment. This could for instance explain the reluctance by the majority of organisations to do more, or on own initiative, than what is required by policy makers/to attract funding.

- **Management buzzword?:** *“We have developed these services since it’s a ‘must-have’ when presenting our university and our services, e.g. towards visitors”* – Innovation manager at a university

The hypothesis is to a certain degree also supported by the web survey directed at researchers who have been partici-

pated in the TULI programme. When researchers rated the different aspects of the local innovation, the criteria that received the highest and lowest scores were the following:

- **Highest:** *“Commercialisation is strategically important in my organisation (university / AMK / RTO)”* – Score: 3.7 of 5.0
- **Lowest:** *“My organisation invests sufficient resources in implementing the commercialisation strategy”* – Score: 3.0 of 5.0

It’s not surprising that the level of resources invested is criticised in the survey; the amounts provided, e.g. in the perspective of starting a company, were minor. However it is also an indication that commercialisation is seemingly high and frequent on the agenda, but is not substantially backed-up with internal/additional resources. As such, innovation and commercialisation run the risk of becoming a “buzzword” with little importance and substance to it.

Cultural resistance still exists; propensity to change is still isolated with the individual

Further support to this hypothesis can be drawn from the observation that the permeation of commercialisation at the individual organisations are still very much driven by individuals or groups of individuals, who show a higher propensity to actively engage in commercialisation activities.

- **Cultural saturation:** *“Researchers committed are still only isolated clusters of driven groups/individuals”* – Innovation manager at a university

As with the organisation itself, this is of course also for the individuals a cultural issue that competes with other tasks of the individual researcher. Consequently, we can conclude that management (as a result also of the TULI programme) has had only limited success in activating the research community on the whole.

TULI has allowed policies and guidelines to be operationalised

Based on this, we conclude that TULI, as funding instrument, has had little to, at best, moderate effect on HEI/RTO management to position commercialisation as a strategically important part of their activities. On the other hand we believe that TULI has been a welcomed tool by management as it has allowed universities and research organisations to develop the ability to provide commercialisation support and to function in this changing environment, and consequently act in line with the policies and general need for change that has been

evoked upon them by both national and European policy makers.

- **Sparkling discussions:** *“TULI served as a ‘battering ram’ catalysing action and discussions within the organisations and among them for how these issues could best be handled.”* – University vice-rector

In addition, TULI is regarded to have provided management – even though it was not steered by management – a useful and functional tool to convince and enable researchers to become interested and involved. Furthermore, as the programme was provided by Tekes, the point was raised in several discussions that this helped to give the activities a higher sense of importance and urgency towards the researchers. Would the programme have been provided solely internally and with no immediate connection to the national setting, it is likely that such activities could have been more easily disregarded by the research staff.

- **Changing researcher mind-sets:** *“Tekes helped give the programme credibility towards researchers.”* – Innovation consultant

Commercialisation is viewed as clearly inferior to the original mission of the research organisation

It should at the same time be said, that the described reluctance, or inability, by management to more forcefully support this change, is by no means a Finnish phenomenon. In other peer countries the role and active engagement of the research organisation to provide internal budgets and more forcefully steer this development has also, despite of similar policy reforms and supportive funding programmes, remained low.

From a European perspective, the technology transfer activities in several countries despite the outspoken ambition to rather quickly reach self-sustainability have continued to be dependent on external funding intervention to provide and sustain commercialisation services for the research staff. This is true for a majority of European countries that have developed, or have the ambition to develop, structures and processes that support commercialisation. A few examples to be named here are Sweden, Germany, France and Norway, where the structures practically since the beginning have been financed by external programmes, rather than through internal budgets. Currently we are not able to discern a pattern that would break this trend.

As a result, the commercialisation services have often been forced to experiment with various funding sources and uses, in

order to be able to provide a comprehensive service package to the researcher staff (e.g. often receiving task-specific funding for different activities from public programmes, regionally available structural funds, or EU-programmes). Exceptions exist of course, and these tend to be more prominent organisations that have a longer history of providing commercialisation services and where management is firmly on-board and have clear perspective of how these services serve the overall mission of the organisation. Examples on a European level for instance include leading British universities, such as Oxford University and Imperial College, or larger consortia of research institutes, such as the Fraunhofer or Helmholtz Associations.

This said, it should be kept in mind that the successful examples listed above are a minority and which have had a longer period to develop, implement and adapt these services so that they fit with the overall mission. As a result the individual models tend to be different, as the different organisations have chosen individual strategies and objectives for this task.

- **Change management within universities is not done overnight:** *“The programme had too short a timeframe to allow for the cementation of structures/process and for achieving cultural change.”* – TULI board member

As visible from the aforementioned discussion, to develop and implement a functional and sustainable commercialisation service is not only a national challenge, but a European one, and as such it requires a broader solution, if the objective is to be reached on a larger scale.

Different levels of prior experience, clearly steered results

We conclude that TULI had a broad aim, targeting all research organisations. At the same time the programme was set in the ground in organisations with widely varying internal cultures, “business models” and prior experience. From this perspective we regard that management within the different organisations, was differently prepared and committed to the programme. As a result, we can discern between outliers in different perspectives:

- **“Prepared” organisations** where TULI fitted with the internal strategies, e.g. Aalto University and VTT. These are also the examples where we have seen the clearest indications/commitment of management to provide internal complementary funding during the programme, as well as step up funding post-TULI to cover prior TULI budgets. *Indication of (some degree of) management commitment.*

- **“Unprepared” organisation** with little to no fit between TULI and internal strategies, e.g. some of the smaller universities and the majority of the vocational universities⁵². Here the results, structures and processes run the high risk of being stopped and lost, if no other public funding can be made available to continue where TULI has left off. *Indication of no management commitment.*

The majority of the organisations (particularly the universities) are of course to be found in between these two extremes. This said, we can only see true congruence to Objective 2 at VTT, this being due to the tradition of strong interaction with industry, more application oriented research and lower degree of conflicts between academic and commercial achievements. At the same time, we cannot conclude that these results were to a large degree attributable to TULI.

Programme additionality

As a tool TULI was a welcomed instrument for operationalising policies, yet was in itself insufficiently addressing management

In light of a national and international scenario of policies increasingly focusing on innovation and commercialisation as well as the national legislative change/university reform, TULI has been a welcomed tool for management to create the ability to provide such services.

We further regard it as unlikely that management on their own initiative would have directed internal resources to this regard; here the programme served its purpose to kick-start development and activities. A European comparison also clearly indicates that public programmes have been used to catalyse the development of these services elsewhere; it has not been internal funding. Here TULI aptly filled a function in the system.

We furthermore conclude that it would have been difficult for management due to internal politics to divert budgets towards commercialisation services at an early stage without the clear support/demand by Tekes/Academy of Finland/national policy makers. To the same degree, this is a reason

for why we are not seeing more resources being directed at commercialisation services today (since it's not demanded/required) at a time when research/administrative budgets run the risk of being cut.

The programme has in that regard not made it evident to management that innovation in a societal/economic impact is a result/achievement in itself.

Programme adequacy

To entice management, instruments and policies must be accompanied by more forceful KPIs/incentives

The TULI funding has been flexible and unbureaucratic enough to allow management to actively use it without too much hesitation and red tape, thereby making the “price for the exercise” low and participation high.

It's evident that the programme has not achieved a systemic impact within management. To this regard, the programme, as can e.g. be seen in the quotes, can be criticised for being too short to achieve this. A perspective worth considering is at what point in time the notion of “commercialisation” (and TULI) became visible on the management level. In light of other reforms (Law for inventions in 2007 and the University reform in 2010), it is likely that programme was not adequately targeting management up until the second programme period (starting 2008). In this case, TULI has actually only had an effect on the internal structures and cultures for approximately four years, which indeed is a very short timeframe, thereby also giving further support to the fact that the programme was too short-lived to have an impact on the management level, also due to the fact that the first programme period was virtually “lost” as it was not targeting/involving management.

The main focus of the programme was to target researchers and provide them with resources for the further development of their inventions. Had the programme targeted management and required a more active participation by management, it is likely that this would have rendered more visible results in internal strategies and management mind-sets.

⁵² It should however with reference to the vocational universities that these activities are still on-going until the end of 2013. As such this statement might be premature, but made on the basis of what is visible at the time of the evaluation.

CASE STUDY: Aalto University

Aalto University represents an interesting story in both the Finnish and European environment, and has already in its very young lifetime (albeit with much older roots), continued to develop many innovative and internationally highly regarded and inspiring methods and tools for supporting innovation, entrepreneurship and commercialisation, such as:

- Aalto Center for Entrepreneurship (ACE)
- Start-up Sauna – co-working space and program for start-ups, now encompassing several functions branded under the same name:
 - Internship program (previously Start-up Life)
 - Accelerator program (coaching program since 2010)
 - SLUSH conference
- Aalto Entrepreneurship Society (Aaltoes.com) – student-run entrepreneurship community
- Aalto Factories: Design Factory, Media Factory, Service Factory – platforms combining expertise
- Staffing – combining key competencies from public organisations, VC, industry and academy

A unique development, during a very short timeframe, that required the strategic vision, commitment and strong support of university management. At the same time the very structure (a merger of three fundamentally different universities) and mission of the university⁵³ (that includes top-quality research, enabling renewal, and nationally, supporting Finland's success and the society's competitiveness, thus linking to the original working name, an "Innovation University") makes this an interesting case to be viewed more closely.

University management showed inventive ingenuity when combining the three universities in 2010 and initially choosing the wording "Innovation University". However, Aalto seems to be now at a point where the community is in disagreement regarding the achieved results and part want to see the original mission back higher in strategy – excellence in research has received a lot of attention lately.⁵⁴

- When Aalto researchers and students who had received TULLI funding were asked to rate the aspects of their local innovation system, Aalto received surprisingly low scores regarding strategic importance: "Commercialisation is strategically important in my organisation" – Aalto score: 2.9 of 5.0 compared to 4.4 of VTT and 3.4 of other universities⁵⁵
- In other aspects, such as availability of resources, Aalto was on the same level or higher than the others.

The reasoning behind a high emphasis on top-quality research is that scientific excellence and publications in leading journals enable Finland to be part of the international scientific community, and leading companies looking for substantial innovative jumps want to build partnerships with the world's leading researchers. Aalto's approach is to combine top-level research to cross-disciplinary way of working in order to make an impact with the inventions originating from science. This is an ambitious task. A key question in this equation is that is there a good match between the needs of the Finnish society of and fields of research – and could this match be further improved by deeper partnerships between the key economic players and the research community.

⁵³ Mission: Aalto University works towards a better world through top-quality research, interdisciplinary collaboration, pioneering education, surpassing traditional boundaries, and enabling renewal. The national mission of the University is to support Finland's success and contribute to Finnish society, its internationalisation and competitiveness, and to promote the welfare of its people.

⁵⁴ For example, discussion in the Finnish press, e.g. article in *Tekniikka&Talous* 18.1.2013

⁵⁵ www-questionnaire to "original idea owner's" (researchers and students) who had received funding from the TULLI programme. Survey was conducted as part of the evaluation with the assistance of innovation services.

3.3 Objective 3: Create dynamic cooperation between the actors

Objective 3: Promote active cooperation between universities, research institutes and vocational universities as well as the establishment of joint functional consortia in activities aiming for commercialisation

In order to promote a more effective national platform for joint learning and sharing of experiences, for the purpose of speeding-up the learning curve and allowing the different actors to achieve results more quickly and efficiently, the programme also aimed at promoting active cooperation between the different actors in the form of functional consortia. To our understanding this was by the programme orchestrated to result from the consortia of research organisations that were formed in order to exchange experiences as well as discuss and decide on the funding of individual cases. Other than that, there was little direct guidance from the side of the programme to promote and organise such cooperation. Instead this was left to the individual organisations to care for.

Our conclusion

TULI was insufficiently structured to incite collaboration

Based on the aforementioned summary of how the cooperation between the organisations was foreseen to function, we can conclude based on the low level of actual, and especially functional, cooperation that the programme did not include enough incentives or programme measures to incite the research organisations to reach this objective. We have of course witnessed some cooperation and exchange, but little that exceed the “normal exchange”, what would be expected anyway.

- **Low level of cooperation:** *“Other than the regular contacts, there was very little cooperation with others”* – Innovation manager at a university

Cooperation was to a certain degree orchestrated/required through the programme, in the sense that the research organisations had to form consortia in order to discuss and decide on funding allocation of individual projects. These consortia were especially by the lesser experienced organisations initially seen as very helpful venues for exchanging experience, learning and discussing cases.

- **The consortia were appreciated, but underutilised:** *“For us the consortia were very helpful and provided a way to learn from others. We would however have liked to remain in the original consortium with both Aalto and Helsinki university, as this would have helped to speed up our own learning process”* – Innovation manager at a vocational university

We conclude that even though that most, if not all, organisations had the best of intentions for these consortia meetings, the effects in terms of true, meaningful exchange and cooperation was not achieved, and consequently that this opportunity was left underutilised.

