ENTERPRISE IRELAND

A REVIEW OF THE PERFORMANCE OF THE

IRISH TECHNOLOGY TRANSFER SYSTEM 2013-2016

Contents

Executive summary

The Technology Transfer Strengthening Initiative 2 (TTSI2) Programme was a €22.6 million programme of funding from Enterprise Ireland which ran from 2012-2016. TTSI2 was designed to further develop the Irish technology transfer system and to take advantage of efficiencies of scale in technology transfer (TT) resources. Leveraging the State investment through the initial TTSI1 programme (2007-2012), the aim was to develop a broader capability that would respond quickly, flexibly and consistently to the needs of Irish industry thus increasing collaboration with industry, and to enhance the culture of commercialisation amongst researchers in the Irish HEI sector. Funding was awarded to consortia of Technology Transfer Offices (TTOs), whereby those more experienced TTOs that were funded under the TTSI1 programme would act as the lead, thereby facilitating the development of capacity and capability in TTOs and Industry Liaison Offices (ILOs) within the smaller HEIs.

Contemporaneous with the TTSI2 programme, in late 2013 Knowledge Transfer Ireland (KTI) was created as the national office with leadership and oversight for knowledge transfer activities in Ireland. KTI is supported by Enterprise Ireland with the Irish Universities Association. As part of its remit, KTI manages the TTSI Programme.

On completion of the TTSI2 programme, Enterprise Ireland commissioned an independent evaluation, which was led by Frontline Consulting. Frontline is a policy and impact evaluation consultancy with considerable experience and expertise in providing impact evaluation and cost benefit analysis support to government departments and agencies.

The evaluation concluded that the second round of the TTSI programme funding effectively built on the initial phase, delivering value in terms of performance outputs, stakeholder and business satisfaction. There was strong performance under TTSI2. The creation of consortia of TTOs in TTSI2 has worked well, with genuine partnerships developed that have led to the sharing of knowledge and expertise. From the end of the TTSI1 programme, the average number of licences, options and assignments (LOAs) executed each year more than doubled, at 185 p.a. The number of spin-out companies created each year reached a steady state of approximately 30 p.a.

TTSI2 created significant additionality benefits for businesses and has added considerable benefit to the Irish economy. Sampling 81 Irish companies that had been able to access technology, IP and expertise from the Irish research base showed that by 2017 these companies collectively employed 5,145 FTE, 451 who would not have been in employment had it not been for the TTSI2 programme. Where businesses could share financial data, there was an estimated collective net attributable turnover of €105 million since the start of TTSI2, of which €41 million would not have been generated without engagement through the TTOs supported by the programme. This has contributed to an estimated €14 million to Irish EVA.

Businesses and researchers alike were generally very positive about their experiences working with a TTO. In the study, 90% of the businesses surveyed rated their experience with the TTO as either ‘good’ or ‘very good’ for approachability, ease of engagement and technical expertise. Researchers who were experienced in working with the TTO saw a continued improvement in service and felt the breadth and professionalism of the in-house support was a great support.

The introduction of Knowledge Transfer Ireland (KTI) during the period of TTSI2 has been a success. During the period, the application of the national policy for research commercialisation coupled with the practical resources available from KTI to support industry-academic engagement, and with an active sharing and promotion of best practice, there has been significant step-change in quality, confidence and consistency within the system.

The chapters that follow provide more detail on the evaluation of the TTSI2 funding programme. The report concludes by describing the follow-on actions that are being implemented. Together this should provide evidence for the importance of dedicated funding for technology transfer activity and offer confidence in future for knowledge transfer between pubic research and enterprise in Ireland.

Context

In 2006 the State recognised a need to build capacity and capability in technology transfer. The then Department of Enterprise, Trade and Employment mandated Enterprise Ireland to deliver this and the Technology Transfer Strengthening Initiative (TTSI) was set up in 2007. The objective of the initial TTSI1 was to develop a professional technology transfer system across Ireland's public research institutions. Prior to the programme there was little or no such capability available within Ireland's HEIs.

