Rialtas na hÉireann
Government of Ireland

National Research and Innovation Strategy 2021-27

Consultation Paper

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Introduction: An ambitious new research and innovation strategy for a period of major transformation

The development of a new national strategy for research and innovation (R&I) is a key commitment in the Government's Economic Recovery Plan 2021, which sets out the "dual ambition of placing research, development and innovation at the heart of addressing Ireland's economic and societal challenges, and building capacity and capability across the research and innovation system to move R&I up the value chain."

The Department of Further and Higher Education, Research, Innovation and Science will lead the development of this new national strategy, in consultation with key Government Departments, agencies and stakeholders. This new Department has been established with a clear mandate to work with all stakeholders to strengthen Ireland's R&I ecosystem, drive reform and collaboration, and enhance outcomes which contribute to meeting societal, economic and global challenges.

The Taoiseach has recently stated that "a deep knowledge-base and a commitment to expanding knowledge is essential if Ireland is to thrive in a world which is constantly throwing up new challenges"[1]. There has been a seismic shift in the challenges and opportunities faced by the Irish economy and society, as a result of the COVID-19 pandemic. This is a shift that is also impacting at a European and global level. The experience of COVID-19 has heightened public awareness of the importance of R&I in responding to the global public health crisis. We now have the opportunity to build on this increased awareness to promote the wider relevance of R&I across other key areas of transformation such as climate change and digitalisation, and develop the right policies to ensure that R&I is at the heart of Ireland's response to these challenges.

This new strategy will aim to be transformative in meeting these challenges. It will identify the reforms necessary to develop an R&I system that has the right capacity and capabilities, and which is supported by coherent policies and structures for

[1] IUA Future of Ireland, An Taoiseach Micheál Martin 27 May 2021, https://www.iua.ie/events/iua-future-of-ireland-webinar-an-taoiseach-micheal-martin-on-the-role-of-third-level-education-and-research-in-the-knowledge-economy-may-27-1200-1245/

national coordination, collaboration and governance across the national R&I landscape.

The public consultation will be critical in informing the Government's strategic approach. The next Strategy will seek to strongly align with key Government, societal and economic priorities, including:

- **Economic recovery and resilience over the coming decade**
- **Sectoral and societal challenges** including climate, digitalisation, health, agriculture, transport
- **Global challenges,** including in the context of the Sustainable Development Goals
- **Government strategies and national policy agendas**, including the Economic Recovery Plan, National Recovery and Resilience Plan, National Development Plan, Climate Action Plan, enterprise and investment strategies, Regional development strategies, the next Smart Specialisation strategy and sectoral research and innovation strategies.

This consultation paper aims to reflect some of the main issues that have emerged in early consultations with key stakeholders. It also reflects the clear intent at EU level that R&I will help our societies recover from the pandemic and prepare Europe for the challenges of the coming decade and beyond.

The strategy will build on the lessons of delivering the previous national strategy, *Innovation 2020*[2]. The overarching vision in *Innovation 2020,* was for Ireland to become a Global Innovation Leader driving a strong sustainable economy and a better society. Within this was a focus on excellence, talent and impact. The Mid-term Review of Innovation 2020[3] found that, while it has been challenging to meet some of the key targets of *Innovation 2020*, much progress has been made and the overall vision of becoming a Global Innovation Leader remains valid. While renewed targets will need to be identified and agreed during the development of the next strategy, the Government's ambition for Ireland to become a Global Innovation Leader has not diminished.

This consultation paper is presented in two parts. The first part examines what should be the strategic direction for our R&I ecosystem over the coming decade

[2] https://enterprise.gov.ie/en/Publications/Publication-files/Innovation-2020.pdf
[3] https://enterprise.gov.ie/en/Publications/Publication-files/Mid-term-Review-of-Innovation-2020.pdf

and what role should it play in responding to major challenges. The second part focuses on how these priorities could be supported and delivered across six core areas of strategic action.

Stakeholders are invited to consider the questions posed in each part and to provide their responses via the online submission tool available at https://dessurveys.education.gov.ie/surveys/researchandinnovationstrategy.

It is the intention that the next Strategy will set ambitious national strategic goals and objectives out to 2027. Action-led Work Programmes will map out specific deliverables over shorter timescales. This will enable agility and responsiveness over the full period of the strategy and a strong focus on delivery and reform.

Part One: A strategic direction for research and innovation which places it at the centre of the national response to major economic, environmental and societal challenges

It is important that our ambition for the role of the R&I system strongly aligns with the national challenges which we will face over the coming decade.

Part one of the consultation paper seeks to gather views from stakeholders on what the strategic direction of the R&I system should be over the coming decade. How can a high performing R&I ecosystem contribute to meeting economic, environmental and societal challenges and support a sustainable jobs market and economy?

The development of higher levels of national R&I capacity is closely related to a wider national strategy for a knowledge-based economy and society. Improved R&I capacity and enterprise-led innovation contributes to longer term economic, social and cultural development through:

- *the creation of a broad knowledge foundation for sustainable wealth generation;*
- *the creation of new knowledge;*
- *Building economic resilience to underpin our economic recovery;*
- *the expansion of human understanding; and*
- *the provision of a stronger source of information for better decision making across the entire span of social, cultural and economic activities.*

The R&I system is a strategic national asset and a critical enabler in advancing national objectives, for instance in strengthening our regions to rebalance uneven growth patterns or addressing climate change and digitalisation. Supporting R&I needs to be framed as serving multiple public missions, responding to both short and long term national priorities. The importance of fundamental and applied research, knowledge transfer, evidence for public policy, commercialisation and enterprise-led innovation are all critical parts of the overall ecosystem.

The following themes are considered in Part One:

1. Role of R&I as a key enabler of transition to a green, digital and sustainable knowledge-based economy and society
2. Importance of R&I for economic recovery and sustainable growth
3. Value of human capital from the research system in meeting high-end skills needs
4. Value of R&I for knowledge
5. Strengthening the role of research for policy
6. Importance of R&I in supporting balanced regional growth, including in the context of driving research performance in the Technological Universities
7. Role of our R&I system in driving connectivity and collaboration on an all-island, EU and global level

Stakeholders are asked to consider how these themes might be articulated in setting the vision and ambition for the next national Strategy and respond to the questions posed. Stakeholders can also propose other thematic areas of importance.

The ambitions set out under each thematic area will inform the targets we will set for the new strategy.

1. The role of Research and innovation as a key enabler of transition to a green, digital and sustainable knowledge-based economy and society

The COVID-19 pandemic has demonstrated the importance of needing to be prepared for challenges, and firmly establishes the role of R&I in responding to these great challenges.

While climate change emerged as a key theme during the earlier consultation phase, public health has come to the fore in the current circumstances and a need for a multidisciplinary response to address public health concerns is evident. There is much to be learned from the experience of the pandemic to support a shift towards a challenge-based and multidisciplinary approach to problem solving. This policy shift is also in evidence at an EU level, both in discussions on the renewal of the European Research Area and in particular with the Mission Boards under

the Horizon Europe Framework Programme. However, designing and implementing challenge-based initiatives can be complex.

Q1.1	How should the next Strategy articulate the role of research and innovation as a key enabler of addressing significant challenges (transition to a green, digital and sustainable, knowledge-based economy)? What impact should research and innovation have on addressing such challenges?

