IRISH UNIVERSITIES ASSOCIATION

Building Ireland's Competitiveness and Innovation Capacity

through a

Research Infrastructure and Talent Development Fund

iua.ie/betterireland

Contents

Summary

The Research Infrastructure and Talent Development Fund is critical for restoring Ireland's competitiveness in research and innovation, particularly against key European and global competitors. Ireland is falling behind in innovation performance. Between 2016 and 2023, Ireland's innovation growth lagged at just 2.3%, well below the EU average of 8.5%, putting the Impact 2030 goal of becoming a European Innovation Leader at serious risk. This underscores the widening gap between Ireland's innovation ambitions and its current performance, highlighting the urgent need for strategic investment to reverse the trend and achieve its leadership goals.

Addressing National Priorities

The Programme for Government 2025 – Securing Ireland's Future[1] outlines the need for increased and sustained research investment when it commits to:

"Increasing funding for research which adds value to our economy, grows future jobs and strengthens our competitiveness."

The Programme commits to a range of measures including continuing to fund Taighde Eireann / Research Ireland, maximising drawdown from the EU's Horizon Europe Fund and increasing support for PhD students and early career researchers. Crucially, the Programme also includes a commitment to a new funding stream along the lines of the former Programme for Research in Third-Level Institutions (PRTLI).

Our universities are wholly committed to working with government to deliver on this commitment. We have the potential to help fuel the next wave of innovation in our country and to expand the pipeline of talented researchers. A structured investment programme such as that outlined below will enable this.

Laying the Foundation for Innovation and Competitiveness

The transformative impact of PRTLI, by investing in research and innovation during the first decade and a half of this century, is well-documented. However, we've lost ground over the last decade. Renewed and strategic investment in Ireland's R&I capacity offers a crucial opportunity to reverse this decline and regain our competitive advantage, fostering sustained economic growth and societal progress.

The geopolitical headwinds that we are now facing heighten the need for investment in Ireland's research and innovation system. The Programme for Government's acknowledgement that *"knowledge and talent are the pillars of our economic success"* clearly signals the need for renewed investment in research capacity in a PRTLI-type programme.

1 https://www.gov.ie/en/publication/078a1-programme-for-government-2025-securing-irelands-future/

This document sets out the three critical elements of such an investment programme with a summary in Table 1 of the multi-annual investment required to deliver this vision effectively. Our universities are research-led teaching institutions so the investment proposed in the programme will benefit, not just an expanded research capacity, but also the talent development at both undergraduate and postgraduate level. Too many of our graduates are currently going into employment in hi-tech businesses, both multi-national and indigenous, having emerged from sub-standard research facilities with out-dated equipment. The proposed investment programme will help to realise the government ambition to make Ireland *"an innovation leader"*.

Table 1: Research Infrastructure and Talent Development Fund Summary

	2025	2026	2027	2028	2029	Total
Equipment Renewal	50m	50m	50m	50m	50m	250 Million
New Infrastructure	50m	50m	50m	50m	50m	250 Million
Talent Excellence	20m	20m	20m	20m	20m	100 Million
						Total: 600 Million

A €600 million investment over five years through a multi-annual Research Infrastructure & Talent Development Fund is proposed to transform Ireland's research infrastructure, drive innovation, and address critical societal challenges.

Building Research Capacity for Competitiveness and Growth

Europe losing ground

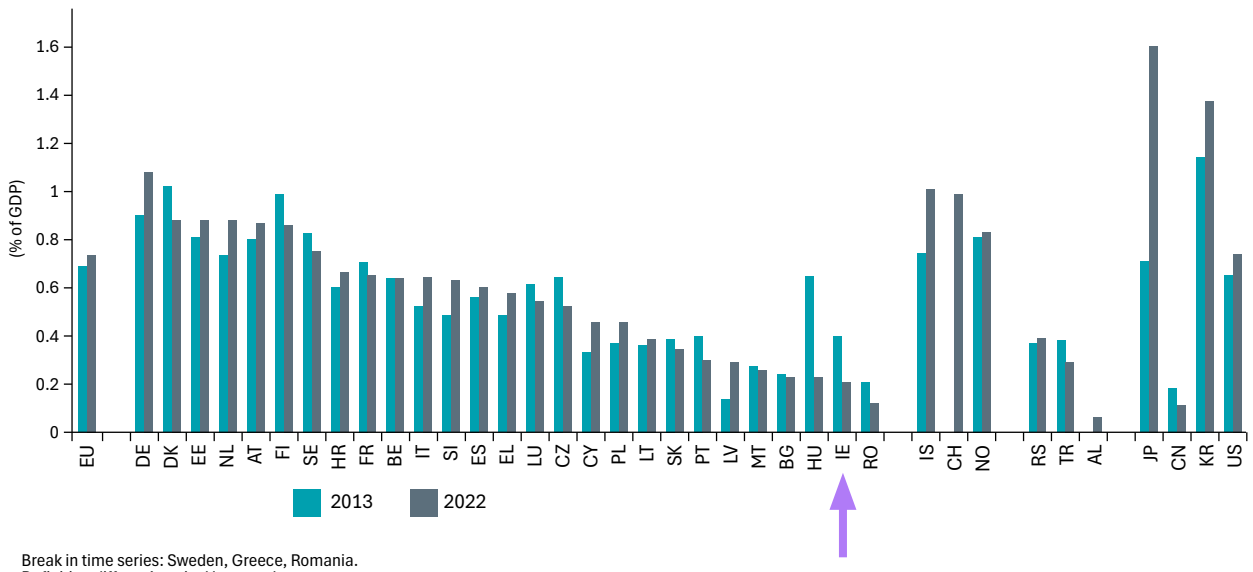
The former President of the European Central Bank, Mario Draghi, in his landmark report[2] on "The Future of European Competitiveness" rang the alarm bell for European competitiveness when he said: *"The EU must profoundly refocus its collective efforts on closing the innovation gap with the US and China".* His call, widely acclaimed, for an EU Research and Innovation Action Plan would boost R&I funding to €750-€800 billion annually and bring EU spending on R&I to 3% of GDP across the union.

