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Report of the Working Group on Research Infrastructure 2025

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Executive Summary

Placing research and innovation at the core of national policy is what enables countries to compete, adapt, and thrive. The recent Draghi report on European competitiveness reinforces this imperative, identifying research as a central driver of productivity and resilience.

A vibrant, ambitious and world-class research and innovation ecosystem drives the talent pipeline that will underpin future economic growth, tackle societal challenges, **build capacity, resilience and growth in our SME base, and propagate the next generation of deep tech start-ups from Ireland.** It also provides an anchor for growth and retention of strategically important economic sectors such as life sciences, semiconductors, food and renewable energy that will provide well paid employment in Ireland.

A strong research base expands the State's fiscal capacity, giving government greater flexibility to invest in public goods such as health, housing, education, and climate action.

International evidence shows that public investment in research delivers substantially higher returns than traditional physical infrastructure — and performs at least as well as private R&D, overturning long-held assumptions to the contrary.

Ireland has more business-funded research and innovation expenditure (BERD) than other countries — accounting for 87% of total R&I expenditure, but this statistic masks underlying strategic vulnerabilities for Ireland: a small number of larger firms account for most of BERD and, linked to this, **Ireland is sharply out of step with other small advanced economies in terms of the overall balance between public and private investment in research and innovation.**

Meanwhile, State investment in research remains persistently low, with Government Budget Allocations on R&D (GBARD) stuck at just 0.9% of total public spending — well below international best practice and the levels seen in countries Ireland seeks to emulate.

Ireland's public research and innovation (R&I) system is under **serious strain.** Despite growing national ambition and clear policy expectations, the system lacks the infrastructure and investment needed to deliver at the required scale.

Nowhere is this more evident than in the condition of research infrastructure across higher education institutions. In the early 2000s, Ireland adopted a strategic and systematic approach through the Programme for Research in Third Level Institutions (PRTL), which provided sustained investment in research infrastructure and facilities.

Since the effective end of PRTL, funding for research infrastructure has become fragmented, inconsistent, and far below what is needed. While PRTL delivered an average annual investment of €100 million, this has dropped to just ~€20 million per year over the past 15 years.

The consequences of this decline are now stark. By the end of this year, over one-third of research equipment in Irish universities will have reached the end of its usable life. Nearly 60% of equipment is more than ten years old — a clear indicator of underinvestment and growing obsolescence.

Technological Universities face a similar challenge. Just 14% of national research equipment is located in TUs, despite their increasingly important role in regional innovation and SME engagement.

Sustained economic growth and rising expectations demand a research system equipped to deliver — but infrastructure investment has not kept pace, creating a widening capacity gap.

A rapidly expanding R&I ecosystem — with more institutions, students, and global collaborations — requires modern infrastructure to translate potential into national impact.

Strategic investment in research infrastructure will unlock practical solutions to national priorities — from decarbonisation and disease prevention to digital transformation and cultural innovation.

Without fit-for-purpose infrastructure, Ireland risks falling further behind in global R&I leadership — particularly in climate, health, and AI — despite its strong talent base and industrial potential.

The Programme for Government includes a commitment to explore a new capital funding stream for research facilities. This Working Group’s analysis identifies a clear and immediate priority: not new buildings, but modern, high-quality research equipment — supported by the necessary technical staff and maintenance — to ensure functionality, longevity, and sustained impact.

A decisive shift is urgently needed in Ireland’s R&I system to **drive innovation by accelerating the research commercialisation performance of the higher education institutions**, including new **spin-out companies** from the public research system that are inherently strong in the development of technology and its delivery to market.

Equally, **SMEs need to deepen their engagement with the public R&I ecosystem** in order to increase their innovation performance and their productivity.

Strategic investment in public research infrastructure will provide the platform upon research can deliver such innovation impact, through the creation of new high-potential spin-outs and impactful collaboration between existing companies across the country with the public research system.

To meet national needs and deliver lasting value, investment should be structured across three categories:

1. **Shared Advanced Infrastructures** — high-end equipment designed for shared use across institutions and sectors;
2. **Local Institutional Infrastructure** — standard equipment used regularly for both research and teaching within institutions;
3. **Strategic National Infrastructures** — systemically important assets serving national or multi-sectoral needs.

All investments should be guided by the following implementation principles:

- Alignment with institutional and national research priorities;
- Demonstrated institutional capability and readiness;
- Potential for collaboration, both inter-institutional and inter-sectoral;
- Strong focus on utilisation, accessibility, and long-term sustainability.

1. Introduction

1.1 Strategic Context

Research and innovation are fundamental drivers of long-term economic development and productivity growth. A robust research ecosystem fuels enterprise creation, supports industrial innovation, attracts foreign direct investment, and strengthens national competitiveness. Critically, economic growth powered by research does more than boost GDP — it expands the State’s fiscal capacity to fund key national priorities, from climate action and health to education and housing. Without sustained investment in research, Ireland risks not only falling behind global peers but also undermining its ability to deliver on the economic and social ambitions set out in the Programme for Government, the National Development Plan, and other national strategies.

1.2 Working Group on Research Infrastructure

In line with *Impact 2030*, Ireland's national research and innovation strategy, and the Programme for Government, the Department of Further and Higher Education, Research, Innovation and Science (DFHERIS), in collaboration with key stakeholders and experts, is developing a strategic and comprehensive approach to the higher education sector's research infrastructure requirements. Such an approach, as set out in this report, to future investment in research infrastructure has regard to the original Programme for Research in Third Level Institutions, as well as taking account of more recent investments and international best practice in this space.

The Department established a Working Group in March 2025 to advance this agenda. The membership of and Terms of Reference for the Group are provided in Appendices B and C respectively. The Group has met twice to date and this report reflects their deliberations and expert perspectives. It supports and expands upon the case that has been made within the Department’s submission to the National Development Review process for research infrastructure investment.

2. Rationale

2.1 The Geoeconomic Imperative

“The starting point is that Europe is facing a world undergoing dramatic change. World trade is slowing, geopolitics is fracturing and technological change is accelerating. It is a world where long-established business models are being challenged and where some key economic dependencies are suddenly turning into geopolitical vulnerabilities”.

- Mario Draghi, Address to the European Parliament, September 2024

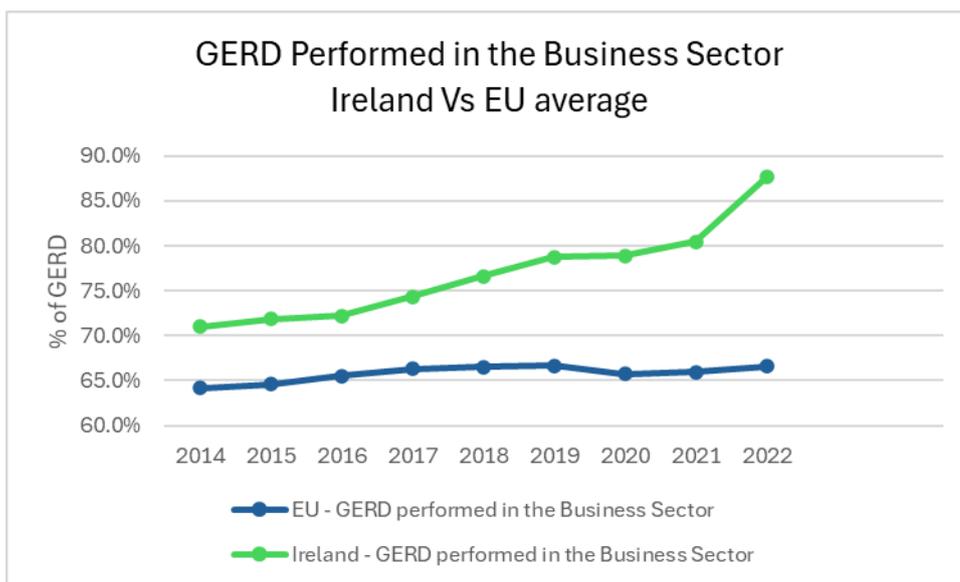
The global economy’s shift away from a multilateral rules-based trade and investment regime has fundamental consequences for the sustainability of the Irish economic model. In addition to the known threatened tariffs, potential supply chain disruptions and the loss of certainty are major risk factors for businesses. As a globalised small open economy, Ireland is particularly exposed. The United States is its single largest trading partner, accounting for 32% of its goods exports and 17% of

imports. Having regard to the impact of tariffs alone, it is estimated that GDP would fall by 2.5%-4% over the medium-term relative to a no-tariff baseline. In a similar scenario, employment is estimated to fall by 2%-3% and exports by 3%-5%.

In this context of growing geoeconomic uncertainty, strengthening Ireland’s national innovation capacity has become a heightened strategic necessity. As global markets become more volatile and the limitations of over-reliance on foreign-owned enterprise grow starker, a robust, well-funded research and innovation (R&I) system offers one of the few levers of resilience that lies fully within national control. Targeted investment in R&I is not only essential to future-proof Ireland’s economic model but also to create new high-value enterprise throughout the regions, diversify export capacity, and reduce structural dependencies that leave the economy vulnerable to international shifts.

Among the areas where Ireland trails its international peers, R&I stands out as a domain in which strategic action can directly enhance national competitiveness. However, there are key weaknesses that must be addressed in order to achieve this. Counter to the internationally accepted benchmark of Business Expenditure on R&D (BERD) accounting for two thirds of a nation’s total (public and private) expenditure on R&I, business expenditure now accounts for well in excess of four fifths (87%) of all R&I expenditure, public and private, in Ireland. This imbalance signals an over-reliance on business-driven closer-to-market investment, with insufficient public funding to support the foundational research, talent pipeline and innovation infrastructure that underpin long-term national capacity. As well as the EU27 average of 66.9%, Ireland’s BERD exposure stands in sharp contrast to levels seen in our comparator small advanced economies: for example, in Finland BERD accounts for 68% of GERD, while it accounts for 61.4% in Denmark.

In most advanced research-intensive economies, public investment plays a stronger role — maintaining a more balanced mix between public and private funding. When one dominates, and all the more so to the extent that it now does in Ireland, the system becomes vulnerable to market volatility and risks drifting out of step with broader national economic and societal priorities.



Ireland’s Business Expenditure on R&D is not only unusually high relative to public investment, it is also highly concentrated:

- More than 84% of BERD comes from foreign-owned companies;

- In 2023, just ten firms accounted for 58% of all business R&D spending, a sharp rise from 37% in 2021.
- Nearly three quarters (72.8%) of Ireland’s Gross Expenditure on R&D was undertaken by foreign-owned enterprises in 2023.

This creates a strategic vulnerability in the Irish R&I system whereby a strong performance by a few actors is masking weaker results from others.

In contrast to the high levels of business investment, Ireland’s public spending on R&I consistently lags international norms — particularly when compared to other small, advanced economies. Government Budget Allocations for R&D (GBARD) account for just 0.9% of total government expenditure in Ireland, well below the EU27 average of 1.49%. Finland allocates 1.68%, Denmark 1.82%, and Switzerland 2.97% — all signalling a much stronger prioritisation of public investment in research capacity. Closing this gap would require an additional approximately €700m in annual public investment — just to bring Ireland in line with the EU average.

This public funding deficit matters: as the White Paper on Enterprise 2022–2030 cautions, *“failing to keep pace with other small-advanced economies in terms of public investment in RD&I would pose a significant risk to the competitiveness of our economy”*. The White Paper also affirms that stepping up innovation in enterprise depends on sustained public investment in frontier research and the broader enabling R&I environment — including infrastructure, talent, and institutions.