2. Demonstrating the importance of research and innovation for economic recovery and sustainable growth

Ireland's national R&I system is a critical platform upon which much of Ireland's economic and social development is dependent. It attracts higher-value Foreign Direct Investment, supports indigenous enterprise and generates new ideas, technologies, skills, knowledge and solutions which have proven to be transformative to our prosperity and the way we work and live. Ireland's R&I system is now ranked 9th in Europe and even simply maintaining this system in the current climate will present considerable challenges.

The links between public R&I investment and an economic growth mission are well established and evidenced. Many EU and national reports highlight the demonstrable economic returns for public investment in R&I[4], establishing a clear link between investment and productivity gains.

> "Research and Innovation are key drivers of productivity and economic growth as demonstrated by ample empirical evidence. Firms and economies achieve large and significant returns on these investments, which also create new and better jobs. The importance of R&I increases even further as our economies become more knowledge-based and intensive in intangible assets."
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> *- Investing in the European Future we Want, European Commission 2017*

In an uncertain economic and internationally competitive environment, Ireland needs to differentiate itself. Research, innovation and human capital are globally recognised as key economic differentiators and are, a critical feature of enterprise and investment in Ireland. R&I enables us to develop products, services and

[4] European Commission 2017 report https://op.europa.eu/en/publication-detail/-/publication/0635b07f-07bb-11e7-8a35-01aa75ed71a1

solutions that are better, cheaper or more novel than those in global markets. At the same time the pace of innovation development has never been quicker. Enterprises that engage in R&I have been shown to grow more sales and exports and create more jobs than non-R&I active enterprises[5].

Q1.2	How can the Strategy demonstrate the importance of research and innovation across higher education and industry for Ireland's economic recovery and sustainable growth? How can research and innovation be recognised as central to recovery and building resilience when faced with pressing sectoral challenges and financial constraints?

3. The value of human capital from the research and innovation system in meeting high-end skills needs

Postgraduate education delivered by higher education institutions (HEIs) is critical to Ireland's research system. In addition to contributing to knowledge, postgraduate researcher education drives participants to develop their own R&I skills that can be applied in a range of environments, in academia, the public sector or industry, at home or abroad.

Across the world, governments have invested in PhD education as part of a broader strategy to develop knowledge-based economies. The availability and quality of graduates is essential if we are to maintain our attractiveness as a location for investment and grow our reputation. There is also a need for developing entrepreneurial and innovation skills for, and within, enterprise to support commercialisation of R&I. This includes supporting postgraduate and post-doctoral researchers in developing skills which can enable them to transition between academic and industry environments.

[5] Source: Forfás analysis of ABSEI (Annual Business) survey

There are a number of key strategies in place at all levels to ensure we meet existing and future skills demands. These include policies designed to ensure a pipeline of suitably qualified science and technical graduates, and initiatives to equip young people and the working population more generally with the skills and capacity to meet these demands. These strategies and initiatives include: the National Skills Strategy 2025; Technology Skills 2022; Springboard+, the Human Capital Initiative and the skills initiatives launched as part of the National Recovery and Resilience Plan.

Q1.3	How can the Strategy articulate the value of human capital from the research system in meeting high-end skills needs? What should the objective of the next Strategy be in relation to identifying human capital needs from the research system?

4. The value of research for knowledge

The research system plays a critical role in expanding and disseminating knowledge of scientific, cultural and social significance. This will continue to be a crucial mission, which is vital for us all as a vibrant, engaged and sustainable democratic society.

The missions for R&I need to be viewed through both a short and long term lens. An alignment of public missions, public strategy and public investment for R&I to longer-term and more wide-ranging benefits, in addition to meeting shorter-term economic priorities, would mean that the full potential of R&I can be reached.

A strong well-funded base in fundamental research is also essential for any country that wishes to keep producing frontier technologies in rapidly evolving markets. As with all things a balance is critical and while progressive changes are required in order to drive this system to meet its fullest economic potential we must be mindful not to 'tip the scales' too far towards high Technology Readiness Levels (TRL) / close to market activities in line with best practice.

The new Strategy should seek to broaden the funnel for ideas to ensure an appropriate balance between basic and applied/industry-oriented research expenditure in order to keep a strong research base and adequately populated research pipeline.

Q1.4	How do we frame our national policy to ensure that we have a well-balanced system of research to enable Ireland to be at the forefront of global research and innovation?

5. Strengthening the role of research for policy

There is a need to recognise the R&I system as a resource to provide evidence-based research to address key national policy questions. This is an issue which has gained momentum in the last number of years and consideration needs to be given to how this could be best articulated and supported through the national strategy. A recent Royal Irish Academy discussion paper entitled "Research for Public Policy and Society"[6] identified that, in the wake of the COVID-19 pandemic, the need for reliable research, evidence and thinking that can inform public debate and policy has never been greater. The paper noted a system-wide need for a more integrated approach with the objective of harnessing the collective research power and expertise of the sector to make it easier for policymakers to draw on it to support their deliberations.

It is important to maintain a broad base of expertise in the country, which requires funding and opportunities for expertise to engage with policy makers. There is

[6] https://research.ie/assets/uploads/2021/01/M.-Doyle-Research-for-Public-Policy-and-Society.pdf

growing global interest in developing and supporting the architecture of the research ecosystem with the establishment of dedicated structures and systems to deepen relationships between research and public policy.

Q1.5	How should the role of research for policy be supported and positioned in the next Strategy?

6. The importance of research and innovation in supporting balanced regional growth, including in the context of driving research performance in the Technological Universities

Investment in R&I and its development at a regional level is essential to fully expand to meet the potential for growth and value in research and to ensure an even distribution of that value. Project Ireland 2040 recognises the potential for the creation of "knowledge hubs" in regions, envisaging that research will be an enabler for the development and strengthening of our regional cities. Delivering an innovative knowledge economy and balanced regional development are identified as priorities in the national Economic Recovery Plan. This will also be a key goal of Ireland's new Smart Specialisation Strategy, which will aim to help regions focus on their R&I strengths and areas of future opportunity.

Higher education-based research in regions can provide a pipeline of talent for enterprise-based research. In addition to this, higher education research expertise can support firms in developing their R&I. Knowledge Transfer Ireland (KTI) and the Technology Transfer Strengthening Initiative (TTSI) programme will continue to be important drivers and supports for engagement between industry and TUs.

HEIs can provide a physical environment to co-locate technology intensive firms and more nascent researching firms creating the potential for capacity development and spillovers. Furthermore, clustering by companies in regions can help to build the necessary capacity for R&I.

HEIs can also provide a regional gateway to international knowledge creation through their international linkages and collaborations and their capacity to attract international talent. The recent emergence of innovation districts, for example, the Grand Canal Innovation District initiative, demonstrates the potential of more intensive local approaches to accelerate knowledge creation and diffusion.

The potential for synergies between education and industry has also been expanded through the formation of a plethora of enabling structures such as Regional Skills Fora and Skillnet Networks, schemes such as Innovation

Vouchers, Technology Gateways, Springboard+ and the Human Capital Initiative. Industry and education partnerships for research are encouraged by the funding requirements for collaboration by Enterprise Ireland, Science Foundation Ireland, and Horizon Europe.

The creation of Technological Universities (TUs) is a critical component of the new regional higher education infrastructure. A defining strength for TUs will be their development of a strategic focus on deepened, distinctive, internationally recognised and inherently technological research underpinned by robust basic or theoretical research.

TU research 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.

Q1.6	What should the next Strategy's ambitions be in terms of research and innovation as an enabler of balanced regional growth?