We conclude that this can be explained by:

- The programme did not include sufficient measures/incentives for cooperation
- Overall understaffed innovation offices; the available resources were not sufficient for the own organisation, let alone for supporting others (even though this could have enabled synergies/increased efficiency)
- No perceived incentives to cooperate; less so by the more experienced organisations as these would mainly have been giving support, not receiving similar support in return
- Sense of “competition” between the different innovation offices and research organisations
- No prior culture of cooperating in this regard

Low tradition and incentive to collaborate

In conclusion we regard that that these factors jointly contributed to lack of closer cooperation between the actors. Especially due to factors such as limited internal resources, lack of perceived incentives and culture to cooperate in this regard, the programme would have needed more forceful measures (e.g. related to the funding itself) to enable this objective. Instead cooperation was limited and the purpose for the innovation managers was unclear.

- **Cooperation was limited to individual cases, which were enabled by other factors:** *“Cooperation with other organisations was limited to situations where we had a shared case; a research project that involved researchers from another university”* – Innovation manager at a university
- **Purpose of joint evaluation processes unclear:** *“The purpose of the consortia for evaluation was vague. Most of the time, the agenda was not clear and it was also not evident how and who made the decisions in regards to awarding*

funding to individual cases – even our own!” – Innovation manager at a vocational university

At the same time, and also due to the lack of clear objectives and guiding mechanisms from the programme, we regard this objec-

tive to be of lesser importance from the programme’s perspective, and should possibly be regarded more as an “experiment” to evaluate if such cooperation would be possible and meaningful. We conclude however that such cooperation, had it been achieved, would have contributed positively both in regards to

CASE STUDY: Turku region

One of the more interesting success stories of cooperation that went beyond mere discussions is the cooperation between Turku University (TU) and Åbo Akademi University (ÅA). The universities due to their geographical closeness have a long history of prior collaboration that covers many aspects of university functions (e.g. managerial aspects, research collaboration, student exchange and joint educational programmes). Consequently when it came to the TULLI programme, the universities decided to develop a joint plan and actively support each other with resources, particularly during the initial phase of the programme.

The close cooperation between the universities was consequently characterised by many of the things that we believe helped create dynamics, efficiency and learning particularly in the absence of a strong funding for structures and staff:

- **A joint TULLI plan** and mission to collaborate from the very beginning
- Joint evaluation board
- **Shared resources** (personnel, databases, administrative functions, etc.)
- Shared office space for a time
- **Operational cooperation**, where TU in the beginning took a leading role also supporting ÅA researchers and helped support the development of the ÅA innovation office. Today senior staff of TU still acts as advisors to ÅA, and ÅA innovation managers are also listed as support staff on the TU website.

Many of the shared functions, e.g. shared office space and to a certain extent also the shared resources, were provided in the initial phase, before both universities could house their own staff. However, when the innovation offices physically separated in 2009/2010, a very strong cooperation and exchange remained. Both universities, and particularly the

innovation managers, regard the experience to be very positive and plan to continue this development. So far discussions between university managements for a more in-depth cooperation are on-going and agreements on principle level exist. A plan for a regional strategy also involving the Turku Science Park (and Tekes) is well underway.

There are of course a number of success factors that enabled this partnership:

- **Prior tradition of cooperation** and exchange; which contributed to an environment of low entry barriers and frequent contacts between university staff and management.
- **Regional closeness**; the closeness of the two universities certainly contributed to a high degree as the innovation staff also shared office space and had easy access to the research staff.
- **Strong political (management and regional) will to collaborate**; which is also visible in the university strategies and a common sense of a mission and need to support regional development and competitiveness.

As such, these factors on the whole were of course aspects that existed prior to the TULLI programme, and consequently the programme cannot be seen to have had a major enabling effect in promoting such cooperation. To a certain degree, this also supports the prior conclusion that if collaboration is not forcefully demanded by the programme, it is of lesser likelihood that a funding programme, such as TULLI, can orchestrate fundamental change in the internal culture. It is also evident that cooperation, to actually happen, needs to be initiated early in the activities. It is clear that the jointly formulated TULLI plan for the universities played a major part in actually laying the foundation for the cooperation that we today can witness.

increased efficiency, and possibly success, of the commercialisation activities, as well as the overall success of the programme.

Some colourful success stories of functional collaboration between innovation units exist, and one such example is described in more detail in the case study of this chapter.

General high interest for collaboration, but not viewed as a priority

We do not see any noteworthy differences between how the research organisations chose to cooperate; overall the level of cooperation was fairly low. We can at the same time conclude that the desire to cooperate and learn was higher among the vocational universities in comparison with the universities and research institutes. Similarly, it was also visible in the interviews that the more experienced organisations, e.g. Aalto and VTT, were overall positive towards finding ways to cooperate with other universities and regularly received as well as held discussions with visitors and other organisations how they could support them. The fact that such cooperation did not happen, despite the readiness and desire to do so, is to our understanding mostly due to the effects mentioned above.

Programme additionality

TULI did not provide an additional effect on the level of collaboration between the organisations

As already highlighted in earlier chapters, we conclude that in light of the limited level of visible and outspoken cooperation between the organisations that the programme did not succeed in inciting cooperation beyond normal levels. Furthermore, the main tool to achieve this, the evaluation consortia, was not successful in sparking discussions and operations in regards to how synergies, efficiency and learning could be supported between organisations or in local settings. The few good examples that we witness, despite being interesting success stories, cannot be attributed to the programme, but rather to a prior history and a regional motivation to collaborate (e.g. the Turku case).

Programme adequacy

TULI was insufficiently structured to incite collaboration

Based on the aforementioned evidence, we conclude that the programme did not include sufficient steering mechanisms to promote and establish cooperation beyond the normal ex-

change, and that consequently the objective was not reached. The purpose and objective of the evaluation consortia, as the single operative tool to achieve this, were unclear to main innovation managers, and as a consequence they remained underutilised. We further regard that clear indicators, funding mechanisms or other incentives would have been needed to motivate the organisations to develop and establish functional partnerships. Granted, such collaboration had it existed, would possibly have been able to increase efficiency within the resource-strapped organisations, conversely however limited resources were raised as a reason for not engaging more in collaboration and partnerships.

3.4 Objective 4: Challenges in integrating commercialisation into the academic world

Objective 4: Attract top-level researchers and business development advisors to collaborate & create technology transfer networks among researchers and private service providers to help commercialise potential projects

Enabling the creation of a commercialisation ecosystem as an integrated part of the research community was a central mission of the TULI program. Functional technology transfer networks and inclusion of private service providers is an integral part of such an environment. Other initiatives, on-going changes in the academic system, shifts in national policy and international trends each played a role here as well. In the following discussion we analyse observed results and effects, providing also a discussion of TULI's contribution.

Our conclusion

We conclude that the TULI programme played an important role in the first step of development, raising awareness, and led to an increased understanding that utilisation of research and high-level science are not conflicting. Actors on the field agree that TULI was the right instrument for that time: helping to establish the foundation for functional and, in time, professional commercialisation structures and ecosystem.

Practical tool for early stages of commercialisation

TULI was a practical tool to involve external experts to help in the early stage examination of commercial potential and proof of concept, and led to increased capabilities in universities to use such services. There are local functional networks at larger campuses, e.g. Aalto University and VTT in Otaniemi, but

we do not see that TULI would have played a significant role in creating these, and TULI did not induce systemic change in creating dynamic environments. The interaction of researchers with private sector providers was limited and commercialisation was not profoundly integrated into the research environment, although some leading organisations are now expressing an intention to move in this direction.

Experiences increased, but direct interaction with researchers was limited

External consultants were used in a large part of the projects. According to the research survey conducted as part of this evaluation⁵⁶, 75% of the respondents had worked with external consultants and 50% of them had positive or strongly positive view that external consultants provided additional value. 15% were unhappy with the external consultants.

The interaction between researchers and private sector services providers was nevertheless limited. Awareness of commercialisation among researchers increased substantially from a status where it simply was not part of the academic world ten years ago, but there is still a fair way to go before we can say that the academic culture has truly been reshaped and top-level researchers are committed to engage in commercialisation. TULI catalysed the build-up of the ecosystem, acted as a platform for discussion and raised awareness. In this sense it was viewed extremely important among different actor groups. There are currently some local functional networks at larger campuses (e.g. Aalto University and VTT in Otaniemi), while collaboration with public actors and regional development organisations is more visible in the regional areas (e.g. Turku, Tampere, Joensuu).

In vocational universities, the focus of commercialisation activities is on student entrepreneurship. According to interviews with representatives of their innovation services, the best experiences have come from working with mentors or coach-type external consultants. From the organisations' point of view, there is a lack of possibilities to be involved in the later stages of the process and follow-up after the students leave the organisation because the student no longer has any formal connection to the university and the organisation does not have any means or resources to follow-up.

Networks built on personal contacts

During the TULI programme, networks among research organisations and private sector providers were created mainly through the personal contacts of innovation managers. It can be concluded that this increased the competencies of universities' innovation service offices in using external services, i.e. capabilities to define the projects and service content increased. However, TULI did not induce a systemic change in creating dynamic environments and enduring technology transfer networks.

To study the reasons behind this, we need to investigate three factors in more detail: (i) the role and intrinsic motives of the researcher, (ii) positioning, available resources and competences of innovation service units, and (iii) commitment of university management.

Researchers are motivated by non-economical motives

Starting with the researchers, their predominant motive to participate in commercialisation is an opportunity to put their research into use (Figure 11). For students who had participated in the TULI programme the driving motive was financial benefit. This has also been pointed out by an earlier study⁵⁷ which stated that researchers' propensity to commercialise is much less affected by economic factors than it is by altruistic, socio-cultural or personal motives. According to this study, the three most important factors for researchers to engage in commercialisation are (i) the inventions' potential to have a beneficial impact on society, (ii) the researchers' ambition of self-fulfilment and a determination to avoid letting the potential of an invention to be wasted in vain, and (iii) securing research funding for further academic research. In a quest to mould the academic culture and create dynamic environments that bear economic and societal benefits, it is important to understand these intrinsic motives of the researchers aiming to serve greater ends. It can be pointed out here that the researchers give positive feedback to the TULI programme in its ability to increase the researchers' interest in developing ideas further. Thus those who have done it are more open to doing it again.

⁵⁶ www-survey aimed at "the owners of original ideas", i.e. researchers, students, staff members in universities, research organizations and universities of applied sciences who had received TULI funding during 2008-2012. Email addresses were obtained from TULI contact persons in the research organizations.

⁵⁷ "Commercialization at Finnish universities", Tahvanainen, Nikulainen, ETLA Discussion paper, 2011

Figure 11. Motives to participate in TULI programme. Data includes all responses from www-survey conducted as part of the evaluation. Researchers were the largest respondent group accounting for 65% of total responses. For students, the driving motive was financial benefit.

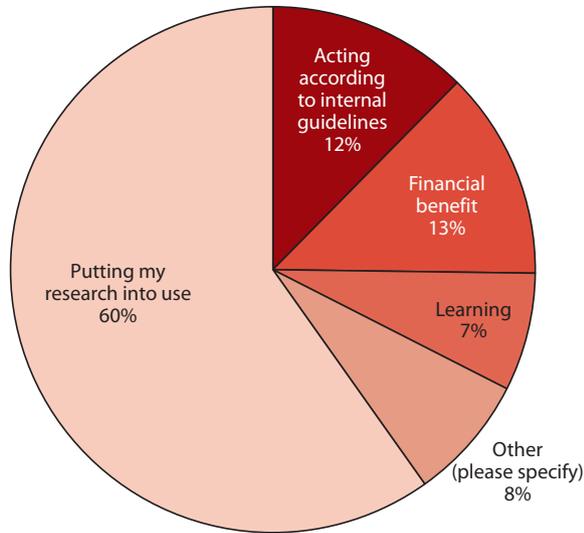
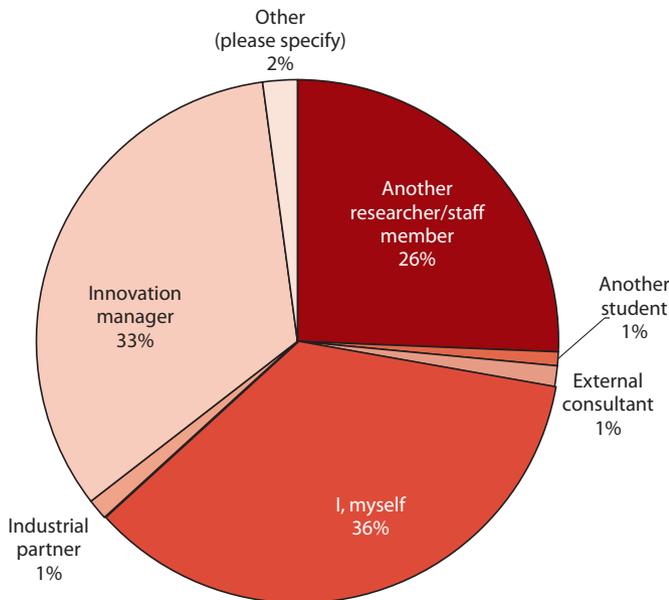


Figure 12. Driving forces to apply for TULI funding. From www-survey conducted as part of the evaluation.