Draghi's report is already influencing decisions at the top level in the EU. European Commission President, Ursula von der Leyen, in her Europe's Choice Manifesto for the EU 2024-2029[3], has committed to *"...putting research and innovation at the heart of our economy"* with a commitment to significantly increase spending.

Ireland lagging in Europe

While Europe has become a global laggard on innovation, Ireland's position within Europe has also fallen back. GBARD, the Government's Budget Allocation for R&D[4], at 0.21% of GDP is far below the EU average of 0.73%. Even when adjustments are made for GDP by using other measures such as GNP (0.28%) or GNI* (0.37%), Ireland still lags our key competitors in Europe. Furthermore, as shown below in Figure 1, our position has weakened over the last decade in comparison with many of our European peers.

Figure 1: Government budget allocation for research and development 2013–2023



Break in time series: Sweden, Greece, Romania.
Definition differs: Austria, Hungary, Japan.
Estimated: EU, Denmark, Estonia, Sweden.
Provisional: Austria, Belgium, Czechia, Germany, Estonia, Finland, Greece, Spain, Croatia, Italy, Lithuania, Luxembourg, Hungary, Netherlands, Poland, Portugal, Slovakia, Switzerland, Türkiye, South Korea, United States.
Albania: 2022 data
China excluding Hong Kong
Source: Eurostat (online data code: GBA_NABSFIN07)
OECD Government budget allocations for R&D for data on Japan, China (except Hong Kong), South Korea and the United States.

2 https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en

3 https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en?filename=Political%20Guidelines%202024-2029_EN.pdf

4 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_budget_allocations_for_R%26D_(GBARD)

It's clear that Ireland, both at an independent national level and as a partner within the EU, has a lot of ground to make up. Alongside talent, investment in research and innovation is an absolute prerequisite for the advanced knowledge economy. The investment in research and innovation in the first part of this century has played a pivotal role in driving the Irish economy and job creation. As a small, open economy, Ireland can only compete effectively in what is an increasingly cut-throat international market by accelerating investment in research and innovation.

Supporting National Priorities: The Enterprise White Paper

Increased investment in research infrastructure and talent will not only help Ireland recover its position in European and global research but also directly support the national goals outlined in the Enterprise White Paper, building a competitive, innovative, and sustainable economy fit for the future. The *White Paper on Enterprise 2022-2030* charts a strategic pathway for Ireland's sustainable growth and competitiveness, emphasizing the transformative role of research and innovation in delivering the following key objectives:

- **Attracting and Embedding Foreign Direct Investment:** Maintaining Ireland's status as a prime location for FDI demands a compelling value proposition. Strengthening research capabilities and nurturing a skilled workforce will provide multinational companies with robust R&D ecosystems, encouraging long-term investment and innovation partnerships.

- **Scaling Irish Businesses Internationally:** While Ireland has achieved significant export successes, the White Paper highlights the need to scale more indigenous enterprises to compete globally. Investment in research infrastructure will help to equip Irish companies with the tools to innovate, increase productivity, and expand into international markets.

- **Implementing Clustering Policy:** Clustering is vital for sustaining competitive advantage, particularly in the green and digital transitions. By fostering collaboration between industry, research institutions, and other stakeholders, strong research ecosystems can drive innovation and economic growth in key sectors.

- **Enhancing Regional Balance:** Achieving a vibrant, regionally balanced economy with a diverse mix of enterprises is essential. Investment in research infrastructure across regions can stimulate local innovation, reduce disparities, and create high-quality jobs, supporting a more inclusive national economy.

From Lagging to Leading: Universities Driving Ireland's Innovation

The Programme for Research in Third-Level Institutions (PRTLI)[5], launched at the turn of the century, made a massive contribution to Ireland's economic success over the last two decades. The €1.2 billion invested transformed the national capacity for research and innovation and provided the university sector with the base funding to attract significant match funding from industry, philanthropy and international funders, including the EU. PRTLI was transformative, not just for the third-level sector, but for the enterprise economy. It was an important part of advancing the nation's capacity to develop and expand leading-edge enterprises and both social and economic public priorities.

The last of the PRTLI funds ran out in 2015 and much of the equipment and infrastructure provided through it is now obsolete, leading to the €1.2bn original investment now holding a net residual book value of less than €100m. A new programme is now urgently needed.

A Research Infrastructure and Talent Development Fund (RITDF) would send a powerful signal to the global community that Ireland is committed to leveraging research to drive societal and economic advancement, cementing its standing as a small nation making an outsized impact on the world stage. By strengthening research capacity, it would boost international rankings for Irish institutions and highlight Ireland as a competitive, forward-thinking destination for education and innovation.