7. *The role of our research and innovation system in driving connectivity and collaboration on an all-island, EU and international level*

The importance of strengthening relationships and engagement beyond our national R&I system cannot be underestimated as such relationships have been a key asset in enabling Ireland to take its place among the top performers globally and excel in key areas of R&I.

The next Strategy will need to prioritise our engagement at many levels, including supporting all-island R&I activity, aligning national priorities with European Research Area (ERA) priorities, optimising participation in the Horizon Europe Framework Programme, strengthening the east-west relationship and looking to foster relationships with key global partners.

In particular, increasing all-island research activity is a priority action under the Programme for Government (under its Shared Island mission) and DFHERIS' 2021-2023 Statement of Strategy. The aim is two-fold: firstly, to deepen existing cooperation and, secondly, to develop more cross-border research cooperation between public research performers, enterprise and other stakeholders.

A new framework for European R&I policy is also currently under development. The ERA aims to achieve a single European research area in which researchers, scientific knowledge and technology circulate freely. Member States agree that a renewed commitment is required at national level to reinvigorate the ERA and ensure we maximise the economic and social impact of investment in R&I. In December 2020, Member States adopted the ERA Council Conclusions[7] which set out the agreed priorities of the EU-27 to revitalise the ERA. In January, the Commission established the ERA Forum for Transition to enable it and Member States to work more closely together and help ensure greater commitment to implementing the ERA priorities at national level.

It is important that, as we develop the national R&I strategy, that our national R&I policies reflect and align with the ambitions and policies that are agreed at a European level.

The next Strategy will also need to continue to prioritise Ireland's participation not only in the EU's Framework Programme for Research and Innovation, Horizon Europe, but also our participation in international research organisations.

Q1.7	How should the next Strategy articulate the role of our research and innovation system in driving connectivity and collaboration on an all-island, EU and international level? How should our national priorities draw upon and align with revised European Research Area priorities?

Q1.8	Are there additional strategic priorities not covered in Part One that you wish to address in your submission?

[7] https://data.consilium.europa.eu/doc/document/ST-13567-2020-INIT/en/pdf

Part Two: Delivering on the vision across six areas of strategic action

Part One of this consultation paper considered strategic priorities which will assist in determining the overall vision and ambition for the next Strategy. It is also key that the Strategy and accompanying Work Programmes set out how the vision and ambition will be realised.

In this part of the consultation we are seeking views on what needs to be done in the coming years to build a strong support structure to underpin a world class R&I ecosystem, and have set out six areas of strategic action. We would invite you to provide input and insight on the following areas in the submissions document provided.

1. Use a mission-oriented approach to tackle grand challenges such as climate and digital transitions
2. Ensure research and innovation powers our economic recovery
3. Enhance the talent pipeline at the heart of our RDI system
4. Build a strong research and innovation environment grounded in excellence
5. Make Ireland a regionally rooted and globally connected island of innovation
6. Foster a more collaborative and impactful system

Area 1: Use a mission-oriented approach to tackle grand challenges such as the climate and digital transitions

Internationally, perspectives on the purposes of research are changing and research is increasingly understood as complex and far-reaching. Major global challenges are beginning to alter the ways in which research is framed. These broader challenges create a demand for R&I that is transnational, wide-ranging and interdisciplinary in nature.

The next Strategy will need to identify the key themes and grand challenges for Ireland's R&I system, and focus on incentivising and building collaborative approaches to addressing these issues, for example climate, digital and building resilience.

Ireland's National Recovery and Resilience Plan includes provision for a new €71 million National Grand Challenges Programme. This programme, administered by Science Foundation Ireland on behalf of the Department of Further and Higher Education, Research, Innovation and Science, will see mission-oriented challenges used to incentivise researchers to deliver tangible impact for society in areas such as health, agriculture and climate.

Adopting this mission or grand challenge approach to solving societal challenges supported by a dedicated national R&I fund will help to ensure that we optimise our R&I capabilities to meet current and future challenges.

An issue that arises as we consider a possible shift towards a mission-based oriented approach is the future role of Research Prioritisation (RP) as a basis for research investment in support of enterprise. The RP exercise carried out in 2018 identified a range of areas where Ireland has a competitive advantage and where opportunities would arise, while also reflecting priorities under the UN Sustainable Development Goals. While key economic and societal challenges such as climate and digital fall within RP, there are many other RP areas beyond climate and digital where Ireland has fostered a competitive advantage.

Q2.1	What could the role of a mission-based approach to solving grand challenges be within the national R&I ecosystem? What structures could be used to deliver on this? How do we reconcile a mission-based approach with Research Prioritisation?

Area 2: Ensure research and innovation powers our economic recovery

Make more indigenous SMEs research active

The Business Expenditure on R&D (BERD) survey 2019-20 shows that almost €3.26bn was spent on research and development (R&D) activities by enterprises in Ireland in 2019 which is a welcome 17.5% increase, or €486m since 2017. However, 79% of this increase is attributable to foreign owned enterprises who invested €2,293m in 2019 (an increase of 20% or €382m over 2017). The remaining 21% of the increase is attributable to Irish-owned enterprises who invested €963m (an increase of just 12% or €104m over 2017). This trend of expenditure being concentrated in large, foreign-owned enterprises is in evidence across OECD members.

The overall number of R&D active enterprises in 2019 was 1,799, up slightly from 1,784 in 2017. Of these, 1,322 (73%) were Irish owned, a drop from 1,455 in 2017 and the remaining 477 (27%) were foreign owned, an increase from 329 in 2017.

In order that the State meets its full economic potential enterprises, in particular indigenous enterprises need to be encouraged and supported to fully engage with R&I. The next national R&I Strategy needs to consider how to strengthen and increase the range of supports for enterprises so as to become R&I active or increase their R&I activity levels. Such supports range from financial supports, to advice and training on technology or intellectual property in order to develop innovation management capabilities or to develop new products, processes or services.

A key element of supporting SMEs under the SME and Entrepreneurship Growth Plan[8] is fostering entrepreneurship and start-ups as a means of enhancing Ireland's productivity. As the economy shifts towards a digital and climate neutral future, enabling and encouraging entrepreneurs to identify and exploit new opportunities will be essential for improving value added and longer-term growth.

Grow the research intensive start-up pipeline

A vibrant start-up ecosystem is the cornerstone of any successful economy and in order for Ireland to more effectively harness the innovation system to produce and support nimble, high-tech, internationally differentiated start-up companies we need a whole of system approach where entrepreneurs are systematically supported, starting at postgraduate level, to develop our next wave of regionally

[8] https://www.gov.ie/en/publication/e19ff-report-of-the-sme-taskforce-national-sme-and-entrepreneurship-growth-plan/

dispersed companies. Additionally, the commercialisation of research, leading to high performing spin-out companies, needs to be appropriately recognised and rewarded in addition to scientific excellence.

Clustering and collaborative initiatives such as Technology Centres and the Disruptive Technologies Innovation Fund achieve impacts across entire sectors of the economy by addressing problems or opportunities that are shared by groups of companies and enable us to build at scale; something that is increasingly important as our innovation system matures and becomes capable of making larger more ambitious plays on the international innovation stage. Such scale may also be required as we seek to tackle significant challenges such as climate change and post-COVID economic recovery. The Economic Recovery Plan has committed to putting in place an overarching National Clustering Policy and Enabling Framework early next year to ensure a strong impact from existing and future clusters in Ireland.

We also need to leverage international funding such as Horizon Europe and Digital Europe in order to build mutually beneficial international clusters. An important development for our technology centres is the European Digital Innovation Hubs (EDIH)[9] Initiative which will support businesses and organisations in their digital transformation and disseminate the latest advances in cybersecurity, Artificial Intelligence (AI) and High-Performance Computing.