Tekes increased the credibility of innovation services

Second, the innovation service units have taken the demanding task of supporting the researchers in various commercialisation activities. In general, participants of the TULI programme were satisfied with the availability of their innovation manager and fairly satisfied with the value that the innovation manager has provided in the commercialisation process. Overall, the researchers view that the commercialisation services seem to be developing in a positive way. Tekes increased credibility of innovation services in the eyes of researchers and showed that researchers had the means to do something in order to pursue putting their research into use. This produced a change in attitudes, which has been further strengthened by a general strengthening of entrepreneurial spirit, mostly visible in the student movement at Aalto University.

However, when the situation is investigated in more detail, problems become visible. A prior study⁵⁸ has concluded that the innovation service units have not become an integral part of the university culture as of yet, and we witnessed this in our evaluation as well. The researchers may be fairly satisfied with the services, but the overall they do not embrace such services as an important part of their work. For this situation to change, the innovation service units need to further increase their visibility and communicate to the researchers from their point of view, addressing their true needs and ambitions. In order for this to succeed, commercialisation also needs to be much more clearly supported by the management, visible in strategies/policies, in universities' goals and in speeches / presentations. The management support is vital for this to become important for the researchers.

Signs of increasing management commitment

The positioning of innovation service units is linked to the third point mentioned above, namely university management's commitment to commercialisation. Although utilisation of research results is now stated to be important on strategic level by most universities, this certainly was not the case ten years ago, and funding from the universities' own budgets for commercialization activities has been to a large part non-existent in most universities and vocational universities. On the whole, commercialisation is not integrated into research activities and innovation services still remain isolated units in universities. Very recently, there have been Increasing signs of

⁵⁸ "Commercialization at Finnish universities", Tahvanainen, Nikulainen, ETLA Discussion paper, 2011

management commitment into implementation, for example through allocation of internal resources, although these activities still mostly run by a small group of individuals. The leading universities and VTT have a dedicated vice-president responsible for innovation activities, an outspoken strategy and are planning ways to integrate commercialisation more into research.

Greatest needs in professionalism and real-life business know-how

When considering the effectiveness and professionalism of the commercialisation and technology transfer processes, most interviewed persons stated that currently the greatest needs lie in building up competences and making the system within universities more effective in producing high-quality cases, as well as involving persons with real-life business know-how in the commercialisation cases, for example through a network of serial entrepreneurs or persons with in-depth industrial expertise. There is a limited supply of competent, committed business developers and no systematic way to involve external consultants or professionals. Often it is not well understood what types of competences are needed in which part of the process. For example, the least experienced persons may be evaluating the incoming flow of ideas, resulting in low efficiency.

- **Competencies:** *"TULI did a great job in activating universities into commercialisation. But the increase in competencies has been regrettably low."* – TULI steering group member
- **Real-life business experience:** *"Finnish public actors have very little real-life business experience."* – TULI steering group member
- **Finding the potential ideas:** *"The change to TUTLI is good. It shows the university management the need to evaluate ideas. But where do the universities find the competences to dig out the potential ideas? Perhaps an external expert is needed?"* – TULI steering group member

Programme additionality

Experiences increased, but no systemic change induced

Good progress was made, but TULI did not induce systemic change in creating dynamic environments. There are individual very successful cases and local functional networks around the

larger campuses (e.g. Aalto/VTT/Otaniemi) which in our view are not attributable to TULI although it played a part. On the whole, top-level researchers were only committed to a certain degree, the supply of competent, committed business developers and external consultants was limited, and their interaction with the researchers was narrow. TULI perhaps played a larger role in inducing collaborative development in some regional areas in which several organisations (including universities, vocational universities and regional development organisations) have searched for synergies and built partnerships for commercialisation (e.g. the universities in Turku region, and University of Jyväskylä with JAMK University and Protomo).

Regarding competencies of universities' innovation services, TULI was a practical tool for using external services, and through experience, the competences of innovation managers to use such services increased. Here we see that the additionality of TULI was rather high in universities and vocational universities due to the fact that the organisations' own budgets were very limited and it is unlikely that the development would have taken place even nearly as extensively without TULI.

Programme adequacy

TULI provided an instrument for building collaboration between researchers and business development professionals, but success was limited by the immaturity of structures

We conclude that the programme was adequate in the sense that it provided an instrument that allowed innovation managers to attract, test and utilise the services of external consultants (and/or other supporting organisations). That this cannot be described as an absolute success, is mostly due to the fact that the innovation managers (on the whole – exceptions exist) had too little understanding of how to maximise the input of the outside resources and how to use them in an effective way. This is due to the fact the internal structures and processes were not adequately developed to handle this. Another factor, related to this, is that the programme did not create a large enough impact with leadership for them to assure that commercialisation was regarded as an important topic for the entire organisation (including the best/most suitable researchers).

CASE STUDY

VTT can be described as a “professional research organisation” with corporate-level functions in place and growing emphasis on innovation and business development. Of the studied organisations, it has the most evolved environment for technology transfer. VTT is actively integrating commercialisation with research activities. Business development specialists will participate in research programmes, and work actively with researchers leading business development work packages in the projects. VTT Ventures, a company providing pre-seed and seed funding for VTT based technologies, has an in-house entrepreneurial development program: Entrepreneur-in-Residence. The program is designed for developing start-ups originating from research at VTT and is regarded as a “Bridge after TUTLI⁵⁹”.

3.5 Objective 5: Licensing is not a straight-forward deal

Objective 5: Raise licensing and technology sales of public research results to a quantifiably solid international level.

In order to discuss the fulfilment of objective 5, it is important to understand changes that took place in the operating environment during the programme period 2008–2012. The ownership of inventions made at HEIs was redefined by legislation entering into force in Finland on 1 January 2007: Act on the Right in Inventions made at Higher Education Institutions (369/2006)⁶⁰. At the time when the second TULI programme was being prepared and this objective was set, great expectations were casted on licencing and IP sales, existing knowledge and experiences of this were very limited. At that time Finnish universities only held a handful of patents and even internationally only few universities had managed to gain substantial income from licencing⁶¹.

Our conclusion

Today, the feasibility of this objective was questioned by many during the evaluation. Emphasis in national innovation policy and universities’ strategies has notably shifted to favour the start-up path over licencing.

Licensing and technology sales volume has not increased during the latter TULI programme 2008–2011. VTT accounts for a large majority of total income and is the only organisation that is producing sales repeatedly. The reasons behind this relate to the on-going university reform and changes in national innovation policy. The Finnish home market for licensing and IP sales is very limited, and universities see a contradiction in international IP sales and serving the societal mission in Finland. In addition, international sales would require expertise and contacts that universities currently do not possess.

The traditional way to utilise research is knowledge transfer to companies through collaborative research and companies employing university personnel. Collaboration with industry, including SMEs, should be developed further to strategic partnerships in selected areas to enable long-term end-user / need-driven guidance.

Licensing and technology sales did not increase during last years

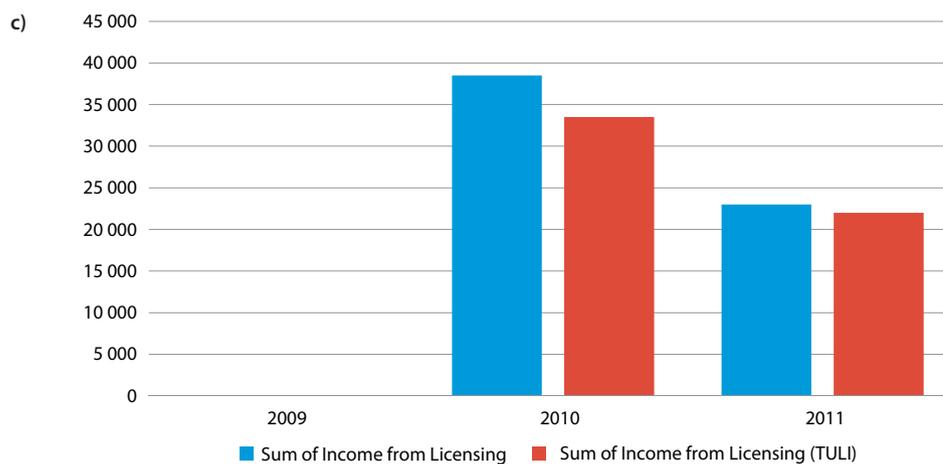
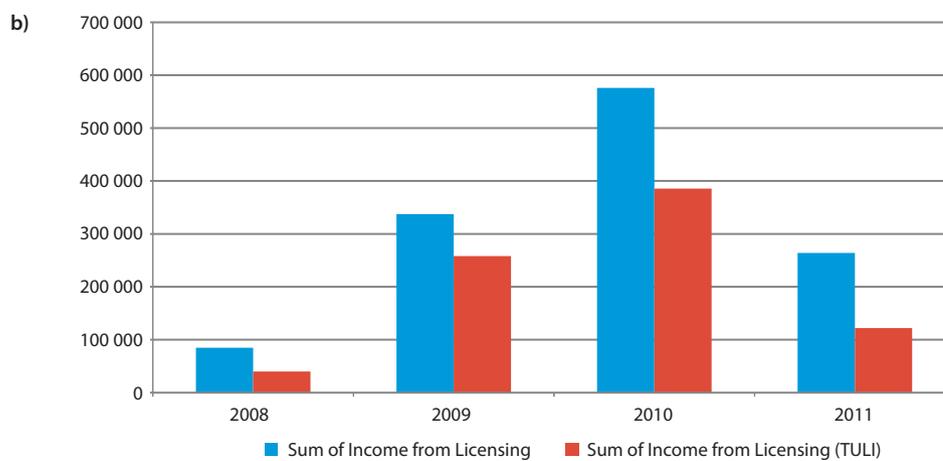
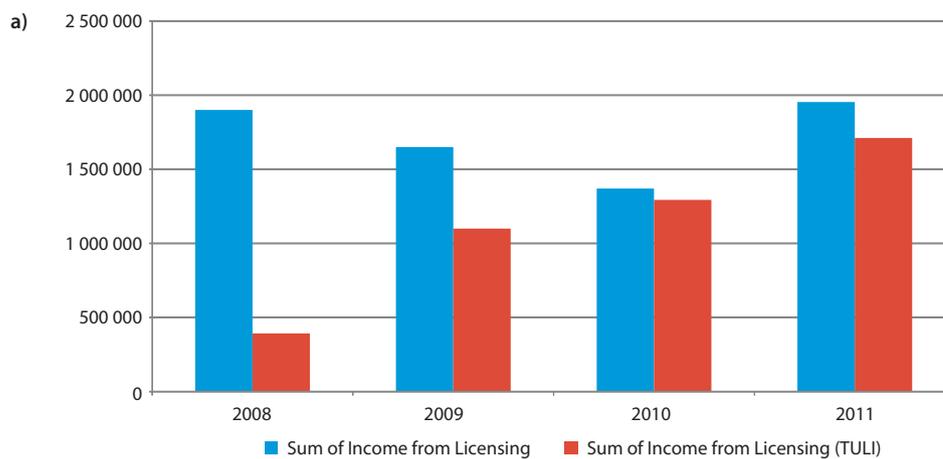
Licensing revenues and technology sales have increased during the entire lifetime of TULI (2002–2011), but the growth path does not show continuation during the last years (2009–2011). The total annual volume of licensing and technology sales has been between 2–3 million euros counting together all Finnish HEIs and RTOs (see Figure 13). Of this, VTT accounts for the majority and it is the only organisation that is producing sales repeatedly. As concluded above, VTT has clearly the most evolved environment for technology transfer of the Finnish HEIs and RTOs, and through its mission, has a long history of working with the industry. This greatly supports licensing through close dialogue and understanding of industry’s needs. Licensing is extremely difficult if it starts at a point when a research project has ended with no prior con-

⁵⁹ TUTLI: Tekes funding instrument “New knowledge and business from research ideas”.

⁶⁰ See Chapter 2 for further details.

⁶¹ See Report “Julkisten tutkimustulosten kaupallinen hyödyntäminen”, Hjelt et al, Tekes publications 192/2006

Figure 13. Total accrued income from licensing during 2008–2011 for (a) VTT, (b) universities and (c) universities of applied sciences.



tact or discussions with potential utilisers. If licencing is to be developed, VTT is the Finnish benchmark from which to learn.