“Integral to stepping up innovation in enterprise is a focus on the broader enabling RD&I environment, continuing to invest in frontier research and a well-equipped research environment”.

2.2 Importance of R&I to International Competitiveness

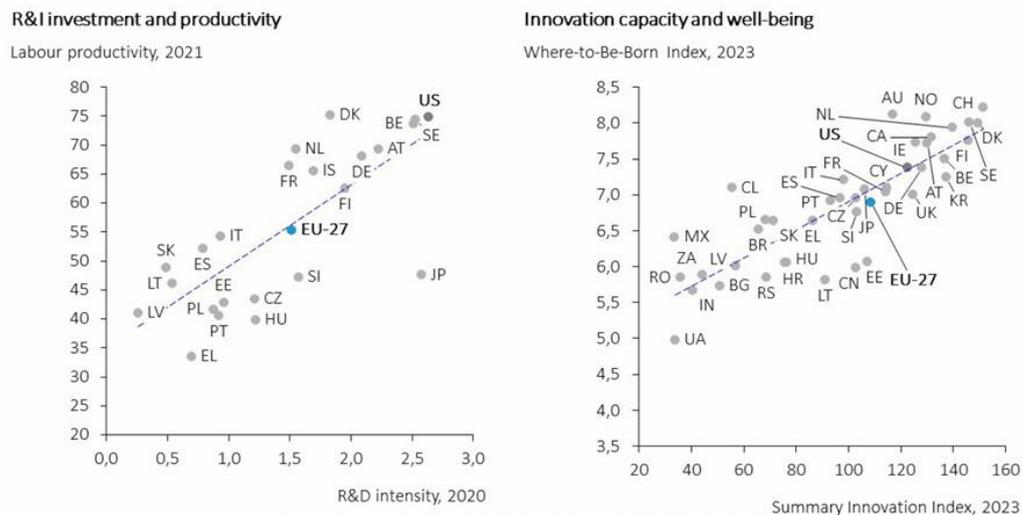
Ireland’s persistently weak public investment in R&I, along with an over-concentration of private R&I expenditure in a small number of larger firms, creates a strategic vulnerability for Ireland and it , runs counter to international evidence and the wealth of data that consistently link strong public R&I investment to national productivity and long-term economic resilience.

Most recently, one of Mario Draghi’s core messages in his (September 2024) report [on The Future of European Competitiveness](#) is that the EU needs to close the innovation gap with others such as the US and China, especially in advanced technologies. According to him:

- R&I are the main drivers of productivity and people’s well-being. Innovation generates positive externalities, with new technologies serving as stepping stones for further innovation. This creates cumulative positive spillovers that justify a role for government intervention to promote R&I.
- Faster innovation will help to raise the EU’s productivity growth, leading to stronger growth in household incomes and stronger domestic demand.
- In addition, R&I will be critical for financing Europe’s welfare system as the EU population ages and its labour force shrinks.
- The importance of R&I for productivity growth will increase in the future as a result of the accelerating pace of global innovation during the past decades.

He also cautions about the dangers of not investing in R&I: in his September 2024 address to the European Parliament, he noted that “over time, we will become inexorably less prosperous, less equal, less secure and, as a result, less able to choose our own destiny”.

FIGURE 1
The impact of research and innovation



Note: Left: business expenditure in R&D (BERD) measured in percentage of gross domestic product (GDP) 2020 and labour productivity 2021 based on Eurostat. Right: Where-to-Born Index by Country 2023, Economist Intelligence, and Summary Innovation Index 2023, European Innovation Scoreboard.

Source: European Commission, DG RTD, 2024.

The graph on the left illustrates the positive correlation between R&D intensity and labour productivity, while the one on the right shows that between a country’s innovation performance and wider wellbeing measures such as life expectancy, corruption and gender equality. The Draghi report therefore corroborates extensive other international analyses, showing that R&I investment drives productivity, delivers high economic returns, addresses market failures, and—contrary to conventional assumptions—is at least as productive as private investment, if not more so, as the following illustrate:

- According to the OECD, business investment in knowledge-based capital contributes 20% to 27% of average labour productivity growth.
- The European Commission reinforces this in its analysis that an increase in 10% of R&D investment is associated with gains in productivity between 1.1% and 1.4%, i.e. an increase in R&D investment of 0.2% of GDP would result in a 1.1% GDP increase: a five-times bigger increase in absolute terms.
- A report by the Research, Innovation and Science Policy Experts (RISE) group to the Commission concluded that, without Government intervention, market and system failures would mean that valuable research would not be undertaken by industry. Firms typically focus on their near-term needs and existing stock of knowledge, and collaboration with the public R&I system.
- A November 2024 report of the US National Bureau of Economic Research concludes that the returns to federally funded R&D are “substantially higher than the returns to other forms of federal investment such as physical infrastructure”, drawing on analysis that finds “a net rate of return of 197%, or nearly two dollars on average for each additional dollar of federally funded R&D (as opposed to the 9.2 cents net effect used by CBO [Congressional Budget Office] by default for federal investments”. Also, significantly in the context of this report, it concludes that “for the case of R&D, the literature does not support the standard assumption that public investments are less productive than private investments”.

Strongly consistent with this literature, the [2024 European Semester Report](#) (June 2024) concludes that sluggish European productivity is as a result of, inter alia “*innovation not being sufficiently scaled-up, a lack of investment in research and innovation and persistent skills shortages*”. It recommends that:

“Member States should implement ambitious reforms to build integrated R&I ecosystems, focusing on governance, public research systems and infrastructures, science-business collaboration and knowledge transfers, as well as innovation deployment and uptake, including through public procurement, with a focus on career prospects for researchers and talent attraction and retention throughout Europe.”

2.3 Role of R&I in Ireland’s Competitiveness and Economic Resilience

The Draghi report findings resonate strongly at national level. For over two decades, Ireland has articulated a national ambition to strengthen its competitiveness and become a global innovation leader. From the 2004 Action Plan for Promoting Investment in R&D and the Strategy for Science, Technology and Innovation 2006-2013 to the more recent Innovation 2020 and current *Impact 2030*—this vision has been reinforced time and again.

As summarised in this section, it is also deeply embedded in wider current frameworks such as the present Programme for Government, the National Development Plan 2021–2030, IDA Ireland’s *Adapt Intelligently* strategy, Enterprise Ireland’s *Delivering for Ireland, Leading Globally*, and national policy commitments to the twin transitions of decarbonisation and digitalisation.

The **Programme for Government 2025** recognises that “*the knowledge economy remains key to our international competitiveness [...] Research and innovation are key drivers of economic progress, but also essential to improving our health and social wellbeing. Ireland must remain a location of choice to realise our ambitions*”.

The **National Development Plan 2021-2030** itself states that “*continued public investment in R&I [...] will support Ireland’s ambition to position itself as a global innovation leader, underpinning a sustainable and resilient economic model that is truly knowledge-based*”. It recognises that “*the establishment of DFHERIS in 2020 was a recognition by Government of the centrality of knowledge, talent and skills to our national and regional ambitions, and provides the opportunity to take a whole-of-system approach to the development of infrastructure and research capacity*”.

The **White Paper on Enterprise 2022-2030** underlines the centrality of innovation to the creation of new products, services and firms, and that innovation is fundamental to Ireland’s enterprise policy approach. The forthcoming Action Plan for Productivity and Competitiveness, as mandated in the Programme for Government, will include innovation as a critical element of Ireland’s economic performance.

Having regard to the recently published 2025-29 enterprise agency strategies, Scaling Cutting-Edge Innovation is one of **IDA Ireland**’s four strategic objectives outlined in *Adapt Intelligently: a Strategy for Sustainable Growth and Innovation 2025-2029*. However, it cautions that “*our ambition for FDI is only realistic if it is matched by the right infrastructure, capacity and policies for Ireland to be a*

competitive, digital and green economy". It highlights Talent Development and Innovation as one of the five key enabling conditions for winning continued investment projects, with *"infrastructural capacity across housing, utilities, public transport, innovation and education"* highlighted as essential to this.

In a similar vein, Igniting Innovation is one **Enterprise Ireland**'s six intended levers under its 2025-29 strategy, *Delivering for Ireland, Leading Globally*. To achieve this, it aims to *"Drive collaboration and investment in innovation, development, and the commercialisation of research for long-term, sustainable growth and competitiveness"*. Enterprise Ireland notes that *"Greater investment in the innovation landscape [...] offers huge potential to deliver added value throughout the Irish enterprise ecosystem"*.

Other **sectoral strategies** also reflect the importance and value of R&I, for example, Silicon Island, the recently published national semiconductor strategy, and *Powering Prosperity*, Ireland's offshore wind industrial strategy.

Amid intensifying geopolitical uncertainty, the twin transitions of decarbonisation and digitalisation remain core challenges – and opportunities – not only for enterprise in Ireland, but also for Irish society more widely. **Ireland's Climate Action Plan 2025**, published on 15 April last, recognises that *"R&I provide the evidence, technologies and solutions to enable the necessary economic and societal transitions to address climate change"*, with its predecessor plan noting that *"Irish higher education institutions (HEIs) play a key role in climate research delivery"*.

Harnessing Digital – The National Digital Framework speaks of *"the opportunities inherent in the mutually reinforcing impacts of workforce development, innovation and productivity*. It also states that *"Ireland will continue to target emerging and new growth areas [...]. The importance of more publicly funded research in these areas will be key, and we will work closely with industry and academia to maximise the economic opportunities available"*.

These successive national strategies have recognised R&I as central to economic competitiveness, societal progress, and resilience. This vision was once backed by major investment programmes like the Programme for Research in Third Level Institutions which transformed Ireland's research capacity and positioned the country as a destination for high-value enterprise and advanced talent.

Yet despite the strength and continuity of this policy direction, sustained investment has not kept pace. Ireland's public investment in R&I is consistently lagging international averages and comparator countries. Continuing under-investment creates clear risks with respect to the achievement of core economic policy objectives - particularly in attracting and retaining foreign direct investment, as emphasised in IDA Ireland's recent strategy. The consequences are equally significant for the resilience, innovation capacity, and global competitiveness of the indigenous enterprise base, as reflected in Enterprise Ireland's priorities. In turn, the potential effects of such an outcome could become starkly apparent in relation to the public accounts, given the large scale contribution of these knowledge intensive sectors to both Corporation and payroll taxes, as well as their large scale spend within the Irish economy.

Enterprise Ireland data show that firms engaging with its R&I supports, encompassing their collaborations with the public research system, consistently outperform their peers, reporting:

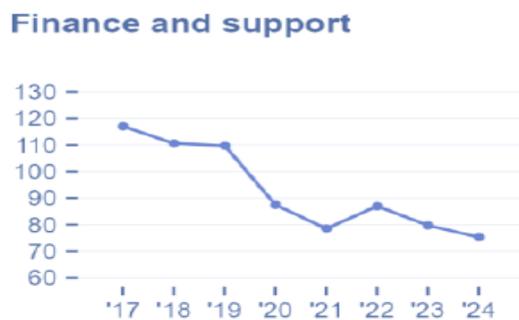
- 2.5 times higher turnover,

- 1.3 times more domestic sales, and
- 4.7 times greater exports.

Longitudinal analysis by the then Department of Enterprise, Tourism and Employment (2000–2016) reinforces this trend, showing that non-R&I-active firms experienced the greatest job losses during the last recession, while R&I-active firms demonstrated greater resilience and stronger performance across employment, exports, and value-added.

