

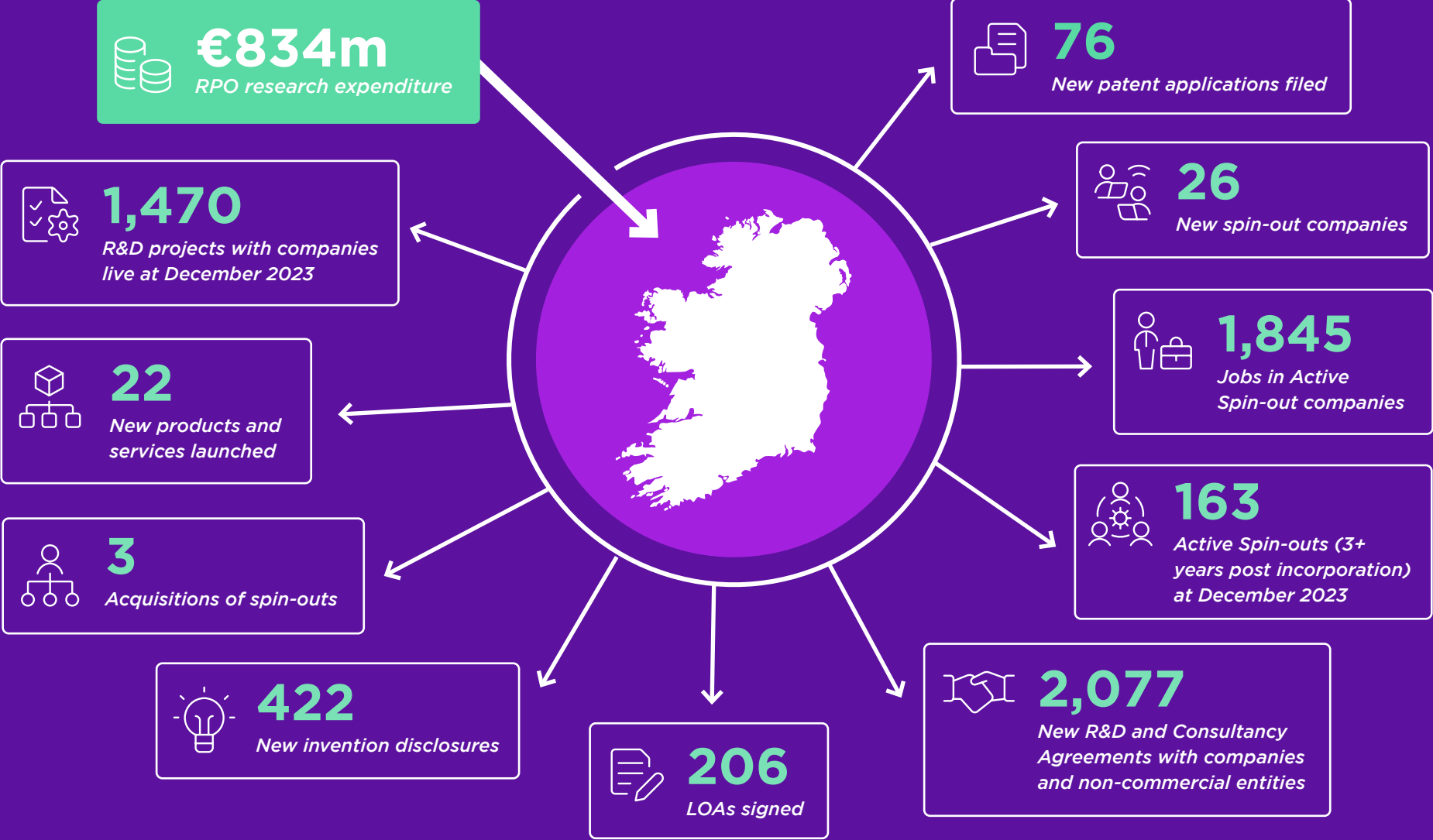


# Annual Knowledge Transfer Survey **2023**

Supported by



# In 2023



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# Foreword



**Marina Donohoe**  
Head of Research & Innovation,  
Enterprise Ireland

The pace of change across the business landscape is accelerating at an unprecedented rate. Investment in research and development (R&D) is crucial for fostering innovation and future-proofing to maintain competitive advantage.

Ireland's Research & Innovation Strategy, Impact 2030, is a comprehensive plan that aims to promote research and innovation to address both national economic and societal challenges nationally. It also addresses talent in the research and innovation ecosystem and importantly, the impact of innovation on company success.

Enterprise Ireland (EI) plays a vital role in achieving these objectives and is the foremost funder of Industrial Research in Ireland. The agency currently has a comprehensive portfolio of offers for supporting clients with their research and innovation agenda through collaboration and project execution. Knowledge Transfer Ireland (KTI) sits within EI and is the national office that helps business to benefit from access to expertise, technology, and intellectual property available within the publicly funded research base in Ireland. Our data shows that Enterprise Ireland clients who avail of Research & Innovation supports have 1.3 times more domestic sales, 2.5 times higher turnover and 4.7 times greater exports.\*

Through our support for knowledge transfer activities, EI supports effective engagement between companies and the research base which stimulates the creation of new companies and founders from research, supporting their journey to High Potential Start-Up status (HPSU). KTI's mission is to make it easier for businesses to access publicly funded research. We are proud to have co-funded and hosted KTI since its inception in 2014 and we believe it is delivering on its objective to make it more straightforward for business and entrepreneurs to connect with, and commercialise, Irish public research.

This report provides a review of the performance results from commercialisation and business engagement across the Irish research system. As part of its work, KTI collects and analyses data from Ireland's Universities, Technological Universities, Institutes of Technology (IoTs) and other State-funded research organisations, to produce the Annual Knowledge Transfer Survey (AKTS) in conjunction with the Higher Education Authority (HEA). The survey covers activities including licensing, collaboration, consultancy and spin-out creation. The results of the 11th annual survey point to solid increases in levels of licensing activity, spin-out company formation and new products reaching the market.

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2023 was the final year of the Technology Transfer Strengthening Initiative (TTSI), managed by KTI which has been in place since 2007 and was a key funding resource for realising these goals. The results show a 32% increase in active spin-outs over the period 2019 - 2023 with jobs in active spin-outs rising from 1,000 to 1,845 in the same period. And in the last five years more than 13,000 Research Collaboration and Consultancy Agreements and 1,008 Licences Options & Assignments have been achieved. It is encouraging to see our more mature spin-out companies performing well, creating additional jobs reflecting the calibre of spin-out companies emerging from our HEIs. Encouragingly, Irish SMEs continue to represent an increasing number of companies engaging with academic research.

Looking to the future, the successor to TTSI, the KT Boost Programme was launched in 2023 and will fund the University and TU Sector to the tune of €34m over a 4-year period. The KT Boost Programme is co-funded by the Government of Ireland and the European Union through the Southern, Eastern & Midland Regional Programme 2021-2027 and the Northern & Western Regional Programme 2021-2027. The initiative aims to strengthen the connectivity with existing companies and engage with new companies, particularly SME's, to drive their innovation agenda and economic impacts while also building the capacity and capability in universities including Technological Universities.

This programme along with the newly developed Innovators Initiative will help achieve the goal of producing more and higher quality spin-out companies and in turn more of these companies will convert to High Potential Start-Ups.

Enterprise Ireland through KTI will continue its work with the Research Performing Organisation's on this important agenda of supporting and encouraging innovation across the entire business landscape. Through this and other EI Research and Innovation Programmes we will engage closely with existing and new clients encouraging them to engage with the Irish research base. This engagement will help achieve the goals set in Impact 2030 including addressing talent in the ecosystem and demonstrating the positive impact of businesses that engage in innovation which will in turn result in more successful and competitive companies on a global level.

*\*Based on 2022 ABR results. Comparison based on Enterprise Ireland supported RD&I active clients versus Enterprise Ireland RD&I non active.*





# Introduction

The **Annual Knowledge Transfer Survey (AKTS)** is published by KTI in conjunction with the Higher Education Authority (HEA). It provides a review of business engagement and commercialisation activity (knowledge transfer, KT) in the State funded research sector. Data are submitted to KTI by each Research Performing Organisation (RPO), coordinated by its Technology Transfer Office (TTO)/Innovation Office and include information from other departments such as the Research Office, the Finance Department and individual research departments.

**More information about knowledge transfer, including case studies of business impacts, may be found on the KTI website at [www.knowledgetransferireland.com](http://www.knowledgetransferireland.com).**

KTI was established in 2014 by the Department of Enterprise, Trade & Employment as a national initiative to maximise access to publicly funded research by companies and entrepreneurs and to help facilitate the commercialisation of that research to deliver impact. To that end, KTI has developed national frameworks and guidelines that standardise the system and make the process of engagement more straightforward. A single portal to research, expertise and how to engage, KTI also offers a broad suite of supporting materials and resources. These include directories and guides, a set of template legal agreements, a tool to find funding to support research and innovation, a comprehensive event calendar and more. KTI's resources are available to companies of all sizes and in all sectors.

The HEA leads the development of the higher education and research system with the objective of creating a coherent system of diverse institutions with distinct missions, which is responsive to the social, cultural and economic development of Ireland and its people and supports the achievement of national objectives.

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# Executive Summary



## Dr Christian Stafford

Head of Knowledge Transfer Ireland,  
Head of R&I Stakeholder Engagement,  
Enterprise Ireland

The **Annual Knowledge Transfer Survey** provides data on a wide range of knowledge transfer activities from across the national research and innovation ecosystem. KTI has been gathering this data for many years allowing us to monitor trends and report annually on system performance.

The data is provided by Ireland's higher education institutions and research-performing organisations (RPOs), which in 2023 comprised eight universities, five technological universities, two institutes of technology, two colleges, Teagasc, the Marine Institute and Irish Manufacturing Research (IMR). A full list of these research-performing organisations (RPOs) can be found in appendix 2. KTI extends its thanks to all these organisations for supporting the annual survey so that a complete and comprehensive picture of the national knowledge transfer system can be captured and shared.

The AKTS survey for 2023 is also the survey that captures data from the last year of TTSI3, the 3rd cycle of funding for the Knowledge Transfer system that funds, through support from the Department of Enterprise, Trade and Employment via EI and KTI, technology and knowledge transfer staff and activities across

the higher education system. Starting in 2024, TTSI has been replaced by a new and evolved Knowledge Transfer programme – KT Boost. The KT Boost Programme is co-funded by the Government of Ireland and the European Union through the Southern, Eastern & Midland Regional Programme 2021-2027 and the Northern & Western Regional Programme 2021-2027 and is designed to significantly enhance the KT outputs from the research and innovation ecosystem through:

- Full and comprehensive support of all higher education institutions, including all the new Technological Universities
- A significantly enhanced and regionally dispersed KT infrastructure.
- A clearer focus on high quality commercialisation metrics particularly the creation of High Potential Start-Ups from Research, underpinned by funding for dedicated spin-out managers.
- A significantly enhanced focus on enterprise engagement, with SMEs

The key highlights from AKTS 2023 are summarised in the impact graphic on page 2. Overall, there are some very positive upward trends, when compared to 2022.

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Key highlights include:

- 1,470 live R&D collaborative projects with industry, an increase of just under 12% from previous year
- 206 LOAs (Licence, Options and Assignments) signed, an increase of just under 16% from 2022
- Spin-outs created in 2023 were 26, up 2 (8%) from 2022 survey.
- Jobs in active spin-out companies up 18% from last year, at 1,845 spin-out employees for 2023
- In 2023, there were 1,671 new R&D and Consultancy Agreements with industry, of which 73% were with Irish companies and 51% were with Irish SMEs

The backdrop to the 2023 survey is a reported record level of research expenditure, reaching €834 million in 2023, an increase of €88 million (up 12%) compared to the previous year. A significant portion of the total research expenditure was provided by the university sector, accounting for 76% of the total. The Technological University and Institutes of Technology sector contributed 16%, while Colleges and State Research Organisations provided 8%. The overall level of national spend in public research organisations has been

trending upwards, critical resources to build capability and expertise, generate research talent and provide the fuel to drive knowledge transfer outputs.