- **Questioning the feasibility of licencing:** *“Was it realistic to expect that TULI funding would lead to licencing income? Maybe not.”* – Innovation manager at a university
- **Volume of licencing and IP sales:** *“Should we be happy with this? No. There is potential for much more.”* – Head of innovation services at a university

Contradiction between international IP sales and societal mission in Finland

When discussing the goals of licencing and IP sales, the question of international agreements should be weighed against the overall objectives of these actions. According to the interviews conducted in this evaluation, several representatives of universities indicated that they see a contradiction in international IP sales and serving the societal mission in Finland. The ways in which IP can be utilised also differ substantially with respect to their impact to the national economy. Companies can use the rights in order to develop and renew their existing business, production or services, they can use the rights to protect their ground or they can even try to gain the rights in order to re-sell them for a higher price. It requires in-depth understanding of the industrial field and current market situation to predict how the IP will be used and what the impacts will be.

Does research match needs?

The Finnish home market is not sufficiently large for the Finnish universities to gain substantial income from licencing to Finnish companies. International IP sales require experience and wide contacts to industry, both of which are rare among university staff. In addition, the Finnish Academia, technical universities in particular, have over the years worked in collaboration with the industry and thus much knowledge is transferred to the companies through joint research and by researchers becoming employed by the companies. Traditionally this primarily served the needs of large corporations, but during the last five years the national policy and related Tekes funding has shifted to strongly target SMEs. Given that funding is available and sufficiently long-term, this in principle would be a feasible way to transfer research results to existing companies in order to develop and renew their businesses. To make it truly effective, international expertise and players in the value network should be coupled in the development.

The crucial question is that is there a good overall match between the needs of Finnish companies and the leading, cutting edge research areas generating the most novel ideas with highest potential added value for competitiveness. There are examples of areas, like the pharma sector, in which high-level research exists, but companies are practically non-existent. On the other hand, materials technology is an example of positive development in which research is being utilised to open new business opportunities, e.g. in the areas of industrial coating solutions, printed intelligence, renewable energy and biomedical applications.

- **Markets for licencing:** *“Licencing deals are not easy. Market is not here [in Finland], but Tekes expects us to license first to Finnish companies.”* – Innovation manager at a university
- **Favouring of start-ups:** *“We are favouring the spin-off track. In many cases the IP is transferred to the company.”* – Innovation manager at a university

Programme additionality

The organisations that had a history of working with the industry would have been likely to continue this even without TULI

Licensing revenues and technology sales have increased during the entire lifetime of TULI (2002–2011), but the growth path does not show continuation during the last years (2009–2011). TULI was a practical tool that enabled the necessary early-stage investigations, building of a basic IP strategy and some proof of concept. If you establish a system and structures for commercialisation to take care of IP rights and attempting to commercialise the results, you are bound to have some hits in regards to executed licenses. What you will not have is a steady increase by itself, in order to do this you need to have (or establish) closer relationships with regional/national industry, and assure that they are involved in the process through strategic partnerships. TULI did not address this, so the programme did allow licencing income to substantially increase.

At the same time, Finnish academia (particularly VTT and the technical universities) have a long history of working with Finnish industry, so the majority of the results emanate from these existing relationships and collaborations. As a result the additionality of TULI to the overall results was not substantial.

Programme adequacy

The TULI programme was not the limiting factor, but overall development turned to favour start-ups

Regarding adequacy of the TULI funding, it is noted that licensing requires less in terms of development and resources than building up a company. The base requirements for licensing are solid IPR, market insight, sound licensing strategy and some proof of concept, which would have all been

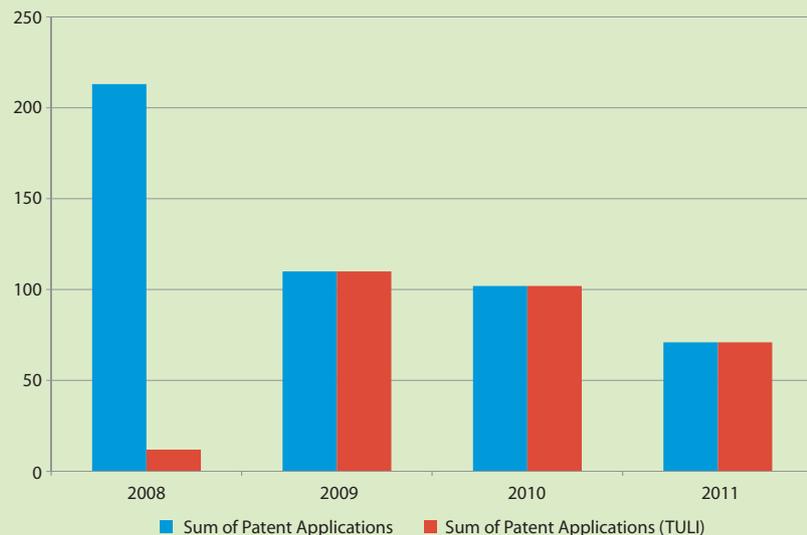
achievable with TULI funding. Thus the funding itself was not the limiting factor, but the number of experienced experts with competences to utilise the funding to maximise this potential was limited. Licensing is extremely difficult without sustained interaction by universities, researchers and innovation managers with the industry, and on top of this, the operating environment and national policy/priorities did not favour/support licensing.

CASE STUDY

VTT accounts for majority of Finnish HEIs and RTOs licensing and technology sales and it is the only organisation that is producing sales repeatedly. This is explained by VTT's positioning in applied research and its mission to produce competitive value to companies and society at large. VTT has a long history of working with the industry and an evolved environment for technology transfer. Figure 14 shows a significant drop in VTT's patenting activity over the period 2008–2011. According to interviews with VTT, this is due to a process change which aims at higher output efficiency by increasing preparatory work to select the most potential ideas, filing patents only in commercially promising cases and focusing resources

on advancing these further. This approach fits well with the renewed Tekes funding instrument "New knowledge and business from research ideas". Looking ahead, VTT is working to further improve the impact of their research projects by integrating market insight into research via business development specialists who will be working with the researchers and heading business development work packages in the projects. "Hopefully we'll get better results, more relevant to business, and more commercial output such that either licensing income will grow or we'll generate more spin-offs", described Petri Kalliokoski, Executive Vice President, Strategy and Business Development at VTT.

Figure 14. Patent applications by VTT during 2008–2011.
Source: Questionnaire to organizations made by TULI programme coordinator / Tekes. In 2008, the small number of TULI-related patents was due to the fact that the person reporting had understood that the invention should have been done during the TULI project (communication with Mika Naumanen, VTT).



3.6 Objective 6: Foundations were laid for start-up ecosystems

Objective 6: Use public research results, know-how and professionals to develop an important resource for new business and growth companies.

Regarding this objective in particular, we would like to emphasise that it is extremely challenging, if not impossible, to precisely evaluate what the contribution of TULI programme has been in the creation of start-ups and growth companies in particular. Here we discuss this point mostly from the perspective of developing an important resource for new business and growth companies.

Our conclusion

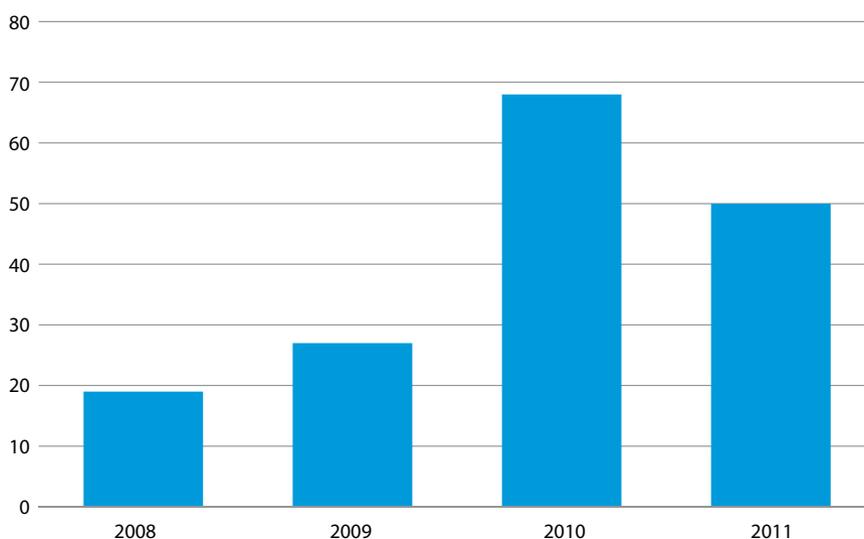
Our understanding of programme development and policy implementation includes the aspect that no programme is able to solve all challenges at once. A part of the process is to induce learning based on the visible programme effects achieved, which then step by step can be identified and addressed through new measures and programmes. Based on this, we conclude that the objective of TULI was not so much

to create a wealth of new companies, but to allow for the development of fundamental support structures to enable such development (albeit with other programmes/measures). In this respect, the TULI programme contributed to creation of environments and favourable preconditions in universities and research organisations to allow public research results to be used as a resource for new business and growth company creation. Now that some of the challenges have been solved and Tekes has moved to a new initiative⁶², the pragmatic approach is to keep moving while at the same time aiming to analyse and solve new challenges that emerge.

Output of companies increased substantially during the last few years

Regarding the first TULI programme period 2002–2005, a total of 91 companies had been reported for the programme's final evaluation⁶³, and a further 12 companies that were established during 2006–2008 (with links to TULI projects) were identified during the evaluation using data obtained from Tekes. Thus during the period 2002–2007, the annual output of start-up companies was between 15–25 companies per year counting together all Finnish universities and research organisations.

Figure 15. Number of companies founded in Finnish universities and research organisations 2008–2011. Source: Data collected from TULI-funded organisations by Tekes / TULI programme coordinator in 2011.



⁶² "New knowledge and business from research ideas", Tekes research funding started 2012

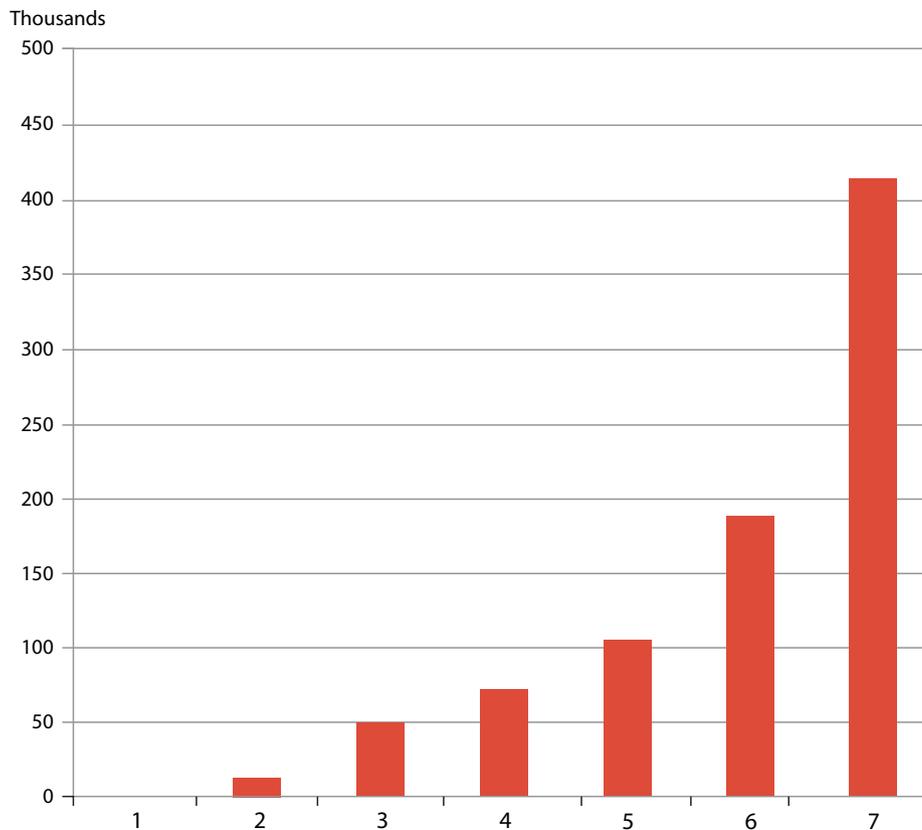
⁶³ Ideat kasvamaan innovaatioiksi, Valovirta et al, Tekes report 2/2006

Figure 15 shows the total output of companies during the latter TULI programme period 2008–2011. We observe a significant rise in 2010. This increased output was observed in several universities (e.g. Aalto, TUT, UEF, Laurea, TAMK). According to interviews, the universities have continued to produce output approximately at this level, for example Aalto produces 15–20 start-ups annually. The total number of companies that were reported by late 2011 is 164.