As Ireland faces growing economic headwinds, strengthening enterprise resilience is more urgent than ever. As highlighted in the White Paper on Enterprise, a well-equipped research environment is essential to achieving that goal. And there have been real successes from the successive policies. The number of R&D-active companies has grown steadily, with continued increases in both “Significant R&D Performers” (spending over €100,000) and “Large R&D Performers” (spending over €1m).

However, Ireland’s overall innovation performance has remained stubbornly static. Since the launch of the European Innovation Scoreboard more than 20 years ago, Ireland has consistently been classified as a ‘Strong Innovator’—slightly above the EU average but never advancing into the top tier of ‘Innovation Leaders’. This plateau reflects a deeper structural issue and, without a change in approach, the trajectory will not change. Between 2017 and 2024, Ireland’s innovation performance improved by just 2.3%, compared to an EU average of 8.5%—a widening gap that undermines Ireland’s ability to meet its own national *Impact 2030* target of becoming an Innovation Leader. This divergence is particularly stark in the area of public investment: Ireland’s performance under the “Finance & Support” Dimension of the Innovation Scoreboard declined significantly in 2024, in contrast to steady EU-wide improvement. In fact, Ireland’s weakest relative performance was in “R&D expenditure in the public sector”, despite having one of the highest per capita incomes and fastest-growing economies in the EU.



Source: European Innovation Scoreboard 2024, Ireland Country Profile

2.4 Role of Research Infrastructure in a National R&I System

Impact 2030 highlights that “research infrastructure is a critical element of an enabling R&I environment”. A national R&I system is a rich and complex system of interdependent elements, in which the central dynamic is the relationship and spillovers between a country’s public R&I capability and private sector R&I activity. Inputs by way of investment in both talent and research infrastructure underpin the public capability, in which environment a range of resultant activities can then be undertaken: cutting-edge undergraduate education, PhD programmes in areas of emerging strategic

importance, bilateral research projects with companies, larger-scale multilateral research centres with industry and international collaborations.

Quality research infrastructure is therefore a foundational enabler of the knowledge and skills that drive national progress. Through Ireland's higher education system, it equips researchers across all disciplines to generate new knowledge, foster innovation, win international funding and contribute solutions to economic and societal challenges.

Maximising the return on public investments in talent and research projects and centres, such as those being administered by Research Ireland through its suite of programmes, is completely dependent on research infrastructure being in place that allows students and researchers to carry out their research work. They cannot function without it, and they are functioning suboptimally on the existing inadequate and deteriorating equipment.

Research infrastructure refers to the core facilities, technologies, and services that enable high-quality R&I. It includes scientific instruments, repositories and data sets, and importantly, encompasses the technical staff and systems that maintain, support, and provide access to them. To ensure Ireland's research system remains globally competitive, it is useful to think of research infrastructure in terms of the following three categories:

2.4.1 Infrastructure Categories

a) Shared Advanced Infrastructures

These are higher-value facilities hosted by one institution but accessed by others, including other higher education institutions, industry, and international collaborators. These shared more advanced infrastructures can foster interdisciplinary collaboration and enable ground-breaking research to take place in Ireland, thereby maximising the return on public investment through inter-institutional and inter-sectoral access and utilisation. Strategic investment in these facilities boosts research impact and strengthens innovation ecosystems. Appendix A provides a series of illustrative examples of shared advanced infrastructures across research disciplines.

b) Local Institutional Infrastructure

This involves the essential, day-to-day equipment embedded in laboratories and departments across higher education institutions — vital for both research discovery and talent development. These items of equipment train students, support PhD research activity, and underpin thousands of research projects annually. Typically valued between €25,000 and €500,000, this infrastructure is required for regular, hands-on use, and is often integrated directly into teaching laboratories, research workflows, or running standard experiments. As such, it must be physically proximate to where research and training take place, making it impractical for shared use across institutions. Its value lies in its immediate availability and reliability, enabling researchers and students to build skills and generate results without delay.

(c) Strategic National Research Infrastructures

A limited number of national-level infrastructures will be central to the realisation of wider national priorities. These systemic capabilities serve critical national objectives—such as health, climate, or digital transformation—and are essential to Ireland's ability to compete in key research domains.

Examples include high-performance computing, cybersecurity, national biobanks, or advanced manufacturing testbeds.

A balanced, strategic approach to all three categories of research infrastructure is essential if Ireland is to meet its national goals, support teaching and talent, and build resilience into its research system.

2.4.2 Infrastructure as a Driver of National Progress

Public research infrastructure, more than tools and machinery, is a strategic national asset—it enables discovery, drives collaboration, attracts talent, and turns ideas into impact. It allows universities, industry, government, and public services to tackle shared national challenges in areas such as health, energy, digital transformation, and climate resilience.

It is also critical for effective hands-on training —giving students and early-career researchers access to the tools, techniques, and environments that prepare them for future roles across industry, academia, and the public sector. It is globally accepted that less than 10% of PhD graduates remain long-term in academia. However, it has been reported anecdotally that private sector employers are finding that newly hired postgraduates from Irish universities can no longer be assured of having received training on up-to-date equipment, and immediately require upskilling before they can be deployed productively.

In terms therefore of both skills and innovation, there is a clear interdependency between modern, accessible research infrastructure and the achievement of Ireland’s industrial and economic policy objectives.

It plays a critical role in helping companies — particularly SMEs — to commercialise their research and bring innovation to market. Smaller firms often lack the in-house resources or technical capacity needed for this work. By accessing capital equipment within the public research system, they can develop new technologies with relatively modest investment, boosting their productivity. Collaborations with researchers further strengthen their ability to deliver impactful innovations, scale operations, and enter new markets.

Investment in research infrastructure would also improve Ireland’s international reputation as a place where excellent research is undertaken and valued, and can leverage further business expenditure in R&I by SMEs and enhance Ireland’s attractiveness for foreign direct investment in an international context. At European level, research infrastructure is a priority in the European Research Area policy agenda. In its December 2022 Conclusions, the Council:

- Agreed that research infrastructures constitute a fundamental pillar of R&I ecosystems in Member States;
- Underlined the benefits and impacts of public investments in research infrastructures on industries, SMEs and other relevant actors;
- Acknowledged that beyond their fundamental missions in the areas of R&I, nationally and regionally anchored research infrastructures act as an amplifier for regional development, and
- Encouraged Member States to form a sustainable political commitment on long-term funding of research infrastructures.

In the absence of sustained infrastructure investment, research activity slows, talent creation and retention weaken, and national capacity for innovation declines. Countries that prioritise research infrastructure not only lead in innovation—they strengthen long-term competitiveness, economic resilience, and strategic autonomy.

2.5 Relevant International Practice

As summarised in this section, comparator countries take a long-term, strategic and systematic approach to research infrastructure investment. It is long accepted internationally that it is imperative not only to maintain the currency of existing infrastructure (and, in doing so, maximise its utilisation) but also to invest in critical new equipment in order to drive competitiveness.

At EU level, in addition to being a priority under the European Research Area policy agenda, Pillar One of Horizon Europe includes a dedicated funding stream for it, as well as supporting infrastructure expenditure under several other wider streams. The European Strategy Forum for Research Infrastructure (ESFRI) is an independent expert group to the European Commission that drives a strategic approach to large research infrastructures in Europe. For example, it develops a Roadmap every five years that identifies the priority infrastructures for investment during the forthcoming period. Ireland is represented on ESFRI by Research Ireland (which currently sits on the ESFRI Executive Board) and the Higher Education Authority.

Denmark similarly develops a roadmap every five years which is effectively its strategy for, and prioritisation of, investment in larger-scale research infrastructure for the forthcoming period. A permanent National Committee for Research Infrastructure serves as the forum for steering the prioritisation and financing of research infrastructures, and the support activities that are required to facilitate optimal utilisation of them. The Danish Ministry of Higher Education and Science invests €50-60m annually in larger-scale infrastructures, in addition to ongoing investment in research infrastructure within higher education institutions that are used for both teaching and research purposes. i.e. the local institutional infrastructure referred to above.

The Netherlands follows a similar roadmap and committee approach to investment in research infrastructure. It invests €40m annually in very large-scale infrastructures (where the minimum grant is €10m), as well again as ongoing investment in infrastructure at scales below that. Again, it has consistently and systematically made these investments, with the recognition that they are integral to the performance of any national R&I system.

Finland adopts a similar approach: under its 2030 long-term plan, the Finnish Research Infrastructure Committee (hosted by the Research Council of Finland) works to ensure that:

- The assessment of research infrastructures is up-to-date and able to identify the most competitive infrastructures for scientific research in Finland.
- Research infrastructure services and technological solutions are user-driven, dynamic and accessible.
- The funding for research infrastructures is predictable, supported by a long-term, multi-channel and transparent funding base, strong ownership and solid expertise.

It develops a roadmap of “significant national infrastructures” every four years, with the current one being in place from 2025 to 2028.

2.6 Evolution of Ireland's Approach to Infrastructure within the R&I System

2.6.1 A Historical Overview

Prior to the commencement of the Programme for Research in Third Level Institutions (PRTLTI) in 1998, Ireland did not have a national R&I system to speak of. There had been no recognition of the systemic importance of R&I to Ireland's economic development, nor had there been a concerted approach across the higher education institutions to develop their strategic research capabilities, with the lack of investment in the Irish R&I system rendering its strategic development unfeasible. Public investment in R&I in 1997 (GBARD) stood at just €257m, while gross expenditure was only approaching €1bn.

PRTLTI, launched in 1998, was the first significant step toward building research capacity in Ireland. By enabling interdisciplinary research environments and supporting high-quality graduate training, PRTLTI laid the foundation for a national research system capable of delivering long-term impact.

In 2004, the Government formally committed to building a knowledge-driven economy with the publication of the Action Plan for Promoting Investment in R&D to 2010. This plan recognised that long-term economic competitiveness depended on a shift from low-cost manufacturing to innovation-led growth. It established R&D as a national priority and called for coordinated action across government, education, and enterprise sectors.

The Strategy for Science, Technology and Innovation (SSTI) 2006–2013 (SSTI) expanded this ambition into a comprehensive, whole-of-government strategy. Crucially, SSTI built on the momentum and infrastructure created by PRTLTI and aligned the efforts of funding agencies like Science Foundation Ireland (SFI), the Irish Research Council (IRC) (now merged in the form of Research Ireland), and Enterprise Ireland (EI).

Together, these initiatives transformed Ireland's research and economic landscape. PRTLTI's capital investment enabled a new generation of researchers to emerge, while SSTI and subsequent strategies such as *Innovation 2020* and *Impact 2030* elevated R&I as central pillars of Ireland's economic model.

2.6.2 Programme for Research in Third-Level Institutions (PRTLTI)

Supported by the National Development Plan as well as a pivotal philanthropic injection, and administered by the Higher Education Authority, PRTLTI was transformative in its scope and ambition. It invested in:

- Research infrastructure: laboratories, specialist equipment, and purpose-built research institutes.
- Human capital: postgraduate training and early career researchers.
- Institutional strategy: requiring universities and institutes of technology to develop long-term, strategic research plans.