Between 2007 and 2012, Enterprise Ireland committed almost €30m in funding to the TTSI1 Programme to provide direct support to eleven HEIs for Technology Transfer Office (TTO) salary and operational costs (including patent support). In recognition of the impact that TTSI was having, a second round of the Programme (TTSI2) was approved. In late 2013 Knowledge Transfer Ireland (KTI) was created as the national office with leadership and oversight for knowledge transfer activities in Ireland. KTI is supported by Enterprise Ireland with the Irish Universities Association. As part of its remit, KTI manages the TTSI Programme.

The Board of Enterprise Ireland approved an overall funding envelope of €22.6m for the second round of funding under the Technology Transfer Strengthening Initiative 2 (TTSI2) Programme which ran from 2013-2016. TTSI2 funded consortia of TTOs, whereby those more experienced Technology Transfer Offices (TTOs) that were funded under the TTSI1 programme would act as the lead, thereby facilitating the development of capacity and capability in TTOs and Industry Liaison Offices (ILOs) within the smaller HEIs. The recipients of the funding are shown in Appendix 1.

The TTSI2 programme was designed to build on the earlier programme, to further develop the Irish technology transfer system and to take advantage of efficiencies of scale in TT resources to leverage maximum value from the State investment through the TTSI programme. The aim was to develop a broader capability that would respond quickly, flexibly and consistently to the needs of Irish industry, increasing collaboration with industry, and to enhance the culture of commercialisation amongst researchers in the Irish HEI sector. In addition to this direct funding, Enterprise Ireland has continued to provide access to training and networking for TT staff and has encouraged attaining the international qualification, Registered Technology Transfer Professional (RTTP).

Impact of the TTSI2 programme

The aim of the TTSI2 programme was to leverage the investment through the TTSI1 programme that created, from a baseline of little activity, the capacity and capability to support commercialisation within a number of HEIs. The second phase of the programme sought to expand performance within the sector and to scale technology transfer expertise across the entire HEI system.

There is an increasing requirement for collaboration with industry and delivery of commercial outcomes from research funding e.g. through national research funding programmes. This, along with the range of state supports that drive industry engagement with the HEIs, means that with industry demand itself, both researchers and their host institutions are more attuned to undertaking research with business. There is evidence that Knowledge and Technology Transfer (KTT) is held in the same high regard as other HEI activities. The TTSI programme has had a key part to play in supporting commercialisation and technology transfer as a core activity in Irish HEIs. TTSI1 put people in place to start a process of technology transfer and **TTSI2 has built on TTSI1 very successfully.** TTSI2 is not only 'a programme' but also a vehicle for change to embed commercialisation in the DNA of HEI activity.

The **culture of commercialisation amongst researchers in the Irish HEI sector has been radically enhanced,** with researchers overwhelmingly positive about their TTO. Many saw a rise in the credibility of undertaking commercialisation within HEIs and credited the TTO with their role in this. Researchers who had had prior experience in commercialisation said that the TTO had always been supportive but had now taken the service provided to the next level. They felt the breadth and professionalism of the in-house service was a great support. Those researchers who had previously not used the TTO service said that the TTO was now proactive in their department, had the time to spend with them to discuss approaches and options and delivered a positive service.

Two major issues that could have impacted either way for TTSI2 were the introduction of Knowledge Transfer Ireland (KTI) and the adoption of TTSI2 funding to consortia of TTOs. These were significant changes and could well have slowed the momentum that TTSI1 had built up. However, they did not, and from an early stage both changes added significant value to the impact that TTSI2 has had.

The introduction of KTI has been a stand out success and **the role of KTI is viewed as a key driver of change.** KTI is credited with supporting many things, including an increase in the credibility of the KTT function through:

- working with government and policy makers to effect change
- raising the profile of technology transfer in a positive way through promotion, events and the release of 'good news' stories
- bringing the KTT function together as a cohesive unit
- taking a position as 'honest broker', supportive of Government policy, HEI strategy, TTO objectives, economic targets and business competitiveness
- positioning itself in a way that works with the strengths of Enterprise Ireland, without being perceived as a large public sector organisation with the negative connotations that this has for some

The success of KTI was also achieved through practical steps in bringing in best practice processes and making them transparent and available to all. KTI has acted as a co-ordinating and central function, providing templates that have driven consistency in operation across Ireland for KTT processes and practices and also providing a user-friendly website.