A total of 26 spin-out companies were established by nine research-performing organisations in 2023 an increase of 2 on the previous year. The average number of spin-out companies over the period 2019-2023 is 28 per year. There is an expectation that with additional focussed support under the new KT Boost Programme which funds dedicated spin-out managers alongside other new programmes in the national system to boost entrepreneurship and commercialisation of research, such as Innovators Initiative and SFI ARC Hubs, there will continue to be an increase in high quality spin-outs being generated that can become EI High Potential Start Ups. There continues to be an upward trend in the number of active spin-out companies. By the end of 2023, there were 163 active spin-outs, representing an increase of 11 on 2022. These companies provide employment for 1,845 individuals, representing an additional 281 full-time equivalent roles compared to the previous year.

The other key area where further growth is needed is enterprise and SME engagement. Innovation is vital for companies to thrive and

grow and a critical element of that is being able to access research infrastructure, to tap into expertise and thought leadership and to collaborate with research system to help solve problem, access technology, and identify and recruit talent. In 2023 R&D and Consultancy Agreements totalled 2,077 with 1,671 of these being with industry to commence research projects. The projects span a range of sizes, from small innovation vouchers to agile projects to larger collaborative programmes. 73% of the industry related R&D and Consultancy Agreements were with Irish Companies. At the end of the year, there were 1,470 active research projects with industry partners across all RPOs.

On the direct technology transfer front, the 2023 survey report 206 licences, options, and assignments (LOAs) being executed, with 55% of them being options, 33% being licences and 12% being assignments. In 2023, most intellectual property licences, options, and assignments to companies were for software and Patented IP, representing 40% and 28%, respectively. Looking further downstream in the commercialisation process in 2023, 22 new products and services were launched into the marketplace, demonstrating the successful translation of research into tangible outputs that can benefit society and drive economic growth.

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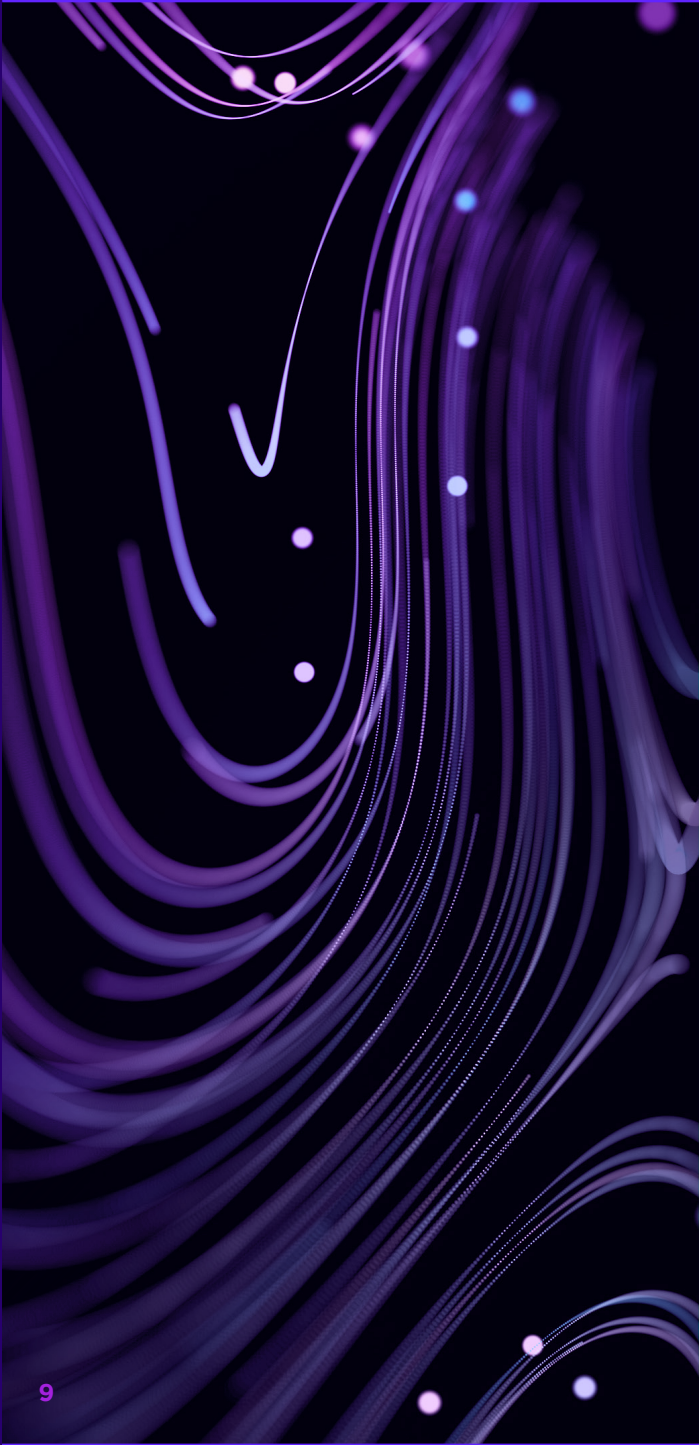
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Finally, in terms of novel IP being generated, there was a downturn in 2023.

Patent Applications filed from previous year, down 27% to 76 from previous year of 104.

Securing intellectual property rights through the filing of patents is essential for protecting the value of research and fostering an environment where research can be safely developed into marketable solutions. This is particularly important for deeptech innovations, hardware, and sectors with long product cycles where patent life is key to enabling return in investment. Patent filings also are a key contributor to global innovation rankings, and it is hoped that this downturn can be reversed in coming years and the increase in research spend bear's fruit. Against that, more encouraging was that in 2023, there were 422 invention disclosures reported, reflecting the strong innovative capacity within the RPOs. These disclosures mark the initial stage in the process of transforming research into commercially viable technologies and products. The 422 invention disclosures marks an increase of 5.5% from 2022.

Overall, the AKTS survey is positive and represents a strong baseline from which further impact can be achieved in the coming years. Impact 2030 holds significant ambitions for the research and innovation sector, and it is vital that all stakeholders, in academia, industry and government continue to work in partnership to ensure the knowledge transfer system in Ireland is as high impact and productive as possible.

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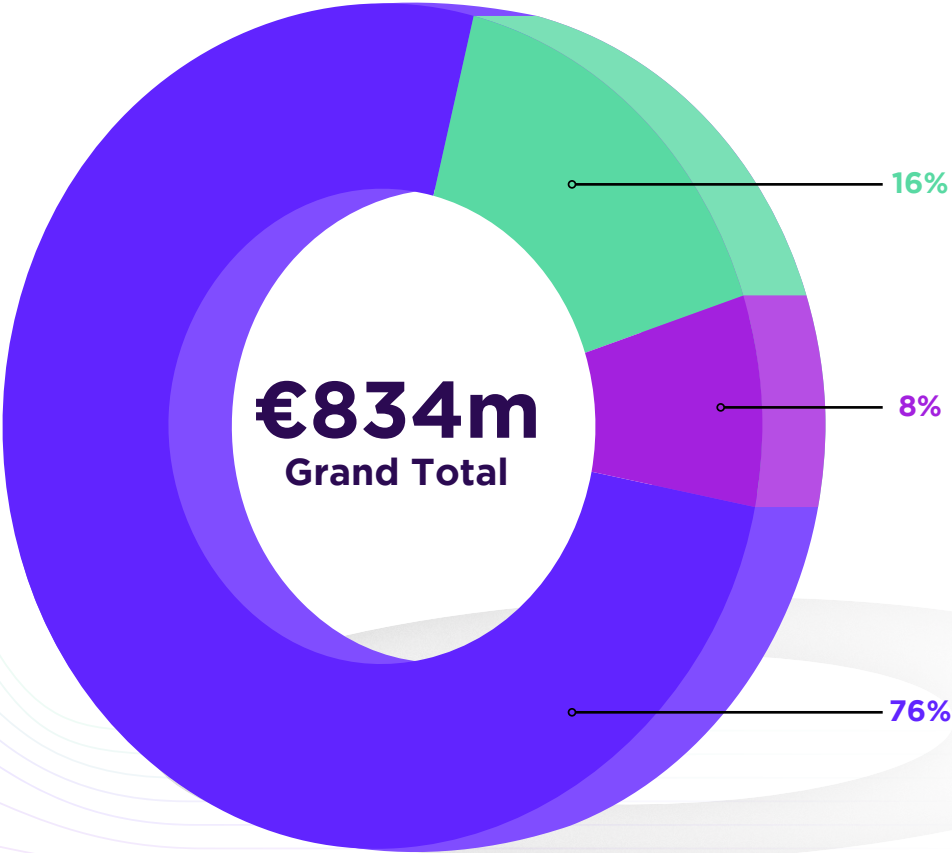


# Research Funding in Ireland

The AKTS uses year-in data on actual research expenditure provided by the individual RPOs to enable a more direct comparison with data from other countries. It does not include block grant and capital expenditure.

The total research expenditure in 2023 was €834 million which is an increase of 12% or €88 million when compared the previous year.

Research expenditure by type of RPO, 2023



- Technological Universities/Institutes of Technology
- College and State Research Bodies
- Universities

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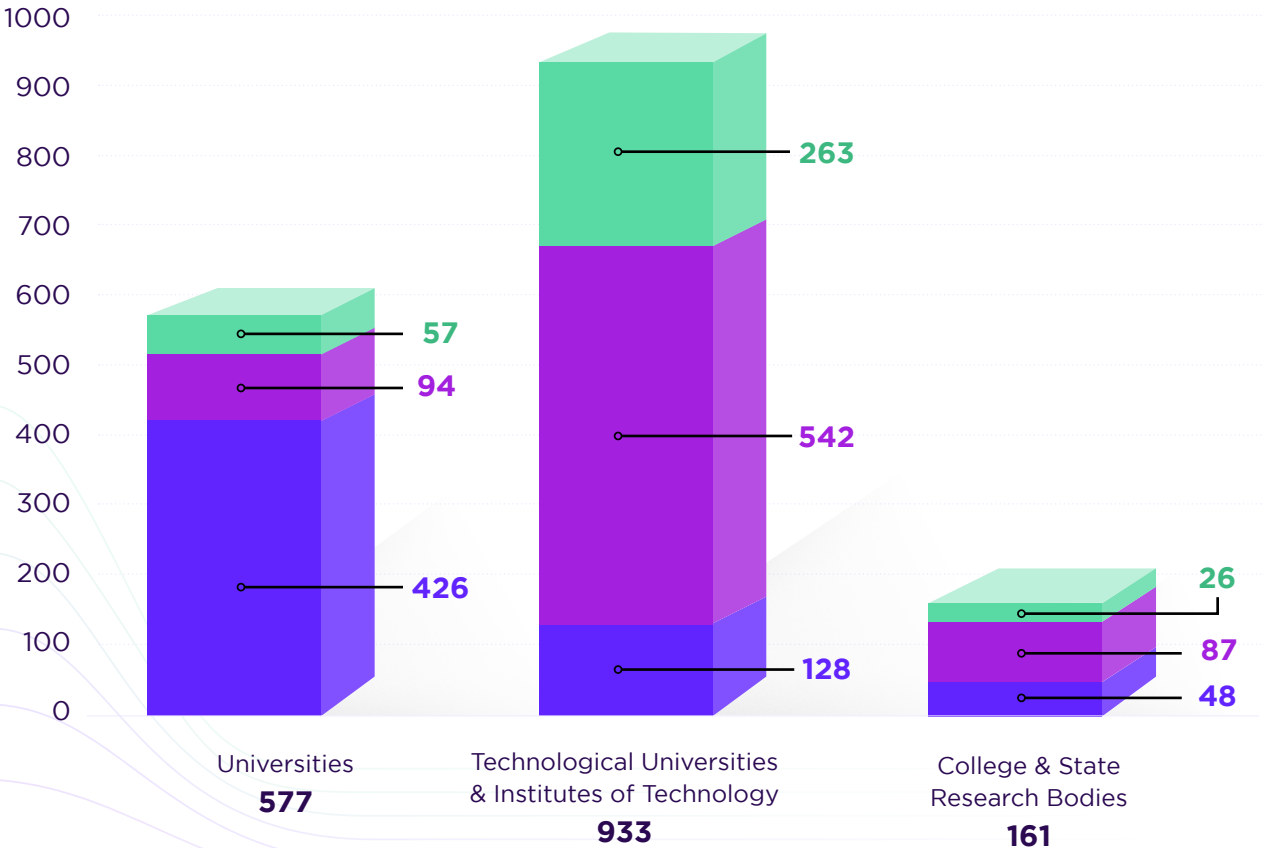
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# Collaborative R&D and Consultancy