Since its launch, there were five cycles of PRTLTI funding, with total investment amounting to approximately €1.2bn (including €178m from Atlantic Philanthropies across Cycles 1-3):

Cycle	Year of Award	Funding Period	Buildings & Equipment	Research Programmes & People	Total
1	1999	2000 - 2003	€177.5m	€28.6m	€206.1m
2	2000	2001 - 2004	€48.8m	€29.7m	€78.5m
3	2001	2002 - 2006	€178m	€142.4m	€320.4m
4	2007	2007 – 2013	€131.3m	€129.4m	€260.7m
5	2010	2011 - 2015	€248m	€99.6m	€347.6m
Total			€783.6m	€429.7m	€1.2bn

A major international interim impact assessment of the PRTL approach highlighted key guiding principles in the HEA's implementation of it, including emphasis on:

- The importance of research infrastructure to the vital connection between a higher education institution's research capability and its teaching of both undergraduates and postgraduate students to deliver a pipeline of highly-skilled graduates;
- Institutional prioritisation of investments made under PRTL to incentivise institutional strategic and management capacity-building;
- Inter-institutional collaboration to drive critical mass in priority research areas.

The expert panel concluded that *"the unique PRTL model seems destined to produce very highly skilled personnel for the national economy, as well as radically new scientific insights"*.

Each cycle was adapted to meet the evolving needs of the research system. Cycles 1-3 responded to the absence of built-for-purpose research facilities in Irish higher education institutions. Cycle 2 introduced the requirement for inter-institutional collaboration, while the development of structured PhD programmes was introduced in Cycle 4. Cycle 5 included targeted calls for specific national infrastructure and investment in emerging research areas requiring capacity development.

Between 2000 and 2015, PRTL averaged approximately €80m in investment per annum. This was complemented by additional initiatives, including the HEA's Research Equipment Renewal Grant (2007) and Research Facilities Enhancement Schemes (2008), which together delivered €88m in direct Exchequer funding. All told, public investment in research infrastructure during this period (including EI and SFI funding) was in the region of €100m annually.

2.6.3 Research Infrastructure Investment since PRTL

Unlike the strategic sustained practices embedded in other countries and despite the prominence of R&I as a policy lever in numerous national strategies, Ireland's approach to research infrastructure since PRTL has been ad hoc, unpredictable and un-strategic. This comes at a time when Ireland's national strategic plans, such as *Innovation 2020*, *Impact 2030*, and others cited in this paper repeatedly call for a significant increase in research capacity—more research conducted by more people across more institutions, targeting a wider range of applications (enterprise, public-policy, climate action, healthcare, etc.).

Yet, the infrastructure and equipment to support these ambitions is increasingly out-dated and deteriorating. Without a renewed commitment to strategic, coordinated investment in research infrastructure, Ireland risks losing its competitive edge as global competition intensifies and the demands for research in areas like climate, health, and digital technologies grow. In fact, a review of *"Ireland's Future Research Infrastructure Needs"* commissioned in 2015 by the then Department of Enterprise, Trade and Employment and undertaken by the international consultancy Technopolis

warned that *“One of the main risks is that the pendulum swings from large, systemic programmes such as PRTLTI to isolated, uncoordinated investments in research infrastructures, research centres, PhD education, etc.”*

The investment swings and uncoordinated nature of funding approaches since the last round of PRTLTI, as highlighted as a concern by Technopolis, do not arise from any change in national policy perspective on the strategic systematic investment required for this vital component of Ireland’s national R&I system. Instead, it reflects the reality that any funding involved has become available in an ad hoc manner, thereby rendering it impossible both for the funding agencies to plan their investments and for the higher education institutions to then use them strategically. Both funders and institutions have used any available funding opportunities to effectively plug the most urgent deficits in the system.

Since the conclusion of PRTLTI, the only relatively significant research infrastructure funding has come through Science Foundation Ireland (SFI), the predecessor of **Research Ireland**. Over the past decade, the agency’s Research Infrastructure Programme has awarded €207m in total, i.e. averaging just €20m annually. Annual investment has fluctuated dramatically, ranging from €6.4m to €53.3m, with the number of awards varying from as few as two to as many as 36 in any given year.

Additionally, the programme carries damaging limitations. Most notably, the absence of dedicated multi-annual funding results in highly unpredictable budgets, making strategic planning difficult for both institutions and the funding agency. Furthermore, support for equipment maintenance is limited to just two years post-acquisition. This shortfall—combined with the irregular funding calls—undermines the long-term sustainability and strategic management of national research infrastructures.

Across 2023 and 2024, €55m was allocated to the higher education institutions for upgrade and replacement of essential research equipment by the **HEA**. This has not included funding for the maintenance and ongoing running of the equipment. Under the HEA’s 2023-28 System Performance Framework, the higher education institutions each have reached performance agreements with the HEA that underpin their strategic development during this period and the HEA’s monitoring of same. Having regard to R&I, the institutions share a focus on building their R&I capacity and industry collaborations according to their institutional strategic priorities. A recurrent issue in the institutions’ annual reviews with the HEA is the need for up-to-date research equipment to enable both of these.

The agencies of the **Department of Enterprise, Tourism and Employment** have provided funding for research equipment in the higher education institutions hosting Technology Centres and Technology Gateways to support collaborative industry R&I. The cost of the equipment is prohibitive to most SMEs so the provision of it in the Gateways and Centres gives companies access to leading-edge facilities and opportunities for research collaborations that will in turn help to improve their technical capabilities and deliver world leading products and services. For example, Enterprise Ireland administers a Capital Equipment Fund specifically for its funded Technology Gateways and Technology Centres, i.e. having regard to the industry needs of the associated client companies. Since the Fund was first piloted in 2007, it has made 266 awards totalling €70m. A further €4m has been provided for equipment under a dedicated strand (since 2019) of the agency’s Innovation Partnerships Programme. Under the Chips for Europe initiative, IDA Ireland is planning to invest in two Pilot Lines in Tyndall National Institute, with a third under consideration.

3. Realising the Opportunity – Strategic Impact of Investment

3.1 The Infrastructure Gap: Current Limitations and Strategic Risks

Despite unambiguous national ambition and a highly capable public research base, Ireland’s research infrastructure is increasingly outdated, fragmented, and inadequate for the demands of a modern R&I system that can serve the country’s needs. As part of this review, higher education institutions undertook a comprehensive audit of research equipment currently in use across their campuses. The audit collected detailed data on the age, estimated remaining lifespan, and replacement cost of infrastructure—focusing specifically on existing equipment in STEM and Health disciplines. It did not include new or future infrastructure needs, nor expansion requirements. Critically, the audit only partially reflects the full national infrastructure gap, as research infrastructure in the Arts, Humanities and Social Sciences (AHSS) was largely absent—not due to lack of need, but as a direct consequence of long-term underinvestment, compounded by the fact that Enterprise Ireland and then Science Foundation Ireland schemes were not open to this community of researchers.

Despite its limited disciplinary scope, the audit was extensive in scale. More than 5,000 individual pieces of equipment were reviewed, with an estimated total replacement cost of €432m. This figure represents the cost of replacing today’s infrastructure with equivalent equipment. However, the reality is that much of this stock is significantly aged and heavily depreciated, highlighting the urgency of systematic renewal and the growing obsolescence risk across the system.

An ageing infrastructure: This pattern is clearly reflected in the data from the HEIs - in the Irish Universities Association (IUA) member universities:

- 59% of research equipment is over ten years old,
- 36% is over 15 years old,
- Only 14% of equipment was acquired in the last five years.

In the Technological Universities:

- 36% of research equipment is over ten years old,
- 23% is over 15 years old,
- Only 31% of equipment was acquired in the last five years.

Limited remaining useful equipment life: An analysis of remaining useful life for the IUA member universities shows that the system is nearing a tipping point:

- By the end of 2025, over a third of the total equipment stock (equating to €132m) will have reached the end of its usable lifespan.
- By 2030, this figure will rise to €285m, meaning nearly 80% of Ireland’s university research equipment will be obsolete and unusable unless action is taken.

Cost profile

When analysed first by cost bracket, most research equipment in Irish universities falls within the low-to mid-value range:

- 23% of equipment is valued below €100,000,
- Over 53% is valued below €500,000,
- 70% is valued under €1m.

Due to their relatively modest scale and everyday purpose, over half of this equipment is not suitable for inter-institutional sharing. They serve specific teams or labs and are typically used on-site, making cross-campus or impractical. This reinforces the need for distributed investment to ensure each institution has fit-for-purpose equipment in place to train both students and researchers and to undertake the research activity that lies at the heart of every higher education institution.

Looking at the other end of the cost spectrum, it is notable that only 15 pieces of equipment across the sector exceed €2m in value, underscoring the point that Ireland's research infrastructure is not heavily concentrated in mega-scale facilities, but rather spread across thousands of smaller, essential instruments that collectively underpin national research capacity. However, while this is invaluable for the reasons outlined above, given the imperative to accelerate Ireland's national innovation performance in the interests of national productivity and competitiveness, the lack of high-technology cutting edge equipment is itself somewhat concerning. By way of international comparison, the funding programme operationalising the Dutch National Roadmap for Large-scale Research Infrastructure awards grants at a minimum level of €10m per award.

Inadequate or absent maintenance arrangements

In the IUA member universities:

- Only 16% of equipment is protected by a service contract.
- While 32% may not require one due to the simplicity or scale of the equipment, 52% of vital research equipment has no service contract in place: a clear exposure to risks systemically across the institutions.
- A number of multi-million euro instruments are operating without maintenance contracts.
- Institutions lack a dedicated budget line for servicing, forcing false trade-offs.

In the Technological Universities, almost 80% of equipment has no service contract in place. Again, while a sizeable share (one quarter of total equipment assessed in the Technological Universities) does not require one, the scale of the remainder identifies a clear risk across the sector of equipment breakdowns, project delays (internationally, as well as nationally funded) and researcher career constraints.

Technical support – a critical staffing gap

Technical staff are vital to the delivering the maximum return on investment in research infrastructure, with particular regard to more advanced equipment. They ensure that it is used to the greatest extent possible, that it is accessible to all stakeholders - including SMEs who may not have the in-house capability to use it – and that there is minimum equipment downtime.

However, existing research infrastructure in Ireland does not have sufficient technical support. For example, in the IUA member universities:

- €131m worth of equipment (35% of total) lacks sufficient technical support.
- 75% of equipment valued between €5m and €10m currently lack sufficient technical support.

In conclusion the results paint a stark picture. The data points to a systematic pattern of ageing infrastructure and declining functionality, underscoring the urgent need for coordinated, strategic reinvestment.

Technological Universities

The Smart Specialisation Strategy 2022-27 notes that research activity in the Technological Universities “*will be closely linked to innovation and human capital and skills development. It will be aligned to the needs of the economy, flowing from their connectedness, and collaboration with local, regional, national and international partners, enterprise and employers more generally*”. They will be pivotal anchors in balanced regional economic development through their provision of skilled graduates and their research-driven innovation collaborations with industry, having particular regard to SMEs.

As reflected in the replacement cost of existing equipment, the Technological Universities (TUs) currently account for 14% of audited research infrastructure. This proportion broadly mirrors their stage of development as emerging research institutions. With a research mandate formalised only in recent years, the TUs are in the early stages of building the capacity needed to sustain and grow research activity.

Expanding this capacity will involve a multifaceted, whole-of-system approach. This includes enabling greater research time within academic contracts, increasing the number of research-active staff supervising PhD students, expanding the pipeline of research students, and strengthening institutional supports for research administration and grant management—areas now being targeted through initiatives such as the ERDF-supported TU RISE programme that is being administered by the HEA. Dedicated investment in research infrastructure must go hand in hand with these system-level enablers, ensuring that the TUs are equipped to fulfil their mandate and play a growing role in Ireland’s national R&I ecosystem.