The creation of consortia in TTSI2 has paid off handsomely with Higher Education Institutions (HEIs) developing genuine partnerships with mutual learning. The more experienced lead HEI partners have widened the remit of their technology transfer function, and brought in some different approaches in 'hands on' working with businesses. The Institute of Technology (IoT) partners have benefitted significantly from an injection of expertise that was previously not available to them and this has widened horizons for researchers.

Creating value for business and the economy

In terms of the KTT system being able to respond to the needs of Irish industry, **businesses generally rated the TTOs with whom they have worked highly** with 90% of the businesses surveyed rating their experience as either 'good' or 'very good' for approachability, ease of engagement and technical expertise, and 78% also giving TTOs one of these two ratings for negotiation of IP. **TTSI2 has created significant additionality benefits for businesses** with nearly half (47%) of the businesses surveyed stating that, without the support, they would not have been able to develop their technology at all. Benefits have included new products and processes, product and process improvements, in some cases leading ultimately to new sales, improved profitability and new jobs for the Irish economy. Repeat business between industry and the HEI was a new outcome indicator, tracked since 2014. Over the last three years there has been a substantial growth in repeat business reported with industry, jumping from 1 such reported repeat engagement in 2014 to 530 in 2016. These findings are an indication of the quality of work being undertaken between the business and HEI and a change in information capture within the HEIs. Yet it is probably conservative as recording of such engagements is a relatively recent concept.

TTSI2 has created significant economic impacts and will continue to do so. Of the 81 companies surveyed, 451 full time equivalent (FTE) jobs have been created or retained to date and 4,979 additional FTE jobs are expected to be created or retained by 2022, which the companies believe are as a direct result of the interaction with the HEI via the TTO. These companies have together generated €41 million in net attributable turnover impact so far and this figure is expected to rise to €1,396 million by 2022. These figures equate to €14 million of economic value added to the Irish economy to date and this is expected to rise to €496 million by 2022.

Outputs under TTSI2 funding

There has been steady performance in licensing activity and spinout company creation. Combined with effective policies and resources nationally, the programme has enabled a more consistent experience for companies engaging with HEIs.

Performance targets for recipients of TTSI2 were established as part of the funding award process, which involved assessment and an international expert review panel. Targets were based on a variety of factors including; amount of research expenditure of the HEI, existing technology transfer capacity, previous experience in undertaking technology transfer, forward plan for development of the TTO. Metrics were monitored closely and performance reviewed by international experts at the start and during the programme.

Metrics used to show performance change in commercialisation activity including: the number of inventions disclosures to the technology transfer office (TTO); the number of new patents filed by the TTO; number of licences, options or assignments (LOA) agreements contracted by the TTO and; the number of new spin-out companies created. During the programme, data on number of Active Spin-out companies[1] was also captured. Figure 1 shows the commercialisation activity prior to and over the period of the TTSI1 (2007-12) and TTSI2 (2013-16) programmes.

TTSI2 continued the performance seen under TTSI1. Prior to introduction of the programme, the base figures in 2005 were five spin-outs and 12 LOAs (licences, options and assignments). By the end of TTSI2 this had risen to 185 LOAs and 26 spin-outs in 2016.

Overall, licences, options and assignments have exceeded the programme target, achieving 123% of the total target for 2013-2016. Over the four years, 686 LOAs were signed against a target of 557. While the total number of licences, options and assignments dropped by 11% in 2016 from 2015 it remained ahead of the 2014 and 2013 figures. Through the Annual Knowledge Transfer Survey (AKTS), published by KTI, the number of new products and services launched on the market by companies as a result of a licence or assignment has been captured since 2013. The number has increased steadily from 26 in 2013 to 36 in 2015.