Research Infrastructure and Talent Development Fund (RITDF)

The establishment of a ***Research Infrastructure and Talent Development Fund (RITDF)*** will provide a platform for the next phase of growth of our high skills, innovation-based economy and underpin our national competitiveness. We propose a €600 million investment over five years through a multi-annual fund to transform Ireland's research infrastructure, drive innovation, and address critical societal challenges. This fund would cover three main areas:

1. **Maintenance and Upgrade of Existing Equipment**
   Ensuring up-to-date research infrastructure supported by qualified technical staff is essential for high-quality, impactful, and innovative research.

2. **Investment in Shared Large-scale Infrastructure**
   Strengthening Ireland's capacity in strategic areas of expertise and maintaining a competitive edge in key sectors.

3. **Talent Development**
   Ensuring universities can attract, train, and retain top talent, providing skilled graduates and research talent to meet current and future industry needs.

5 https://en.wikipedia.org/wiki/Programme_for_Research_in_Third_Level_Institutions

1. Maintenance and Upgrade of Existing Research Equipment

The Issue

Outdated research equipment in higher education institutions across Ireland is severely undermining research quality, delaying projects, and harming competitiveness, industry partnerships, and regional development. There is considerable evidence that highlights several concerning trends:

- **Companies are bypassing Irish researchers** because slower project completion times, driven by inadequate facilities, make collaboration less appealing.
- **Industry reports declining graduate skills**, attributing this to limited access to modern tools during education, which impacts recruitment and workforce readiness.
- **PhD students face project delays or risks** due to frequent equipment breakdowns, jeopardizing their research progress.
- **A growing number of our top academics are pursuing opportunities for relocation** outside of Ireland, seeking better-equipped research environments.
- **Attracting world-leading researchers has become increasingly difficult** as Ireland's outdated facilities deter top talent.
- **Researchers are turning to facilities abroad** to compensate for the lack of functional equipment at home, further eroding domestic research capacity.
- **Efforts to meet ambitious climate action goals are hampered by the sustainability cost** of old equipment that is generally energy inefficient.

These challenges threaten Ireland's ability to attract and retain top talent, weakening the sustainability of Ireland's research ecosystem and damaging its global competitiveness.

The Reality on the Ground

The IUA conducted an extensive audit of research equipment across member university campuses and found that over a third (36%) of research equipment is over 15 years old, with 59% more than a decade old, highlighting an urgent need for renewal (Table 2). Most equipment requiring replacement (53%) costs under €250k, primarily routine lab tools that can't be shared across campuses. This equipment plays a key role in both education and research, with usage equally split between students and researchers, ensuring graduates are workforce-ready and driving the knowledge economy.

Table 2: IUA Universities – Research Equipment Age Profile

Age	%	Cumulative %
>20 years	13	19
>15 years	17	36
>10 years	22	59
>5 years	27	86
All	**100**	**100**

This is threatening the country's research capacity and reputation. In one example, a high-speed cell sorter, the only one in the region and vital for immunology, cancer, and stem cell research, is on the brink of failure after 15 years. Frequent breakdowns caused months of delays for PhD students and postdocs, jeopardizing publications, funding deadlines, and thesis submissions. Financial losses from downtime and wasted consumables can exceed €10,000 per project, while alternative solutions are logistically and scientifically impractical.

Similarly, an automated microscope purchased in 2011 revolutionized research by automating imaging tasks, reducing experiment times from 5 days to just 17 minutes. In 2022, it supported 45 researchers for over 1,200 hours across fields like cancer, infectious diseases, and neuroscience. Declared at 'end-of-life' in 2023, its failure halts research, jeopardizes thesis submissions, and can force the return of international research funds, with no viable regional alternative.

IUA member universities estimate it will cost €255 million over five years to renew existing research equipment (Table 3). The IUA equipment audit highlights that this figure reflects only the cost of maintaining the current inventory in the 8 IUA member universities surveyed, emphasizing that renewal is essential to prevent further decline in capacity and quality.

Table 3: Replacement Cost Estimate for Out-dated Research Equipment

Remaining Years	Sectoral Total €m	Year Replacement is Required
0	€130.2	2024
1	€22.7	2025
2	€21.0	2026
3	€60.9	2027
4	€20.7	2028
Total	**€255.3m**	

Recent, and very welcome, government investments, such as the €40 million allocated in November 2024 through the HEA's Higher Education Research Equipment Grant (HEREG) and €15 million in 2023, are appreciated but rely on in-year underspend of Departmental budgets. This ad hoc approach hinders long-term planning and strategic priorities and does not deal with the substantive infrastructure deficit. A dedicated, multi-annual funding model is the only realistic way to ensure a coordinated, sustainable, and forward-looking approach to renewing and modernizing equipment, enabling Ireland's higher education sector to remain competitive and innovative.

The Solution

A €50m annual five-year equipment renewal programme would modernize outdated research infrastructure in the €20k-€500k range, align upgrades with institutional strategies, and enhance sustainability. A subsequent annual allocation would maintain facilities, support research-led teaching, and safeguard Ireland's global competitiveness by ensuring cutting-edge equipment and long-term resource efficiency.