Their existing connectivity into their respective regional enterprise bases presents a significant opportunity – through the platform of shared and accessible research infrastructures across both the TUs and traditional universities – to leverage these regional industry linkages for enhanced research performance and impact across the country.

3.2 Unlocking National Capability through Infrastructure

Ireland’s R&I system has expanded significantly over the past decade — in scale, reach, and strategic importance. However, while the ecosystem has grown, investment in the infrastructure that enables it has not kept pace. In fact, infrastructure funding has declined sharply, creating a widening gap between national ambition and system capacity.

Economic Growth and Rising Expectations

Between 2012 and 2022, Ireland’s economy recorded an average annual (real) GDP growth rate of 8.3%, far surpassing the Euro Area average of 1.4%. This rapid economic growth has heightened expectations for the R&I system to deliver on national goals — from enhancing competitiveness and resilience to advancing public health, sustainability, and digital transformation. While public R&I expenditure has increased in absolute terms, it has not kept pace with overall economic growth — and has not matched the system’s growing demands. This imbalance underscores the need for sustained and strategic infrastructure investment to underpin a modern, high-performing research ecosystem.

Expansion of the Public R&I Ecosystem

Over the same period, the national R&I system has undergone major expansion:

- *Institutional evolution:* The creation of five Technological Universities since 2018 has extended the geographic and disciplinary reach of Ireland’s public research base, advancing regional innovation and broadening system capacity, in line with the TUs’ legislative mandate to increase the research intensity of both its student and staff communities.
- *Increasing research student numbers:* over the last five years, PhD enrolments in Ireland have increased by 24.7%. And, within this, non-EU (and excluding the UK) enrolments have increased by 90%.
- *Success in international collaborations:* In the first four years alone of Horizon Europe, the higher education sector has itself secured €531m and is an essential collaborator in the participation of many other Irish stakeholders including, but not limited to, industry. This compares to the higher education sector’s total outturn for the full seven years of the predecessor Horizon 2020 programme of €659m.
- *Diversification of research outputs and impacts:* in line with the core mission of *Impact 2030* that Ireland’s collective investment in R&I makes as big a difference as possible to as many people as possible, Irish research now addresses a wider spectrum of public and private needs — informing policy, supporting cultural and technological advancement, and delivering impact across sectors from health and energy to AI and the creative economy.
- *Growth in Research Workforce:* Academic staff numbers in higher education institutions have more than doubled — from 7,168 in 2011 to over 15,000 by 2019.

However, the vital underpinning infrastructure investment has not kept pace with this expansion. As noted earlier, in the early 2000s, average annual infrastructure investment was in the region of €100m thanks, in large part, to the Programme for Research in Third Level Institutions. Since then, as also highlighted, investment under the primary infrastructural funding mechanism (Research Ireland’s Research Infrastructure Programme) has only averaged at €20m annually over the last decade. This stark decline in infrastructural support — even as research activity has intensified — has meant that the present stock is under increasing strain, approaching obsolescence and not being replaced.

Recent commercialisation trends are causing concern about the underlying strength of this present system to generate future returns. Despite their promise, the volume of High-Potential Start-Ups (HPSUs) from the research system has plateaued. Enterprise Ireland data show that between 2013 and 2023, the number of research-based HPSUs annually ranged between 10 and 15 —only reaching 15 briefly in 2016, 2017, and 2018. Deepening this trend, Enterprise Ireland recently (7 May 2025) reported 13 HPSUs from research activity in 2024; against an *Impact 2030* target of 30 annually by 2030.

New patent filings by the higher education institutions have nearly halved in the 2019-23 period. As noted by Enterprise Ireland in its 2023 Annual Knowledge Transfer Survey (published August 2024), patent filings are “*particularly important for deeptech innovations, hardware and sectors with long product cycles where patent life is key to enabling return on investment. Patent filings are a key contributor to global innovation rankings*”.

The result is a growing mismatch between national expectations and the system’s capacity to deliver. Without renewed, targeted investment, Ireland will be unable to fully unlock the capability that exists within its research ecosystem. This makes clear the case for action. Strategic investment in research infrastructure is essential to unlock discovery, develop talent, support enterprise collaboration, and build a more resilient research system.

3.3 Strategic Opportunities for Ireland

Targeted investment in research infrastructure offers Ireland a transformative opportunity to convert its research excellence, talent, and ambition into practical, scalable solutions for the country's most pressing strategic economic and societal goals:

- Accelerating the green transition would bring Ireland enhanced energy security and climate resilience.
- Advancing health innovation would strengthen Ireland's position in the life sciences, including in advanced manufacturing and high-value research and development.
- Driving progress in AI and digital technologies would enable Ireland to build on its strong tech sector, support SME digital transformation, and enhance the efficiency and impact of public services.
- With a sizeable presence in advanced manufacturing and R&D, Ireland is strongly positioned to play a pivotal role in the development of semiconductor technologies and to reap the benefits from increased R&I in this area in the future. Given the cross-sectoral impact that semiconductors have, it is critical that Ireland capitalises on its underlying strengths in this sector to derive maximum benefit

Fit-for-purpose infrastructure is urgently required in order to allow Ireland to maintain pace with comparator countries and ensure that the outcomes of our researchers can be impactful for society and the economy.

Driving the Green Transition and Climate Resilience

Ireland has committed to reaching net-zero emissions by 2050 and must rapidly scale its capacity to decarbonise transport, energy, industry, and agriculture. Research infrastructure is essential to this effort — supporting innovations in battery technologies, hydrogen fuels, sustainable farming, environmental monitoring, and climate modelling. Shared national platforms — such as high-resolution observatories or energy storage testbeds — will underpin the scientific and technological advances needed to meet Ireland's climate goals, strengthen adaptation strategies, and secure EU funding through programmes like Horizon Europe and the Green Deal.

Advancing Health and Life Sciences

Ireland's ambition to be a leader in personalised medicine, genomics, and next-generation therapeutics depends on access to cutting-edge biomedical infrastructure. Investments in shared platforms such as cryo-electron microscopy, clinical trial centres, and biomanufacturing facilities will accelerate translational research, enable participation in international health consortia, and enhance patient outcomes. Infrastructure also supports the development of diagnostics and treatments for cancer, rare diseases, mental health, and pandemic preparedness — aligning with national health priorities and positioning Ireland as a global partner in life sciences innovation.

Enabling Digital and AI Leadership

Ireland is well placed to lead in areas such as artificial intelligence, quantum computing, and digital transformation — but infrastructure gaps remain a limiting factor. National investments in secure, high-performance computing, large-scale data repositories, and AI training environments will ensure researchers and enterprises have the tools needed to lead in a rapidly evolving global digital economy. This includes capacity for ethical AI research, secure data-sharing, and cross-sector applications — from personalised healthcare to smart cities and next-generation manufacturing.

Seizing opportunities to develop Ireland's semiconductor industry

Semiconductor chips are the backbone of digital technologies and play a foundational role in the global economy, driving innovation, productivity, and economic growth. They power devices ranging from smartphones and laptops to servers and data centres, enabling communication, computation, and the storage of vast amounts of data.

With advanced manufacturing facilities, strong R&D capacity, a skilled workforce, and proven expertise in building state-of-the-art fabs, Ireland is well-placed to expand its role in the semiconductor industry, both regionally and globally. These strengths not only attract continued foreign investment but also contribute to the resilience and growth of the European semiconductor ecosystem.

To stay competitive and achieve economic gains, investing in semiconductors is essential. Focusing on R&I will ensure we remain leaders in this fast-paced technology sector. The aim of the Government's Silicon Island strategy is to establish Ireland as a leading jurisdiction of global research and innovation across the semiconductor value chain.

Supporting Cultural and Creative Innovation

Research infrastructure is not limited to labs and servers. In the creative and cultural sectors — which contribute over €5bn annually to Ireland's economy — dedicated spaces for performance, digital production, preservation, and public engagement are essential. Infrastructure investment in this area supports Ireland's global cultural leadership, strengthens the creative industries, and drives cross-sector innovation in immersive media, design, and storytelling. It also enriches community life and ensures the cultural sector is equipped to evolve in a digital-first world.

Promoting Regional and All-Island Development

Shared infrastructure can be a powerful tool for balanced regional development. Strategically located facilities enable institutions across Ireland to participate fully in high-value research. Infrastructure also supports all-island collaboration, creating opportunities for cross-border research partnerships in areas such as health, energy, and digital technologies. Investing in distributed, accessible platforms enhances research equity and strengthens Ireland's collective innovation capacity.

Appendix A outlines a set of illustrative case studies that demonstrate the type and scale of infrastructure required to support a high-performing national research system. These examples are indicative only and are not presented as individual proposals, but rather to highlight the strategic impact that targeted, collaborative investment can achieve.

3.4 Risks of Inaction: Strategic and Economic Consequences

The cost of not investing in research infrastructure is not merely the absence of new capability — it is the erosion of Ireland’s long-term competitiveness, resilience, and global standing. Without targeted, sustained investment, Ireland faces escalating risks across five interlinked dimensions:

(a) Talent Drain and Workforce Gaps

Modern infrastructure is essential to attract, train, and retain world-class researchers, engineers, clinicians, and creative practitioners. Without access to up-to-date equipment and collaborative research environments, Ireland will struggle to recruit and keep the talent needed to drive innovation — particularly in competitive fields like AI, health, energy, and digital technologies. Graduate researchers and early-career academics are already seeking better-resourced systems abroad, weakening Ireland’s long-term pipeline of skilled innovators.

The present infrastructure stock, is therefore posing clear risks to Ireland’s productivity, competitiveness and growth. The age and currency of the equipment that students and researchers have to use is logically diminishing their work-readiness and attractiveness to employers. PhD students commonly encounter project delays because of equipment breakdowns, therefore hampering their move into industry. At the other end of the research career spectrum, out-of-date research equipment reduces Ireland’s attractiveness to world-class researchers. In addition, because of the age of the equipment still in use, it is less energy-efficient than up-to-date equipment, thereby hampering achievement of the climate action goals of the higher education system.

(b) Missed Economic and Enterprise Opportunities

Ireland’s enterprise strategy depends heavily on the translation of research into innovation. However, the absence of state-of-the-art infrastructure limits the ability of researchers and businesses — particularly SMEs — to prototype, validate, and scale new technologies. It reduces the capacity for public-private collaboration and hampers the pathway to commercialisation, investment, and job creation. Emerging sectors in energy storage, biopharma, AI and the creative industries will be forced to seek solutions elsewhere.

This constraint is clearly visible in the stagnation of High Potential Start-Ups (HPSUs) emerging from the public research system despite their importance to the commercialisation and innovation agenda, benefiting from strong intellectual property foundations, embedded access to expertise, and an innovation pipeline driven by curiosity-led discovery. The HPSU research spin-out pipeline is not meeting either expectations or targets. *Impact 2030* set a 2030 target of 30 against a 2021 baseline of 15 such spin-outs per annum. Indeed, Enterprise Ireland data show that between 2013 and 2023, research-based HPSU creation has held steady at just 10 to 15 per year — underscoring how far current performance falls short of the target and how little the trend has shifted in over a decade.

Without significant new investment in research infrastructure — the very foundation that supports discovery, experimentation, and early-stage development — this number is unlikely to rise. It raises a fundamental challenge to the ambition set out in *Impact 2030*. That goal cannot be met by policy changes or programme supports alone. It requires renewed investment in the public research system's capacity to generate the kind of deep, novel knowledge that gives these start-ups their competitive edge. As Enterprise Ireland's 2025-29 Strategy highlights, "*Innovative, ambitious start-ups are the bedrock of the Irish economy and will form the foundations of future enterprise success*".