Revitalise the role of research and innovation in the FDI proposition

A key element of the Foreign Direct Investment agenda is increasing the "stickiness" of Ireland once a company has established itself here. New and established Multi National Company (MNC) operations in Ireland have an appetite for support from the research system that can be more focussed on later levels on the technology readiness scale (points 4 up to 9). There is a need to increase recognition of the role of whole research system to embed FDI. The system needs to pursue collaboration at all levels of company size and development. Critical to this is national level collaboration of relevant agencies to bring MNCs, SMEs and research performing bodies together to build a small number of sectoral areas of research excellence.

The economic return from industry R&I grants is exceptionally clear and direct and it needs to remain a key pillar of the next R&I strategy. We can also grow the

[9] https://digital-strategy.ec.europa.eu/en/activities/edihs

potential for impact from industry R&I grants by enhancing funding programmes that drive multi-industry cross-sectoral R&I projects.

Advance the wider innovation agenda

Apart from the need for supports which help companies increase their innovation capacity and compete globally we also need to invest in the system's general vitality and ability to engage with industry. The next Strategy needs to distinguish between 'research' and 'innovation'. Innovation can, and should, include third level research where appropriate. However, the strategy needs to acknowledge that research is not always necessary or appropriate for innovation activities to be successful. The strategy's innovation context should therefore include a more contemporary and wider view of innovation. This could include exploring the roles of organisational and marketing innovation, disruptive innovation, innovation and public procurement, the role of standards development in driving innovation, innovation management, IP policy generally (i.e. not just IP from academic research), financing of innovation and new financial models for innovation as well as the development of the RTO model in Ireland.

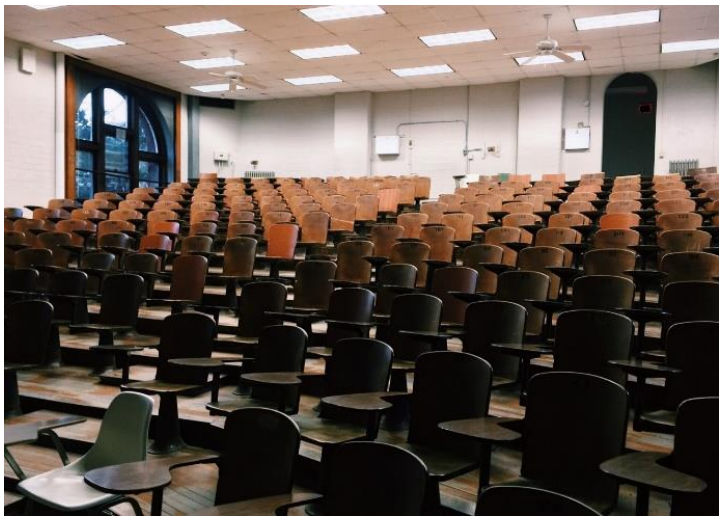
A key priority of Ireland's publicly funded research system is skills development with significant contributions to FDI attraction and research commercialisation. Enabling and rewarding it for engaging collaboratively with industry for, primarily, industry's benefit requires funding, expertise, governance structures, industrially relevant equipment and appropriate Key Performance Indicators (KPI) that are linked to funding. The knowledge transfer system plays a key role in supporting industry-academia collaboration. Career progression in the HEIs is still primarily academic in focus; researchers are not rewarded in career terms for commercialising their research or engaging with industry and indeed such activity may limit their future prospects in the research system. Industry engagement and

commercialisation need to be included as part of a balanced scorecard for an academic's career progression.

Q2.2	How can we ensure that we support enterprises to engage in research, development and innovation or become more research, development and innovation active? How can we encourage greater levels of industry and academic collaboration or collaboration between SMEs and multinational companies? How can we support innovation in and of itself within enterprise? How can we improve the knowledge transfer system?

Area 3: Support the talent pipeline at the heart of our research and innovation system

Developing and nurturing research talent is crucial if Ireland is to realise its ambitions under the Programme for Government and Project Ireland 2040. The focus of previous national strategies was on increasing researcher numbers at all levels, with a particular focus on doctoral enrolments. The latter has been boosted by schemes such as SFI's Centres for Research Training and the IRC's Government of Ireland and enterprise-linked awards. This notwithstanding, the most recent Survey of Higher Education Expenditure on R&D (the 'HERD Survey') finds that approximately 4,000 of the 10,000 research student enrolments are self-funded. This points to the imperative for all research students in the system, in keeping with the National Framework for Doctoral Education, to receive a consistent standard of doctoral educational experience.



We need to ensure an inclusive and supportive approach to researchers at all stages of their career and the Researcher Career Framework is a first step in this journey. Excellent R&I is highly dependent on excellent researchers and innovators. Accordingly, the development of a stronger R&I system is dependent on the creation and communication of a valid and robust career framework for that system.

In the next Strategy, issues such as researcher mobility into industry will need to be addressed, including providing researchers with the skills to both collaborate with and transition to industry. The needs of industry will also need to be identified. While census figures point to a strong movement of PhD qualified personnel moving into enterprise, the Business Expenditure on Research and Development (BERD) Survey 2019-2020[10] suggests that the vast majority of these may be doing so into non-enterprise roles: the numbers of PhD-qualified researchers in enterprise was 2,195 in 2017 and dropped to 1,966 in 2019. In 2019, this was out of a total of just under 20,000 full time equivalent posts employed in R&D in enterprises. This falls well short of the *Innovation 2020* target of 40,000 research personnel in industry, despite the significant increase in expenditure on R&D by enterprise from €2.2 billion in 2015 to €3.2 billion in 2019. There is also a need to recognise a legitimate route into research for knowledge and policy.

Q2.3	How do we deliver a pipeline of talent for academia, industry and public service? How can we best support researchers on their career pathway?

Area 4: Build a strong research and innovation environment grounded in excellence

Build a world class environment for research and innovation

A Global Innovation Leader needs a world-class research infrastructure. In the Mid-term Review of Innovation 2020, in early consultations on the next Strategy and in consultations with the research community on the review of the National Development Plan, investing in Ireland's national research infrastructure has been identified as a priority not only to enable academic research but also to provide

[10] https://www.cso.ie/en/releasesandpublications/er/berd/businessexpenditureonresearchdevelopment2019-2020/

access to research infrastructure by enterprise to assist with de-risking their R&I activity.

A clear understanding of research infrastructure needs and priorities is required, as is ensuring any additional funding of research infrastructure is optimised through national and inter-institutional initiatives such as developing a research infrastructures database, a new research infrastructures roadmap and ensuring that publicly-funded research infrastructure is seen as a national asset to be shared by and across institutions, industry and regions.

Q2.4.1	What are the key priorities in determining research infrastructure needs across the system, both for higher education and for industry? How can we ensure best value for money for investment in research infrastructure?

Make excellence our consistent goal

Ireland has made good progress in the areas of research integrity, gender and open science and it is welcome that Ireland can be said to be in the company of leading European countries in terms of policy direction and development of good practices in these areas. The next Strategy needs to ensure that this progress is strengthened and embedded across the system and fully integrated into research practices rather than being seen as “add-ons” or depending on champions to progress the issues at both an institutional, organisational or national level.

Consideration needs to be given to how this can be achieved, whether the current fora/groups which draw on both the expertise and the goodwill of many in the research community should be put on a more formal and supported footing in order to ensure that Ireland embraces and embeds best practice across these horizontal issues to ensure research excellence.