Engaging with the Irish Research ecosystem remains critical to both industry and non-commercial organisations in Ireland but particularly to industry in order to grow sales and remain competitive in global markets. Research collaboration with Irish Research Performing Organisations allows for the generation of new knowledge and access to consultancy services from the RPO which draws on existing knowledge to provide this service to the client. In 2023 R&D and Consultancy Service Agreements totalled 2,077 with 1,671 of these being with Industry. 51% of the agreements with industry involved Irish SMEs. When compared to the previous year the total agreements with industry decreased by approximately 3%. As of the end of 2023 there were 1,470 live R&D projects (excluding Consultancy) with companies.

R&D and Consultancy Service Agreements with non-commercial entities in 2023 totalled 406. These agreements are usually with public sector or charities and they were down by 100 agreements when compared to the previous year.

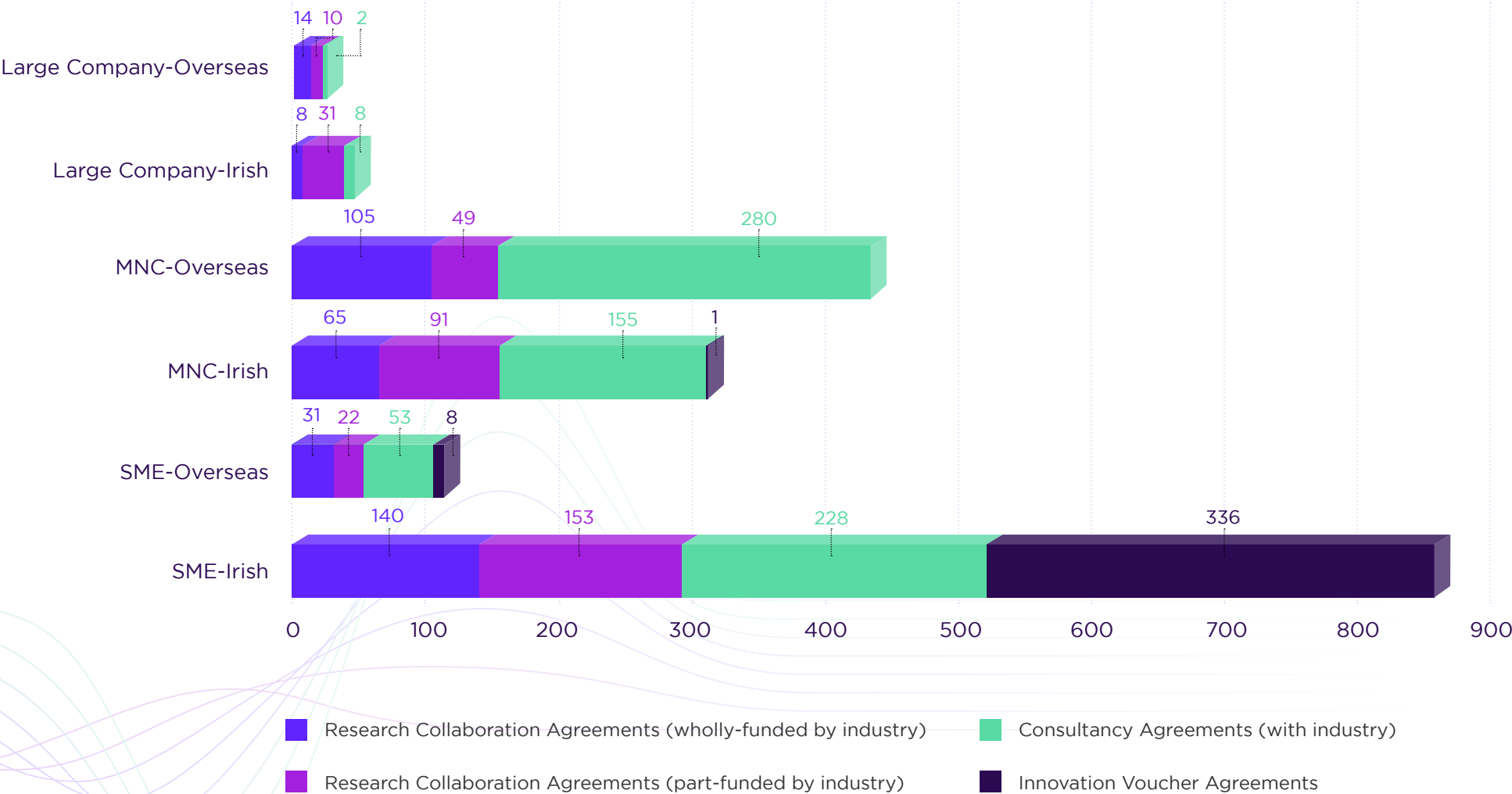
No. of R&D Agreements and Consultancy Agreements with Industry 2023 - RPO Type



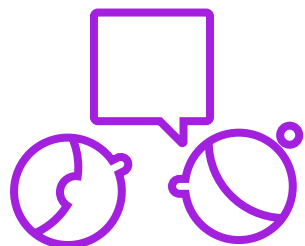
- Innovation Voucher Agreements
- Consultancy Agreements
- Research Collaboration Agreements with Industry



No. of R&D and Consultancy Agreements with Industry 2023 - Company Type



*\*Individual agreements may include multiple companies.*

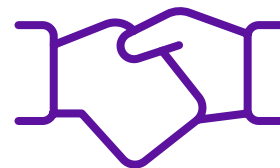


**51%** of all R&D & Consultancy Agreements with Industry in 2023 involved Irish SMEs or

**73%** involved Irish Companies



**7.3% Increase** in live R&D Projects with industry and Non-Commercial Entities



**19% Increase** in Consultancy Agreements



**Over 13,300** R&D & Consultancy Agreements over the past 5 years

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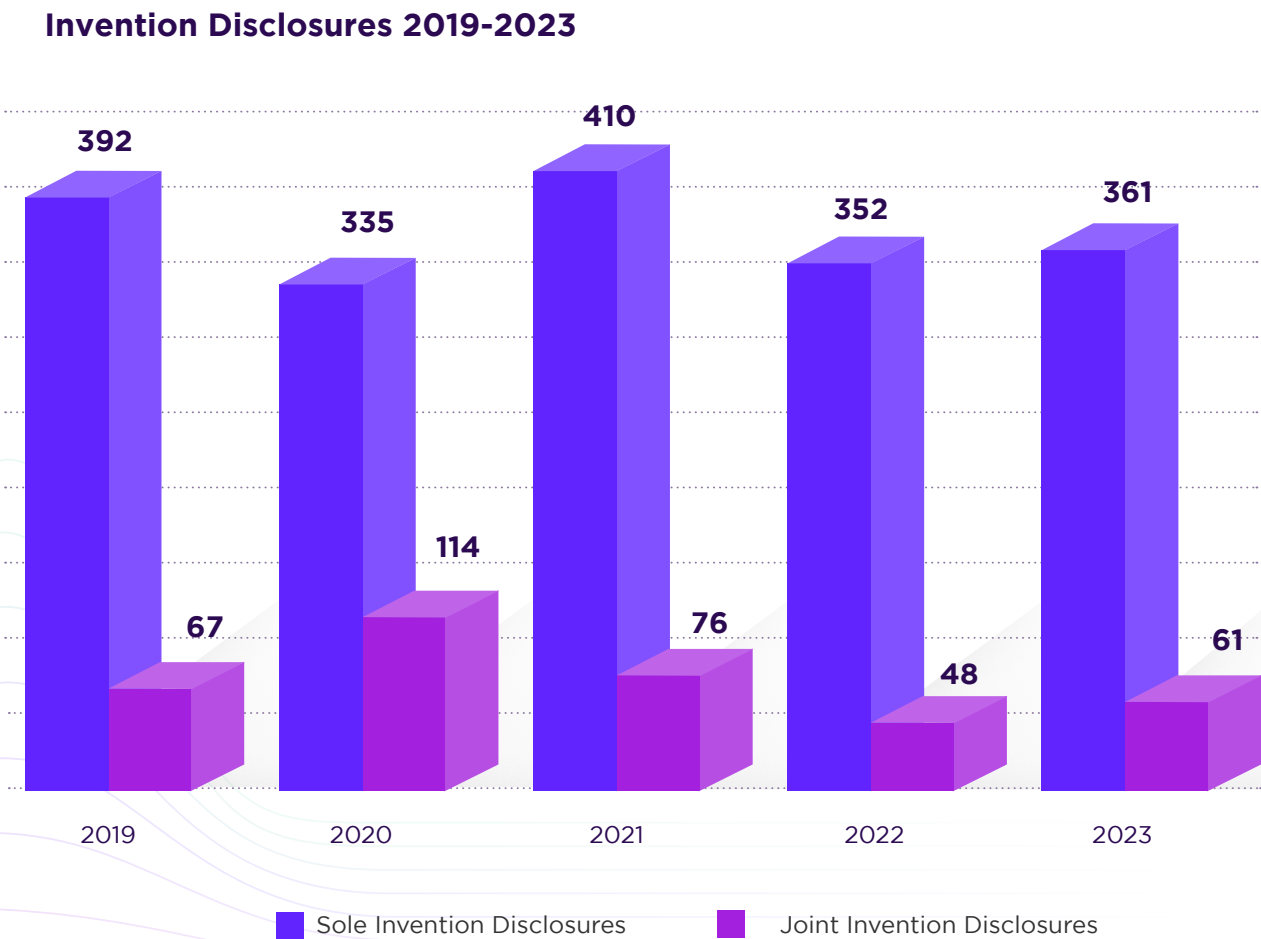
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# Inventions, Intellectual Property and Licensing

Over the past five years there has been a total of 2,216 new invention disclosures with an increase in 2023 of 5.5%. The trend remains with the majority being sole invention disclosures which is where there is just one RPO involved. The overall breakdown between sole and joint remaining similar across most years.