Proposed Approach

An equipment renewal programme would empower universities to strategically plan for the renewal, upgrading, and maintenance of essential research equipment, particularly in the €20k-€500k range. This programme would enable institutions to align equipment replacement with their development master plans and sustainability goals, ensuring efficient allocation of resources to meet critical infrastructure needs.

With much of Ireland's research equipment now outdated, **a five-year funding cycle of €50m per annum** would allow universities to prioritize replacements in a coordinated and cost-effective manner. Allocations could follow proven models like HEREG, providing institutions with autonomy while maintaining oversight and accountability through audits. This approach would safeguard Ireland's research competitiveness, support cutting-edge projects, and maximize the impact of State, industry, and European investments.

Ensuring Long-Term Sustainability

While a five-year equipment renewal programme is a critical first step, it is equally important to ensure ongoing investment in equipment upkeep and renewal. Without a sustained commitment, Ireland risks facing the same challenges in 10 to 15 years, as research infrastructure once again becomes outdated.

To address this, **consideration should be given to introducing an annual allocation to universities** following the initial five-year programme. This allocation would support the ongoing maintenance, upkeep, and renewal of research equipment, enabling institutions to maintain cutting-edge facilities and avoid future crises in infrastructure. Moreover, such an allocation would directly enhance the quality of educational experiences, ensuring that research-led teaching remains a core element across all higher education institutions and providing future generations of students with access to the best learning and research opportunities.

This dual-pronged approach—a structured five-year renewal programme followed by consistent annual investment—will ensure Ireland's research ecosystem remains robust, competitive, and well-equipped to meet the challenges of the future.

2. Investment in Shared Large-scale Infrastructure

The Issue

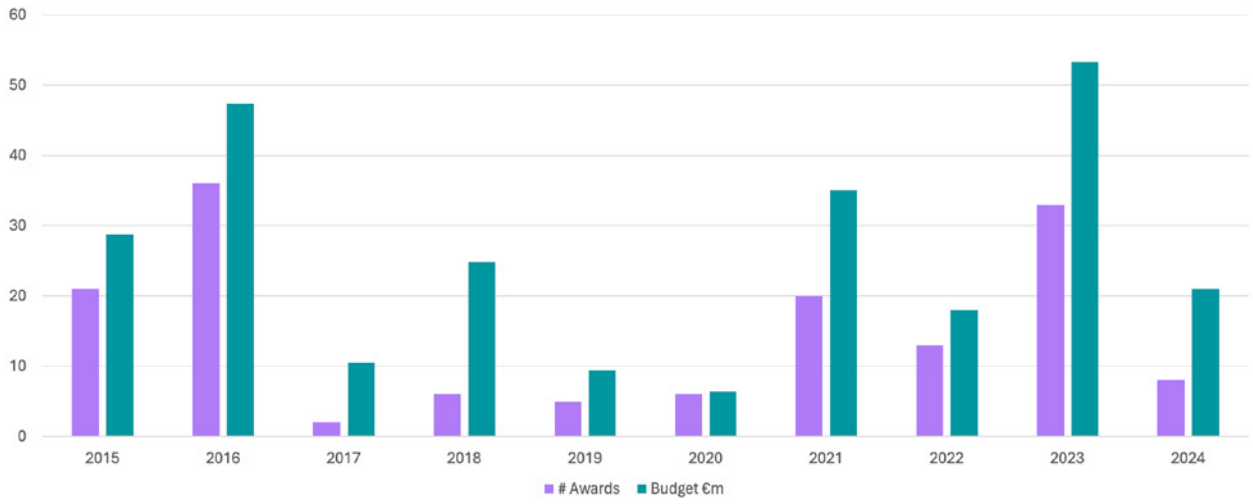
The equipment renewal programme outlined above will only maintain the status quo. This must be coupled with funding for new, cutting-edge equipment to keep up with rapid technological advancements. In the competitive global landscape of scientific research, access to advanced equipment is a key differentiator. Countries and institutions equipped with the latest technologies attract top-tier talent and significant research funding and, in turn, are a magnet for innovation-led enterprises. For Ireland, investing in a robust inventory of specialized research equipment is essential to drawing and retaining world-class researchers and graduate students. This strengthens Ireland's standing as a hub for scientific innovation, fosters international collaborations, and unlocks new opportunities for investment and economic growth.

The Reality on the Ground

In 2015, as the final funding of PRTLI came to an end, the Irish Government commissioned a study by Technopolis to identify any future investment needs in the period to 2020 (and beyond) that may be strategically required for the achievement of national R&I priorities. The report[6], 'Ireland's Future Research Infrastructure needs' stated "*One of the main risks is that the pendulum swings from large, systemic programmes such as PRTLI to isolated, uncoordinated investments in Research Infrastructures, research centres, PhD education, etc.*"

However, despite this warning, since PRTLI Cycle 5 there has been a clear lack of strategic planning and the necessary investment. While SFI's Research Infrastructure Programme has played a critical role in funding large-scale equipment, it faces significant limitations, particularly the unpredictability of annual budgets. Over the past decade, funding has fluctuated dramatically, ranging from €6.4 million p.a. to €53.3 million p.a., with the number of awards varying from just 2 to 36 in a given year (Figure 2). The average annual investment of €25 million represents a substantial shortfall compared to the approximately €80 million p.a. allocated through PRTLI.