Another issue to consider in this context – that forms part of improving researcher careers in Ireland and supporting high skilled human capital for the economy and society –is provision of and consistency of training to ensure best practice across the system. Researcher competence is pivotal to career success and research excellence. For the conduct of high-quality research, there is an evolving suite of researcher competences, including but not limited to open research, research integrity and intellectual property. Increasingly researchers are expected to engage with citizens, inspire students, collaborate with industry and collaborate

internationally. Greater incentives need to be created for the development of these competencies and/or appropriate support services.

Q2.4.2	What support and structure needs to be provided to embed good research practices across the system? How can researchers be incentivised to engage with this agenda?

Optimise public funding for research and innovation

Research shows[11] that "decades of macroeconomic research show that innovation contributes between two-thirds and four-fifths of economic growth in developed countries and in Europe".

The next Strategy will need to ensure that public funding that is allocated to R&I over the coming years is optimised in order to strengthen the capacity and capability of the ecosystem to deliver on an ambitious strategy. To do this, a greater level of understanding of investment priorities is needed with an emphasis on laying strong foundations to support the R&I system that can be built upon. Overall, there is a need for an assessment of the various funding sources in the R&I system to ensure that they are being adequately and appropriately targeted to achieve the right kind of balance, linked to a broader longer term strategy overall.

Q2.4.3	Do we need to review or reform public funding structures for research and innovation? What should public funding priorities be over the course of the next national Strategy?

Area 5: Make Ireland a regionally rooted and globally connected island of innovation

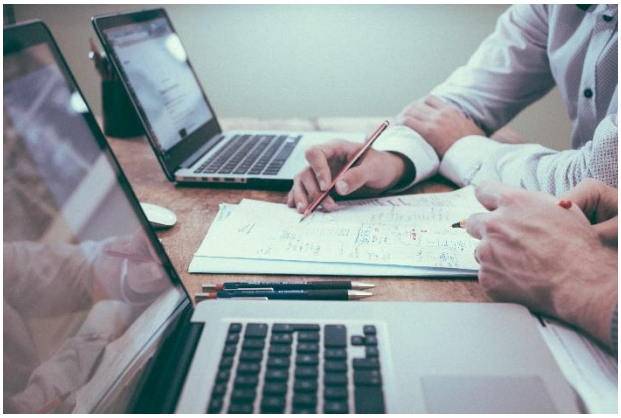
Drive smart regional ecosystems

The creation of TUs is a potentially transformational development in the context of clustering in Ireland. The October 2019 report[12] of the Technological University

[11] https://media.nesta.org.uk/documents/plan_i_for_europe.pdf
[12] https://www.education.ie/en/Publications/Education-Reports/connectedness-collaboration-through-connectivity.pdf

Research Network (TURN) identified the building of TU research capacity as one of its three priority investment pillars, which includes developing researcher human capital, facilitating research activity and opportunities for existing academic staff, addressing infrastructural deficits, prioritising research strategies within TUs, and exploiting fully the mutually supporting roles of teaching and research.

Ireland's current enterprise support framework promotes collaboration, clustering and linkages between enterprises and HEIs through a range of initiatives including the Regional Technology Clustering Fund, and Regional Enterprise Development Fund, administered by Enterprise Ireland, in addition to Technology Gateways, and enterprise collaboration supports from KTI and TTSI. However, there is a need for an overarching framework to maximise the potential of clustering as a policy tool to deliver national enterprise policy objectives and support economic recovery, enterprise competitiveness and resilience, and the green and digital transition. An overarching National Clustering Policy and Enabling Framework is being developed by the Department of Enterprise, Trade and Employment (DETE) to ensure a strong impact from existing and future clusters in Ireland.



A key enabling condition to qualify for funding under the European Regional Development Fund (ERDF) Operational Programme for 2021-27 is "good governance of a national or regional smart specialisation strategy". DETE is currently developing Ireland's new Smart Specialisation Strategy (S3) which involves a 'bottom-up' consultation process where government, business, academia and civil society identify a region's strengths and comparative assets, prioritise R&I investment in competitive areas and define a shared vision for regional innovation. The S3 will feed into both the next Regional Enterprise Plans (REPs) and will also feed into and align with the next National R&I Strategy.

DFHERIS will work with DETE and other key stakeholders to ensure that the priorities identified in both the Clustering Policy and Framework and the S3 are

reflected in the next national Strategy and that there is coordination/collaboration and efficiency in their development of over the coming months.

Q2.5.1	How can the Strategy best ensure that it delivers on regional priorities and promotes regional balance while pursing excellence and impact? How can the TU sector be supported to drive their research agenda?

Advance all-island research and innovation cooperation

All-island approaches to R&I cooperation, as committed to in the New Decade New Approach deal, the Programme for Government and the Department of Further and Higher Education, Research, Innovation and Science's recent Statement of Strategy will provide a unique opportunity to foster greater collaboration and cohesiveness, strengthening the research ecosystem in support of the all-island economy.

There are clear advantages in working collaboratively on a North-South basis to engage in areas of common interest and the Department of Further and Higher Education, Research, Innovation and Science and the Department of the Taoiseach are working to strengthen collaboration in this area as part of the Shared Island initiative.

Q2.5.2	How can we best support the development of all island collaboration on research and innovation?

International collaboration

In addition to ensuring that our national R&I strategy reflects EU values and the priorities of the European Research Area, a priority in implementing our strategy needs to be around strengthening EU and international relationships.

Ireland has developed strong and well-diversified collaborative links with a wide range of international partners. The most effective way for Irish researchers and enterprise to collaborate with other countries is through the R&I framework programmes. Under Horizon 2020, which closed its final call in January of this year, Ireland has to date won €1.14 billion in net EU funding with a success rate of 14.93% (EU average is 12.05%) and 17,277 applications.

The next national Strategy will need to consider ambitious but realistic targets for our participation in Horizon Europe. Ensuring that we have the necessary national support structure is key to ensuring we optimise participation.

Ireland's worldwide reputation for high quality education and research is built upon a commitment to excellence. Attracting outstanding researchers to our institutions to contribute to building research capacity and commercialisation of research has been a strong feature of our international engagement and outreach.

This outreach and our global research footprint will be considered as part of a forthcoming DFHERIS consultation on international education, R&I. While the international consultation will identify the opportunities for greater synergies between higher education and research collaboration with international partners, international research policy will continue to be a central pillar of Ireland's national R&I strategy.

Area 6: Foster a more collaborative and impactful system

Put our knowledge to work

A national R&I system is a complex construct. The next Strategy can no longer rely on assumptions of R&I as unidirectional with a linear flow from science through applied research and development to commercialisation. Knowledge flows are now accepted as multidirectional, with many more interdependencies between various parts of the system, servicing a wider range of purposes alongside economic ones. Understanding the dynamic between the various elements of the R&I system can help to build virtuous circles of exchange and avoid negative and unintended consequences.

Knowledge Transfer Ireland (KTI) plays a key role in the Irish innovation system by providing a responsive interface between companies and the wealth of technology, skills and "know how" available in the higher education system.

A knowledge-based economy relies on a systematic approach to wider knowledge transfer, not only from academia to industry but

also from academia to the public service to support evidence-based policy, and provide scientific advice to and across Government.

Q2.6.1	How can we effectively ensure that knowledge is transferred as widely as possible to ensure greater impact of research?