Investment in research infrastructure would also improve Ireland's reputation as a place where excellent research is undertaken and valued. This could leverage further business investment in R&I by SMEs and further Ireland's attractiveness internationally for FDI.

(c) Declining International Competitiveness

As other countries scale up public investment in research infrastructure, Ireland's relative position is weakening. Without the tools required for high-impact research, Ireland's participation in major international consortia — including Horizon Europe — will be marginalised. Our ability to lead proposals, host collaborative projects, and leverage international funding is diminished when core capabilities are outdated or missing.

(d) Strategic Vulnerability in Key National Priorities

From pandemic response and climate resilience to digital transformation and food security, modern research infrastructure is the foundation for evidence-based decision-making and rapid response. Without it, Ireland is more vulnerable to external shocks and less able to shape — or even respond to — future challenges. National sovereignty in strategic areas such as clean energy, cybersecurity, and biomedical innovation is directly tied to domestic research capacity.

(e) Widening the Infrastructure Gap

The longer investment is delayed, the steeper the climb becomes. Infrastructure that is already ageing will fall further behind global standards. The cost of catching up — both financially and reputationally — will grow exponentially. Underinvestment today will compound tomorrow's deficits, making it more difficult to scale future research and innovation efforts.

3.5 Positioning Ireland to Become a Global R&I Leader

Ireland's international reputation for research excellence has grown steadily over the past two decades — but that position is increasingly at risk without a coordinated national strategy or roadmap for research infrastructure, as is the norm in other countries. In the global competition for talent, investment, and influence, modern infrastructure is a critical differentiator. Countries that provide cutting-edge facilities not only attract world-class researchers and industry partners but are also better positioned to lead and shape major international collaborations. Ireland's ability to fully participate in programmes like Horizon Europe depends on having the infrastructure to match its scientific ambition. Without it, researchers are excluded from high-impact consortia, and domestic institutions lose ground in the race for global funding and recognition. Conversely, a strategic, well-funded approach to infrastructure would strengthen Ireland's appeal as a location for frontier R&I —

enabling it to compete with leading systems, drive EU-level influence, and secure its position as a global innovation hub.

3.6 Building a More Resilient and Responsive Research System

A modern research system must do more than generate knowledge — it must respond quickly to emerging challenges, enable agile collaboration across disciplines and sectors, and support national preparedness in an increasingly volatile global environment. Research infrastructure is the foundation of this agility. It allows Ireland’s universities and research centres to pivot in times of crisis — as seen during COVID-19, when access to diagnostic tools, clinical research equipment, and data platforms determined the speed and scale of national response.

Strategic investment in shared, interoperable infrastructure enhances Ireland’s capacity to respond to future shocks — whether in public health, energy systems, food security, or digital resilience. It enables interdisciplinary collaboration by giving researchers from different fields access to common tools and shared platforms. It also reduces duplication, increases system efficiency, and strengthens the national ability to absorb and apply international research quickly.

Without this capability, Ireland risks a brittle research system — one that is excellent in places but uneven and slow to adapt when confronted with urgent societal needs. A coordinated infrastructure strategy will ensure Ireland’s research system is not only globally competitive, but nationally responsive, resilient, and fit for an uncertain future.

4. Proposed Future Strategic Approach

4.1 Overarching Intent

The overarching intent of this proposal is to demonstrate that Ireland’s publicly funded R&I system is a vital enabler of the country’s long-term economic, social, and environmental ambitions — from building a competitive, knowledge-driven economy to addressing urgent challenges in health, climate, digitalisation, and societal wellbeing.

A considerable momentum and impact was achieved under the previous programme of PRTL investment. A decisive shift is again urgently needed in Ireland’s R&I system to drive innovation by accelerating the research commercialisation performance of the higher education institutions, including new spin-out companies from the public research system that are inherently strong in the development of technology and its delivery to market. Equally, SMEs need to deepen their engagement with the public R&I ecosystem in order to increase their innovation performance and their productivity.

Strategic investment in public research infrastructure will provide the platform upon research can deliver innovation impact, through the creation of new high-potential spin-outs and impactful collaboration between existing companies across the country with the higher education system. It is the essential scaffolding of the national R&I system — it enables knowledge generation, supports industry partnerships, attracts international funding, and equips future-ready talent.

This proposal puts forward a strategic, coordinated approach to renewing and strengthening that infrastructure, ensuring that Ireland has the capacity, agility, and resilience to meet the demands of a rapidly evolving global landscape. It is a case for investment not only in facilities and equipment, but in the national capability required to deliver impact at scale — for the benefit of the economy, society, and future generations.

In doing so, we will ensure that Ireland’s publicly funded research system is equipped to:

- Develop and retain high-level talent by providing the advanced facilities required to train PhD researchers, postdoctoral fellows, and graduates with the skills demanded by Ireland’s high-tech, knowledge-intensive economy — supporting both foreign-owned and indigenous enterprise.
- Deliver internationally competitive research of the quality, scale, and relevance needed to:
 - Strengthen the innovation capacity of enterprise, giving companies based in Ireland a clear advantage;
 - Underpin Ireland’s competitiveness in strategically important sectors, and activities, and
 - Enable Irish research teams to participate effectively in international R&I funding programmes, including Horizon Europe, thereby increasing the drawdown of non-Exchequer funding.
- Ensure value-for-money through strategic investment in shared infrastructure that is properly resourced — not only in terms of equipment, but also through adequate provision for technical staff, maintenance, and lifecycle management.
- Advance environmental sustainability by supporting the replacement of outdated, energy-intensive infrastructure with modern, energy-efficient equipment — reducing the environmental footprint of research while aligning with national and institutional climate targets.
- Support regional and inclusive growth by enabling access to cutting-edge infrastructure across institutions and geographies, strengthening Ireland’s innovation system as a whole and promoting balanced national development.

4.2 Outline of Proposed Approach

Critically from a wider National Development Plan (NDP) perspective, while R&I funding is technically classified as capital expenditure, the investment lines below do not involve construction so they will not be impacted by construction sector constraints, including labour availability or planning delays.

The Programme for Government includes a commitment to “*Examine a new funding stream for bricks and mortar facilities e.g. laboratories and libraries along the lines of the former Programme for Research in Third-Level Institutions*”. In responding to this, the Working Group’s deliberations have identified a priority need not for new buildings, but for modern, high-quality research equipment — appropriately housed and supported — including the necessary technical staffing and maintenance to ensure functionality, longevity, and impact across a number of levels:

1. **Shared Advanced Infrastructures**, i.e. more sophisticated equipment that is appropriately shared across a number of institutions and the broader ecosystem,
2. **Local Institutional Infrastructure**, i.e. standard equipment within a higher education institution that is used regularly for both teaching and research purposes,

3. **Strategic National Infrastructures**, i.e. a small number of systemically important infrastructures.

This investment is integrally linked to the investments in research talent that are made through Research Ireland's suite of associated programmes, in addition to the critical core grant investment by the HEA, as well as relevant programmes of the agencies of several other Government Departments. Further investment in research talent is encompassed in this Department's submission to the NDP review currently underway.

4.3 Pillar 1: Shared Advanced Infrastructures

This Pillar addresses the need for higher-cost, high-performance equipment — often exceeding €500,000 in value or comprising integrated suites of equipment — that supports specialised research activities within disciplines, and often enabling inter-disciplinary research activity. Unlike standard laboratory instruments, these are typically not in daily use within a single institution and are therefore best delivered through coordinated, multi-user access models. This infrastructure underpins national capacity in areas such as energy storage, 3D bioprinting, advanced materials discovery, and next-generation imaging.

In recent years, the Research Infrastructure Programme operated by Research Ireland (and through its predecessor SFI) provided some support for these assets. However, a more strategic and system-wide investment model is required. Experience from the PRTL era shows that institution-led proposals aligned with research priorities deliver more coherent, impactful infrastructure outcomes than fragmented, PI-led bidding processes. Strategic planning at institutional level ensures that investment reflects long-term institutional research goals, facilitates collaboration, and enables broader access — including by researchers from other institutions and enterprise partners.

For example, the Leica SP8 STED super-resolution microscope (€1m capital cost), installed in 2015, has been central to advanced life sciences research. Used by more than 120 researchers and supporting 600 hours of activity annually, it has also served external institutions and industry users. However, the system is now reaching the end of its operational life. Imaging requirements have advanced rapidly, and the existing equipment can no longer deliver the resolution, speed, or dimensionality required. Maintenance challenges are increasing, and software limitations are creating barriers to data analysis and integration with emerging technologies.

Strategic investment in this type of advanced equipment — driven by institutional research priorities and supported by shared access models — is essential to maintain Ireland's global competitiveness in high-value research domains.

4.4 Pillar 2: Local Institutional Infrastructure

This category refers to essential equipment embedded within laboratories and research spaces across individual higher education institutions. It is core to the delivery of both high-quality teaching and impactful research, playing a foundational role in the education of high-level skilled graduates and the

day-to-day functioning of Ireland's R&I system, including the central dynamic of industry-academic collaboration.

For example, a single nuclear magnetic resonance (NMR) spectrophotometer in one university underpinned high-impact research across disciplines such as materials science, synthetic chemistry, and chemical biology. As the equipment aged, its reliability declined, maintenance costs increased, and it no longer met international standards. Targeted investment through the HEA enabled its replacement and upgrade — ensuring continuity of critical research in areas including rare diseases, drug formulation, environmental sustainability, and advanced materials.

Because this equipment is in regular use by researchers and students alike — often integrated into research workflows and doctoral training — it must be located where research and teaching take place. Shared use across institutions is typically not feasible. The quality and relevance of a doctoral candidate's training — particularly for the vast majority who pursue careers outside academia — depend on access to up-to-date equipment and the development of industry-relevant skills.

It is also important to highlight that PhD programmes are not exclusively producing doctoral graduates; rather they are instrumental to the research activity and outputs of the higher education institutions. Ensuring continuity of access to modern, fit-for-purpose infrastructure is therefore essential to both talent development and research excellence.

4.5 Pillar 3: Strategic National Infrastructures

A small number of strategic national research infrastructures will be critical systemic components of Ireland's future competitive advantage. The underpinning digital research infrastructure in the higher education sector is fundamental to the performance and wider impact of all research disciplines and the plans below regarding its High-Performance Computing (HPC) capability and the Irish Research electronic Library (IREL) speak to this. These plans are set against a growing and evolving international context in which AI and digitalisation are recognised as systemically important to multiple sectors, policy agendas and technological opportunities.

There are a small number of other strategic national research infrastructures that will be key to Ireland's future competitiveness and the initiatives in Section 4.5.3 below provide an indicative, rather than exhaustive, picture of these. DFHERIS is engaging with other Departments on this shared strategic agenda and will bring plans forward collaboratively in this regard over the coming period. These will have regard, for example, Silicon Island, Ireland's recently published national semiconductor strategy, Powering Prosperity for offshore wind energy and the forthcoming national lifesciences strategy as noted in the Programme for Government, as well as the key growth areas outlined in IDA Ireland's and Enterprise Ireland's recently published 2025-29 strategies. They will also be informed by DFHERIS' review of Ireland's membership of international research organisations and facilities.