A part of the companies are able to grow, but only after several years in operation

Regarding the impact of the TULI programme and commercialisation on the whole, a key question is what happens to the companies created. Assessing this thoroughly would be a demanding task and requires a sufficiently long timeframe of observation (at least 10–15 years). In this evaluation, we have included a light follow-up study of companies established

Figure 16. Median revenue (in thousands of €) by years operated for subset of 25 companies founded during 2002–2006. Information of 33 identifiable companies was obtained from Tekes (companies that had originated from TULI 2002–2005, partly founded later). 25 of these companies were showing revenue in 2012 and those were tracked.



during the first TULI programme in 2002–2005 and the latter programme in 2008–2011. Regarding companies founded during the first programme, there was no record available that would have included the names or company registration numbers of the 90 companies that had been reported by October 2005 for the programme's final evaluation. We obtained information of 33 identifiable companies from Tekes (companies that had originated from TULI 2002–2005, partly founded later). 25 of these companies were showing revenue and taken into closer tracking.

Figure 16 shows the median revenue by years operated for the subset of 25 companies founded during 2002–2006. We observe that companies are able to grow, but it seems to take at least five years of operation before signs of faster growth appear and this is only true for that fraction of all founded companies that are even able to survive past five years (due to missing data, it is not possible to provide an exact number of how many of the reported companies were still in operation in 2012).

Regarding companies founded during recent years 2008–2011, it is too early to assess the developments, but we provide a few observations. Of the total of 164 companies that were founded in 2008–2011, 76 firms have been able to show revenue by 2012 and 6 do not exist anymore. The total revenue generated by the 76 companies was 8.8 million € euros in 2011. Only a few of the companies post profit at this stage. The median revenue of all companies was 25,000 € in 2011. After four year of operation, the median revenue has increased to 80,000€ (only companies founded in 2008–09 have been in operation this far). 5% of the companies are generating 75% of the revenue. 90% of revenue is coming from firms that originate from universities. Annual median growth rate for companies that are able to post revenue is 60%.

Large differences between organisations

When looking at the output in terms of companies created, we observe large differences between organisations. Aalto is clearly the strongest and in its own league. By the end of 2011, Aalto had reported 35 companies that were founded during 2008–2011⁶⁴. These companies posted a total of 2.3 million € revenue in 2011. The Aalto start-up environment is very dynamic and the lively student movement has created an atmosphere that is currently spreading inspiration to the researcher community at Otaniemi, as well to other universities and even gaining international interest.

Other examples of positive development are Tampere University of Technology (TUT), University of Eastern Finland (UEF) and Laurea University of Applied Sciences. These are all showing clear increase in terms of number of companies established annually and the revenues generated by these companies are growing. Also Tampere University of Applied Sciences is showing a positive start and companies have been established during 2010–2011, and they are already posting revenue.

VTT's focus has traditionally been on close industrial co-operation. It is the only organisation getting notable income from licensing. VTT's output of start-ups was 3–4 companies per year between 2008 to 2011, which is a sound target for VTT's type of industrially focused organisation given the resource requirements for professional support. VTT can offer its spin-off companies a professional, facilitated process through VTT Ventures and its Entrepreneur-in-Residence programme. This includes an in-house entrepreneurial development program and professional business development support. VTT Ventures also co-invests in these companies with private investors. VTT Ventures's spin-off portfolio includes 20 companies in start-up phase.

⁶⁴ Data reported to TULI programme coordinator by Aalto.

Figure 17. Number of Aalto, TUT and UEF start-ups and revenues compared to university averages.

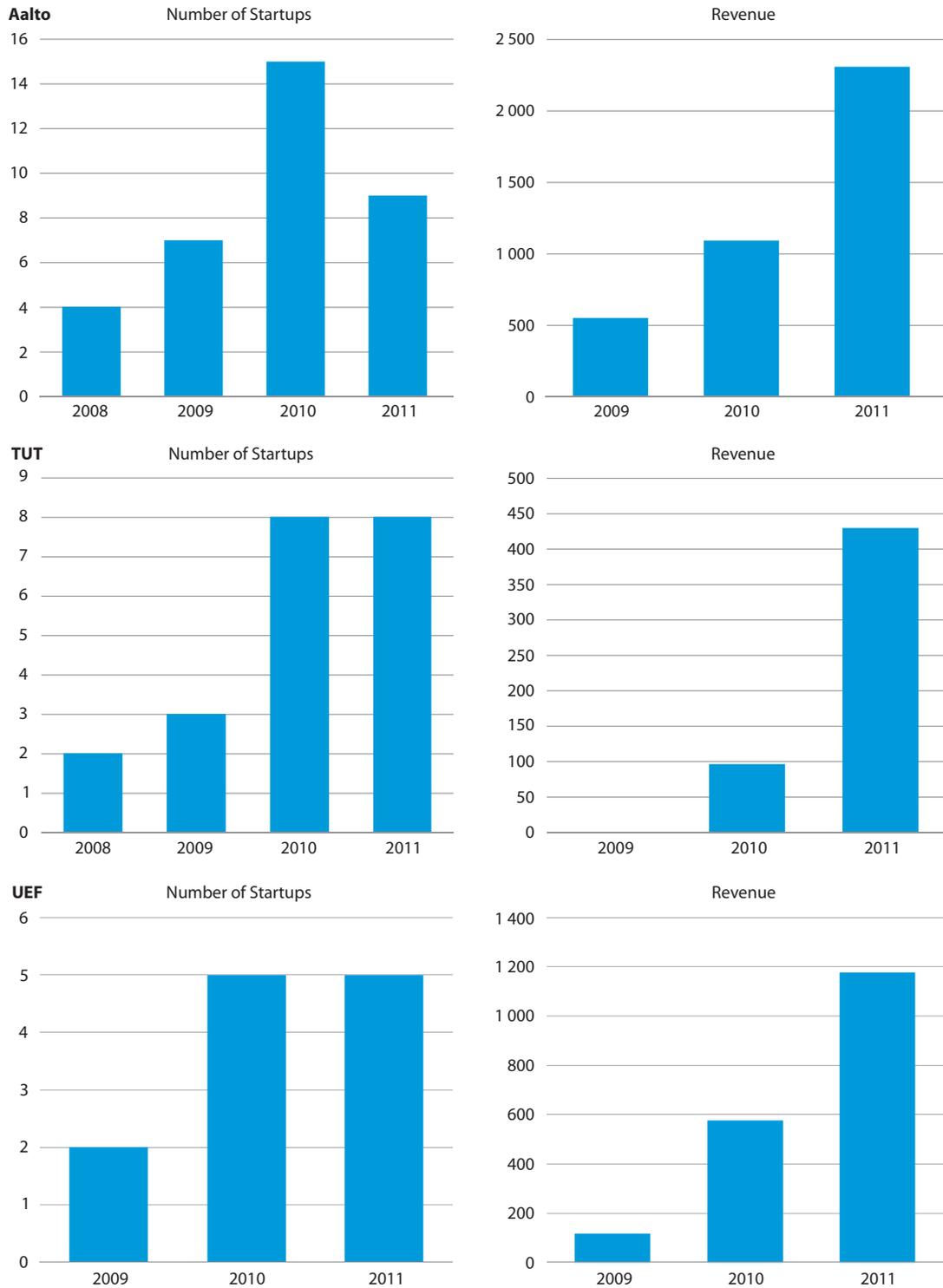
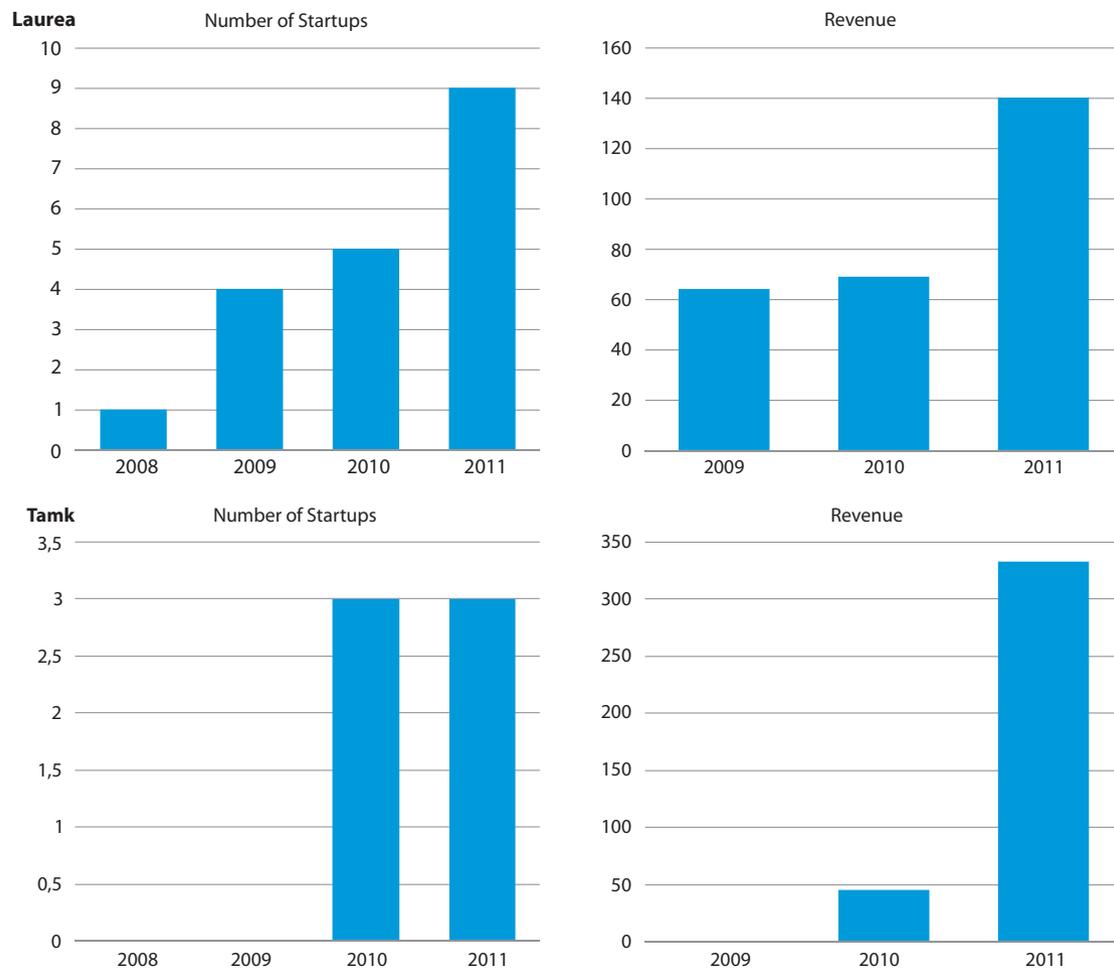


Figure 18. Number of Laurea and TAMK start-ups and revenues compared to AMK averages.



Greatest needs in deal flow, improving effectiveness and quality

Actors in commercialisation and technology transfer currently see greatest needs in (i) increasing deal flow, (ii) improving the professionalism and effectiveness of commercialisation services and (iii) focusing on the quality and competitiveness of created companies. These points are further discussed below.

With regards to deal flow, TULI programme clearly functioned as an activator and increased flow of idea-phase projects (from over 1,000 projects during TULI 2002–2006 to over 2,500 projects during 2007–2011). In the discussion concerning objective 1, we concluded that it is highly doubtful that such a comprehensive change in particular in regards to awareness and structures would have been possible in the absence of TULI, or a similar funding instrument. One of the fundamental objectives of the programme was to allow a large number of researchers to come into contact with commercialisation and that programme was designed to allow this.

Thus TULI made a big impact in sparking awareness, but nevertheless, the initial deal flow is an absolute prerequisite to commercial output and emphasis should be given to this also in the future, as one of the interviewees said:

“Deal flow is still too low. The number from research side is especially very low. Some researchers still see TTOs as the ‘mean guys who steal their IP.’”

Regarding the next point, professionalism and effectiveness of commercialisation services, we have already concluded that TULI has provided both the incentive and the financial means to catalyse the development of commercialisation services at a national level. The challenge is now to upgrade and take commercialisation processes to the next level, aiming for improved efficiency and increased commercial output.

“Patent application is seen as the climax of commercialisation, at which point the process stops. Instead, the process should focus on building a business model,” quote by a researcher who has successfully started a company and is now growing it internationally.

Approaching better integration of commercialisation into research

Leading actors see that commercialisation must be integrated more profoundly into research. This includes identifying spearhead areas with international commercial potential and developing these areas systematically towards need-driven, goal-oriented approach. Several practical mechanisms need to be developed to achieve this. Innovation services should work more closely with the researchers, creating an open dialogue and inspiring the researchers through their internal motives to develop their ideas further to create value. Partnerships between universities and key players of economy improve the relevance of scientific research and accelerate the adoption of innovations in businesses.

Finally, and very importantly, the last point is summarized by the following quote:

“What’s the quality of the companies? We want to have solid companies, even with a lower number.”