Build national-level structures to guide and support our research and innovation system

There is a desire across the system to ensure that Ireland's R&I system delivers excellence and impact in as efficient and effective a manner as possible.

With the establishment of the new Department for Further and Higher Education, Research, Innovation and Science, it is timely to reflect on what a future-proofed world-class R&I system looks like and determine what steps need to be taken to transform or reform our current system to bridge the gap to that world-class system. With the establishment of the new Department has also come an increased expectation from the R&I community for a step change in supporting our public R&I system.

At the very least, we need to ensure greater collaboration and coordination across the system that puts both R&I and the researcher at the heart of the process, in particular when it comes to cross-national systems or initiatives (such as open science, data repositories, research classification), and we need to have a clear and coherent competitive funding system which is easy to navigate and avoids duplication.

We need strong national and regional structures to support the R&I system, drive alignment with national priorities and support cross-Government collaboration. There is also a need to develop stronger foresight, risk assessment and a robust evidence base to support policy development and investment decisions and evaluate impact.

Identifying how to enhance R&I structures, strengthen governance and processes is a challenge that is being examined at both an EU level through the European Research Area Forum for Transition and by the OECD and we can draw upon this work to inform our thinking.

Q2.6.2	What structures are needed at national/government level to support the research and innovation system? How can collaboration, coordination and engagement be strengthened? What should be the specific role of the new Department for Further and Higher Education, Research, Innovation and Science vis-à-vis other Government Departments?

Engage our communities and beyond

Finally, in order to ensure that R&I is seen as a critical enabler of our recovery from the pandemic and of the necessary transition to a knowledge-based, green and digital economy with a fairer society, we need to articulate this message clearly through increased engagement and communication within and across multiple communities.

Communicating the importance of R&I will be needed across Government to ensure that it is acknowledged as key to many areas of policy development and decision making. Engagement with the political system will also be a key aspect of articulating the message about R&I and initiatives with the Oireachtas could be further strengthened.

One of the most important aspects of communicating the message about the importance of R&I will be with the engagement we have with Irish citizens. The Irish public, particularly our young people, are demonstrating their desire to be heard and to connect with decision-makers in areas of significant challenges such as climate change. It is timely to grasp this possible once in a generation opportunity and continue to enhance the public's interest and engagement in R&I matters. DFHERIS wishes to ensure that citizens have a voice in articulating the issues they face, the opportunities they see, and the role of science, R&I in addressing them. DFHERIS is launching a public research engagement initiative, Creating Our Future, which aims to grow connectedness and trust between people of all backgrounds and interests and the research system. This initiative will run in parallel to the preparation of the next Strategy and will help to inform the Work Programme of the next Strategy.

Q2.6.3	How do we ensure that we engage with multiple communities and stakeholders to both inform policy development and communicate the impact and relevance of R&I to citizens, communities, regions and our national and EU partners? How does your organisation engage on R&I issues with citizens and community organisations? What is your experience of engagement with national R&I organisations?

Q2.7	Are there any other areas that require action that you would like to include in your submission?

Appendix 1: Innovation 2020 Background

Innovation 2020, Ireland's whole-of-Government strategy for research and development, science and technology was published in December 2015 by the then Department of Jobs, Enterprise and Innovation. It set the vision for Ireland to become a Global Innovation Leader driving a strong sustainable economy and better society, focusing on excellence, talent and impact in research and development.

The strategy was developed by the Innovation, Research and Development policy unit at DJEI overseen by the Interdepartmental Committee on Science, Technology and Innovation which comprised of research funding Government departments. Following publication the IDC was expanded to include agencies and renamed the Innovation 2020 Implementation Group and had responsibility to drive implementation of the strategy.

Four progress reports and a Mid-term review of Innovation 2020 have been published to date.

Vision

Ireland – a Global Innovation Leader driving a strong sustainable economy and a better society underpinned by:

- Excellent research in strategically important areas that has relevance and impact for the economy and society
- A strong innovative and internationally competitive enterprise base, growing employment, sales and exports
- A renowned pool of talent both in Ireland's public research system and in industry that maximises exchange of talent and knowledge
- A coherent joined-up innovation ecosystem, responsive to emerging opportunities, delivering enhanced impact through the creation and application of knowledge
- An internationally competitive research system that acts as a magnet and catalyst for talent and industry

Key objectives

The strategy aimed to build on the significant progress of the previous decade in developing Ireland's R&I system and international reputation, by continuing to support excellent research across the full continuum and across all disciplines. To do this, the strategy and its 93 actions (including 140 sub actions) would guide Ireland to:

- Become a Global Innovation Leader
- Increase public and private investment in research and development
- Enhance the impact of R&I for enterprise
- Ensure that education drives innovation
- Focus R&I activity on social and economic development

- Support Innovation through the protection and transfer of knowledge
- Engage with the rest of the world in becoming a Global Innovation Leader
- Effectively implement this strategy to become a Global Innovation Leader

Key actions included:

- Reach R&D intensity target of 2.5% of GNP
- Research Prioritisation (RP) as basis for research investment in support of enterprise
- Optimise network of technology and research centres
- Increase collaboration within the public research system and between firms and the public research system
- Address public policy needs and optimal use of research
- Support national and European open access policies and principles
- Publish a revised IP Protocol to ensure that the Irish protocol remains 'best in class' and encourage commercialisation of publicly-funded research
- Enhance collaboration with the UK, US, EU and beyond

Metrics and targets

- Improve performance in the European Innovation Scoreboard
- Increase overall investment and reach the R&D intensity target
- Increase research masters and PhD enrolments, and research personnel in enterprise
- Increase innovation and research active firms
- Reach commercialisation targets
- Secure €1.25bn from Horizon 2020

Update on progress of Innovation 2020

Innovation 2020 came to its conclusion at the end of 2020. Innovation 2020 had 140 sub-actions contained within 93 actions over 7 chapters. The primary actions were to move Ireland upwards in EU and global rankings towards becoming a Global Innovation Leader and to research the R&D intensity target of 2.5% of GDP. Ireland's performance relative to the EU average has improved between 2014 and 2020 resulting in 9th position in the European Innovation Scoreboard. Overall private and public investment in R&I continues to rise, reaching an estimated €4.37 billion in 2019, an increase of almost 50% from the 2014 baseline.

Reaching the 2.5% of GNP intensity rate target continues to present a very significant challenge. In 2019 our GNP intensity level stood at an estimated 1.59%, down from 1.87% in 2011. Even when using GNI* as a complementary indicator (GNI* removes globalisation impacts on the Irish economy), the R&D intensity rate is estimated at 2.05% for 2019. R&D as a percentage of GDP was an estimated 1.23% in 2019.

The remaining actions were not weighted or ranked, though some had targets and metrics assigned to them. Many were discreet pieces of work identified for completion early in the life of the strategy, many continue to be important on an ongoing basis to the research system and will live on beyond 2020. The Mid-term Review of Innovation 2020 published in 2019 highlighted the importance of investment human capital and research infrastructures.

Additional on targets

The number of research personnel in enterprise has increased modestly, with 2,970 additional research personnel in enterprise between 2013 and 2019, just 20% of the targeted increase by 2020. After several years with little progress, the number of enrolments into PhD and Research Masters courses met its targeted increase of 500 first year enrolments in the 2019/2020 academic year with 2,675 students.

Targets for commercialisation of research are on track with commercially relevant technologies (Licences, Options and Assignments) and collaborative research projects between enterprise and the public research system both exceeding their targets each year from 2016 to 2019, HPSUs are still on target though dipping in 2019, however spinouts remains at risk with a shortfall of 14 in 2019.