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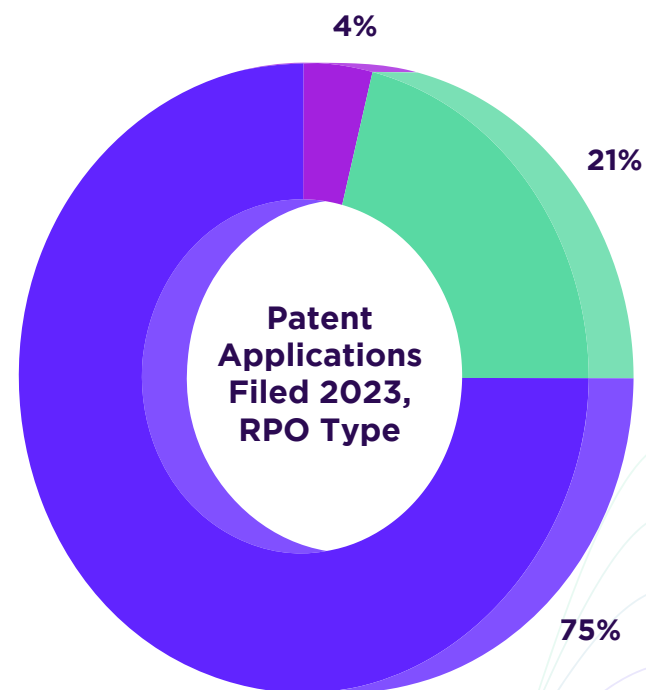
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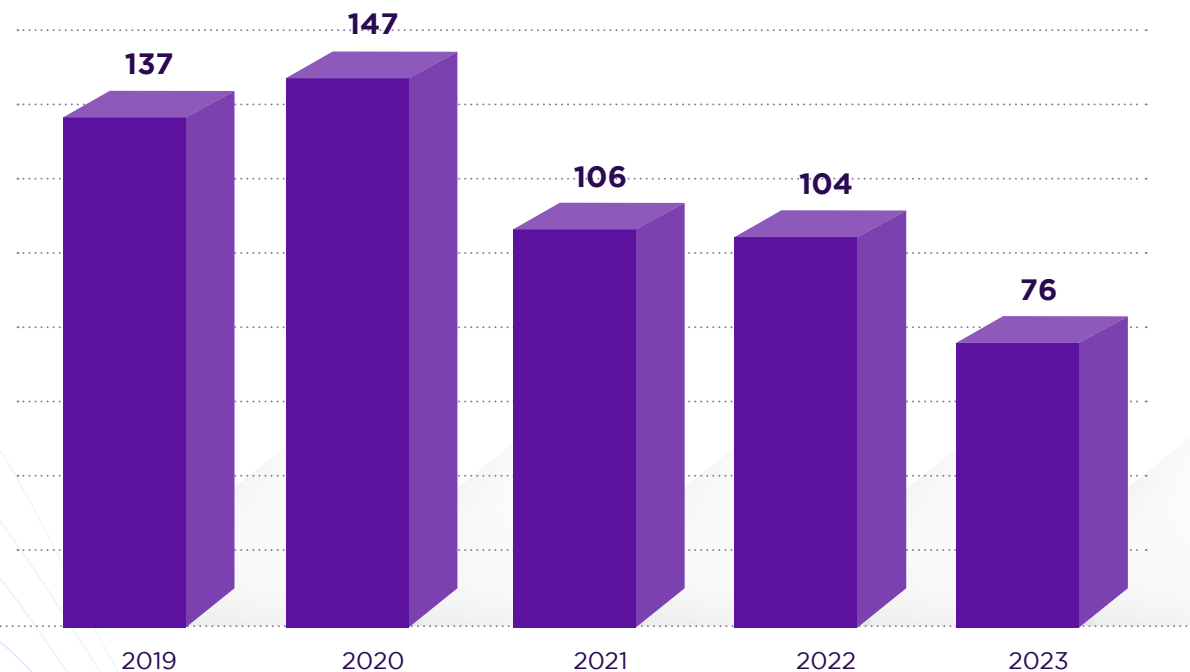
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- College & State Research Bodies
- Technological Universities & Institutes of Technology
- Universities

**Priority patent applications filed 2019-2023**



The number of patents filed in 2023 has dropped significantly when compared to 2022. Of the patents filed in 2022 (104) 52% progressed to PCT applications in 2023, which is a drop from the previous year. The UK Intellectual Property Office and the European Patent Office remain the most popular initial patent filing offices with 87% of the total patents filed in 2023 being in those jurisdictions.

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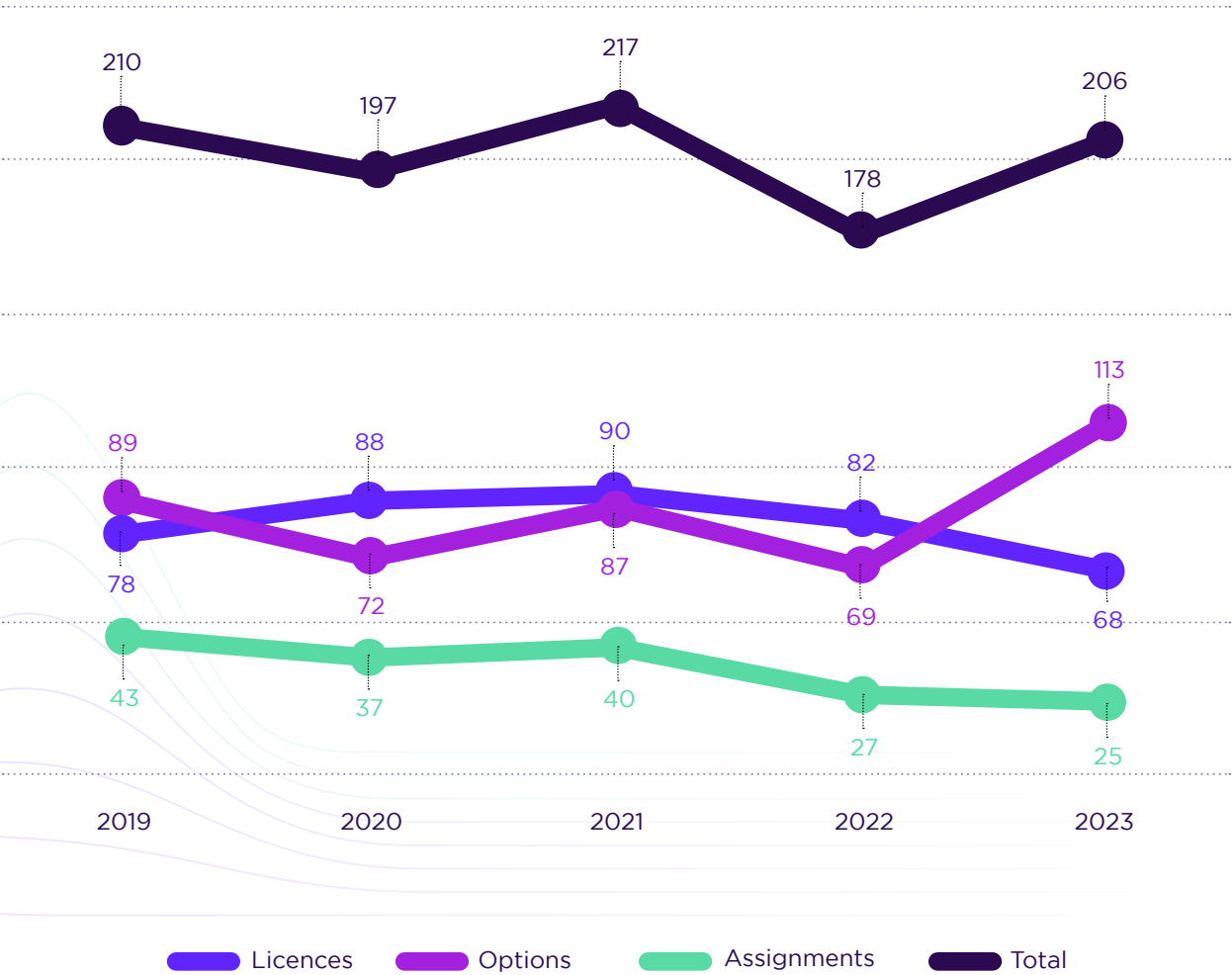
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# Licensing

Licences, Options and Assignments (LOAs) have increased by almost 16% when compared to the previous year (206, 2023). The total gross licence revenue being €3.6m which is an increase of around €1.2m compared to 2022. Looking at the last 5 years there have been 1,008 LOAs issued with the majority being Options accounting for 43%, Licences accounting for 40% and Assignments at the lower end of 17%.

No. of Licences, Options & Assignments executed 2019-2023



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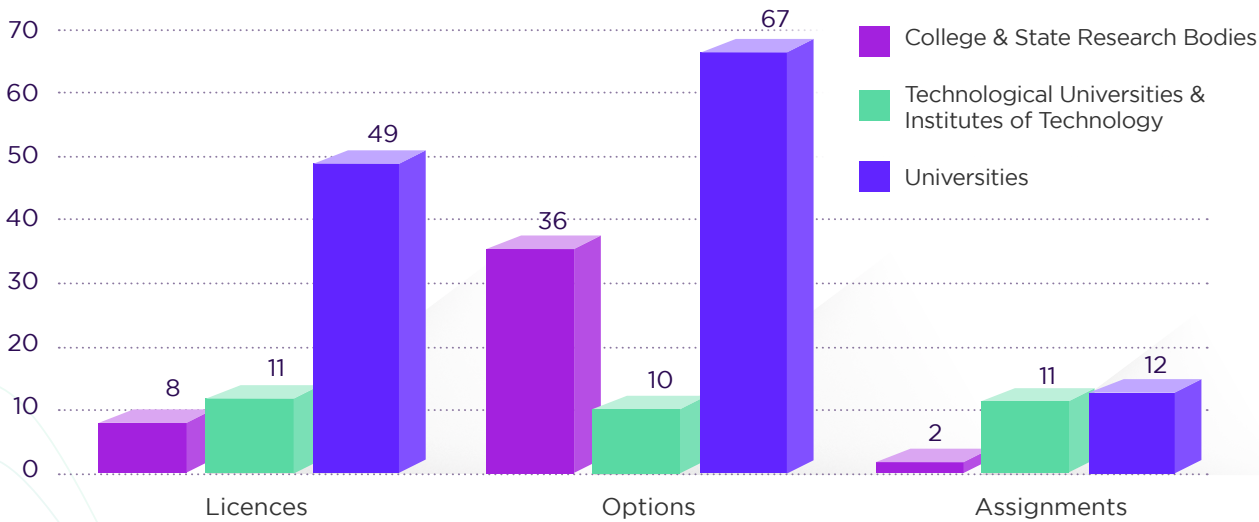
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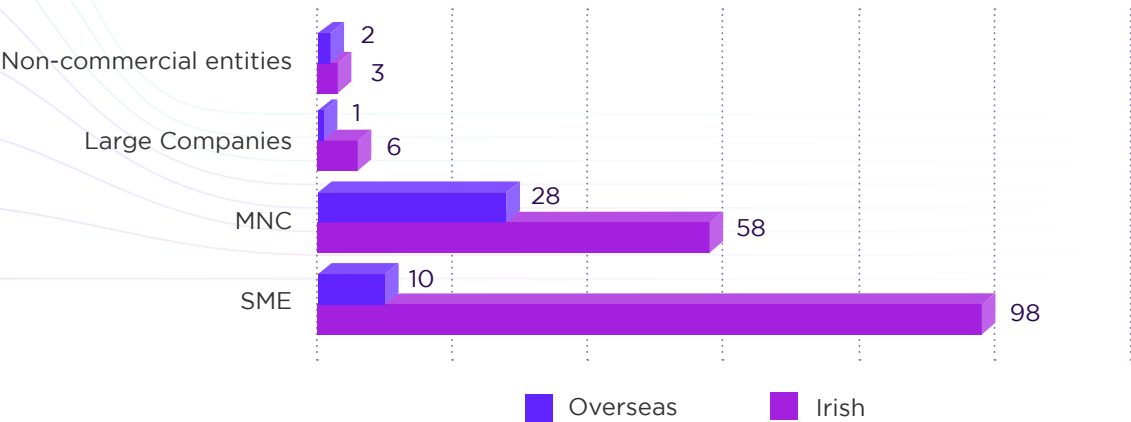


Of the 206 LOAs the majority (79%) were issued to Irish Companies with 48% being to Irish SMEs which while overall is an increase in the numbers issued to Irish Companies, the number of Irish SMEs executing LOAs has fallen slightly compared to 2022. The University sector accounts for 62% of LOAs executed, College and State Research Bodies account for 22% and the Technological Universities and Institutes of Technology sector accounts for 16%.