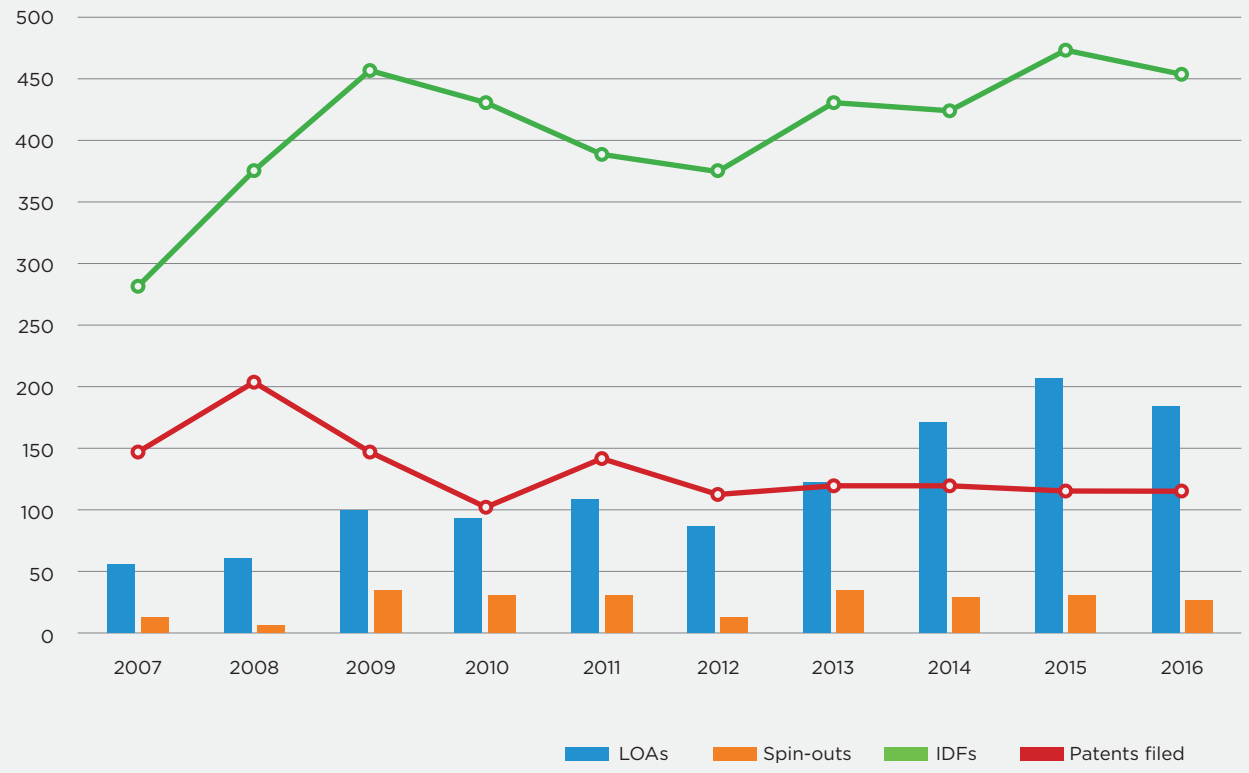
The number of new spinouts per annum has decreased from 34 in 2013 to 26 in 2016 achieving on average 88% of the overall programme target. Since 2014 the TTOs have also been tasked with recording the number of Active Spin-outs. By the end of 2016, there were 119 spin-outs that were still in business three or more years post-formation.

Invention disclosures achieved 110% of target, growing year on year, except for 2016 when there was a slight decrease in numbers (whilst still achieving 103% target for that year).

Patent fillings achieved 81% of the programme target with a consistent growth level achieved year on year. This ranged from 126 patents filed in 2013 to 166 in 2016. The lower level against target was due in part to more stringency in the quality of filings made and in part the nature of the intellectual property licences. For example, there is less requirement for patent protection within the ICT space.

1 An Active Spin-out: See Appendix 2

Figure 1: TTSI programme outputs prior to and over the period of TTSI1 (2007-12) and TTSI2 (2013-16).