Figure 2: SFI Research Infrastructure Programme 2015-2024



6 https://enterprise.gov.ie/en/publications/publication-files/irelands-future-research-infrastructure-needs-study.pdf

The Solution

A €50m annual five-year programme would establish Technology Expertise Hubs, centralizing advanced equipment and technical expertise for shared use. By requiring institutions to lead bids, the programme would foster collaboration, ensure alignment with national research priorities, and support strategic planning. Proposals would include access plans, cost calculators, and lifecycle management, including funding for technical staff, ensuring sustainable infrastructure and transformative impacts on research, innovation, and global competitiveness.

Proposed Approach

To maximize the impact of large-scale infrastructure investments (≥€500k), funding should focus on **Technology Expertise Hubs**. These hubs would centralize equipment and technical specialists, enabling inter-institutional and inter-regional sharing while fostering collaboration. Investments should align with national research and innovation strategies, based on a robust audit of needs, and funding bids should come from institutions rather than individual researchers.

This approach ensures strategic alignment with both institutional goals and national research objectives. An **effective access plan** should be a mandatory component of all proposals, detailing how infrastructure will be made available beyond the hosting institution. Key elements of this plan include:

- A standardized access charge policy addressing gaps such as staff costs, year-to-year allowable costs, depreciation, and future replacement costs.
- A detailed cost calculator to reflect the full lifetime expenses of instruments, ensuring high-quality maintenance, adequate staffing, and long-term sustainability.
- Provisions for technical and support staff costs, legacy use (e.g., undergraduate training or donations), and clear end-of-life management strategies.

Ensuring Sustainability and Cohesion

Rolling national replacement cycles and multi-annual funding programmes are essential to enable cohesive planning and prevent future waves of obsolescence and to avoid an uncoordinated rush to bid in sporadic infrastructure calls. This would ensure steady progress in maintaining cutting-edge infrastructure.

Shared national infrastructure should prioritize access for Irish researchers while allowing limited use (~10%) by international collaborators. This dual approach would strengthen Ireland's global research reputation and increase competitiveness through openness to international excellence while safeguarding domestic research capabilities.

Eligible Costs and Infrastructure Requirements

Funding must cover not only the procurement of equipment but also the necessary installation, including any enabling works such as building upgrades (e.g., air-handling systems), and ongoing management to prevent valuable infrastructure from becoming underutilized.

In addition to supporting the installation of new infrastructure, investment should address the costs associated with the disestablishment of outdated or obsolete equipment, an area that is often overlooked but critical to ensuring efficient and sustainable use of resources. Furthermore, the lifecycle of infrastructure should also encompass support for appropriate waste disposal, particularly in alignment with health and safety regulations as well as sustainability and circular economy objectives.

High-tech equipment requires purpose-built facilities that must undergo regular refurbishment to meet evolving health and safety standards, improve energy efficiency, and enhance accessibility. By factoring in these essential elements—installation, disestablishment, and waste disposal—the overall sustainability and functionality of research infrastructure can be maximized, ensuring long-term value for research and innovation.

Equally important is the investment in qualified and experienced technical support staff, which is necessary to optimise and realise the potential of infrastructure investments. These staff are crucial for the proper maintenance, operation, and hands-on training that enable equipment to be used effectively and consistently. Without skilled support staff, even the best infrastructure cannot function to its full potential. Unfortunately, technical staff positions have often been overlooked in funding models, leading to resource gaps, retention challenges, and unsustainable workarounds. To ensure infrastructure is maximized, it is essential that these support roles are recognized and funded appropriately, enabling the highest standards of research, training, and industry collaboration.

Impact of a Strategic Infrastructure Programme

A €50 million per annum investment over a five-year cycle would significantly enhance research capabilities in universities. Allocations should follow a competitive and strategic process, requiring consortia of at least two institutions to submit comprehensive proposals that:

- Detail research strategies, programmes, and infrastructure needs.
- Demonstrate alignment with institutional missions and emerging strengths.
- Outline plans to promote high-quality research and training, enhance graduate outcomes, and encourage collaboration to build critical mass in key research areas.

Such an initiative would transform Ireland's research landscape, addressing critical societal and governmental challenges such as health, climate change, and digital transformation. It would deliver significant economic returns by fostering new technologies, creating high-value jobs, and enhancing Ireland's global competitiveness.

Potential hubs could focus on areas such as Spatial Imaging, Single-Cell Sequencing, Cryo-Electron Microscopy (Cryo-EM) for Structural Biology, Quantum Imaging, Organoids and Microfluidics, Artificial Intelligence (AI) / Machine Learning for Data Analysis, Next-Generation Mass Spectrometry (NGMS), and Advanced Light Microscopy as well as hubs in areas such as Environmental Monitoring and Climate Modelling, Additive Manufacturing with Multi-Material and Nano-Printing—each providing specialized insights to drive innovations across various research fields. More details on some of these examples can be found in Appendix 1 along with examples of previous investments in large scale infrastructure in Appendix 2.

This investment is an investment in Ireland's future, ensuring sustainable growth, national resilience, and continued influence on the global research stage.