Licences, Options & Assignments by RPO Type, 2023



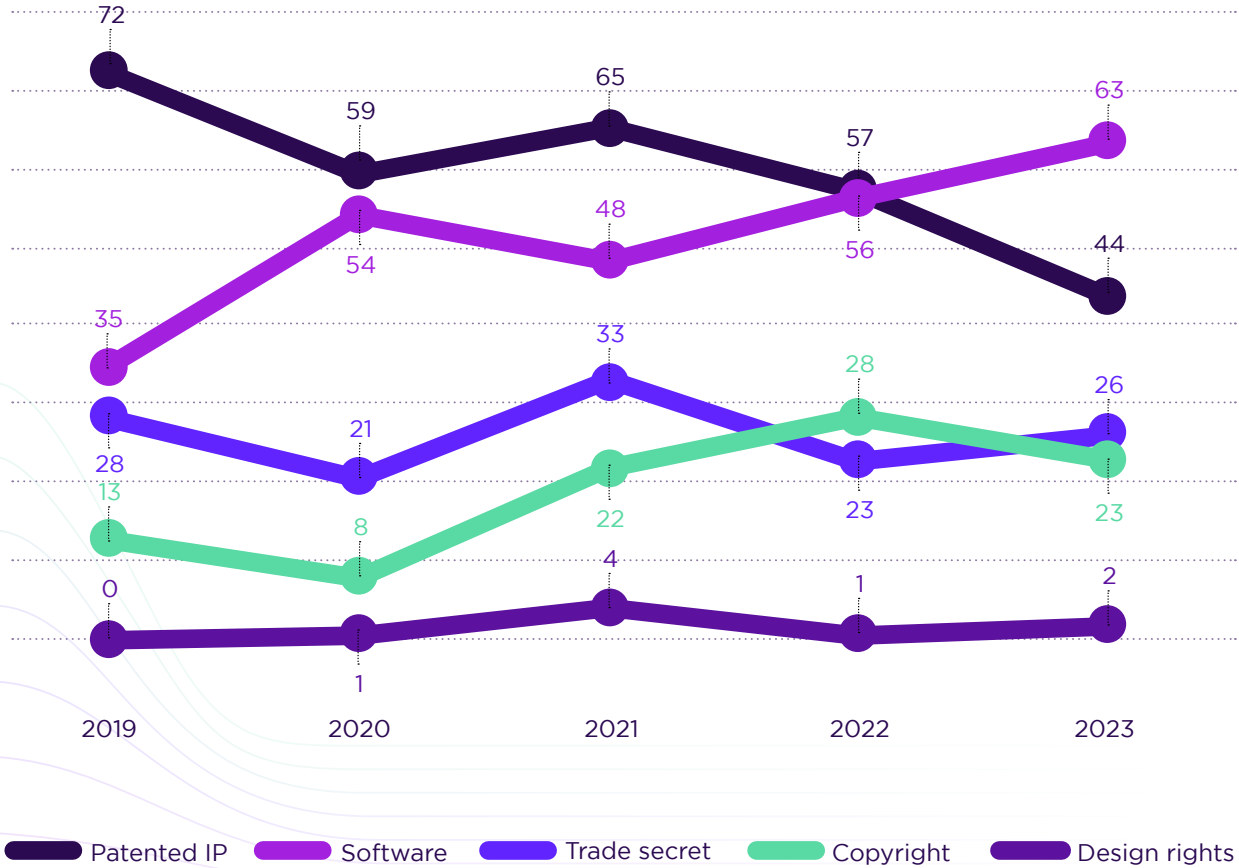
Licences, Options & Assignments by Company Type 2023



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Over the period 2019 to 2023 Patented IP continues to be the most prevalent type of intellectual property in LOAs. Looking at the total in the graph to the right it accounts for 38% of the five year total with Software not far behind accounting for 33% of the total. However, looking at 2023 alone Software has taken the lead in terms of the main type of Intellectual Property in LOAs for the first time over the 5 year period, accounting for 40% in the graph to the right with Patented IP accounting for 28%.

Main types of Intellectual Property in LOAs 2019-2023



NOTE: there are other response categories not covered in above graph and text, e.g. Research Materials, plus other (e.g. know how, etc.)

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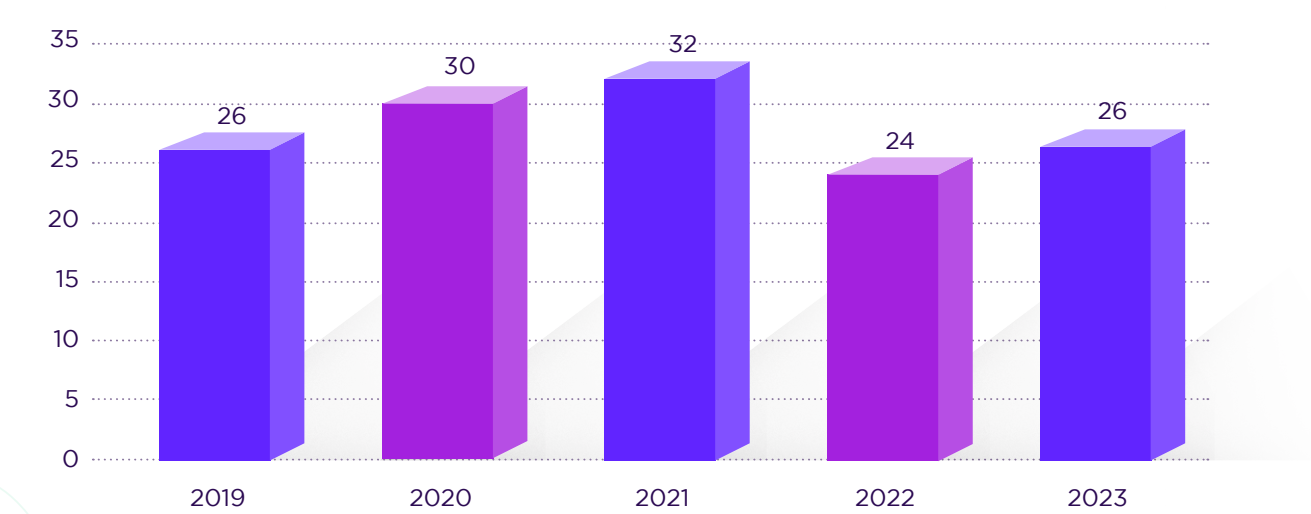


# New company creation

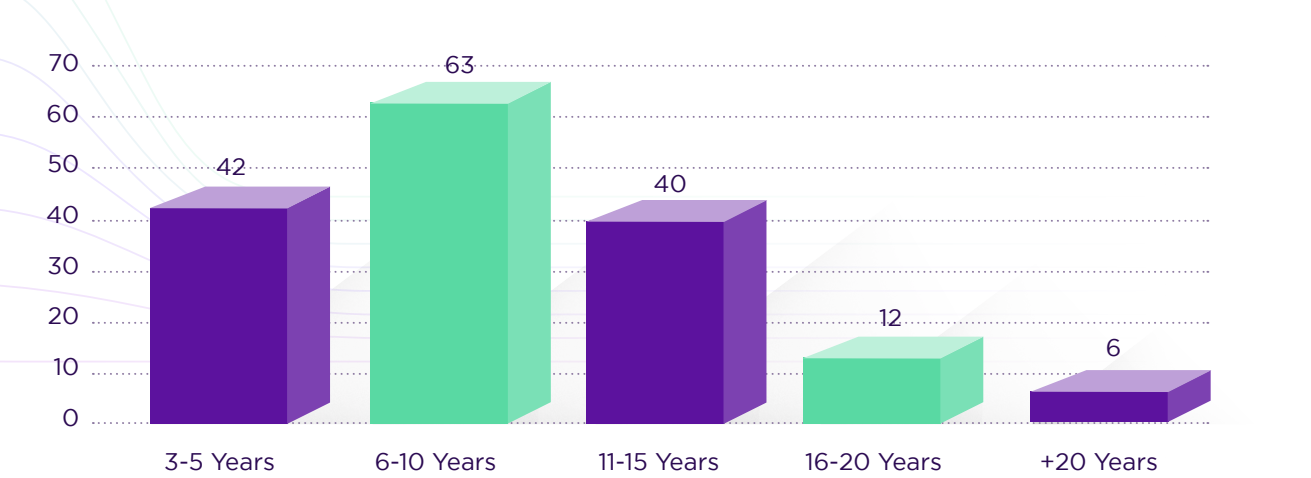
In 2023 26 new companies spun out from 9 of the RPOs, in the previous year this figure was 24 from 8 RPOs. The total number of new companies that spun out from RPOs over the period 2019-2023 totals 138, an average of 28 per year which is a drop of one on the annual average. There were three spin-out companies that were either acquired or merged with another company in 2023.

The aggregate number of companies in which the RPO holds equity or share options at the end of 2023 was 212 which is an increase of 19 compared to 2022. There were 163 Active spin-outs (at least 3 years post formation) at the end of 2023 employing a combined 1,845 Full Time Equivalents. This is an increase of 11 active spin-outs and 281 jobs on the previous year. It is important to note that this figure relates to the employment as of the end of 2023 and does not take account of people employed over the lifetime of the spin-out.

Spin-Outs Established, 2019-2023



Active Spin-Outs - No. of Years Incorporated



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## ENGAGEMENT

# Alltech partners to reduce antimicrobial resistance (Maynooth University)

Overuse and misuse of antimicrobial drugs in farm animals can lead to antimicrobial resistance (AMR), making infections harder to treat. Reducing the use of these drugs doesn't just prevent AMR – it keeps residues out of our ecosystem, where they can damage human health.

Through its partnership with Maynooth University (MU), animal nutrition leader Alltech is learning how a mannan-rich fraction (MRF), a derivative of yeast, can minimise AMR and keep animals healthy.

### Researching a breakthrough in animal health

Alltech, a US-based multinational, has a history of successful collaboration with the Human Health Institute at MU. For this project, Alltech Ireland partnered with Prof Fiona Walsh for world-class research on the animal microbiome.

MU's technology transfer office (TTO), MaynoothWorks, was involved from the start, helping to craft the wholly funded research contract and shape long-term collaboration options.

Prof Walsh's lab found MRF supports chicken and pig gut health by stabilising the diversity of bacteria present. The stable microbiome then acts as the animal's own defence mechanism against pathogens and antimicrobial resistance.

These results have helped Alltech's product development, as well as its efforts to show customers the benefits of maintaining animal health and reducing antimicrobial use.

For MU, the collaboration validates the industrial impact of Prof Walsh's work – ultimately helping to build its research capacity.



### A growing, problem-solving partnership

*"Strong strategic collaborations can deliver solutions and options for real-world problems," says Prof Walsh. "Our collaboration with Alltech has grown into an excellent working relationship and an ongoing partnership."*

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## ENGAGEMENT

# Carten Controls diversifies and grows its product portfolio with SETU

(South East Technological University)

Diversification sets any business, in any sector, apart and sets it up for success. There's no denying extending your products or services can lead to more revenue and new customers.

Carten Controls designs, manufactures and supplies high-performance valves and flow solutions. Employing around 150 in its Waterford plant, the company was keen to extend its portfolio to include bio-pharma products.

With this in mind, it partnered with the South Eastern Applied Materials (SEAM) gateway at South East Technological University (SETU) on several projects.