Establishing start-ups shouldn’t be the goal as such, but these start-ups should be able to be competitive, grow and contribute to the prosperity of a knowledge-based society. The leading organisations state that this is their goal in the coming years: to be able to build a dynamic and sustainable ecosystem that builds awareness, catalyse growth entrepreneurship and professionally facilitate the process of bringing inventions to markets.

Programme additionality

TULI contributed to building an environment to spark company creation

Regarding the additionality of the TULI programme, we conclude that TULI’s establishment of a professional framework contributed to building an environment to support and motivate the creation of new companies. It is very difficult to evaluate TULI’s direct contribution to new companies, and growth companies in particular, because TULI was an instrument with greatest influence in the very early stages of the process: raising awareness and increasing idea generation. The programme design contributed to increasing the incoming flow of ideas.

Programme adequacy

Funding volume was too low to suffice alone, but gaps to reach other support became smaller

Regarding adequacy, we note that the TULI funding volume was too low to alone fulfil this objective had other funding not been available. It is clear that by no means was TULI intended to offer the full support for the establishment and growth of start-ups. Tekes' Young Innovative Enterprise (NIY) funding became available 2008, and funding from ELY-centres and Tekes as well as Finnvera were also available this time period. During the entire TULI period, the biggest gap was in advancing the promising ideas sufficiently far that the preconditions for setting up a company were established. The TULI funding evolved over the years to close this gap. The eligible funding volume increased from below 10,000€ to 55,000€, topped up by the possibility for additional proof-of-concept project funding from Tekes. On the side of TULI, funding from universities for the early stages was often very limited, and most of the other funding instruments became available only after the start-up was established.

CASE STUDY

Laurea: In vocational universities, student entrepreneurship was nearly non-existent five years ago. Now it is a strategic key area in Laurea and the number of established companies is increasing rapidly. Interviewed persons at Laurea estimate that development would probably have happened to some extent also without TULI, but the programme was a clear catalyst, which gave an incentive for the organisation to start actively developing relevant structures and provided important resources for this. In the TULI programme, Laurea's emphasis was on students. In many of these cases, a lot could be established with just 5,000 € of funding. The students were directed to work on the cases themselves and consultants were used to mentor and coach the students. TULI played a very important role in activating the community. Tools such as business idea competitions were used. During five years, this turned into "an on-going, every-day activity" with strategic importance.

4

Recommendations

Finland, as well as several other European countries, can today look back at a decade of reforms, policy making and funding programmes for supporting innovation and the commercialisation of public research. It is evident that the measures and activities undertaken have impacted the research community in terms of increased awareness and interest among researchers, development and implementation of supporting fundamental structures and processes as well as reaching and having an impact (albeit still limited) on the management agenda. Even though the overall progress has been slow and often met with strong resistance from individual researchers, university management and industry, this new mission – constantly spurred on by national policy makers as well as the European Commission – has slowly impacted the community. As a result, today most RTOs and HEIs have guidelines and established processes for taking care of and supporting commercialisation; so also Finland as witnessed in this evaluation.

This development, which has been on-going for the last ten years, has now however reached a point that warrant clearer direction, increased commitment and more visible output. This trend is both evident from the perspective of the next generation of European framework programmes as well as the development of regional innovation strategies⁶⁵ for utilising ERDF-funding⁶⁶, but is also increasingly saturating the national funding programmes targeting public research.

Consequently, and particularly in the wake of the funding provided for the development of structures and capacities to assure such services, the pressure on the HEI/RTOs is increasing to provide tangible output in terms of traditional metrics such as license agreements, start-ups and jobs. As a consequence new barriers that hinder this process are identified and possible mitigating solutions tested. Suffice to say, the European system (Finland included) is still far from producing the

results that are expected by policy makers and funding agencies. As a result, several initiatives are on-going that attempt to address this challenge, e.g. consolidation of commercialisation of structures and resources, focusing of resources, facilitating utilisation of IPR on non-commercial terms, development of early-stage venture capital instruments, etc.

It is from this perspective, building on the observations and conclusions that can be drawn from the Finnish system, that we develop our recommendations. In this regard and in order to support the actors of the Finnish system in their respective missions, we have tried to combine an approach that both identifies and analyses the effects and contribution of the TULI programme with a forward-looking approach in order to help plot the course for the immediate future, particularly leading up to the next generation of EU programmes.

4.1 Target groups for the recommendations

Based on the evaluation methodology suggested for this study, we will provide recommendations for four organisational layers that influence this process: Policy makers, Tekes, research organisations and individual researchers (as well as innovation managers). In more detail, these four groups and their respective supporting function can be described accordingly:

- A. For innovation policy makers:** How and by which means can policy makers continue to support the development of a more efficient commercialisation system at public research organisations?
- B. For Tekes:** What concrete and proven best practices can be identified to be used in Tekes' new instrument "New knowledge and businesses from research", as well as in other commercialisation activities?

⁶⁵ RIS

⁶⁶ ERDF: European Regional Development Fund / Structural Funds

- C. For the commercialisation activities of universities, vocational universities and research institutes:** How can the existing structures, processes and activities be enhanced to become more efficient? How can the task to identify and create commercial value be combined with and enhance the traditional mission of the HEI/RTO? What is the significance of specialisation, e.g. regional specialisation?
- D. For individual researchers and innovators:** We have chosen to interpret this target group as what can be done in order to attract and motivate these individuals to participate in the commercialisation process. What incentives for motivation exist? How can these individuals best be supported? Consequently we have chosen to view this primarily from the perspective of the person responsible to assure this within the innovation system, which is most often the role of the innovation manager.

These four groups will form the basis for our recommendations.

4.2 Three main recommendations

When addressing the four aforementioned target groups for the recommendations, we can discern between three overarching main recommendations that are broken down in the following to recommendations to each target group. These are to:

1. Move to the next phase – from competence building to commercial results
2. Exploit synergies – with international outreach
3. Commit long-term – engaging the private sector

Table 3 makes use of these overarching recommendations and assigns them in more detail to the individual target groups. The recommendations as described in the table are broken down into more detail in the following chapter.

Table 3. Recommendations to four target groups.

For policy makers	For Tekes	For universities and research organisations	For motivating researchers and innovators ⁶⁷
1. Move to next phase – from competence building to commercial results			
Actively support increasing commercial output of research by making it a national priority and establishing KPIs with impact on financing and global benchmark.	Integrate commercialisation into funding programmes.	Develop a strategy for commercialisation at your organisation and assure resources to implement it.	Motivate by powerful support that has an effect. Commercial ability and understanding increases chances of funding.
2. Exploit synergies – with international outreach			
Improve Finnish readiness and ability to compete for the new European programmes.	Consolidate and focus resources for commercialisation support.	Assure access to available resources to increase competitiveness for the coming funding programmes	Focus resources on fewer cases as well as on those willing and able to participate.
3. Commit long-term - engaging the private sector			
Commit long-term and ensure that appropriate funding is actively supported and included in the national research budgets.	Assure appropriate and flexible funding to ensure professional commercialisation services, allowing also for development of collaborative public-private-partnerships.	Develop strategic partnerships with the private sector that ensure resources and that facilitate the commercialisation process.	Help build long-term relationships (partnerships) between industry and research groups. Commercialisation is not a one-time offer.

⁶⁷ Primarily from the perspective of the innovation manager

4.3 For policy makers

Move to next phase – Actively support increasing commercial output of research by making it a national priority and establishing KPIs

We recommend that Finnish policy makers decide to take a clear step to the next phase of commercialisation support: from competence building to increasing commercial output. This requires **making innovation and commercialisation a national priority** with joint high-level strategic targets.

Attention should be given to implementation and steering on several levels and through different means:

- 1. Develop strategic national-level targets for commercialisation and implement useful key performance indicators (KPIs) to measure performance in terms of economic output.** This is not an uncomplicated task, but also not only a Finnish challenge. The Finnish policy makers should interact and drive this development on a European level, since such metrics will need to be included/synched with the European programmes as well as to allow for global benchmarking. Here Finnish policy makers should take a leading role. There are interesting initiatives that already exist/being implemented (e.g. the AUTM's 'Better World project', initiatives in the UK and the European initiative U-Multirank⁶⁸).
- 2. In order to assure that implemented actions are effective and that the development steers in the right direction, regular impact evaluations or even in-process evaluations linked to Tekes/funding agencies are needed to assure control and steering.**
- 3. Ensure that activities supporting commercialisation is assigned sufficient funding, e.g. by continuing its saturation into national research funding⁶⁹, and that it is clearly visible on the national policy agenda.**

Exploit synergies – Improve Finnish readiness and ability to compete for the European programmes

As innovation and commercialisation are to receive an increasingly strong emphasis in the European programmes, particularly in the framework programmes⁷⁰, it is critical that the individual member states, funding agencies and actors wanting to participate in the programmes assure that they have the resources and capacities to handle this task professionally, as it is likely to become an important competitive advantage to compete for funding.

European programmes have over the years grown to become an important source of (synergetic) funding for R&D purposes. At the same time, commercialisation, or knowledge-transfer, has over the years been an increasing trend within the EU programmes, which we believe will continue. Currently the programmes are in the process of being re-written for Horizon 2020. Although details are not yet clear and openly communicated, it has been stated that new programmes will take an even stronger focus on innovation and the utilisation of research.

We conclude that Finnish national policy makers have an important role to fill in this development process in order to:

- A. Assure that these programmes are written in a way that takes the capacities and ability Finnish innovation system into account** by taking an active role in European forums⁷¹.
- B. Assure that the Finnish innovation system is supported in a way that ensures professionalism and competitiveness in upcoming European programmes**, including abilities in innovation and utilisation of research, as well as capabilities to apply for the funding.
- C. Assure good and transparent communication with other policy makers, funding agencies, research organisations and industry, to clarify the message and raise awareness of the increasing emphasis on innovation and commercialisation** in the new programmes.

⁶⁸ E.g. "The Better World Project" by the US Association of Technology Transfer Managers, the European initiative "U-Multirank" or simply how other more experienced countries/regions (particularly the US and UK) understand the potential and purpose of how commercialisation can support the growth of the economy.

⁶⁹ Not only designated commercialisation funding (e.g. Tekes TUTLI), but integrating commercialisation in-depth into national research funding, including Tekes, but also e.g. the Academy of Finland.

⁷⁰ But also smaller, yet very attractive programmes, such as Eurostars, ERC, CIP, etc.

⁷¹ E.g. actively contributing to programme preparation and supporting Finnish players to engage in different entities, such as PPPs.

In doing so, we also recommend that the national funding programmes and available resources are exploited in a way that assures that synergies between the programmes are developed. For instance, in parallel to Horizon 2020, the European regions are in the process of developing their Regional Innovation Strategies for the utilisation of Structural Funds. One important topic for the utilisation of these funds, as communicated by Brussels, is to actively support innovation, competitiveness and regional growth. As such, the Finnish policy makers have an important role to fill in assuring that these funds are utilised in a synergetic way that fills gaps and assures the innovation system's ability to function.⁷²

Commit long-term – Assure long-term financing in budgets and focus on the best

A self-sustainable commercialisation structure⁷³, be that on a national or individual level, that is sufficiently financed and structured to handle its assigned role takes a long time to develop. The best examples we can identify on a systemic level in this regard can be found in the US and the UK – the two countries who have the longest and most profound experience with commercialisation.

Finland has taken the first step (or even steps), but to be able to compete with global leaders, policy makers should make a clear decision to take this development to the next level and **assure long-term funding for commercialisation**, e.g. by integrating funding for commercialisation services into the national research budgets (example Sweden, the Government Bill on Innovation and Research). In addition, national policy makers should assure that funding volumes available are relevant, e.g. Norway 250 mNOK/year⁷⁴ or France 1 bEUR⁷⁵ until 2020.

It should also be understood that commercialisation is not for everyone – nor should it be – thus the next phase actions should **focus on the best: those who are committed and showing results**. On the side, provide support and paths for “rising stars” to develop, and be prepared to remove actors who do not show progress. **Use financial bonuses and other financial incentives to award research actors developing professional structures** this way assuring constant improvement.

As a background, we note that there is a prevailing tendency among European policy makers to believe that university leadership shall be quick to understand, lift the importance and assign internal budgets for supporting commercialisation. University presidents face incredible pressure on many fronts, and it is to a certain extent understandable that they struggle with assigning sufficient importance to this so-called “third mission”. At the same time, the expectations of policy makers and funding agencies have in Europe historically been too high. It is our understanding, and also visible in this evaluation, that leadership want to change, but they struggle at finding the tools (financial means, recruiting the right people, assigning relevant and measurable goals, creating incentives towards researchers, developing strategic industrial partnerships) to allow this.

Going back to mainland Europe, we can conclude that the understanding among national policy makers in this regard is increasing, and we are consequently witnessing an increased long-term commitment in several countries. This is for example visible in the development of the SATT in France⁷⁶, FORNY2020 in Norway⁷⁷ or the German “High-Tech Master Plan”⁷⁸.