Research collaborations (the sharing of research and expertise) are captured under TTSI2 as "research agreements" (RAs). A target was set at the beginning of TTSI2 for RAs of greater than €25,000. At mid-term review, a target for RAs below €25k was introduced to reflect the value to industry of smaller scale engagements. Data were captured across all ranges during the programme. Overall, RAs reported grew from 221 in 2013 to 1440 in 2016.

Conclusion

This report presents an independent evaluation of the performance of the knowledge and technology transfer system in Ireland. It combines the use of data collected by Enterprise Ireland with a study undertaken by the consultancy firm Frontline. That study probed specific outcomes from the TTSI2 programme which, together with experience of managing the programme over the 10-year period since the inception of TTSI, makes it possible to draw conclusions and to make recommendations for future action.

Above all, the evaluation demonstrates that the TTSI programme has had a key role to play in the development and delivery of technology transfer activity in the State and that the second round of funding has built upon the earlier programme. Through the support for a professional, resourced technology transfer infrastructure within or accessible by HEIs combined with national policy and resources there is an evidenced impact for enterprise and the economy through increased turnover and job creation.

Whilst the trends and feedback are positive there is still further progress to be made. There is room for further development in the specific areas of spin-out company creation to bring the same level of good practice as has been created for licensing and collaboration agreements. Nationally, there needs to be better co-ordination of commercialisation data reporting. Performance measurement needs to move towards more outcome related metrics that more adequately reflect success from the programme and from the KTT system and it needs to encompass broader KTT channels such as consultancy to business and other beneficiaries.

Longer term, sustainability of the TTO system needs consideration. There is a reliance on TTSI funding and if this funding was to reduce it is almost certain that the service that exists today would also reduce. It is recognised that the current financial environment for HEIs makes it unlikely that they would step in to make up the deficit. It is also unlikely that returns on investment will generate levels of income to make TTOs self-sufficient (in common with the majority of TTOs internationally).

The report makes some recommendations in respect of KTI, including that it continues as an agent for change in the ongoing adoption of KTT as a key business asset and economic driver and maintaining its role as “honest broker”.

There is already a focus on many of the recommendations identified, through a combination of the third round of the TTSI programme (TTSI3, 2017-21) and the strategic work plan for KTI. Delivering and promoting the impact of knowledge and technology transfer will require concerted action from the HEIs, RD&I funders and the companies and investors who engage with the system. There is a strong base from which to build.

Recommendations and responses arising from the evaluation

1. Spin-outs and investment

Closer links between the investment community and HEI/TTO will help to build partnership and trust, making the decision-making processes of investment more transparent. The clarity that the KTI licensing templates now give has been helpful and there is a need to expand this type of guidance to equity considerations.

KTI will support this through planned work in 2017/8 on spin-out company formation as part of further development of the national IP Protocol. It should be noted that, whilst the Protocol provides a framework, transactions would be expected to be negotiated on a commercial basis.

2. Consultancy services to enterprise

The provision of consultancy services by researchers is a useful measure of company engagement and is worth measuring nationally.

Recognising the value of consultancy activity from HEIs to business, under the TTSI3 programme (2017-21), five competitively won Managed Consultancy Services pilot awards were made to: University College Dublin, University of Limerick, Trinity College Dublin, Waterford Institute of Technology and Maynooth University (in collaboration with Athlone Institute of Technology and the Institute of Technology Carlow).

3. Metrics

Performance should be measured by both outputs and outcomes.

Metrics requirements under the TTSI3 programme (2017-21) have moved towards this. In addition, the Annual Knowledge Transfer Survey (AKTS), published by KTI, assesses performance of the KTT system and its impact.

4. Data requirements

Consideration should be given to standardised KTT reporting across State funding bodies, with KTI considered the natural lead.

Data collection under the AKTS is undertaken jointly by KTI and the HEA. The HEA uses this to inform its performance compact data. Further co-ordination across agencies and funders is desirable.