### Building on strong foundations

Carten Controls has a long-standing relationship with the SEAM team. Over the past 15 years, SEAM has been Carten Control's first port of call when it needs technical support, from mechanical testing to failure analysis.

More recently, it worked with SEAM to develop miniature full bore flow diaphragm valves – valves that allow fluid to flow unobstructed – for the pharmaceutical industry.

They also optimised the design of a diaphragm valve, extending the product's lifespan tenfold. It's now the most popular item on Carten's website each month. SEAM also helped the team select materials for new valve lines, including hydrogen control valves.

### Benefiting from years of research and innovation experience

Over the years, Carten Controls has built a strong relationship with SETU's Technology Transfer Office. It has worked closely with Dr James O'Sullivan, Head of Innovation and Commercialisation, on various collaborations.

From managing the discussion phase to negotiating the contracts and agreements, he seamlessly led the administration side of their recent project.

Carten Controls hopes to work with SEAM on a number of future projects, including developing new technologies to minimise raw materials in valve construction and silicone recycling and reuse.

“

*The SEAM team's technical analysis, responsiveness, project management skills and project resolution exceeded our expectations,” says Declan Irish, Managing Director at Carten Controls. “It provided a high level of professionalism and expertise in a number of disciplines throughout this difficult project task.”*

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## ENGAGEMENT



# Danone Ireland harnesses MTU research for healthcare education

(Munster Technological University)

Early childhood is a period of rapid growth and development. During this time, young children move from primarily milk-based diets to a more varied independent diet, developing their own food preferences and eating habits.

Infant and toddler nutrition is integral to health-focused food and beverage company Danone Ireland. Base powder for Cow & Gate and Aptamil infant formula brands is produced in Cork, finished and packaged in Wexford, and supplied to over 50 countries worldwide.

Keen to gain a deeper understanding of toddler dietary intakes and patterns, the team at Danone Ireland partnered with Dr Janette Walton, researcher and senior lecturer at Munster Technological University (MTU), and Dr Laura Kehoe, senior researcher at MTU, to gather insights into toddler diets in Ireland.

### Underpinning fact-based healthcare materials

The initiative helped strengthen MTU and Danone Ireland's relationship, and enhanced Danone Ireland's credibility and reputation among healthcare professionals nationwide.

MTU's research, using data from the Irish National Pre-School Nutrition Survey, produced valuable findings. Danone Ireland used this research to create evidence-based resources to educate healthcare professionals.

The findings were also presented to an audience of healthcare professionals, academics and policymakers at The Nutrition Society, Irish Section Conference in Cork in 2022.

Ann-Marie Barrett from the MTU Innovation and Enterprise Office was involved from the beginning of the project to advise on costings, negotiate the contract and review the agreement between Danone and MTU.



### Appreciating the value of knowledge transfer

*"We really value the expertise of Dr Janette Walton and Dr Laura Kehoe. This collaboration allowed us to deliver our findings in an informative and educational way, helping to increase our visibility and credibility among healthcare professionals,"*

**Jennifer O'Neill,**  
*medical affairs manager at Danone Nutricia Ireland.*

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# COMMERCIALISATION

## Micron Agritech works to revolutionise animal health management (Technological University Dublin)

When livestock are tested for parasitic infections, farmers face a way of two days on average for lab results. That's not fast enough.

Micron Agritech, a Technological University (TU) Dublin spin-out, is shortening that wait to 30 minutes with its Micron Kit for app-based testing. This innovation will combat the build-up of medication resistance, giving farmers and vets tools to improve the lives of animals while increasing productivity.

### A student project with global aims

Micron Agritech grew out of a student project in Product Design at TU Dublin's School of Creative Arts, in collaboration with CreateLAB, a TU Dublin initiative that supports industry with its product design and development expertise.

TU Dublin's Innovation Office worked with the founders to protect their intellectual property and navigate the licensing process. It went on to help with key areas including patent drafting and funding acquisition.

With this support, Micron Agritech raised €500,000 in seed funding, another €1.5 million to bring the product to market, and a further €2.7 million since.

Micron Agritech's goal is to make its platform accessible globally, starting with Ireland and the UK. Last year, it reached major milestones, making its initial sales and setting up a UK office

“

### A relationship built to last

*“Micron Agritech's achievements of first sales and expansion into the UK market mark pivotal moments in its journey,” says Paul Maguire, head of innovation and knowledge transfer at TU Dublin.*

*“We remain committed to supporting Micron Agritech as it continues to develop its groundbreaking solutions, expand its global presence and contribute to advancements in animal health management.”*

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## ENGAGEMENT

# Misean Cara partners with RCSI to measure COVID-19 impact and build crisis strategy (Royal College of Surgeons in Ireland)

No corner of the globe was spared the devastating effects of COVID-19. For the world’s poorest countries, however, those effects hit even harder.

Misean Cara is an Irish missionary organisation that supports development, humanitarian and emergency projects in over 50 countries.

When the COVID-19 pandemic hit, however, the team was unable to deliver its usual level of work due to restrictions. As the pandemic was the first of its kind, it was tricky for the organisation to foresee the challenges or repercussions that lay ahead.

### Assessing the impact to plan for the future

Misean Cara partnered with the Royal College of Surgeons in Ireland (RCSI) research team, led by Dr Jakub Gajewski, to determine the impact of COVID-19 on its services and rural healthcare facilities.

Thanks to RCSI analysis and insights, Misean Cara was able to accurately measure the effects of the pandemic on its work, as well as how health project teams responded to the challenges.

Moreover, it provided key learnings which enabled the team to build an action plan and strategy for future crises. It also helped validate and highlight Misean Cara’s work during the pandemic.

Aoife Gallagher and the RCSI Innovation Office supported throughout the project, helping negotiate the contract and manage project costs.



### Unlocking the power of meticulous research

*“The rigorous research approach adopted by RCSI validated our members’ responses to the challenges presented by the pandemic,” says Seamus Collins, learning and development manager at Misean Cara.*

*“The final report from RCSI provides us with a reference point when faced with future crises. We found RCSI easy to work with, and communication was always clear and collaborative.”*

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# COMMERCIALISATION

## Nexalus partners with TCD to take pioneering technology to market (Trinity College Dublin)

The climate emergency is one of the biggest challenges of our time. New technologies, however, are paving the way for a cleaner, greener future.

Trinity College Dublin (TCD) professor Anthony Robinson is behind two cutting-edge innovations making strides in carbon reduction efforts across multiple industries.

A liquid heat exchanger works as a water cooling system for electronics thermal management, while sealed data centre modules offer an inexpensive solution to effectively cool data centres and their server modules. Both innovations work to reduce energy demands and boost efficiency.

### Building a trailblazing partnership

In 2019, TCD licensed the two innovations to Nexalus, a TCD spin-out specialising in technology that sustainably cools electronics.

Acquiring the licences was a crucial step for Nexalus, allowing it to raise private investment and launch a series of innovative products.

TCD's Knowledge Exchange Office (KEO), led by Samantha Williams and Graham McMullin, played a pivotal role in the partnership from the beginning.

From the intellectual property identification and evaluation phases, the KEO team supported at all stages, advising on aspects like patent protection, filing and prosecution.

It also worked closely with the Nexalus team throughout the licensing process, including drafting and negotiating two licensing agreements. Moreover, the KEO team introduced Nexalus to key Enterprise Ireland contacts.



### Benefitting from the experience of seasoned pros

*"The TCD Knowledge Exchange Office spearheaded the contract drafting and negotiations between Nexalus and Trinity College Dublin," says Kenneth O'Mahony, CEO of Nexalus.*

*"The team demystified what could have been a challenging task. I would encourage any commercial company to reach out to this team and bring more fantastic research from Trinity College Dublin to the world."*

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## COMMERCIALISATION



# NUA Surgical innovates to meet a clinical need in maternal health

(University of Galway)

Caesarean deliveries – or C-sections – can pose many challenges for obstetricians, especially when they’re operating on patients with a high body mass index.

NUA Surgical, a spin-out from the BioInnovate Ireland programme at University of Galway, wants to make C-sections safer. Its SteriCISION C-section Retractor improves ergonomics and reduces risk factors for mothers and babies.

### The road from R&D to awards

With support from the university’s Innovation Office, NUA Surgical’s founder, Barry McCann, was awarded funding for an R&D team to develop a commercially-oriented technology. This resulted in multiple patent applications and, ultimately, a spin-out company: NUA Surgical.

The Innovation Office continues to work with NUA Surgical, supporting the company with IP management and collaboration projects. It also shares information about funding opportunities, competitions and awards.

The awards have come thick and fast for NUA Surgical and McCann, with recognition in both the US and at home. And in 2022, the company achieved high-potential start-up (HPSU) status with Enterprise Ireland.



### The right relationship for a successful start

*“Spinning out is a long process, but having a good relationship with the Innovation Office helped our journey,” says Barry McCann, NUA Surgical’s founder and chief executive officer.*

*“The early R&D work at University of Galway, facilitated by an Enterprise Ireland grant, was a crucial de-risking ingredient to developing a successful spin-out and HPSU.”*

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# COMMERCIALISATION

## OncoLize brings new potential to cancer treatment

(Royal College of Surgeons in Ireland)

New developments for the hardest-to-treat cancers aren't just rare – they're often only marginally effective, and inaccessible to many patients.

An invention from Prof Helena Kelly of the RCSI promises to do better. The ChemoGel technology developed in her lab can localise the slow delivery of chemotherapy drugs inside or next to a tumor. This precision leads to improved results, fewer side effects and a lower cost of care.

The development of ChemoGel into a commercial product is set to improve experiences and outcomes for cancer patients around the world.

### Support in spinning out

From pitch training to patent filing, the RCSI's Office of Research and Innovation (ORI), under Dr Aoife Gallagher, has taken an active role in championing ChemoGel and its resulting spin-out company, OncoLize.

The ORI facilitated OncoLize's commercial and investor engagements, negotiating contracts and controls. It closed a seed investment round of \$1.7m in 2023, and continues to support the OncoLize team on its progress to first-in-human studies, testing its delivery system in pancreatic cancer patients.

Prof Kelly is now chief scientific officer of OncoLize. Under a consultancy arrangement with RCSI, she has oversight of and project-manages the company's pre-clinical development activities, and supports its ongoing fundraising activities.



### Collaboration that will change lives

*"Working closely with the TTO has been instrumental in navigating the complex landscape of technology transfer and the logistics of company spin-out and fund-raising activities," says Prof Kelly. "They have provided invaluable support and guidance every step of the way."*

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## ENGAGEMENT

# PBC Biomed collaborates with DCU on a breakthrough

(Dublin City University)

Complex bone fractures are complex to treat, as the name implies. They can require screws and plates, and healing can be a long, painful process.

An innovation from PBC Biomed, developed in collaboration with DCU's Biodesign Europe research centre, is poised to change all that.

OsStic® is a bioadhesive surgeons can inject into bones, reducing the need for hardware while accelerating healing. The US Food and Drug Administration has already acknowledged OsStic®'s potential to be transformative, by designating it as a 'Breakthrough Device'.

### Sharing world-class capabilities for better patient outcomes

Recognising the expertise of DCU's Biodesign Europe team in pioneering biomaterials, PBC Biomed partnered with the university to advance the development and clinical application of OsStic®.

DCU Invent, DCU's Technology Transfer Office (TTO), set up multiple layers of collaboration with PBC Biomed.

The resulting consortium combined the strengths of:

- PBC Biomed
- DCU's Biodesign Europe
- I-Form, the SFI Research Centre for Advanced Manufacturing
- Dolmen Design, a product design company based in the DCU Alpha Innovation Campus.