3. Human Capital Development – The talent pipeline of PhDs and Postdocs

The Issue

PRTLI was instrumental in advancing Ireland's research capacity, with talent development as a cornerstone of its success. By funding structured PhD programmes and creating research positions, PRTLI cultivated a new generation of highly skilled researchers, expanded Ireland's research workforce, and fostered interdisciplinary collaboration. This approach not only elevated the quality of research outputs, but also ensured that graduates were equipped with the skills needed to address complex societal and economic challenges.

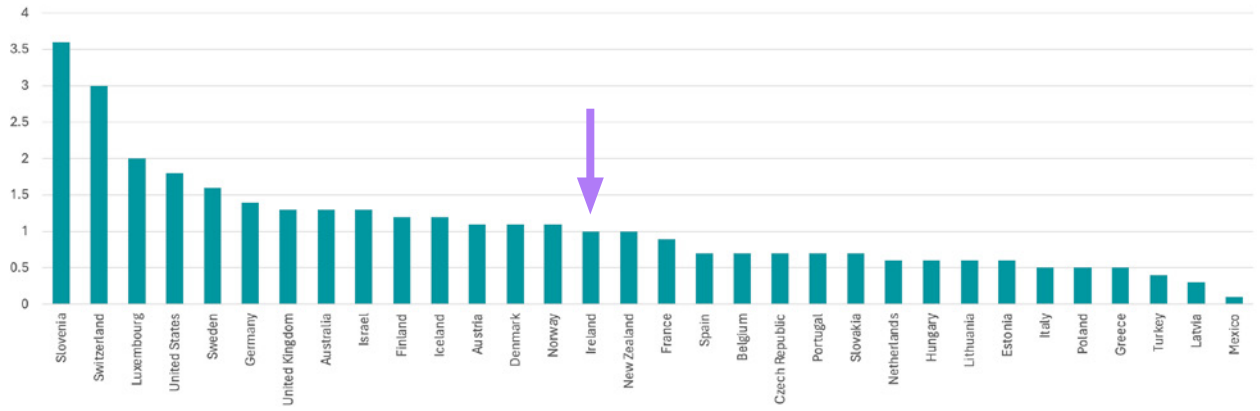
The interdisciplinary nature of this approach was critical, involving not just Science, Technology, Engineering, and Maths (STEM) fields but also the Arts, Humanities, and Social Sciences (AHSS), whose insights play an essential role in addressing global challenges. Our research-led teaching universities are the primary pipeline of top talent for a whole range of enterprise sectors that underpin our economy. Investment in our future talent is fundamental to underpinning competitiveness and driving the next wave of innovation.

As Ireland's research landscape evolves and societal demands intensify, there is an urgent need to renew our focus on talent development to sustain our competitive edge and prepare the next generation of researchers to tackle global challenges such as climate change, digital transformation, and public health crises. A multidisciplinary approach that integrates diverse perspectives from STEM and AHSS disciplines will be essential for developing solutions that are both scientifically robust and socially relevant.

The Reality on the Ground

Cultivating a diverse and robust talent pipeline, as emphasized in Impact 2030: Ireland's National R&I Strategy[7], is vital to achieving Ireland's research and innovation objectives. PhD candidates and postdoctoral researchers form the bedrock of our R&I capacity, yet Ireland lags significantly behind other innovation leaders in the proportion of doctoral graduates within the population. OECD data reveals that only 1% of Ireland's population holds a PhD, compared to 3.6% in Slovenia, 3% in Switzerland, and ~2% in the USA, Luxemburg and Sweden[8].

Figure 3: % of population with PhD degrees 2024



7 https://www.gov.ie/en/publication/27c78-impact-2030-irelands-new-research-and-innovation-strategy/

8 https://worldpopulationreview.com/country-rankings/phd-percentage-by-country

At a national level, a strong research student presence is critical for Ireland's competitiveness and economic growth. With <4% of higher education students pursuing PhDs, Ireland lags behind leaders like Germany (6.0%) and Luxembourg (13.3%), where higher research student populations fuel innovation across sectors like healthcare, sustainability, and technology[9]. PhD students drive breakthrough solutions to global challenges while boosting academic-industry collaboration and attracting talent, investment, and partnerships. To remain competitive, Ireland must significantly increase the number of PhD students, with research as the foundation of a resilient, future-proof economy. To move from 4% to 5% Ireland needs an additional 2,500 research students enrolled in a given year.

This shortfall is particularly concerning given that PhD-qualified employees in Ireland disproportionately occupy the highest salary brackets and are pivotal contributors to both the domestic and multinational sectors of the economy, as shown by Central Statistics Office data[10]. At the same time, it highlights a significant opportunity for growth in high-end, high-value employment, which could further strengthen Ireland's position as a hub for innovation and advanced industries. Furthermore, OECD findings confirm that individuals with PhDs have the highest rate of employment compared to any other qualification level. Despite this, the first annual Progress Report for Impact 2030[11] highlights that "Nurturing and attracting R&I talent, at all career stages" is the only flagship initiative yet to be commenced among Ireland's 30 national priorities.

Addressing this gap requires an investment in interdisciplinary research talent, where both STEM and AHSS fields are equally represented. This diverse talent pool is key to creating the kind of research ecosystem that addresses the full spectrum of societal challenges—from technological innovation to cultural shifts and policy development.