4.5.1 High-Performance Computing

Since 2012, a high-performance computing (HPC) infrastructure has been managed by the University of Galway for use by all researchers across the Irish higher education sector. It has also been available for use by industry and public sector bodies, for example, Met Eireann. This is an essential underpinning infrastructure for research activity across all higher education institutions and research disciplines. However, that infrastructure reached its end-of-life in 2023 and an interim service has been operating since.

A strategic investment in HPC is now required to ensure the digital research capacity of the higher education institutions and, therefore, their capacity to support IDA and Enterprise Ireland client companies and, ultimately, Ireland's competitiveness and productivity. DFHERIS is currently undertaking a strategic review to ensure that investment in this infrastructure is appropriate to industry and public sector, as well as academic, needs.

4.5.2 Irish Research eLibrary

IReL, the Irish Research eLibrary, is the national electronic higher education research library and is a vital underpinning digital infrastructure across all research disciplines. Managed out of Maynooth University as a shared service on behalf of the higher education sector, it provides researchers in Ireland with access to extensive research databases and open access agreements. Its resources are available to all students and staff in the institutions, opening the door for all into global research developments.

In 2023, IReL recorded nearly 25 million uses of its licensed resources, the highest in its 20-year history. In addition to enabling those across the Irish higher education sector to tap into international expertise to order to maximise the quality and relevance of research being undertaken in Ireland, open access is a requirement for Ireland's continued successful participation in Horizon Europe, the EU's €95bn R&I funding programme. By December 2024, Irish researchers won €836m in non-Exchequer funding under the Horizon Europe programme.

IReL has been funded to date through a mix of sources as (and if) they become available each year. A dedicated funding line is required in order to place this essential digital infrastructure on a stable footing.

4.5.3 Other Strategic National Infrastructures

National Cyber Security Research Centre of Excellence

The Programme for Government 2025 includes a commitment to *“establish a Cyber Security Centre of Excellence around a cluster of Third Level Education facilities and related industry”*. The National Cyber Security Centre (NCSC) has scoped this out as one of its key pillars in Ireland's national cyber security capacity development. Its plans align with the European Cybersecurity Competence Centre (ECCC)'s Strategic Agenda (the NCSC is Ireland's national node for the ECCC). The purpose of the Cyber Security Research Centre of Excellence is to drive cutting-edge cybersecurity research in Ireland, nurture emerging talent and accelerate innovation to address national challenges. It will be co-located in an

existing higher education institution and it will provide a focal point for the research community across Ireland to work together on this agenda. The NCSC has engaged with DFHERIS in driving this forward collaboratively, leveraging existing capability in the higher education system and tapping into international best practice in this space.

Digital Health

DFHERIS is engaging with the Department of Health to scope out and progress collaboratively the particular digital research infrastructure requirements of health research. These are strongly grounded in European developments: the European Health Data Space (EHDS) is a cornerstone of European health policy and foundation for digital health advancements in Ireland. It, first and foremost, will provide citizens with access to electronic personal health data and, secondly, it will enable invaluable secure access to European-wide data for health research purposes. The EHDS Regulation, which came into force at the end of March 2025, mandates Member States to make specified health data available for research (amongst other secondary use purposes) by March 2031. In order to achieve this, the Department of Health is working on developing the necessary technical tools, including secure processing environments.

The Department of Health is also supporting the digital and research infrastructure developments that underpins innovative clinical studies and health research, particularly regarding ongoing work to enhance the clinical trials landscape in Ireland and implementing the National Strategy for Accelerating Genomics and Genetic Medicine, both of which will be key in supporting the forthcoming national Life Sciences Strategy.

Building on Department of Health priorities to advance health research in Ireland and DFHERIS' focus on the priority research infrastructural requirements of the higher education sector, the two Departments are now commencing work to identify infrastructural and other requirements that will optimise the higher education-healthcare research nexus in Ireland.

Note: DFHERIS is also progressing a separate research infrastructural capital investment proposal that is reflected in its submission to the National Development Plan review but does not form part of the deliberations of this Working Group.

4.6 Arts, Humanities and Social Sciences

Research infrastructure in the Arts, Humanities and Social Sciences (AHSS) extends beyond traditional laboratory equipment to encompass a broad range of physical, digital, and institutional resources. These include digitised archives, large-scale data repositories, shared research platforms, specialised laboratory facilities (such as psychology and archaeology labs), and advanced digital tools.

AHSS research infrastructure requirements predominantly fall under Pillar 1: Shared Advanced Infrastructures. While some local institutional equipment is required, as it is in STEM disciplines, the relatively most significant AHSS infrastructure are typically larger in scope and, as noted above, are typically most impactful when appropriately shared across multiple institutions.

While there are clear strengths across the AHSS sector, including leadership in open science, the curation of significant cultural collections, and the previous (PRTLTI-supported) development of interdisciplinary research centres, persistent infrastructure gaps risk constraining AHSS contributions to major national and global challenges. Chronic underinvestment, fragmentation of digital and physical resources, and insufficient technical and administrative staffing, remain recurring barriers.

Given the long-standing lack of targeted infrastructure investment for AHSS, there is now a strategic imperative to address core gaps and to modernise the digital, physical, and collaborative research environments that underpin AHSS excellence and impact. Priority needs identified across the AHSS community include:

- Investment in shared digital infrastructure (such as unified national data repositories and licences for key research software);
- Sustainable funding models for major national collections and longitudinal surveys;
- Improved access to computational resources for researchers at all career stages;
- Improvements to the IReL system and sustained funding for national library and archival resources,
- The negotiation of shared institutional licences for expensive databases and journals.

As noted earlier, Research Ireland's Research Infrastructure Programme has been the main funding instrument for shared advanced infrastructure in Ireland in recent years. Because this programme operated (until the last call in 2023) under the legal remit of its predecessor organisation, Science Foundation Ireland, AHSS disciplines were not eligible for support.

Under Research Ireland's remit, any future funding calls under its research infrastructure programme will be open to all research disciplines. It will be critical that these calls explicitly recognise the distinctive infrastructure requirements of AHSS and are designed to accommodate them, thereby ensuring that AHSS researchers can compete on an equitable basis for vital advanced infrastructure funding for the first time since the last PRTLTI funding call, over 15 years ago. The establishment of Research Ireland and the widening of eligibility for its infrastructure programme, alongside the experience and role of the HEA as a key funder of previous large-scale AHSS infrastructure initiatives such as PRTLTI, present a landmark opportunity for the AHSS research base in Ireland.

Addressing the above needs will unlock the full contribution of AHSS disciplines to issues of vital national importance, including cultural heritage preservation, social innovation, public policy development, and societal resilience. The availability of financial support, for the first time since PRTLTI, for Shared Advanced Infrastructure in AHSS will also enable a central role for the community in catalysing critical interdisciplinary research activity in Ireland.

5. Implementation

5.1 Investment Principles

In order to achieve the overarching intent of this proposal, the following investment principles will apply:

- ***Institution-Led Proposals:*** The programme will be institutionally-focused rather than led by individual researchers. This will ensure integration with long-term strategic planning and avoid fragmentation of effort or duplication of capability.
- ***Strategic Alignment:*** All investments must clearly align with the host institution's strategic research priorities and demonstrate their contribution to wider national objectives, including those articulated in *Impact 2030* and the National Development Plan.
- ***Institutional Capability and Readiness:*** Proposals must demonstrate the institution's capacity to manage, maintain, and maximise the performance of the infrastructure, including evidence of robust governance and monitoring structures.
- ***Excellence-based and Impact-Driven Investment:*** Infrastructure proposals will be assessed on their potential to deliver national impact — including the development of highly skilled graduates, facilitation of enterprise collaboration, and the capacity to attract international research funding and to attract / retain talent.
- ***Collaborative Potential*** (for Shared Infrastructures): Where infrastructure is designed to serve as a shared resource, proposals must demonstrate strong potential for inter-institutional, interdisciplinary, or industry-academic collaboration — ensuring optimal return on public investment and enhancing Ireland's research competitiveness.
- ***Shared Access and Sustainability:*** Where appropriate, funded infrastructure must incorporate structured access for other institutions and external partners including, but not limited to, industry. Proposals must also include robust sustainability planning — including maintenance, technical staffing, and lifecycle management — which will be considered eligible costs and core to the assessment process.

5.2 Funding Conditions

In line with international and national good practice, mandatory funding conditions for all awards made under this programme across all levels will include:

- Maximum utilisation of the infrastructure funded in order to drive value-for-money, having regard to:
 - Intra-institutional usage of local equipment for both teaching and research purposes,
 - Inter-institutional usage of shared equipment,
 - A small level of international access, in keeping with Irish access to similar resources overseas,
 - Industry access, within the parameters of State Aid rules.

- And having particular regard to advanced equipment:
 - A publicly available access charge plan and a clear access point for external users,
 - A comprehensive data management plan.
- All advanced equipment registered and maintained on a central national database in order to maximise access and utilisation.
- Appropriate maintenance and technical support in order to ensure maximum lifespan and utilisation of the infrastructure funded.
- Minimisation of environmental impact, for example, in terms of energy efficiency and renewable energy deployment.
- Clear monitoring and reporting procedures on the part of both the host institution and the funding agency.

5.3 Key Implementation Features

Flowing from the principles and conditions above, implementation of this programme of investment will contain a number of key features:

- ***Institutional applications*** will be grounded in institutional research strategies, having regard to the performance agreements reached with the HEA under the Higher Education System Performance 2023-28 and wider national strategies, as well as cognisance of the international environment including, but not limited to, global R&I developments and trends.
- ***Inter-institutional partnerships*** will be an essential condition of applying for and hosting Shared Advanced Infrastructures. This will include strategic collaborations between traditional universities and Technological Universities in order to maximise the utilisation and regional footprint of these infrastructures and to leverage them for increased research performance – public and private – across the regions.
- ***Evaluation of proposals*** will include assessment of the institution’s track record, not only in research performance, but also in innovation impact and in evidence of institutional delivery of value-for-money in its utilisation of Exchequer monies. Consideration will be given to the particular stage of R&I strategic capability development of the Technological Universities.
- ***Maintenance support***: in addition to purchase of the equipment itself, in line with international good practice and in order to maximise the lifespan and utilisation of the infrastructure, an appropriate level of maintenance support will be included in the institutional award.
- ***Technical staffing***: for the same reasons, the institutional award will include a contribution to the technical staffing needed for these infrastructures, having particular regard to Shared Advanced Infrastructures. These staff are crucial for the reliable operation of these infrastructures and, critically, for ensuring that external users, such as SMEs, are helped to use them to maximum effect in their own technology development strategies.

- **Register of Shared Advanced Infrastructures:** a central portal will be developed, actively managed and promoted, so that the funded infrastructures are fully accessible to other higher education institutions and industry, especially SMEs, across the country. UKRI's Infraportal provides a good exemplar of this aspect of an infrastructure programme's implementation.
- **Monitoring of infrastructural utilisation and impact:** each funded institution will put in place robust and transparent procedures to monitor:
 - **Intra-institutional usage**, having regard to its usage for teaching undergraduate students, research students, training researchers, and for undertaking research activities and projects.
 - **Inter-institutional usage**, having regard to the ongoing collaboration expected with institutional partners, levels of usage across traditional and technological universities, and all-island opportunities.
 - **Industry access and utilisation**, including reporting on how the facilities are promoted to industry, how their use of them are helped by the technician staffing support provided under this programme, and types of industry users in terms of both ownership and scale.
 - **Impact on achievement of institutional strategic priorities**, for example, PhD graduates trained, industry collaborations made possible, non-Exchequer and international funding secured.
- **Funder oversight and performance monitoring:** post-award, the funder will monitor and manage:
 - **Value-for-money** achieved by institutions,
 - Ongoing alignment and contribution of funded infrastructures to **institutional strategy implementation** and sectoral contribution to national policy objectives and international competitiveness,
 - The **central portal** referenced above for all Shared Advanced Infrastructures,
 - Consistency across institutions in **good practices** having regard, for instance, to:
 - Internal and external accessibility of the infrastructures,
 - Environmental considerations,
 - Approaches to maintenance and technical staffing arrangements,
 - Open Research and consistency of data management practices.
- **Inter-Departmental coordination**, having particular regard to Pillar 3 and prioritisation of national strategic opportunities, will be continued and strengthened in order to maximise cross-Departmental synergies and minimise any potentially inadvertently duplicative activities.