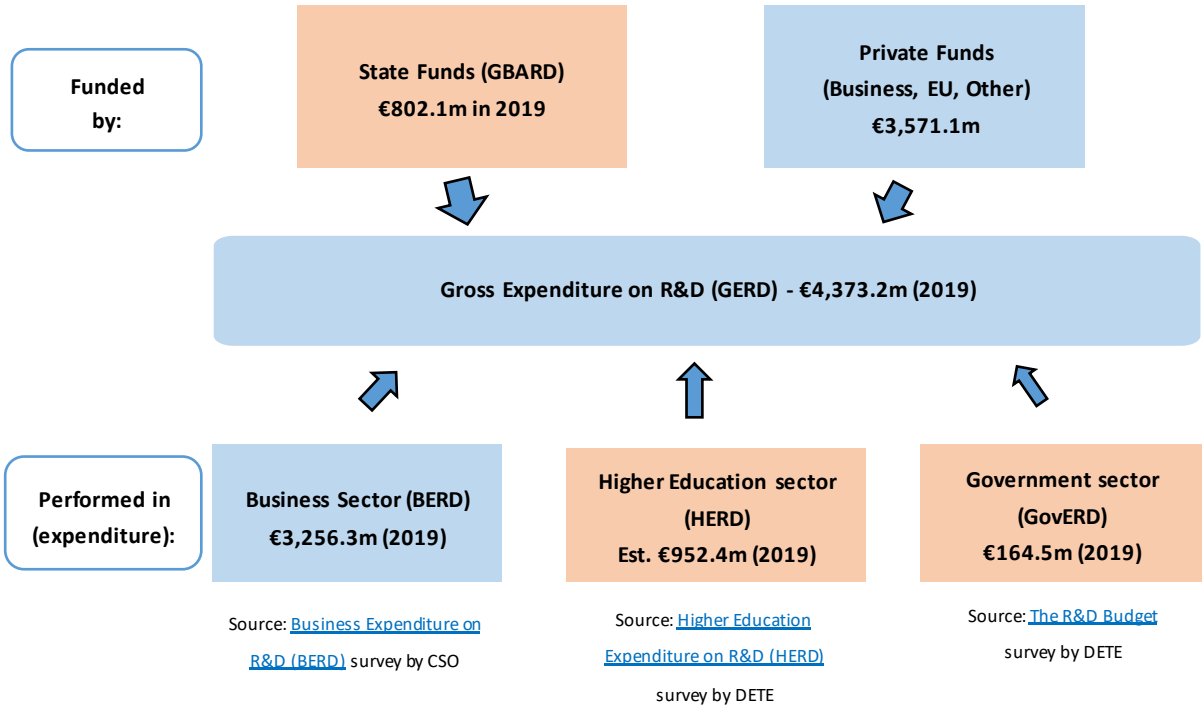
The number of enterprises engaging in research activities has not met expectations, with only 45.5% of firms being innovation active in 2018 (target of 73% by 2020), though this can be expected to increase for the 2020 survey due in 2022 with many companies needing to pivot due to the COVID-19 crisis. 901 firms were significant R&D performers in 2019 (spending between €100,000 and €2m in R&D activities), 300 shy of the target for 2020. The number of large R&D performers has exceeded the target with 241 firms spending over €2m on R&D activities in 2019, much of this can be attributed to multinational enterprises.

Current implementation structures

DFHERIS currently chairs and provides secretariat to the Innovation 2020 Implementation Group (which transferred over from the Department of Enterprise, Trade and Employment with the establishment of DFHERIS). DFHERIS has responsibility for overseeing the development of the next National R&I Strategy, in consultation with all key Government Departments, Agencies and the Chief Scientific Adviser. DFHERIS accounts for approximately 54% of the Government's research and development budget, which is disbursed through three key research funding bodies, Science Foundation Ireland, the Irish Research Council and the Higher Education Authority through the core grant to HEIs. There are many other key research funding Departments that have related policy remit, in particular DETE with nearly one quarter of total government expenditure on R&D with policy remit for enterprise R&I policy, through Enterprise Ireland and IDA Ireland and the Disruptive Innovation Technologies Fund, and other Government Departments driving policy development and funding research for their sectors, whether it be agricultural research policy, health research, environmental research etc.

Appendix 2: Ireland's Research and Innovation investment figures

Ireland's R&D Budget 2019 (updated to include BERD 2019 figure)



Funding

R&D in Ireland is funded by public (Government) and private sources. **Government Budget Allocations on R&D** (GBARD) amounted to €802.2 million in 2019 and an estimated €869.2 million in 2020. This represents an increase of €83 million since 2016 and is the highest level of public expenditure on RDI since 2010.

Expenditure

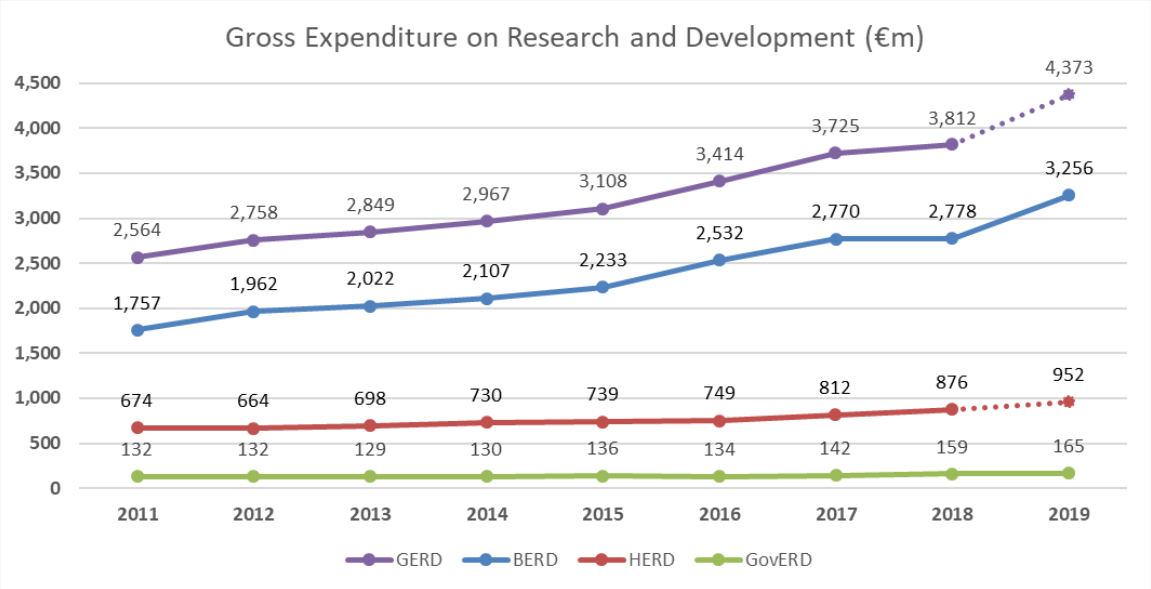
Gross Expenditure on R&D (GERD) was an estimated €4.373 billion in 2019. GERD has increased every year since 2011, resulting in an overall increase of almost €1.8bn since 2011. Expenditure in RDI is carried out in three sectors – the business sector, higher education sector and Government sector.