Ireland's dynamic economy thrives on skilled workers and world-class talent, and realizing our ambition to become a European Innovation Leader requires bold action. **Developing the next generation of doctoral and postdoctoral researchers** is not just a strategic priority—it is **a necessity to drive inward investment, support indigenous enterprises, and secure a highly skilled future workforce**. Below, we outline how this goal can be further supported by leveraging EU funds, specifically through the Marie Skłodowska-Curie Actions (MSCA) COFUND programme, to create a stronger talent pipeline while also conducting research that aligns with public priorities.

The Solution

A €100 million national fund to leverage EU funding through the MSCA COFUND would enable the recruitment and training of 500 - 600 PhD students and postdoctoral researchers. Aligned with the 16 key themes from "Creating Our Future," based on 18,062 public submissions, this initiative - addressing critical national priorities such as health, housing, and climate action - would provide a unique opportunity to turn public engagement into actionable research agendas, driving societal impact.

9 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tertiary_education_statistics#Participation_by_level

10 https://www.cso.ie/en/releasesandpublications/ep/p-fdi/foreigndirectinvestmentinireland2018/fdiandeducation/

11 https://www.gov.ie/en/press-release/97edf-minister-harris-welcomes-the-publication-of-the-first-impact-2030-annual-progress-report/

Leveraging EU Funds to Build a Talent Pipeline

Given significant constraints on exchequer budgets, the MSCA COFUND offers an invaluable opportunity to co-finance doctoral and postdoctoral training under Horizon Europe. This prestigious programme enables the European Commission (EC) to match national funding, providing between 40-55% of the total programme cost. Universities and other organisations apply to the EC for co-financing to fund, recruit, and train PhD students and postdoctoral researchers while carrying out research on topics based on national strategic needs.

Since 2014, Ireland has excelled in securing MSCA COFUNDs, achieving a 75% success rate from 36 proposals, placing us at the top of the European table. To date, Ireland has secured 27 COFUNDs, worth approximately €66 million. Despite this success, further leveraging of MSCA COFUND is constrained by the lack of exchequer match funding. Addressing this gap presents a clear and immediate opportunity to significantly increase Ireland's R&I capacity.

Harnessing the Potential of "*Creating Our Future*"

To ensure strategic alignment, the programme would prioritize applications aligned with the themes identified in "Creating Our Future" (Appendix 3). This initiative by DFHERIS and SFI captured 18,062 public submissions on how research can contribute to a better future, resulting in 16 key themes, including health and social care, housing solutions, and climate action. These themes represent areas of critical national importance and provide a unique opportunity to channel public engagement into actionable research agendas.

By integrating cross-disciplinary research teams from both STEM and AHSS, this initiative ensures that the research addresses not only the technological challenges but also the social, ethical, and cultural dimensions of the issues at hand.

Aligning MSCA COFUND projects with these priorities ensures that Ireland's R&I system responds directly to societal needs while leveraging the transformative ideas generated by this initiative. However, without sustained, multi-annual investment in research capacity, the potential of "Creating Our Future" risks being unrealized. Significant and strategically focused R&I investment is essential to develop these ideas and deliver the highest societal and economic returns.

A National MSCA COFUND Programme

To fully leverage the opportunities offered by the MSCA COFUND, we propose establishing a €50 million national fund over the remaining three years of Horizon Europe. This fund would provide the essential match funding required to unlock European Commission co-financing, doubling the impact of exchequer investment and potentially securing over €50 million in additional EU funding. Such a programme could support the recruitment and training of 250-300 PhD students and postdoctoral researchers, while strategically addressing Ireland's priority research and innovation needs.

Aligned with the themes identified in "Creating Our Future", this programme would focus on areas of critical national importance, ensuring research efforts directly respond to public priorities. A national MSCA COFUND programme, supported by exchequer seed funding and aligned with societal priorities, offers a clear pathway to increase PhD numbers and thereby strengthen Ireland's research capacity, attract global talent, and drive innovation. By enabling Irish institutions to harness EU funding, this initiative would secure the talent and resources needed to tackle pressing challenges while positioning Ireland as a European Innovation Leader with a sustainable, high-impact R&I ecosystem.

Appendix 1

Examples of Potential Areas for Technology Expertise Hubs

Example Hub: Spatial Imaging for Breakthrough Research

Spatial imaging allows researchers to map molecular interactions within cells and tissues in high resolution. This technique is critical for understanding how molecules work together in living systems, offering insights into cancer, infectious diseases, and neuroscience. It helps researchers:

- Visualize cancer cell spread and immune evasion.
- Track viral protein distribution during infection.
- Investigate brain cell communication, which could lead to breakthroughs in neurodegenerative diseases.

Example Hub: Earth Cycle Observatory (ECO) for the monitoring of key biogeochemical cycles in the environment

This state-of-the-art suite of analytical instrumentation would allow for the investigation of key biogeochemical cycles (e.g. nitrogen, water, hydrogen, oxygen, phosphorous, sulphur cycles) using a combined organic and isotopic approach. The unique combination of equipment would facilitate research at the bulk, molecular, and atomic level. Research emerging from this facility would shed light on past, present, and future climate scenarios allowing us to expand our fundamental understanding of climate system science and to mitigate and prepare for the effects of future climate change.

This core facility would be of huge benefit to advance research for environmental scientists, geologists, marine scientists, soil scientists, ecologists, palaeontologists, palaeoclimatologists, and materials scientists.