⁷² E.g. in comparison with Sweden's and Germany's active utilisation of such funding to support demand-oriented research projects with strong involvement of industry/SME, incubation services and start-up support, early-stage VC funding instruments.

⁷³ Regardless of how you define it, e.g. funded by revenues, industry or internal budgets – or a combination of the three.

⁷⁴ For FORNY2020

⁷⁵ For next generation of SATT (see below for more detail)

⁷⁶ SATT: Sociétés d'Accélération de Transfert de Technologies; a ten year plan to create “big size” technology transfer structures, financed by a 1 billion Euro grant.

⁷⁷ FORNY: Forskningsbasert Nyskapning; a programme from 2011-2020 to provide commercialisation support and services, with an approximate funding of 675 million Euro.

⁷⁸ Including a multitude of sub-programmes addressing innovation and economic growth

4.4 For Tekes

Move to next phase – Integrate commercialisation into funding programmes

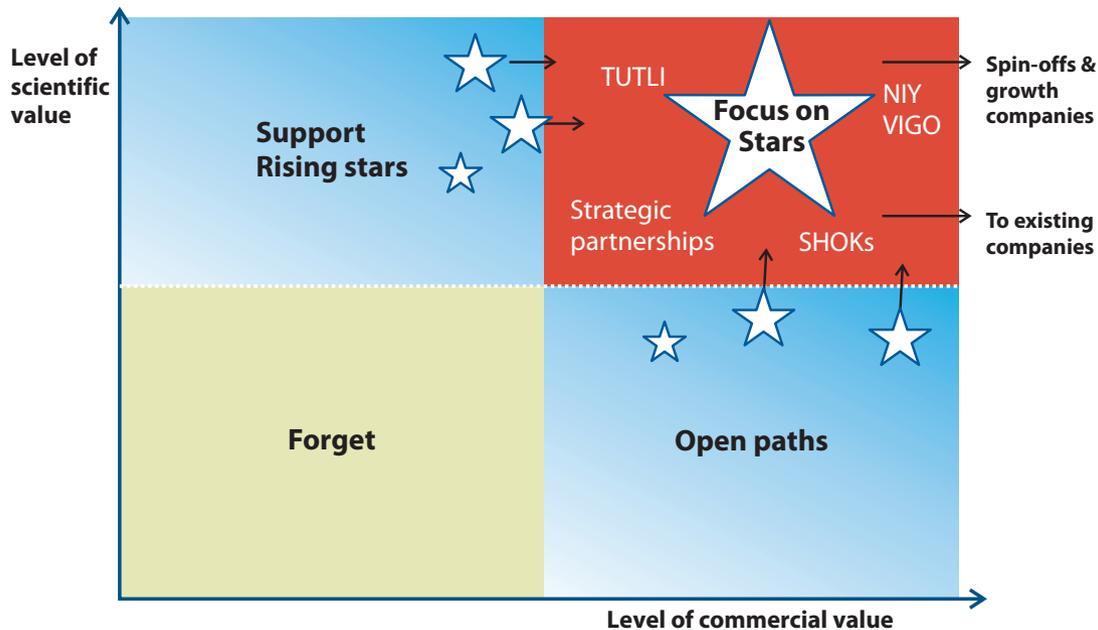
We conclude that the initiative by Tekes to **a) develop financially more capable** and **b) more focused funding instruments**, such as TUTLI⁷⁹, is a welcomed addition to the existing funding portfolio. By allowing commercialisation to take a leading role both in regards to selecting projects for funding, and also allowing the commercial progress and results to steer the course (and potentially even decide on the early termination) of a project, is a useful instrument for increasing the proportion of high-level commercial output, as well as proactively changing mind-sets and improving the professionalism of structures.

Another requirement that we see as an essential factor in increasing the output of solid commercial results is **moving from “technology push” approach to “market pull”** (or at least an effective combination of the two). TULI was – in

essence – a programme for building up the competencies, a learning process. It had a university-focused approach: taking research-based ideas and pushing these towards the markets. The limiting factor is that many of these ideas are still very far from commercial readiness/relevance, and many even scientifically excellent inventions are “off” market-wise (meaning that they do not match user need, for which the reasons can be many, e.g. mismatches with current solutions / platforms, not understanding what the most valuable application would be, etc.).

To address this, we recommend Tekes to **improve integration of commercialisation into all of its funding for public research and allow more flexible interplay of different funding types**⁸⁰, including support actions for establishing development paths for research openings that show potential, but are not directly applicable to TUTLI. We illustrate this with the following schematic that illustrates the landscape of where the focus should be and where support actions are needed.

Figure 19. Schematic showing the landscape of where the focus of Tekes funding for commercialization should be and where support actions are needed to allow flexible interplay of different funding types.



⁷⁹ New knowledge and business from research ideas (TUTLI)

⁸⁰ Public research networked with companies, TUTLI and strategic research openings, as well as Tekes programmes and SHOK research programmes.

In summary:

- Focus on “stars” – the cases with high scientific value and high commercial potential (TUTLI funding)
- Provide support and development paths for “rising stars” – the cases with either:
 - very high scientific quality, but less developed commercial capabilities / longer time to market (e.g. strategic research, new openings from programmes, Academy of Finland projects)
 - sound technical quality (but not perhaps world-leading new science) and excellent connections with Finnish industry, but lacking immediate opportunities to commercialise (e.g. side-inventions from research networked with industry, SHOK programmes)

Exploit synergies – Consolidate and focus resources, with international outreach

The TULI programme has been a versatile and easy-to-use instrument, which has allowed all HEI/RTOs and their staff to experiment with commercialisation activities for a number of years. Even though the programme can show good progress regarding the development of awareness and building of capabilities, resistance to change due to countervailing forces and disincentives inherent in the research culture is strong and has also prevented a wider impact of the programme. This can both be seen on a holistic level, where some universities and research actors show little to no commitment to embrace this opportunity, and within individual organisations, where some research groups refuse to participate in the process. This is however to be expected, and is a regular scenario in most international settings.

Resistance however tends to lead to an inefficient use of available funding and resources, particularly when the funding on the whole is limited (e.g. in the light of little to no matching funding from universities/RTO). As such, mind-sets that despite the programme continue to be opposed to change cannot – in our opinion – be swayed by more funding;

at least not from the perspective of justification of an efficient use of resources.

Consequently, we recommend that Tekes should:

- **Concentrate funding** for commercialisation on those that are prepared to change and that continue to **show clear improvement in terms of measureable commercial output** (linking to the need for relevant measureable metrics/KPIs)
- Require consolidation of existing structures where output is limited to improve efficiency, and require individual structures to **find ways for functional collaboration and exchange**⁸¹
- Allow for the development of **dedicated commercialisation resources** that focus on one particularly strong and commercially relevant research area, or a strong research centre/group, preferably with a strong potential impact for the Finnish industry/economy⁸²

Regarding the need to develop relevant measureable metrics / KPIs – linking to creating a sustainable European framework for commercialisation – Tekes should, through its central role in the Finnish innovation system and its close contacts to other European funding agencies and policy makers, **take a leading role in the European discussion** regarding the identification and development of suitable incentives, metrics and funding instruments for commercialisation.

Commit long-term – Assure appropriate and flexible funding for commercialisation services, engaging also the private sector

Through TULI Tekes has taken a first fundamental step towards creating a culture and structure for commercialisation services within public research organisations in Finland. The instrument was critical and aptly suited in the sense that it provided a flexible funding instrument that allowed many researchers to come into contact with the programme and provided HEI/RTO leadership with an uncomplicated and “harmless”⁸³ tool

⁸¹ Examples in this regard can include the development of the SATT programme in France, the subsequent consolidation of the PVAs in Germany, or individual examples such as the tech transfer structure “Fyrklövern” in Sweden (combining the services of four geographically wide-spread universities in Sweden).

⁸² For example the development of the concept of “Innovation officers” at Lund University, that are dedicated resources of key research areas, e.g. the Lund Diabetes Centre, that are directly included in the Centre’s budget and that in addition to providing commercialisation support have an important role as an industrial liaison to facilitate industry exchange and collaboration.

⁸³ Harmless in the sense that it did not inflict with any other budgets or funding streams and required very little actual commitment from management.

to act according to national reform and international trends.

The on-going trend within the European programmes is to put even more emphasis on innovation and commercialisation. From the national viewpoint of creating a more capable system for harnessing the commercial potential of the research results, this trend is indeed very helpful and effective. At the same time, it is important to emphasise that also Tekes must assure that the system and its actors are aptly suited to handle such services professionally. This is for instance of great importance for the implementation of the TUTLI programme **in order to assure commercially relevant results**, but it is also important to assure that **the Finnish innovation system will be competitive for the European funding**. In this regard, Tekes as well as other funding agencies and policy makers, have an important role to fill to continue to allow the system to improve and mature.

We concluded in this evaluation that the actors in the field see that greatest needs lie within the universities' **capabilities of providing a professional commercialisation service**. This is e.g. due inadequate funding, lack of critical competencies and resources, lack of synergies and efficiency in the provision of services in-house. TULI recognised this, and allowed for the use of outside experts to work on individual inventions. The results however showed that the lack of *internal* competencies and resources for managing and directing the individual projects (and consultants) resulted in a) an in-efficient use of external consultants due to unclear/non-optimal assignments, b) quality control was difficult, c) the results ran the risk of being lost once the consulting project ended, and d) the use of a large number of external experts did not create an overall efficiency and synergies in the use of the funding.

We therefore recommend that Tekes should provide funding targeting the development and provision of improved structures and processes for commercialisation services – with the focus described above – and allowing/supporting the establishment of **external collaborative public-private-partnerships between universities and private actors** to form long-term framework agreements for the handling and provision of services.

This builds on the following reasoning:

- Success in commercialisation requires that the commercialisation structure is capable of establishing confidence and respect in its dual relationship with both researchers and market players:

- Researchers require: Professional support in handling innovation and commercialisation related matters, from handling of individual inventions and developing sustainable business models, to receiving support in discussions with an industrial partner or when submitting a research proposal.
- The market requires: To be able to trust that the organisation/persons responsible will handle all matters related to commercialisation, agreements and relationships professionally.

By establishing a long-term joint venture with an experienced and competent private sector partner with established industry relationships and references, will help to achieve this more efficiently both in regards to time and costs.

- To succeed, the commercialisation structures need to be able to hire competent and experienced professionals from the private sector. University budgets and salary models however cannot offer the financial incentives common in the private sector. A public-private-partnership model would allow more flexibility in this regard, and also assure that the funding provided is efficiently used (simplified, you do not hire a one-time consultant, but receive the full dedication of an experienced professional).
- The dual nature of a public-private structure facilitates the access to complementary funding sources.

4.5 For universities, vocational universities and research organisations

Move to the next phase – Develop an internal strategy for how commercialisation is handled

As evident from the recommendation of the necessity to exploit synergies, each university and RTO must create an individual mission for how commercialisation is handled within the organisation. To commit, **make innovation and commercialisation a management priority** and assign a person of management to be responsible for innovation and commercialisation. Furthermore, management must **assure that the organisation is sufficiently resourced** (both in regards to financing and competencies) to implement this strategy. To follow-up and ensure that the strategy is functioning, **goals**,

metrics or KPIs need to be developed and regularly followed up to ensure goal congruence.

Aside from providing the tools to support the commercialisation process, management should also actively promote the necessity and value of such activities towards its research staff. This requires a long, sustained commitment and focus to succeed. The leadership has to lay out a vision for the institution's role in innovation in the 21st century that includes higher education's growing role in fuelling the economy. By making this vision a priority in their strategic planning, communication/speeches and budget, the leadership will invoke the support of policy makers and funding agencies to provide additional resources to fulfil this strategy. This said however, it is of importance that the universities and RTOs take the initial and leading role in creating the vision.

To truly emerge as a global forerunner, commercialisation should not only be visible in the university's mission statement, but **commercial excellence/experience should be formally recognised as an important criterion when evaluating for academic tenure**⁸⁴. Tenure policies – which currently reward mostly academic merits, and to a lesser extent teaching, do nothing to incentivise commercialisation – could be one crucial missing link in fostering research-based innovation as a source for economic growth, jobs and competitiveness.

Exploit synergies – Assure access to available resources to increase competitiveness for the coming European funding programmes

As can be seen from the aforementioned examples, research funding is shifting to increase emphasis on innovation and commercialisation (albeit from very low levels). Competition for research grants both from national and European sources is already fierce. With increased demands by the funding agencies and programmes to include adapted and realistic plans for how the research results emanating from the project shall be utilised / commercialised, researchers will look to their management to provide support in this regard. As a criterion that helps determine competitiveness in acquiring research

funding, providing a capable in-house commercialisation service that can help provide a viable answer to this question should not be disregarded or handled unprofessionally.