Business Expenditure on R&D (abbreviated as BERD), measures the total amount on expenditure on R&D activities carried out by enterprises in Ireland. While private spending on

R&D slowed during the financial crisis, it has been increasing steadily since 2011. The most recent BERD survey was published in March 2021. It showed that Business Expenditure on R&D has increased to €3.26 billion in 2019 from €1.7 billion in 2011, an increase of over 90%. In 2019, BERD accounted for an estimated 75% of GERD.

Higher Education Expenditure in R&D (HERD) measures spending on R&D carried out in Ireland's HEIs. The latest figures show that €876 million was spent in 2018. Over three quarters of this funding is provided by the Irish Government, either through direct or indirect funding.

Government Expenditure on R&D (GovERD) is calculated annually as part of the R&D Budget report. GovERD reached €164.5m in 2019, having increased by almost €28.5 million since 2015.



€m	BERD	HERD	GovERD	GERD
2018	2,777.75	876.10	158.60	3,812.45
2019	3,256.30	952.40 (e)	164.50	4,373.20 (e)
2020	3,391.17 (e)	1,038.80 (e)	161.10 (e)	4,591.07 (e)

R&D Intensity Ratio

Overall private and public investment in R&I continues to rise, reaching an estimated €4.373 billion in 2019. A key ambition of *Innovation 2020* was to increase total investment in R&D in Ireland, led by the private sector, to 2.5% of GNP by 2020.

However, due to the strength of our economic performance and subsequent increases in GNP growth rates year on year over the last number of years, this increase in value actually equates to just a small rise in the research intensity rate to 1.59% of GNP in 2019 (from 1.55% in 2015) or 1.23% of GDP.

GDP rose by 108% between 2011 and 2019. GNP rose by 100% in the same period. The most significant increase occurred in 2015 which was largely a consequence of the relocations of entire balance sheets to Ireland from outside the EU and the activity related to these relocations.

Even when using GNI* as a complementary indicator (GNI* removes globalisation impacts on the Irish economy), the RDI intensity rate is estimated at 2.05% for 2019. GNI* grew by 69% between 2011 and 2018.

Appendix 3: Innovation 2020 Table of Key Metrics & Targets May 2021

Metric	Baseline[13]	Latest Data	Target 2020	Data Source
European Innovation Scoreboard: performance relative to EU average	+9% 10th Place	+12% 9th Place (2020)	+20%	European Commission
Gross (public and private) Expenditure on R&D • as % of GNP • as % of modified GNI*	€2.97bn 1.81% 2.00%	€4.373bn (2019 est.) 1.59% 2.05%	 2.5%	R&D Budget report (DETE) and BERD survey (CSO)
Increase private funding of R&D performed in the higher education sector	€24m	€48m (2018)	€48m per annum	HERD survey (DETE)
Increase research masters and Ph.D. new enrolments	2,235 (2013/14) (revised)	2,765 (2019/20)	Increase of 500	HEA stats
Research Personnel[14] in Enterprise	24,785 (2013)	27,755 (2019)	40,000	BERD survey (CSO)
Increase number of firms that are[15]: • Innovation active	 58% (2012)	 45.5% (2018)	 73%	Innovation in Irish Enterprises (CSO)
• Significant R&D performers[16] • Large R&D performers[17]	1,040 170	901 (2019) 241 (2019)	1,200 200	BERD survey (CSO)
Commercialisation Targets (per annum) • Commercially relevant technologies (Licences, Options, Assignments) • Spinouts	 124 29	**2019 outturns:** 210 26	 175 40	KTI Review and Annual Knowledge Transfer Survey
• High Potential Start-Ups from Spinouts • Collaborative research projects between enterprise and public research system	11 878	13 1,084	16 920	EI Annual Report
Draw down Horizon 2020	€620m under FP7	€1.11bn to April 2021	€1.25bn	European Commission
How informed the public feel about R&D in STEM	49% (2015)	56% (2020)	60%	Barometer survey (SFI)

[13] Baseline year is 2014, unless otherwise indicated.
[14] Includes researchers, technicians and support staff.
[15] Using CSO definitions.
[16] No. of enterprises that spent between €100k and €1,999,999 on R&D.
[17] No. of enterprises that spent €2m or more on R&D.

Appendix 4: Summary of Questions

Part One: A strategic direction for research and innovation which places it at the centre of the national response to major economic, environmental and societal challenges

Q1.1	How should the next Strategy articulate the role of research and innovation as a key enabler of addressing significant challenges (transition to a green, digital and sustainable knowledge-based economy)? What impact should research and innovation have on addressing such challenges?
Q1.2	How can the Strategy demonstrate the importance of research and innovation across higher education and industry for Ireland's economic recovery and sustainable growth? How can research and innovation be recognised as central to recovery and building resilience when faced with pressing sectoral challenges and financial constraints?
Q1.3	How can the Strategy articulate the value of human capital from the research system in meeting high-end skills needs? What should the objective of the next Strategy be in relation to identifying human capital needs from the research system?
Q1.4	How do we frame our national policy to ensure that we have a well-balanced system of research to enable Ireland to be at the forefront of global research and innovation?
Q1.5	How should the role of research for policy be supported and positioned in the next Strategy?

Q1.6	What should the next Strategy's ambitions be in terms of research and innovation as an enabler of balanced regional growth?
Q1.7	How should the next Strategy articulate the role of our research and innovation system in driving connectivity and collaboration on an all-island, EU and international level? How should our national priorities draw upon and align with revised European Research Area priorities?
Q1.8	Are there additional strategic priorities not covered in Part One that you wish to address in your submission?

Part Two: Delivering on the vision across six areas of strategic action

Q2.1	What could the role of a mission-based approach to solving grand challenges be within the national R&I ecosystem? What structures could be used to deliver on this? How do we reconcile a mission-based approach with Research Prioritisation?
Q2.2	How can we ensure that we support enterprises to engage in research, development and innovation or become more research, development and innovation active? How can we encourage greater levels of industry and academic collaboration or collaboration between SMEs and multinational companies? How can we support innovation in and of itself within enterprise? How can we improve the knowledge transfer system?

Q2.3	How do we deliver a pipeline of talent for academia, industry and public service? How can we best support researchers on their career pathway?
Q2.4.1	What are the key priorities in determining research infrastructure needs across the system, both for higher education and for industry? How can we ensure best value for money for investment in research infrastructure?
Q2.4.2	What support and structure needs to be provided to embed good research practices across the system? How can researchers be incentivised to engage with this agenda?
Q2.4.3	Do we need to review or reform public funding structures for research and innovation? What should public funding priorities be over the course of the next national Strategy?
Q2.5.1	How can the Strategy best ensure that it delivers on regional priorities and promotes regional balance while pursing excellence and impact? How can the TU sector be supported to drive their research agenda?
Q2.5.2	How can we best support the development of all island collaboration on research and innovation?
Q2.6.1	How can we effectively ensure that knowledge is transferred as widely as possible to ensure greater impact of research?

Q2.6.2	What structures are needed at national/government level to support the research and innovation system? How can collaboration, coordination and engagement be strengthened? What should be the specific role of the new Department for Further and Higher Education, Research, Innovation and Science vis-à-vis other Government Departments?
Q2.6.3	How do we ensure that we engage with multiple communities and stakeholders to both inform policy development and communicate the impact and relevance of R&I to citizens, communities, regions and our national and EU partners? How does your organisation engage on R&I issues with citizens and community organisations? What is your experience of engagement with national R&I organisations?
Q2.7	Are there other areas that require action that you would like to include in your submission?

Please enter your responses via the online submission tool available at:

https://dessurveys.education.gov.ie/surveys/researchandinnovationstrategy