At an estimated cost of €10M - €12M, the key analytical instrumentation would include:

- Triple quadrupole gas chromatography - mass spectrometry
- Triple quadrupole liquid chromatography - mass spectrometry
- Gas chromatography - isotope ratio mass spectrometry
- Elemental analysis - isotope ratio mass spectrometry
- Soft electron ionisation - high resolution accurate mass spectrometry
- Time-of-flight - secondary ion mass spectrometry
- Nanoscale - secondary ion mass spectrometry

Example Hub: Single-Cell Sequencing

Single-cell sequencing provides an unparalleled view of gene expression and cellular behaviour by examining the genetic material of individual cells. It's especially valuable for understanding complex biological systems that vary across cells within a tissue. It allows researchers to:

- Investigate tissue and tumor heterogeneity, essential for personalized cancer treatments.

- Track how individual cells respond to environmental changes or disease.
- Study the genetic underpinnings of complex diseases like autoimmune disorders or neurodegeneration.

Example Hub: A national infrastructure for energy storage technologies

This initiative would drive the development of cutting-edge energy storage technologies, including rechargeable batteries, flow batteries, and electrofuels, while fostering innovative solutions for integrating storage across the electricity grid. The higher education sector already boasts significant expertise in these areas, making a national infrastructure a potential game-changer.

This effort builds on existing investments by SFI, such as the rechargeable battery fabrication facility AMPIERE and infrastructure for solid-state battery development. These foundational investments have enabled leadership and collaboration in four Horizon Europe network projects, involving over 30 partners across the EU value chain, including industry leaders like Analog Devices, Stellantis, and Ferrari.

Additionally, these investments have supported multiple Marie Curie Fellowships, strengthened battery research at MaREI and AMBER Research Centres, and secured DTIF funding along with direct industry partnerships. Expanding on this momentum, a national infrastructure for advanced energy storage technologies would be transformative, catalyzing innovation and furthering Ireland's role in shaping the future of energy."

Example Hub: Cryo-Electron Microscopy (Cryo-EM) for Structural Biology

Cryo-EM enables scientists to examine the structure of biological molecules at near-atomic resolution in their natural environment. Unlike other imaging techniques, it provides detailed 3D views of macromolecules, essential for understanding their function. Cryo-EM supports:

- Mapping disease-related proteins and molecular complexes.
- Analyzing viral particles to understand how they infect cells.
- Revealing the molecular dynamics of key biological processes, which can lead to new diagnostics and treatments.

Example Hub: Environmental Monitoring and Climate Modelling

Environmental monitoring technologies, including remote sensing, IoT-based sensors, and satellite imagery, provide real-time data on climate patterns, pollution, and biodiversity. This data is essential for making informed decisions on climate action and sustainability.

Applications include:

- Tracking air and water quality to improve public health and environmental policies.
- Monitoring deforestation, agricultural practices, and land use changes for better resource management.
- Modelling climate change impacts and developing predictive systems for natural disaster preparedness.

Appendix 2

Examples of previous large-scale research infrastructure investments that had transformative impact

The Materials and Surface Science Institute

The Materials and Surface Science Institute (MSSI) at University of Limerick received a total of **€15.75m** during Cycles 1 and 3 of the PRTLI. These investments provided the facilities and equipment essential for UL's materials research capabilities, enabling the university to host national centres such as SSPC, DPTC, and PMTC. Additionally, this core infrastructure helped UL secure significant philanthropic funding through the Bernal project, leading to a further €52m investment in infrastructure, facilities, and personnel. This project attracted top international researchers to Ireland, including two SFI Research Professors. The MSSI evolved into UL's Bernal Institute, with its successful development rooted in PRTLI funding.

The National Preclinical Imaging Centre

Large-scale specialized research equipment serves to foster collaboration between universities, industry, and government to tackle critical societal challenges. An example of this is the National Preclinical Imaging Centre which provides enhanced research data to inform new clinical trials that aim to improve patient outcomes, funded with a **€3.4m** award under SFI's Research Infrastructure Programme, and co-funded by RCSI, UCD and University of Galway.

The Long Room Hub

Shared facilities can bring together multidisciplinary teams to tackle complex societal issues, pooling their expertise and resources. In 2007, despite the economic downturn, the Irish government invested **€10.8m** through PRTLI 4 in Trinity College Dublin for the construction of the Long Room Hub as part of the Humanities Serving Irish Society (HSIS) project. The Trinity Long Room Hub is now a world leading research institute for the Arts and Humanities with research focusing on democracy and resistance, cultural and literary heritage, the futures of Ireland, and human-centred approaches to technology.

Appendix 3

"*Creating our Future*" clustering of public submissions into themes

16 Themes

Enhancing a Human Centred Approach to Health and Social Care

Reimagining Learning and Development across the Life Course

Advancing Solutions for Housing

Safeguarding Public Interest and Trust in the Digital World

Improving Policymaking and the Political System

Promoting Equality, Diversity, and Inclusion in Ireland

Fostering Regional Strengths

Valuing and Connecting Communities

Embedding Climate Action Across Society

Supporting Innovation in Farming and Food

Future-proofing Energy and Water Systems

Connecting Ireland through Green Transport Systems

Nurturing the Humanities, Culture, and the Arts

Harnessing the Benefits of Fundamental Research

Building Resilience and Preparedness: Insights from the Pandemic

Strengthening the Research Landscape and Public Engagement

Notes

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