For PBC Biomed, the collaboration has meant access to world-class expertise, as well as cutting-edge facilities for its work. And the experience has given DCU's teams a new understanding of how to translate innovative medtech and biopharma ideas from academia into business.



### The power of partnership

*"The project was a success thanks to the diverse strengths and capabilities of everyone involved," says Prof Nick Dunne, executive director of Biodesign Europe.*

*"The dynamic collaboration with PBC Biomed and the invaluable input from the TTO illustrate the power of industry-academic partnerships in driving innovation and making a meaningful impact in healthcare."*

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## COMMERCIALISATION

# UCD develops groundbreaking respiratory disease vaccine with Poolbeg Pharma (University College Dublin)

While many in Ireland may not have heard of it, melioidosis is estimated to cause as many deaths as measles globally every year. That's why a vaccine for the disease is so crucial.

Melioidosis is a serious tropical infection caused by the *Burkholderia pseudomallei* bacterium. There are thought to be about 165,000 cases a year, mostly in South-East Asia, Northern Australia and India. The mortality rate runs at 45%.

### Breakthrough vaccine developed in UCD

Following years of research, UCD associate professor Siobhán McClean of the School of Biomolecular and Biomedical Science developed a melioidosis vaccine.

In 2021, UCD licensed MelioVac – the preclinical vaccine not yet tested on humans – to Dublin-based pharmaceutical company Poolbeg Pharma.

As part of the agreement, Poolbeg Pharma is continuing to develop the vaccine and leveraged MelioVac to secure Disruptive Technology Innovation Fund funding, along with UCD, TCD and AnaBio Technologies. The funding will go towards developing an oral vaccine candidate ready for phase one clinical trials.

### Building a long-lasting, life-changing partnership

Dr Stephen Donoghue from UCD's Knowledge Transfer Office was instrumental in the project from the beginning. He assessed whether the patent was viable, organised meetings between Prof Siobhán and Poolbeg Pharma, and negotiated the licence agreement.

“

*“We had a great experience collaborating with UCD on the MelioVac licence agreement, including the option to identify and develop other vaccine antigens at UCD,” says Jeremy Skillington, CEO at Poolbeg Pharma.*

*“We worked closely with UCD's Knowledge Transfer Office to put the licence agreement in place, and we hope to strengthen this relationship as we look to expand Poolbeg's pipeline.”*

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# COMMERCIALISATION



## The WellSchools Network drives positive change in schools (University College Cork)

Happy, healthy students tend to be more motivated, engaged and perform better academically, according to the University of Cambridge\*. Therefore, ensuring our schools are safe and nurturing spaces makes sense.

The WellSchools Network, a University College Cork (UCC) spin-out and national organisation, gives school leaders and teachers a training programme and the resources to promote student wellbeing and a positive learning environment.

The company was born from the WellSchools Framework, a model developed by school principal Dr David Cashman during a UCC employment-based PhD scholarship.

### A framework built on years of research

The Framework is based on collective teacher efficacy – teachers’ belief they can positively impact students’ learning – and creates a consistent set of school values and social norms.

It was licensed to The WellSchools Network in 2023 and is now used in schools all over the country.

The company is expected to grow to have six staff within two years. David – now CEO of The WellSchools Network – hopes to explore other areas, including introducing The WellSchools Framework to workplaces and potentially exporting it to other markets.

### Accessing the right support and unlocking the power of connections

UCC’s Innovation team was involved from the outset. Dr Anthony Morrissey negotiated the licence and shareholders’ agreement. He also advised and supported David in developing a business plan and introduced him to a network of entrepreneurs.

“

“Anthony was a great support, helping identify and capture the intellectual property to launch the company,” says David. “He also helped me navigate the shareholders’ agreement, and has given me access to like-minded entrepreneurs who I look forward to learning from.”

*\*Source: Helping adolescents to feel competent and purposeful, University of Cambridge, 2023*

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## ENGAGEMENT

# Tidal Flyer innovates in marine renewable energy

(WiSAR Technology Gateway at Atlantic Technical University)

In 1941, Norwegian sailor Fin Utne built a novel boat, with a solid sail and a self-adjusting tail. Not much came of it – until the early 2000s, when Irish engineer Theo Devaney saw potential in Utne’s system for generating renewable energy.

Devaney went on to found Tidal Flyer Ltd, a company whose namesake hydrofoil system can harness tidal energy even in low-flow waters.

### Collaborating for underwater communication

When Tidal Flyer needed wireless underwater communication for data collection and system control, the company turned to the Wireless Sensor and Applied Research Lab (WiSAR) at Atlantic Technical University (ATU) Donegal.

Tidal Flyer asked WiSAR to design an antenna and transceiver unit that would perform underwater, and then to support testing at the National Maritime Centre in Cork. ATU’s Technology Transfer Office supported the collaboration, sourcing Innovation Vouchers from Enterprise Ireland.

Drawing on combined experience in antenna design and electronics, WiSAR provided Tidal Flyer with a reliable method of underwater communication in freshwater.

Through the project, the WiSAR group gained insight into the renewable energy sector, and a new understanding of requirements for underwater communications.

Based on this success, Tidal Flyer and WiSAR are planning further collaboration, with the potential to involve more research groups at ATU.



### The power of generating practical knowledge

*“Through the collaboration with WiSAR we’ve gained practical knowledge of the operational trade-offs of under-water communication systems,” says Theo Devaney, director at Tidal Flyer Ltd.*

*“This will let us choose the appropriate technology, with sufficient range and resilience, to operate in each environment.”*

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# Appendix 1. Summary Data by RPO

Selected data relating to the returns made by the 20 RPOs are presented in tables A1-C2.

A1: Research Expenditure, research agreements and consultancy with Industry 2023: Universities, Colleges & State Research Bodies

RPO	Research expenditures (less block grant) in the reference year (€)	Research Expenditure derived from Industry	Number of Collaborative Research Agreements with Industry	Number of Innovation Vouchers with Industry	Number of Consultancy Agreements with Industry	Total Number of Collaboration, Innovation Voucher and Consultancy Agreements with industry
University						
Dublin City University	35,492,571	2,204,089	36	4	2	42
Maynooth University	53,026,059	1,341,559	12	7	5	24
University of Galway	78,950,735	5,526,551	57	3	2	62
Royal College of Surgeons in Ireland	27,290,322	2,456,129	37	-	8	45
Trinity College Dublin	127,697,849	8,428,058	67	23	25	115
University College Cork	125,359,646	12,535,965	80	2	20	102
University College Dublin	136,189,846	4,753,026	98	16	26	140
University of Limerick	49,487,815	10,540,905	39	2	6	47
Total	633,494,843	47,786,281	426	57	94	577
College & State Research Bodies						
National College of Art and Design	477,695	367,825	10	3	12	25
National College of Ireland	380,000	-	-	-	-	-
Teagasc	58,200,000	10,476,000	10	5	66	81
Irish Manufacturing Research (IMR)	11,892,221	713,533	28	18	9	55
Marine Institute	-	-	-	-	-	-
Total	70,949,916	11,557,358	48	26	87	161

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A2: Research Expenditure, research agreements and consultancy with Industry 2023: Technological Universities & Institutes of Technology

RPO	Research expenditures (less block grant) in the reference year (€)	Research Expenditure derived from Industry	Number of Collaborative Research Agreements with Industry	Number of Innovation Vouchers with Industry	Number of Consultancy Agreements with Industry	Total Number of Collaboration, Innovation Voucher and Consultancy Agreements with industry
Technological Universities/Institutes of Technology						
Atlantic Technological University	17,290,998	518,730	42	31	65	138
Munster Technological University	30,318,721	1,998,004	17	53	75	145
South East Technological University	20,242,999	1,214,580	28	72	179	279
Technological University Dublin	27,638,857	1,036,457	11	9	70	90
Technological University of the Shannon	28,585,994	1,143,440	20	66	151	237
Dundalk Institute of Technology	3,677,000	73,540	10	18	2	30
Dun Laoghaire IADT	1,747,008	-	-	14	-	14
Total	129,501,577	5,984,750	128	263	542	933
Grand Total	833,946,336	65,328,390	602	346	723	1,671

A3: Research Expenditure, research agreements and consultancy with non-commercial entities 2023: Universities, Colleges & State Research Bodies

RPO	Research expenditures (less block grant) in the reference year (€)	Research Expenditure derived from non-commercial entities	Number of collaborative Research Agreements with non-commercial entities	Number of Consultancy Agreements with non-commercial entities	Total Number of Collaboration and Consultancy Agreements with non-commercial entities
University					
Dublin City University	35,492,571	4,816,342	17	7	24
Maynooth University	53,026,059	859,022	10	16	26
University of Galway	78,950,735	7,895,074	4	-	4
Royal College of Surgeons in Ireland	27,290,322	4,912,258	6	-	6
Trinity College Dublin	127,697,849	6,001,799	61	19	80
University College Cork	125,359,646	5,265,105	-	14	14
University College Dublin	136,189,846	11,262,900	104	28	132
University of Limerick	49,487,815	989,756	16	1	17
Total	633,494,843	42,002,256	218	85	303
College & State Research Bodies					
National College of Art and Design	477,695	71,654	3	13	16
National College of Ireland	380,000	-	-	-	-
Teagasc	58,200,000	4,656,000	-	6	6
Irish Manufacturing Research (IMR)	11,892,221	-	1	-	1
Marine Institute	-	-	-	-	-
Total	70,949,916	4,727,654	4	19	23



A4: Research Expenditure, research agreements and consultancy with non-commercial entities 2023: Technological Universities & Institutes of Technology

RPO	Research expenditures (less block grant) in the reference year (€)	Research Expenditure derived from non-commercial entities	Number of Collaborative Research Agreements with non-commercial entities	Number of Consultancy Agreements with non-commercial entities	Total Number of Collaboration and Consultancy Agreements with non-commercial entities
Technological Universities/Institute of Technology					
Atlantic Technological University	17,290,998	-	24	13	37
Munster Technological University	30,318,721	-	-	25	25
South East Technological University	20,242,999	809,720	8	-	8
Technological University Dublin	27,638,857	2,764	-	-	-
Technological University of the Shannon	28,585,994	-	1	6	7
Dundalk Institute of Technology	3,677,000	36,770	2	-	2
Dun Laoghaire IADT	1,747,008	-	1	-	1
Total	129,501,577	849,254	36	44	80
Grand Total	833,946,336	47,579,164	258	148	406

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B1: IP and IP Transactions 2023: Universities, Colleges & State Research Bodies

RPO	Total number of invention/ software disclosures received during the year	Total number of new patent applications filed during the year	Previously filed priority patent applications filed progressed to PCT in year	Total number of patents granted in year	Total number of patent families owned by the RPO at year end	Total number of licences, options and assignments executed (LOAs)	Market launches of products or services in year based on RPO licence
University							
Dublin City University	14	1	2	5	70	7	3
Maynooth University	7	2	1	4	20	0	0
University of Galway	44	1	5	6	101	13	2
Royal College of Surgeons in Ireland	16	3	3	2	35	7	1
Trinity College Dublin	58	12	11	45	175	23	9
University College Cork	45	15	6	7	56	35	3
University College Dublin	81	18	12	17	154	27	2
University of Limerick	25	5	2	5	80	16	0
Total	290	57	42	91	691	128	20
College & State Research Bodies							
National College of Art and Design	0	2	0	0	0	0	0
National College of Ireland	3	0	0	0	0	1	0
Teagasc	42	1	3	1	33	43	0
Irish Manufacturing Research (IMR)	0	0	0	0	0	2	0
Marine Institute	0	0	0	0	0	0	0
Total	45	3	3	1	33	46	0

B2: IP and IP Transactions 2023: Technological Universities & Institutes of Technology