Commercialisation is not for everyone, nor does it have to be. Spending resources to change an inherent culture, which is not open to change, is not an efficient use of resources. Instead **focus internal resources on centres, groups and individuals who are interested, capable**⁸⁵ **and that request support, also allowing the innovation office to quickly terminate, or not even accept, inventions with low commercial potential.**

Assure that the organisation has access to both sufficient and competent resources to fulfil its own, the national policy makers' and the EC's goals for innovation and commercialisation. Assure that the innovation office is structured for its purpose, that it allows flexibility in its employment agreements and optimises the use of available funding streams to fulfil its mission. The German trend of externalising the commercialisation service, either through joint ventures (public private partnerships) or wholly owned subsidiaries, can serve as one role model in this regard⁸⁶.

Evaluate the possibility of developing **dedicated commercialisation support for the leading research centres**, e.g. including the costs of this service in the centre's budget. Commercialisation activities that start at the point when the research result is finished are more difficult to commercialise (particularly in licensing). Instead **assess the possibility of starting commercialisation activities at an early stage** by also giving this resource a broader role, which also includes **liaising with industry in a proactive manner** to exploit research collaboration and setting a joint research agenda. Thereby provide the leading research units dedicated resources (commercialization specialists/business developers) with better insight into their research activities, higher efficiency in commercialisation activities and a proactive approach that can help deliver more commercially useful results.⁸⁷

If very limited internal or external resources can be provided for commercialisation services, **assess the possibility**

⁸⁴ Some US universities are currently including patenting and commercialisation as a factor in tenure promotions (e.g. Oklahoma State, University of Texas System).

⁸⁵ E.g. industrially relevant research, industry contacts, strong research, application oriented, well-resourced staff, etc.

⁸⁶ see also recommendations to Tekes

⁸⁷ There are many examples that can be used as an inspiration in this regard. One is the "Innovation officer" programme at Lund University, e.g. dedicated to their Diabetes Research Centre.

to identify and develop collaboration with other research organisations or regional actors. In the case where such collaboration can be defined and developed, this would help to at least provide basic functions with fewer resources. Inspirational examples in this regard include the German structure of PVAs (one tech transfer organisation providing commercialisation services to a larger research consortia consisting of many universities/RTOs), but also the German programme “Sektorale Verwertung”, which takes a thematic approach and enables research organisations within specific research areas to collaborate regarding commercialisation services.

In order to care for the future competitiveness of the research organisation in general, but individual research groups/researchers in particular, universities and RTOs cannot afford to disregard the necessity of having access to capable commercialisation services. As visible from these examples, there are many possibilities to develop capable structures that do not have to be the sole financial responsibility of one research organisation. Many times resources can be used more efficiently in collaboration with others.

Commit long-term – Develop strategic partnerships to ensure resources and facilitate commercialisation

Strategic partnerships can be used to support and enhance the commercialisation process, whereas at the same caring for efficiency and long-term sustainability:

- **Strategic partnerships for providing a sustainable commercialisation service:** From an ROI⁸⁸ perspective it is not justified that each university/RTO develops all necessary structures and competencies in-house. Depending on the strategic mission, some parts of the process can and should be out-sourced or handled by partners (e.g. as discussed, sharing resources/collaborating with other universities/RTOs or with existing regional actors). Another possibility is to collaborate with private partners, as made possible within the TULI programme. As discussed, there are inherent risks in outsourcing, e.g. that certain critical elements in regards to learning and highly valuable industrial contacts are not sufficiently transferred to the research group/the organisation. In order to avoid this, we recommend **assessing the possibility of establishing longer**

term partnerships with one/a select few outside experts, over a large volume of consultants. If such long-term relationships can be established, these are more likely to be more efficient and the learning aspect is better harnessed. Successful examples exist in this regard, e.g. the structure of public-private-partnerships as evident from Germany.

- **Strategic partnerships for facilitating the commercialisation process:** As discussed, if the commercialisation process starts at the point when the research project is finished, it creates unnecessary difficulties when presenting the result to a potential buyer, industry partner or customer due to:
 - Not allowing for the customer to have early phase insight into or influence the development process, or establish a relationship with the research team
 - There being little to no possibility to change the focus of the research or add an important development process.

By engaging with strategic industrial partners at an early level and establishing open relationships, it is far more likely that the research result can be optimised, from a commercial perspective, during the development process and be better adapted to fit the needs of the end customer.

4.6 For motivating the researchers and innovators⁸⁹

Move to the next phase – Motivate by powerful support that has an effect

We can already see from the web survey that many researchers who have actively participated in the TULI programme view this as a very positive experience; thereby providing innovation managers with a tangible group of individuals to actively work with. As already stated, commercialisation is not for everyone and as such cannot be forced upon faculty, instead management and innovation managers should actively develop existing best practice of breaching the divide to at least those research groups that are developing commercially relevant results. A few such examples are listed below:

⁸⁸ Return On Investment

⁸⁹ Primarily from the perspective of the innovation manager

- One of the best incentives for researchers to engage more in commercialisation activities is the **new opportunity for funding** that it bears with it, which can help to enhance their research goals and career. This can be actively emphasised in the discussion between researchers and innovation managers as well as from the side of the leadership. The growing emphasis on innovation and commercialisation in upcoming European funding programmes supports this.
- Another aspect, which is not as often used when trying to change the culture, is to actively discuss and show that commercialisation isn't simply about bringing more grants to the university/RTO to support more research, but that it can also help to **enrich the context of research and making it more relevant and applicable in the region/Finland**, and in the process educating people in fields fundamentally important to the economy.
- A third aspect in this regard, which builds on the recommendation above, is to **use the experience of researchers' peers** (colleagues) who have had positive experiences from working with commercialisation and industry.

Exploit synergies – Focus resources on the best cases

As witnessed in the interviews with innovation managers, they are in the process of shifting focus, from initially focusing on awareness raising, research motivation, increasing innovation disclosures and providing early phase commercialisation activities (such as patent filings), towards later stages of the commercialisation process. From our perspective, this is a healthy sign, as it means that innovation managers are increasingly focusing their efforts on activities that increase the commercial value of the invention. In order to provide quality services, **innovation managers should be allowed to focus their efforts on the best cases, and quickly disregard the cases**, which have little chance of success. Establishing the innovation office, as a free-for-all type of service, will not help to produce good results.

Commit long-term – Commercialisation does not provide a one-time offer, develop strategic partnerships with industry and private service providers

Innovation managers can facilitate the commercialisation process by **supporting the development of long-term partnerships/liasing with industry and specific research groups**, al-

though these partnerships should of course operate through direct contact and joint work between the researchers and industrial partners. Based on such partnerships, research results can be developed jointly through framework agreements or in close dialogue with industrial partners, which assure that the projects benefit from the input of the potential buyer or customer of the later developed business model. Long-term public-private partnership between the innovation services and private sector service providers would also be an efficient method to establish new connections to industrial players through the networks of the private consultants.

To further help to create long-term effects and establish sustainable relations with research staff, we would like to raise the following aspects:

- Focus on **fewer cases** to assure that sufficient resources can be provided to move the case forward
- Assure **transparent decision-making** in order to explain the selection of cases and distribution of resources
- View it as a **learning process for the researcher**, which does not end with this case. Take care to explain the results of the commercialisation process in order to assure the learning effect for subsequent cases

4.7 Summary of recommendations

We conclude that TULLI was – in essence – a programme for building up the competences, a learning process. Some organisations have progressed well, even reached a leading European level, but we must remember that competition is global. Finland should now move to the next phase, which aims at producing solid commercial output and focuses on those who are committed, progressing and showing results. A key requirement to accomplish this is for policy makers as well as individual organisations, is to develop strategic targets for commercialisation and implement useful key performance indicators (KPIs) to measure performance in terms of economic output.

Producing economically competitive and useful results requires also a solution to a fundamental problem: moving from trying to push research-based ideas to markets towards a system that integrates commercialisation into research and is – where this is the objective – steered by the needs of industry / end-users. To accomplish this, the Finnish commercialisation system and its actors must commit long-term and engage with the private sector through strategic partnerships.

Appendix 1. List of persons interviewed

Innovation managers/TULI contact points at HEI/RTO

Universities:

- Aalto/ACE: Sami Heikkiniemi, Jari Rantala, Panu Kuosmanen, Tapio Siik
- University of Helsinki: Tiina Tolvanen
- Tampere University of Technology: Pasi Rautiainen
- University of Eastern Finland: Matti Höytö
- Lappeenranta University of Technology: Tero Lehtikainen
- University of Turku: Mauno Kangasaho
- Åbo Akademi University: Olle Lagerroos
- University of Jyväskylä: Riikka Reitzer
- TULI 2002-2006 contact point / manager of Helsinki University of Technology: Tuomas Mennola

Vocational universities:

- Laurea: Antti Vettenranta
- TAMK: Markku Oikarinen
- Savonia: Risto Kiuru

Research institutes:

- VTT: Mika Naumanen
- VTT Ventures: Antti Sinisalo
- MTT: Anna-Marja Hoffrén

External consultants

- Jussi Harvela, Veturi Growth Partners Oy

HEI/RTO management

Universities:

- Aalto, Vice President Hannu Seristö
- University of Turku, Vice Rector Kalle-Antti Suominen

Vocational universities:

- Laurea, Vice Rector Maarit Fränti

Research institutes:

- VTT, Petri Kalliokoski, Executive Vice President, Strategy and Business Development

TULI programme coordinators and steering group members

- Jorma Helin, IP Finland
- Tiina Tolvanen, formerly at IP Finland
- Tuomo Pentikäinen, formerly at Suomen Teknologikeskusten Liitto TEKEL, programme manager of TULI 2002-2006
- Juha Jutila, Keksintösäätiö (Steering group member)

Tekes

- Jari Romanainen, director, Tekes
- Janne Viemerö, programme manager, Tekes

Ministries

- Ministry for Education and Culture: Erja Heikkinen (TULI steering group member)
- Ministry for Employment and the Economy: Tuija Ypyä (TULI steering group member)

Appendix 2. Participants at TULI evaluation workshop 15.1.2013

Mika Naumanen, VTT
Erja Heikkinen, OKM
Markku Oikarainen, Tampereen ja Pirkanmaan ammattikorkeakoulu
Pekka Räsänen, Oulun yliopisto
Anne Marjamäki, Turun yliopisto
Eliisa Särkilahti, Turun yliopisto
Valtteri Vento, TEM
Anna-Marja Hoffren, MTT
Sami Heikkineniemi, Aalto
Jari Romanainen, Tekes
Janne Viemerö, Tekes
Laura Juvonen, Spinverse Oy
Joakim Ketonen, inno AG
Nils Gabrielsson, inno AG

Tekes' Programme Reports in English

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- 7/2012 BioRefine – New Biomass Products Programme. Tuula Mäkinen, Eija Alakangas and Niina Holviala (eds.). Final Report. 100 p.
- 6/2012 Navigating New Routes to a Better Boat Industry – Executive Summary of the Research Programme 2007–2011 in Finland. Markku Hentinen, Sirpa Posti and Kari Wilén (ed.) Final Report. 69 p.
- 2/2012 Software, mobile solutions and games industry – Evaluation of Tekes software related programmes. Tuomas Raivio, Johan Lunabba, Erkkä Ryytänen, Juhani Timonen, Markku Antikainen and Santeri Lanér. Evaluation Report. 83 p.
- 6/2011 Co-operation to Create Converging and Future Networks – Evaluation of Five Telecommunications Programmes. Annu Kotiranta, Olli Oosi, Mia Toivanen, Jaakko Valkonen and Mikko Wennberg. Evaluation Report. 69 p.
- 4/2011 GIGA – Converging Networks programme 2005–2010. Final Report. 217 p.
- 1/2011 FinNano Technology Programme. Final Report.
- 6/2010 From Spearheads to Hunting – Evaluation of Nano Programmes in Finland. Tuomas Raivio, Piia Pessala, Jatta Aho, Tiina Pursula, Alina Pathan, Jukka Teräs and Kaarle Hämeri. Evaluation Report. 67 p.
- 3/2010 MASI Programme 2005–2009. Niina Holviala (ed.). Final Report. 137 p.
- 4/2009 ClimBus – Business Opportunities in the Mitigation of Climate Change 2004–2008. Final Report. 564 p.
- 6/2008 Finnish participation in the EU 6th Framework Programme – Evaluation of Participation and Networks. Soile Kuitunen, Katri Haila, Ilpo Kauppinen, Mikko Syrjänen, Juha Vanhanen, Paavo-Petri Ahonen, Ilkka Tuomi, Pekka Kettunen & Teemu Paavola. Evaluation Report. 91 p.
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- 11/2006 Competitiveness through Integration in Process Industry Communities. Evaluation of Technology Programme “Process Integration 2000–2004”. Evaluation Report. 17 p.

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