5. Marketing

Getting the message across to businesses that HEIs can add value to them is vital and responsibility for this lies with both the HEIs and with KTI.

HEIs undertake this at an institutional, or consortium, level whilst KTI has a national "single shop window" role. More could be done by the HEIs and TTOs to promote the role of KTI as this shop window, whilst KTI will develop a more enhanced and co-ordinated marketing offer across the system.

6. TTO staff career development

The levels of expertise within the TT offices has grown over time, as evidenced particularly through the international professional (RTTP) qualification. It is timely to look to additional skills development and associated career progression.

KTI plans to support the TTOs in the development of a competency framework for KTT.

7. Knowledge Transfer Ireland (KTI)

KTI has a powerful voice, one that is listened to and respected, and that gives KTI real strength in being an agent for change in the ongoing adoption of KTT as a key business asset and economic driver. The contribution of Knowledge Transfer Ireland and the National IP Protocol is rated highly, but not always fully understood by industry.

KTI has become embedded in the innovation landscape and its role will continue and develop over the next phase of its strategic plan. There is more to be done to promote to enterprise the value of engaging with State funded research and expertise, the resources available and framework (through the national IP Protocol). Responsibility for this sits not just with KTI but also with the HEIs and State funders of R&D&I.

Appendix 1: TTSI2 consortia of Research Performing Organisations

Consortium lead	Consortium members
Dublin City University	Dundalk Institute of Technology
Dublin Institute of Technology	Institute of Technology Tallaght Institute of Technology Blanchardstown Institute of Art, Design and Technology National College of Ireland
National University of Ireland Galway	Galway-Mayo Institute of Technology Institute of Technology Sligo Letterkenny Institute of Technology
Maynooth University	Waterford Institute of Technology Athlone Institute of Technology Institute of Technology Carlow
University College Cork	Cork Institute of Technology TEAGASC
University of Limerick	Limerick Institute of Technology Institute of Technology Tralee
University College Dublin	National College of Art and Design
Trinity College Dublin	Royal College of Surgeons in Ireland*

* RCSI joined the programme in 2015

Appendix 2: Glossary

Active Spin-out:	An Active Spin-out is an RPO-created spin-out company that is at least three years post-formation and has at least one paid employee and has raised equity and/or has booked sales revenue. It is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The RPO will have executed a licence to the spin-out for the IPR and/or will hold equity in the spin-out.
Consultancy Services:	RPO provides professional-level work to an external client organisation through an academic, researcher or other member of RPO staff in exchange for a commercial fee. The work is specified (or agreed) by the client against deliverables agreed with the RPO.
Invention Disclosure:	The invention disclosure is the first recording of potential new intellectual property (IP). The Invention Disclosure Form (IDF) contains basic information, including supporting data, which helps to evaluate and subsequently, potentially, protect and commercialise the intellectual property.
ILO:	Industry Liaison Office – the team responsible for managing KTT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.
KTT:	Knowledge and Technology Transfer – the sharing of expertise, capability, technology and intellectual property between the research base and industry or the public sector with the aim of developing new or improved products, processes and services that deliver societal and economic benefit. May sometimes be referred to as KT or TT.
LOA:	Licence, Option or Assignment – a contract under which IP rights are transferred, or are agreed to be transferred, from one party to another for the purpose of commercialisation.
Priority Filing:	The first filing of a patent application which will establish a priority date from which all national patents will derive. Depending on patent strategy the priority filing may be done as a provisional application or national patent application or regional or international (PCT) patent application.
Repeat Business:	Number of companies with whom the RPO has entered into commercial transaction (collaborative research or consultancy services agreements or LOAs) on two or more occasions in the past three years.
RPO:	Research Performing Organisations. Universities, institutes of technology and other research institutions funded primarily by public funds.
Spin-out:	A spin-out company is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The rights to the company can be linked to a specific researcher who was within the RPO at the time of company formation and who would be considered an academic founder. The RPO will hold equity in the spin-out and/or has issued the company with a licence to the IP.
TTO :	Technology Transfer Office – the team responsible for managing KTT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.

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