RPO	Total number of invention/ software disclosures received during the year	Total number of new patent applications filed during the year	Previously filed priority patent applications filed progressed to PCT in year	Total number of patents granted in year	Total number of patent families owned by the RPO at year end	Total number of licences, options and assignments executed (LOAs)	Market launches of products or services in year based on RPO licence
Technological Universities/Institutes of Technology							
Atlantic Technological University	0	0	0	0	0	0	0
Munster Technological University	14	1	7	0	8	7	0
South East Technological University	6	2	1	1	11	3	1
Technological University Dublin	37	12	1	0	41	14	1
Technological University of the Shannon	4	1	0	0	0	1	0
Dundalk Institute of Technology	1	0	0	0	1	2	0
Dun Laoghaire IADT	25	0	0	0	0	5	0
Total	87	16	9	1	61	32	2
Grand Total	422	76	54	93	785	206	22



C1: Spin-out companies, incubation and use of facilities 2023: Universities, Colleges & State Research Bodies

RPO	Number of spin-outs established during the year	Number of staff or student start-ups established during the year	Number of Active spin-outs in existence at the end of the year	Number of spin-outs merged or acquired during the year	Number of contracts with companies for use of facilities and equipment at the RPO
University					
Dublin City University	1	0	14	0	13
Maynooth University	0	0	4	0	4
University of Galway	4	0	19	0	0
Royal College of Surgeons in Ireland	1	0	1	0	0
Trinity College Dublin	4	5	40	2	8
University College Cork	4	4	19	0	0
University College Dublin	6	0	21	0	0
University of Limerick	0	0	17	0	117
Total	20	9	135	2	142
College & State Research Bodies					
National College of Art and Design	0	0	0	0	0
National College of Ireland	1	0	2	0	0
Teagasc	0	0	4	0	51
Irish Manufacturing Research (IMR)	0	0	0	0	0
Marine Institute	0	0	0	0	5
Total	1	0	6	0	56

C2: Spin-out companies, incubation and use of facilities 2023: Technological Universities & Institutes of Technology

RPO	Number of spin-outs established during the year	Number of staff or student start-ups established during the year	Number of Active spin-outs in existence at the end of the year	Number of spin-outs merged or acquired during the year	Number of contracts with companies for use of facilities and equipment at the RPO
Technological Universities/Institutes of Technology					
Atlantic Technological University	0	0	0	0	31
Munster Technological University	0	1	4	1	110
South East Technological University	0	0	8	0	0
Technological University Dublin	3	0	9	0	1
Technological University of the Shannon	0	0	0	0	55
Dundalk Institute of Technology	0	0	1	0	0
Dun Laoghaire IADT	2	0	0	0	0
Total	5	1	22	1	197
Grand Total	26	10	163	3	395

# Appendix 2. List of Research Performing Organisations (RPOs)

Reporting Sector	Institution	Year of foundation of TTO
University		
	Dublin City University	2007
	Maynooth University	2005
	National University of Ireland Galway	2005
	Royal College of Surgeons in Ireland	2007
	Trinity College Dublin	1987
	University College Cork	1982
	University College Dublin	2003
	University of Limerick	2005
Technological Universities/Institutes of Technology		
	Technological University Dublin	2000
	Technological University of the Shannon	2008
	Munster Technological University	2009
	Atlantic Technological University (Galway, Sligo, Letterkenny)	2008, 2017, 1998
	South East Technological University	2008
	Dundalk Institute of Technology	2012
	Dún Laoghaire Institute of Art, Design and Technology	2012
Colleges and State Research Bodies		
	Irish Manufacturing Research (IMR)	N/A
	National College of Art and Design	2013
	National College of Ireland	2011
	Marine Institute	N/A
	Teagasc	2011

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### Appendix 3. Ireland’s Internationally Recognised Technology Transfer Professionals

2015	Dr Andrew Marsh	IBM ex. TU-Dublin
2015	Dr Anthony Morrissey	University College Cork
2016	Dr Aoife Gallagher	Royal College of Surgeons in Ireland
2015	Dr Carolyn Hughes	Dublin City University
2015	Dr David Corkery	University College Cork
2016	Dr Derek John	Royal College of Surgeons in Ireland
2015	Dr Emily Vereker	Health Research Board ex. Trinity College Dublin
2015	Dr Ena Walsh	University College Dublin
2015	Dr Gordon Elliott	Trinity College Dublin
2015	Dr Graham McMullin	Trinity College Dublin
2015	Dr Jacinta Thornton	NUI Galway
2015	Dr James O’Sullivan	South East Technological University - Waterford
2018	Dr Joan O’Sullivan	University of Limerick
2015	Dr Karl Quinn	Lifebit ex. University College Dublin
2017	Dr Kieran Ryan	NUI Galway
2016	Dr Margaret Lawlor	University of Limerick
2016	Dr Miriam Walsh	Teagasc
2017	Dr Paul Maguire	Technological University - Dublin
2015	Dr Paul Tyndall	Maynooth University
2015	Dr Peter Olwell	Dublin City University
2020	Dr Samantha Williams	Trinity College Dublin
2016	Dr Seamus Browne	Royal College of Surgeons in Ireland
2017	Dr Siobhan Mac Sweeney	Munster Technological University

2017	Dr Stacey Kelly	University College Dublin
2020	Dr Stephen Donoghue	University College Dublin
2015	Dr Tim Roche	Formium ex. University College Cork
2019	Mr Aidan Browne	Dundalk Institute of Technology
2021	Mr Brian Callaghy	Trinity College Dublin
2019	Mr Brian Ogilvie	South East Technological University - Carlow
2016	Mr Conor Morris	University of Limerick
2020	Mr David Gardiner	Technological University - Dublin
2018	Mr David Murphy	NUI Galway
2019	Mr Ian Gallivan	NUI Galway
2016	Mr John Gleeson	CONFIRM ex University of Limerick
2015	Mr Kevin Dalton	University College Cork
2016	Mr Kieran O’Connell	Technological University - Dublin
2021	Mr Michael Lonergan	Technological University of the Shannon
2016	Mr Neil McLoughlin	Dundalk Institute of Technology
2015	Mr Patrick O’Boyle	Dublin City University
2015	Mr Paul Dillon	University of Limerick
2016	Mr Peter Conlon	Maynooth University
2015	Mr Richard Stokes	Independent Consultant ex. Dublin City University
2015	Mr Ronan Coleman	Munster Technological University
2012	Mr Tom Flanagan	University College Dublin
2016	Ms Breda Lynch	Technological University of the Shannon
2015	Ms Emma O’Neill	Trinity College Dublin
2020	Ms Josette O’Mullane	Munster Technological University

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# Appendix 4 - Glossary

**Active Spin-out:** An Active Spin-out is an RPO created spin-out company that is at least three years post-formation (three years since being reported as an RPO spin-out) and, as at the end of the reference year, 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.

**Assignment:** Contract transferring ownership of right in IP to a third party.

**Collaborative Research:** A research project/ programme between an industry party and an RPO. The project/programme may be:- wholly-funded by the industry party or; partfunded by the industry party (in cash and/or in kind, including participation in the research itself) and part-funded by the State or other external sources. Collaborative research may involve two or more parties. Characteristics of collaborative research with industry: The purpose of collaborative research is the generation of new knowledge. Typically, there will be an expectation of publication although the project may be governed by aspects of confidentiality.

Intellectual property may be created and how the company benefits will be determined in the collaboration agreement and will depend on the contribution to the project made by the company. (Excludes contract services, consultancy, innovation vouchers, academic collaborations and research grants).

**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. This may include Consultancy agreements, "Contract services" agreements and projects contracted under a work order. Characteristics of consultancy services: The purpose of consultancy is not typically the generation of new knowledge, rather it draws on existing knowledge. There will usually be no expectation of publication, results will be confidential and will be transferred to the client. The type of work might typically involve one or more of the following: advice; analysis; production of a report. Projects will generally be of a short term. (Excludes collaborative research, research grants, Academic collaboration, Training and provision of Continuing Professional Development (CPD)).

**Equity:** Shareholding in a legal entity.

**FTE:** Full Time Equivalents - People working part-time are only included for the fraction that they are employed.

**Incubator:** A dedicated facility on the RPO campus in which early stage companies are housed and supported (pre- and post-formation). The facility may offer desk space, laboratory space or a mix of both.

**Innovation Vouchers:** Innovation Vouchers worth €5,000 are available to assist a company or companies to explore a business opportunity or problem with a registered knowledge provider (i.e. higher education institutes, public research bodies).

**Invention disclosure:** The invention disclosure is the first actual recording of potential new intellectual property (IP). The researcher/ inventor and TTO/ILO will complete an Invention Disclosure Form (IDF) which is a written, signed and dated record. The IDF contains basic information, including supporting data, which helps to evaluate and subsequently, potentially, protect and commercialise the intellectual property. For avoidance of doubt, the IP may be software.

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**ILO:** Industry Liaison Office - the team responsible for managing KT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.

**Joint Invention/Software Disclosure:** Simultaneous reporting of an Invention Disclosure for the same invention or software to more than one RPO that has been created jointly by more than one RPO via the TTO/ILO.

**KT:** Knowledge 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. Knowledge Transfer Ireland.

**Large Company:** A company which is based in one country only and which has more than 250 employees and has either an annual turnover greater than €50m or an annual Balance Sheet total greater than €43m. 51Annual Knowledge Transfer Survey 2020

**Large Company – Irish:** A Large Company which is based in Ireland. Licence A contract under which IP rights are transferred from one party to another for the purpose of commercialisation.

**Licence:** Contract transferring intellectual property rights for the purpose of commercialisation in accordance with contractual terms and conditions.

**LOA:** - Licence, Option or Assignment A contract under which IP results are transferred, or agreed to be transferred, from one party to the other for the purpose of commercialisation.

**MNC:** A multi-national corporation that has its facilities and other assets in at least one country other than its home country. Such companies have offices and/ or factories in different countries and usually have a centralised head office where they co-ordinate global management.

**MNC Irish:** An MNC which has its HQ based in Ireland and/or which has a significant R&D presence in Ireland.

**Non-commercial entity (NCE):** Public sector organisation or charity.

**Option:** A contract under which a potential licensee is granted a period of exclusivity during which it can decide whether it may wish to take a licence to the intellectual property and negotiate the terms of a licence agreement. The option period may include evaluation of the IP by the potential licensee (including assessing the technology). This may be called an Option & Evaluation agreement.

**PCT:** Patent Cooperation Treaty - the Treaty makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing an “international” patent application.

**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.

**R&D Agreements:** Research Collaboration Agreements (wholly and part-funded) plus Innovation Vouchers.

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**Reference Year:** The twelve-month reporting period from January 1st to December 31st.

**Research Expenditure:** This represents the total expenditures on all types of basic and applied research in Irish RPOs from all funding sources: government, industry, nonprofit foundations, etc. It excludes any academic costs dedicated to research, costs of administrative support and capital expenditures on new equipment, buildings or land.

**Research grant:** An academic grant not involving industry. An award to an RPO by a research funding agency (e.g. government agency, charity) to perform a programme of research with the intention of disseminating the research results and in which an industry party is not involved. Typical research funders may include: SFI, ERC, Wellcome Trust etc.

**RPO:** Research Performing Organisations. Universities, Technological Universities, Institutes of Technology and other research institutions funded primarily by public funds.

**SME:** Has less than 250 employees and has either an annual turnover not exceeding €50m or an annual Balance Sheet total not exceeding €43m.

**SME Irish:** SME which has its head office in Ireland. Sole invention / software disclosure. An Invention Disclosure for an invention or software created by one RPO and reported to that RPO via the TTO/ILO.

**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.

**Start-up:** Company formed by staff or students from the RPO not based on knowledge or IP generated by the RPO and where there is no formal IP licence or equity share with the RPO.

**TTO:** Technology Transfer Office - the team responsible for managing KT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.

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