Appendix A: Illustrative Examples of Shared Advanced Infrastructures

Critical shared infrastructures are high-performance, often cross-disciplinary research environments embedded in or between higher education institutions. They combine advanced equipment, expert technical staff, and structured access models to support high-quality, reproducible research. Designed to serve as national platforms, these facilities enable collaboration across institutions, regions, and sectors — strengthening Ireland’s R&I ecosystem while delivering return on investment through skills, partnerships, and innovation.

This appendix presents a series of illustrative examples of shared infrastructures grouped into four strategic themes:

- i. **Health & Biomedicine**
- ii. **Climate, Environment, Energy & Agri-Tech Innovation**
- iii. **Advanced Technologies & Digital Innovation**
- iv. **Creative & Cultural Infrastructure**

Together, these examples illustrate how such shared infrastructures can:

- Deliver on national priorities including *Impact 2030*, the *National Development Plan*, and strategies for health, digital, climate, semiconductors, offshore wind, the creative economy and the enterprise agency strategies.
- Support balanced regional development through distributed infrastructures and inter-institutional, as well as intersectoral, access.
- Enable cross-sector partnerships linking higher education, enterprise, healthcare, and Government.
- Provide hands-on training for the next generation of researchers, innovators, and technical staff.
- Unlock access to international funding, collaborative research networks, and global scientific leadership.

i. Health & Biomedicine

Structural Biology: National Cryo-Electron Microscopy (Cryo-EM) Capability

Cryo-EM is transforming biomedical research and drug discovery—but Ireland lacks a national-scale facility. Investing in this Nobel Prize-winning technology will enable near-atomic resolution of biological structures, accelerate health innovation, support pandemic preparedness, and train the next generation of scientists in a globally competitive field.

Advancing Biopharma and Food Systems: A Cross-Sector Hub for 3D Bioprinting and Bioanalytics

To sustain global leadership in pharma and unlock innovation in sustainable food, Ireland needs to invest in cross-cutting infrastructure for biopharma and bioprinting. Such a shared infrastructure would drive new therapeutics, scalable bio-manufacturing, and next-gen protein research, while boosting strategic autonomy in health and agri-tech.

Accelerating Biomedical Discovery: A National Germ-Free Animal Model Facility

Ireland’s leadership in immunology and in microbiome research is constrained by the absence of germ-free animal infrastructure. A national facility would support research in immunology, mental health,

ageing, and personalised nutrition—enabling EU leadership, commercialisation, and strategic collaboration across life sciences.

Enabling Clinical and Translational Health Research: A Shared Biomedical Instrumentation Platform

Access to state-of-the-art imaging and cell technologies is essential for Ireland’s ambitions in precision medicine, oncology, neuroscience, and immunology. A coordinated investment in advanced biomedical instruments would accelerate diagnostics, therapies, and clinical trials—while training a skilled biomedical workforce.

ii. Climate, Environment, Energy & Agri-Tech Innovation

Strengthening Climate Resilience: The Earth Cycle Observatory (ECO)

Ireland currently lacks the high-resolution analytical infrastructure needed to understand and manage biogeochemical cycles that underpin soil health, ocean chemistry, and biodiversity. ECO would be a national, multi-scale observatory enabling policy-relevant environmental modelling, EU-aligned climate action, and world-class ecosystem science.

Delivering Real-Time Environmental Intelligence: Infrastructure for Monitoring and Climate Modelling

Ireland faces mounting climate threats but lacks a coordinated, real-time data system to inform policy and preparedness. A shared national platform integrating remote sensing, IoT sensors, and climate models would support evidence-based decisions in public health, land use, agriculture, and disaster response—strengthening resilience across sectors.

Accelerating the Green Transition: National Infrastructure for Advanced Energy Storage

Ireland’s net-zero transition depends on rapid progress in energy storage technologies. A national shared facility for advanced batteries, flow systems, and electrofuels would support discovery, prototyping, and grid integration—linking energy research centres and industry partners across the country. This platform would secure Ireland’s leadership in EU battery consortia, power industrial innovation, and develop the skilled talent required for a green economy. Without it, Ireland risks falling behind global competitors and missing the opportunity to shape the technologies central to energy resilience.

Modernising Animal Health Innovation: Automated Detection for Bovine TB Management

Bovine TB costs Ireland over €90 million annually, yet detection methods remain outdated. A national digital surveillance and analytics infrastructure could transform disease management—reducing transmission, improving farm-level response, and showcasing Ireland as a global leader in smart, sustainable agriculture.

iii. Advanced Technologies & Digital Innovation

Powering Future Technologies: A National Platform for AI-Driven Materials Discovery

Ireland’s innovation pipeline in energy, semiconductors, and medtech depends on faster materials discovery. A shared national platform using robotics, automation, and AI to screen thousands of material combinations daily would revolutionise research efficiency and global competitiveness in this critical field.

Establishing a Digital DataHub for National Research Capacity

Data is the lifeblood of modern science, but Ireland’s research system lacks Tier-2 digital infrastructure for high-performance computing, secure storage, and advanced analytics. A national Digital DataHub would support data-intensive research across health, AI, climate, and the arts—while promoting open science, security, and interdisciplinary collaboration.

iv. Creative & Cultural Infrastructure

Transforming the Creative Economy: A National Creative Arts Centre of Excellence

Ireland’s creative sector lacks purpose-built research infrastructure. A Translational Creative Arts Centre of Excellence would foster artistic R&D, cross-sector innovation, and immersive technologies—linking artists, technologists, and educators. It would be a hub for public engagement, cultural impact, and creative industry growth.

The examples presented in this appendix illustrate the scale of opportunity that targeted investment in shared research infrastructure can unlock — across health, climate, technology, and the creative economy. They are not exhaustive, but rather indicative of the types of national assets needed to underpin a world-class, impact-driven R&I system. A competitively run, strategically aligned funding programme will be essential to identify the most critical infrastructure investments — those that best serve the needs of the research system and deliver the greatest national benefit.

Appendix B: Working Group Membership

Department of Further and Higher Education,
Research, Innovation and Science

William Beausang (Chair)

David Keating

Sandra Urwin-Gowran

Aaron Larkin

Nicki O'Connor

Department of Enterprise, Tourism and
Employment

Dr Céline McHugh

Research Ireland

Dr Ruth Freeman

Peter Brown

Higher Education Authority

Tim Conlon

Caitriona Ryan

Dr Vivienne Patterson

Technological Higher Education Association

Dr Joseph Ryan

Professor Marie Claire Van Hout

Irish Universities Association

Dr Lisa Keating

Ministerial Nominee

Dr Don Thornhill

Ministerial Nominee

Dr Kevin Byrne

Working Group Terms of Reference

Context

Research infrastructure, broadly defined as research equipment and research facilities and laboratory equipment to support teaching and learning, is an essential component of the national research and innovation system.

It equips researchers across all disciplines to undertake their research, to be internationally competitive and to produce new knowledge and innovations for both economic and wider societal impact. It is also critical for training students as well as researchers in research techniques that can then be applied in the private, as well as the public research system.

Research infrastructure comes in many sizes: from that used predominantly within the host institution for both research and teaching purposes, to larger-scale infrastructures that are appropriately shared across a number of research performers which are critical to underpinning Ireland's knowledge economy in strategic sectors, and larger again in terms of Ireland's membership of international research facilities.

Impact 2030, Ireland's national R&I strategy, includes the objective to “advance priority system needs and opportunities through a framework for future research infrastructural investment” (Section 2.4).

The Department of Further and Higher Education, Research, Innovation and Science is now convening a working group for this purpose. As outlined in *Impact 2030*, the framework that will be developed by the Working Group “will be employed if any in-year funding comes available under the renewed NDP. [...] It will ensure that any underspend of NDP funding that is re-allocated to R&I funding can be drawn down effectively and efficiently at short notice according to an agreed schedule of priorities, thereby best meeting needs across the system.” It will also be available in the event of new funding streams becoming available for investment in this area.

Purpose

For the purposes of this review, ‘Research Infrastructure’ is defined as Research Equipment and Laboratory Equipment for teaching and learning.

The Working Group will review:

1. Existing Research Infrastructure in the higher education system in terms of, in particular:-
 - Scale broadly defined in terms of cost,
 - Current condition and projected lifespan,
 - Distribution across higher education institutions,
 - Alignment with priority national needs for which higher education-based Research Infrastructure is critical.

The review should, insofar as is possible, draw on existing data and evidence including aggregate investment over the past ten years for these purposes.

2. Funding models previously or currently in operation (for example, the Programme for Research in Third-Level Institutions (PTRLI), other funding from the Higher Education Authority, Research Ireland programmes) in terms of:-
 - Programme scope,
 - Conditions of funding and eligible expenditure,
 - Provision for Research Infrastructure maintenance, upgrades and staffing required to ensure maximum value-for-money from investments made.
 - Post-award governance and oversight: both funder and institution.
3. Examples of relevant practice internationally for meeting Research Infrastructure needs and lessons for Ireland in this respect.

Key Deliverables

In light of the above Review, the Working Group will:

- Identify and set out **key principles** to a future national approach to research infrastructure.
- Examine the case for a small number of **nationally strategic Research Infrastructures** that will service the needs of the national R&I system and, in doing so, help to maximise its contribution to Ireland's future competitiveness.
- Consider how research **collaborations with industry**, including SMEs, could be strengthened by a programme of investment in Research Infrastructure and how this could drive greater innovation impact.
- Scope specific requirements for **AHSS** Research Infrastructure that will optimise the contribution of AHSS to national research and innovation policy objectives.
- Propose a **methodology** for prioritisation of any future available funding.
- Develop **shared principles** to underpin the effective management of all existing as well as future research infrastructure
- Examine **skills requirements** both in terms of researchers and the technical and maintenance staff that are required to maximise:
 - Utilisation of any new investment in Research Infrastructure,
 - The broader (economic and social benefits) of the relevant research area and
 - Value-for-money through maximum appropriate lifespan of the Infrastructure.
- Present the foregoing analysis in a Draft Roadmap for Strengthening Ireland's Research Infrastructure.

Ways of Working

- The Working Group will be chaired by the Assistant Secretary responsible for R&I in the Department of Further and Higher Education, Research, Innovation and Science.
- Members will include:
 - The Higher Education Authority;
 - Research Ireland;
 - Department of Enterprise, Tourism and Employment;
 - Relevant State Agencies (as required)
- Subject-matter experts and or key stakeholders (including industry representatives) may be invited to attend the group or present on specific topics as agreed by the Working Group.

Deliverable

A first report of the Group will be finalised by April 2025 to inform the expected forthcoming review of the National Development Plan.